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From Editor's Desk

JIAFM

A Quarterly Publication

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I feel immense pleasure to present before you the first issue of 2014. I would like to inform all of you that our esteemed Journal of Indian Academy of Forensic Medicine which is published quarterly since 1991 has been started gaining wide recognition not only in India but globally among the scientific community. I am trying to maintain your faith and trust in me to bring this journal to highest level of its achievements.

I have received many requests from other countries about inclusion of many papers in their indexing data base, including USA Government agencies. JIAFM is indexed not only in **IndMed** and **MedInd Indian indexing** agencies but also in the **SCOPUS**, **IMSEAR** informed by the **Information Management and Dissemination (IMD)**, **World Health Organization, Regional Office for South-East Asia, Indraprastha Estate, New Delhi, India**. It is hoped that once this journal indexed in IMSEAR it would be automatically indexed in the **Global Index Medicus managed by WHO Headquarters in Geneva as informed**.

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This is a well produced journal in an important subject field with interesting content, which deserves a wide readership. The editors are to be commended on their efforts.

I assure you about the quality of research papers and quality of printing in future issues. Your valuable suggestions are always encouraging me and I heartily welcome for future suggestions.

Professor [Dr.] Mukesh Yadav
Editor, JIAFM

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Editorial

Is there Need for Redrafting the Rule for MCI Elections?

Elections of Medical Council of India were always being the matters of controversies and challenges before the Court. Elections of MCI were subject matters of Judicial Scrutiny since 1987 [1], 1990 [2] and in 2013 when the election of Dr. AKN Sinha, then President of MCI was challenged in the Bombay High Court, for his election as the President for the previous term of five years from 1985-90. After about seven years again in the year 1990 MCI Election of President and Vice-President was challenged before the Division Bench of Delhi High Court. Result of Reconstituted MCI in the year 2013 was also subjected to the outcome of decisions of two petitions filed before the West Bengal High Court and Nagpur Bench of the Bombay High Court. [3, 4]

Another Public Interest Litigation (PIL) filed by Dr. Anil Kumar Singh from Allahabad High Court has been dismissed on 20th January 2014 by the Division Bench of Allahabad High Court comprising of Hon'ble Justice, Sunil Ambwani, and Justice Dinesh Gupta, on the ground of Alternate Remedy not used by the petitioner before Central Govt. It is important to mention that case was listed for 13 times before dismissal of the case.

Background of the Case:

The Medical Council of India was superseded in the year 2010 by Indian Medical Council (Amendment) Act 2010 with provisions for Constitution of the Board of Governors for one year. Their term was extended by the Ordinances promulgated in the year 2011 and in the year 2012 for one year each. The least of these Ordinances namely the Indian Medical Council (Amendment) Ordinance 2013, could not be enacted into Act, in as much as the Bill for re-enactment was referred to the Standing Committee of the Parliament and that the Bill could not be debated and discussed as the Parliament Session was adjourned sine die.

Case before Bombay High Court in 1987:

In CW 1319/87 [R] the election of Dr. AKN Sinha the present President was challenged in the Bombay High Court, for his election as the President for the previous term of five years from 1985-90. The allegation was that his membership of the Council had lapsed **because of the abolition of the senate of Patna University by the State Government.**

Division Bench observed that an argument raised in 1990 petition before the Delhi High Court was similar to the one raised as the President availing of sub – section (2) of section 7, was turned down by the, Bombay High court. It was held the sub – section (3) overrides sub – section (2) of section 7. It was further held:

“Section 7(1) lays it down that the President or the Vice – President of the council shall hold office for a term not exceeding five years and not extending beyond the expiry of his term as member of the Council. Now when respondent No.2 was elected as the President, he was a member of the council having been elected from the constituency contemplated by section 3 (1) (b) of the Act. That constituency has been abolished and the natural effect is that respondent No. 2's membership of the Council qua the abolished constituency has expired. Having come in from a fresh constituency, he cannot cling on to an elective office different constituency. This is the combined effect of sections 3 (1) (b) 3 (2), 7 (1) and 7 (2) of the Act. Any other constituency would be violative not only of the language of the enactment but also of the spirit under lying representative democracy”.

Division Bench of Delhi High Court held that we are in respectful agreement with the reasoning of the Bombay High court. For the reasons stated above, we hold that the election of the Vice- President, Dr. P. Narsimha Rao, is contrary to law and has, therefore, to be set aside. Dr. Harcharn Singh Case, 1990. The election of the President, Vice-President and Executive Members of the Indian Medical Council was held on 6.2.1990. It was challenged by the medical practitioners and who were members of the Medical Council of India at that time. As the term of the erstwhile Council was to expire on 5.2.90 the Central Government issued a notice of fresh elections on 28.12.89. [Page 2]

Irregularities in the MCI Election 1990:

It was an admitted fact **that no list of voters was circulated along with the said notice.** The petitioners submit that on the date of the election, viz. 6.2.1990, after the members assembled, a list of member was shown to them. 78 members were present and participated in the election. The petitioners further submit that on 28.2.1990 the minutes of the elections were approved by the elected office-bearers.

When the said minutes were examined the petitioners found that as many as 25 members were ineligible to participate in the elections either by way of a candidate or as members proposing and seconding the candidates. The petitioners thereafter came to know of a letter written by the Central Government to the Medical Council on 16.1.1990. The letter is of some significance to show that the voters list itself was contrary to the provisions of the Act of 1956 and hence, the same is quoted;

Continuation of the membership:

According to the counsel, the continuation of the membership of the said respondents would be squarely covered by Section 4(2) of the Act. According to the Counsel, respondent No.2, the President, had secured 49 votes as against his rival who had secured 28 votes, with one vote being declared invalid, i.e. he had won by a margin of 21 votes.

Unchallenged Eighteen years misuse of de facto power u/s 7 (2)?

Court observed that even if it was assumed, that membership of some members was doubtful, the election of the President would not be materially affected. As regards the election of the Vice-President, it was submitted, that although his membership lapsed in 1972 he continues to be the member under section 7(2) of the Act and has, therefore, a right to be elected as the Vice-President. As regards the election of the Executive Committee members he has submitted that none of them has incurred any disqualification as a member.

Interpretation and Case laws cited by the Respondent and petitioner:

In support of his submissions the Counsel of the respondent has relied on the interpretation of Sections 3, 4, 7 and 10 of the Act. He has also **cited some decisions** in support of his submissions.

On the other hand Counsel for the petitioners, has controverted each of these submissions on his **own interpretation of the said statutory provisions**.

In order to appreciate the rival contentions and the principal challenge in the writ petition, it is necessary to refer to the said sections of the Indian Medical Council Act:

3. (1) The Central Government shall cause to be constituted a council consisting of the following members, namely:

- (a) One member from each State other than a Union Territory to be nominated by the Central Government in consultation with the State Government concerned.
- (b) One member from each University to be elected from amongst the members of the medical faculty of the University by members of the Senate of the University or in case the University has no Senate, by members of the Court.
- (c) One member from each State in which a State Medical Register is maintained, to be elected from amongst themselves by persons enrolled on such register who possess the medical qualifications included in the First or the Second Schedule or in Part II of the Third Schedule.
- (d) Seven members to be elected from amongst themselves by persons enrolled on any of the State Medical Registers who possess the medical qualifications included in Part I of the Third Schedule.
- (e) Eight members to be nominated by the Central Govt.

(2) The President and Vice-President of the Council shall be elected by the members of the Council from amongst themselves.

(3) No act done by the Council shall be questioned on the ground merely of the existence of any vacancy in, or any defect in the constitution of the Council.

4 (1) (a) An election under clause (b), clause (c) or clause (d) of sub-section (1) of section 3 shall be conducted by the Central Government in accordance with such rules as may be made by it in this behalf, and any rules so made may provide that pending the preparation of the Indian Medical Register in accordance with provisions of this Act, the members referred to in clause (d) of sub-section (1) of section 3 may be nominated by the Central Government instead of being elected as provided therein.

(2) Where any dispute arises regarding any election to the Council, it shall be referred to the Central Government whose decision shall be final.

Term of the President /Vice-President, Section 7:

7. (1) The President or Vice-President of the Council shall hold office for a term not exceeding five years and not extending beyond the expiry of his term as member of the Council.

(2) Subject to the provisions of this section, a member shall hold office for a term of five years from the date of his nomination or election or until his successor shall have been duly nominated or elected, whichever is longer.

(3) An elected or nominated member shall be deemed to have vacated his seat if he is absent without excuse, sufficient in the opinion of the Council from three consecutive ordinary meetings of the Council, or

in the case of a member elected under clause (b) of sub-section (1) of section 3, if he ceases to be a member of the medical faculty of the university concerned, or in the case of a member elected under clause (c) or clause (d) of that sub-section, if he ceases to be a person enrolled on the State Medical Register concerned.

(4) A casual vacancy in the Council shall be filled by nomination or election, as the case may be, and the person nominated or elected to fill the vacancy shall hold office only for the remainder of the term for which the member whose place he takes was nominated or elected.

(5) Members of the Council shall be eligible for re-nomination or re-election.

(6) Where the said term of five years is about to expire in respect of any member, a successor may be nominated or elected at any time within three months before the said term expires but he shall not assume office until the said term has expired.

Executive Committee Constitution, Section 10:

10. (1) The Executive Committee, hereinafter referred to as the Committee shall consist of the President and Vice-President, who shall be members ex-officio and not less than seven and not more than ten other members who shall be elected by the Council from amongst its members.

(2) The President and Vice-President shall be the President and Vice-President respectively of the Committee.

(3) In addition to the **powers and duties** conferred and imposed upon it by this Act, the Committee shall exercise and discharge such powers and duties as the Council may confer or impose upon it by any regulations which may be made in this behalf.

Is Remedy for illegalities in the MCI President, Vice-President Elections lies before the Central Government?

Section 3 speaks of the constitution and composition of the Indian Medical Council. The Council is constituted by the Central Government. Referred to Section 3(2) that the election of the President and the Vice-President forms part of the constitution of the Council, and, therefore, any dispute regarding their elections can be raised only before the Central Government under Section 4(2) of the Act.

Observations of the Division Bench of Delhi High Court

- On plain reading of Section 3(2) with Section 4(1) the interpretation suggested was **clearly impermissible**.
- Section 4(2) provides for **disputes regarding any election “to the Council”** and not the **election by the Council**.
- Section 3(2) is very clear as regards the election of the President and the Vice-President. They shall be elected by the members of the Council from amongst themselves.
- Therefore, the scheme of the Act is **that first the Council is constituted either by elections or by nominations**, as provided in Section 3(1) (a) to 3(1) (e).
- This creates the **general body of the representative members for electing the President and the Vice-President**.
- For becoming the President or the Vice-President **a person has to be first a member falling in some category** mentioned in section 3(1) (a) to 3(1) (e).

All these Provisions make it clear that the election to the Council is in terms different from the election of the President and the Vice-President. **As a matter of fact if there is no election to the Council there cannot be any election of the President and the Vice-President**. This interpretation of Section 4(2) is further clear when it is read with Section 4(1). Election under clause, (b), (c) and (d) of sub-section 3(1) are **conducted by the Government**.

Therefore, **disputes in regard to the said elections under the said clauses are to be referred to the Central Government under Section 4(2)**. The reason is simple. The process of election under clauses (b), (c) and (d) involves large number of Universities and the members on the State Medical Register. Their elections by the said bodies or their ceasing to be the members of the said bodies involve complicated and detailed facts which, according to the Scheme of the Statute only the Central Government should be in the know of.

Contradictory View by the Allahabad High Court Judgment January 2014

Sections 4(1) and 4(2) read together, thus make it clear: that election disputes referred to in Section 4(2) are limited only to elections under clauses (b), (c) and (d) Section 3(1). The legislative intent of restricting the scope of section 4(2) is very clear. Since Section 4(1) controls section 4(2) **there is no scope for reading any other election within the ambit of section 4(2)**. **If the election of the President and the Vice-President or of the Executive Committee are to be covered by**

Section 4(2), that would be contrary to the express provision and would amount to re-writing Section. Elections up to the post of President and the Vice-President should be conducted by the Council and not by the Central Government.

Hence, the Legislature has not made a provision for raising election disputes in regard to the said posts to the Central Government. [Page 11, 12]

Challenge to the MCI Office Bearers Elections:

It was alleged that a fraud has been played as the Act to constitute a truncated council with representatives of six states only out of 28 states and Union Territories and that the elections of the Chairman and other office bearers was held from a partially constituted council denying the right to election to the members on the rolls of Medical Council of India from Uttar Pradesh and other States. [Para 6]

According to the petitioner the representatives of State of U.P. was not elected and that only a few members, from six States have illegally elected as the office bearers of the Medical Council of India. [Para 7]

Complaint to Central Government as an Alternate Remedy in the form of Election Petition before approaching the Court:

Court observed that we find that sub-section (2) of Section 4 of the Indian Medical Council Act, 1956 provides that where any dispute arises regarding any election to council it shall be referred to the Central Government whose decision shall be final. [Para 8]

The petitioner has alternative remedy to challenge the election on all the ground which may be available to him before the Central Government. [Para 9]

Division Bench of Allahabad High Court clarified that we do not find any substance in the arguments of the learned counsel for the petitioner that the dispute relating to elections to the council will not include dispute relating to elections of Chairman and other office bearers of the council in as much as the elections to Medical Council of India include both the elections of the members of the Medical Council of India and the elections of the office bearers of the Medical Council of India. [Para 10]

Why MCI has not framed such Regulations? Is there Need for redrafting of Election Rules?

Under Section 33 of the Act, the Indian Medical Council has the power to frame regulations to carry out the purposes of the Act and without prejudice to the generality of the powers in regard to certain heads mentioned in that Section. **The Council is thus fully empowered under the Statute to frame regulations for election disputes in regard to election of President and Vice-President. But, unfortunately, no such regulations are framed by the Council.**

Bombay High Court has given similar instructions for framing of Regulations:

The Bombay High Court had emphasized for **framing of regulations in regard to the election of the President and the Vice-President.**

Central Government can also frame Regulations:

Division Bench of Delhi High Court observed that even the Central Government can frame rules for the effective functioning of the Council under Section 32 of the Act.

The Indian Medical Council Election Rules, 1957:

In exercise of the said power of Section 32, read with Section 4, **the Central Government has framed rules in 1957 and same were amended in 1980, 1992.** The rules provide for elections under clauses 3(1) (b) and 3(1) (c), which are the elections to the Council.

There was no provision what so-ever in the said rules for the election of the office-bearers such as the President and the Vice-President, by the Council. But The Medical Council of India (Conduct of Elections to the Posts of President, Vice President, Members of the Executive Committee and the elected members of the Postgraduate Medical Education Committee) Regulations 1998 has detailed provisions in this regard but hardly known to the contestant and not implemented in letter and spirit till date, including 2013 MCI Election.

Relied on rule 25 of the 1957 that the challenge to the election of the President and the Vice-President would be covered by the said rule, rule 25 reads:

“25, (1) The Central Government may, on objection made by a candidate for any election within a period of thirty days from the date of the [election of] returned candidate, or on its own motive at any time, declare the election to be void on account of **bribery, undue influence or other corrupt practice** which,

in the opinion of the Central Government, has interfered with the **free and fair conduct of the election or for any other Sufficient cause**, and may call on the electorate to make a fresh election.

(2) The decision of the Central Government under this rule shall be final.”

On close reading of Rule 25 together with the scheme of the Election Rules, it is apparent that the interpretation suggested by Mr. Salve is erroneous. Rules 3, 4 and 5 provide for elections under clause 3(1) (b) and Rules 6 to 9 provide for election under clause 3(1) (c) of the Act. When the Legislature restricts the elections rules only to these two categories, it is impermissible to read election to any other office in the said election rules. All other provisions on the rules upto Rule 24 are only in furtherance of the election to the said two classes of members and no others. Therefore, to read words “any election” in Rule 25(1) to include any election by the Council such as Pres.& Vice-Pres. Would be contrary to the scheme of the Rules and would amount to re-writing of Rule 25(1). When the Legislative intent is clearly expressed in Section 4 and the Rules framed under it, either there is no scope for any surmise that every election/to the Council or by the Council can be challenged under Section 4(2) of the Act. Absence of a provision for challenging of election of the President and the Vice-President cannot be covered by the existing provisions by causing violence to the letter of law. **The submission was rejected by the Court.**

Summary and Conclusion:

Before parting with the case, Division Bench of Allahabad High Court observed that this matter could not have been entertained as public interest litigation as no public interest is likely to be served in allowing any of the prayers or the awarded prayers.

On the contrary in the opening part of the judgment dated 21st November 1990, Division Bench of Delhi High Court observed that we have highlighted the importance of the role of the Medical Council of India. The Council has to ensure that proper standards are maintained in medical education in this country. If the medical education is on sale by such corrupt practices as are imputed to respondent No.3 **what will happen to the medical profession and what type of medical aid will the citizens of this country get?** It is an office of great faith and trust for protection of citizens of the country. The intention of the statute embodies the aspirations of the citizens of the country for quality medical education and services. If those who are entrusted with the task of ensuring proper medical education and medical services in the country are to act in such dishonest manner, it is complete betrayal of the trust reposed. The statute i.e., the Medical Council of India Act was enacted with noble intentions little Realizing that a person like respondent No.3 will use the office of President for subverting the statute and its objectives for personal monetary gains. [Para 35]

Unfortunately institutions meant to improve professional standards are passing into hands of unscrupulous persons. A stage has come when on account of politicking and manipulative tactics of such persons in institutions meant to maintain professional standards, **no good or eminent person with stature wants to serve such institutions.** This results in institutions being controlled by undeserving persons. [Para 38]

In view of contradictory opinion given by two High Courts on the same matter it is advised to use alternative remedy by complaining to Central Government under section 25 of the Rules, 1957 should be utilised before approaching the Court of appropriate jurisdiction for appropriate remedy.

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Original Research Paper

Knowledge and Attitude of Medical Students and Interns toward Forensic Autopsy

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Abstract

For centuries, autopsy has been instrumental in establishing the cause of death both in clinical and Forensic cases. Clinical autopsy has significant role in clinical quality control, clinical auditing and medical education. Medical student's knowledge and attitude toward Forensic autopsies influence the quality of autopsy reports being prepared by them in their professional carriers. A survey was conducted on 100 medical students and 40 interns to assess their knowledge and attitude toward Forensic autopsy. Most of the medical students (76% Part I and 90% part II) and interns (60%) found that demonstrations of the autopsies during their 2nd Prof Practical classes was a learning experience and wished, they could see more autopsies. However in the present study, majority of the medical students (88% Final Yr. Part I and 84% Final Yr. Part II) and interns (87%) felt themselves incapable of performing autopsies independently on becoming physicians. Medical teachers should encourage the medical students to become more interested in observing Forensic autopsies. It is suggested that problem based learning during practical training of autopsy must be incorporated as a part of the medical curriculum.

KeyWords: Autopsy, Forensic autopsy, Medical students, Interns

Introduction:

For centuries, autopsy has been instrumental in establishing the cause of death both in clinical and Forensic cases. The knowledge gained from clinical autopsies conducted during the earlier times have helped in-laying the foundation stones of modern medicine. Western medicine led to the first insights into the connections between a patient's clinical symptoms and the diseased organs due to the practice of autopsy. In nineteenth century, Virchow and Osler used the autopsy to understand the pathology of fatal diseases such as endocarditis and pulmonary embolisms. [1]

Contribution of clinical or hospital autopsy to medical field extends beyond confirmation of the ante mortem diagnosis. It has a significant role in clinical quality control, clinical auditing and medical education. [2,3]

The quality of healthcare services can be assured and regularly monitored by backing up clinical diagnosis with a pathological diagnosis.

Various studies have established that autopsy has been central to medical education, as it teaches students about clinic-pathological correlations, gross anatomy of disease, death certification and death statistics. [4-6] Despite the proven evidence of its clinical value and relevance, the incidence of clinical autopsies is declining world over. [7]

Factors responsible for decline are complex and include financial constraints, unfavorable attitude of healthcare professionals towards autopsies, clinicians not asking for permission to have the autopsy performed on their patients. [8] Forensic or medico-legal autopsy is a special type of autopsy performed as a part of inquest (legal investigation into cause of death) and carried out in unnatural deaths or deaths occurring in mysterious or suspicious circumstances.

The inquest system exists in all parts of the world, though it may vary from country to country depending upon the local legal system. England, and many other countries and colonies associated with England adopted the Coroner System of inquest.

In United States of America, presently many states are following the Medical Examiner System of inquest. Continental Europe and their former colonies follow the Code Napoleon. In Scotland the Procurator Fiscal System is followed. [9]

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In India, overall scenario of medico-legal work is substandard. In hospitals, except those attached to medical colleges, most of the Forensic autopsies are being conducted by medical practitioners who are not specialists in Forensic Medicine, resulting in unsatisfactory quality autopsy reports. [10, 11] Medico-legal knowledge is imparted to the undergraduate medical students during 2nd Prof. under the subject of Forensic Medicine and Toxicology.

The undergraduate students are supposed to witness medico-legal autopsies so as to be capable of interpreting medico-legal autopsy findings. The knowledge and attitude of medical students and interns towards Forensic autopsy is a significant factor that influences the quality of autopsy reports.

Material and Methods:

To assess the knowledge and attitude of medical students and interns towards medico-legal autopsy, a study was conducted on 100 medical students (50 each from MBBS Final year part I and part II), and 40 interns of Dayanand Medical College and Hospital, Ludhiana, Punjab. Before starting the study, written approval from the institutional ethics committee as well as written informed consent from the participants was obtained after providing the information sheet.

The questionnaires consisting of 12 questions related to the knowledge of and attitude towards autopsy were distributed to the aforementioned participants.

Medical students and interns, who refused to participate or were not available on second visit, were excluded from the study. The students who got reappear in the subject of Forensic Medicine and yet to clear the exams were also excluded from the study.

Observation:

A total of 100 medical students (50 each from MBBS Final year Part I and Part II) and 40 interns participated in this study. The majority of students (Final Yr. Part I 100% & part II 98%) and interns (87%) agreed that medico-legal autopsy plays an important role in administration of justice by providing significant information to the court of law regarding unnatural deaths. (Table 1) Most of the medical students (76% Part I and 90% part II) and interns (60%) found that demonstrations of the autopsies during their 2nd Prof Practical classes was a learning experience and wished, they could see more autopsies.

However some students (14% part I and 10% part II) and 20% interns, either felt uncomfortable or did not find it to be a learning experience. (Table 1)

Out of total 76% students of Final Yr. Part I, and 72% students of Final Yr. Part II, and 77% interns agreed that demonstration of medico-legal autopsies facilitates 'problem based learning' and compliments the didactic teaching. (Table 1)

On being asked whether they felt capable of conducting the autopsy independently (upon becoming a physician), 88% Part I and 84% Part II students and 87% interns felt themselves incapable or were not sure about their capability.

In this study 94% Final Yr. Part I and 80% Final yr. Part II students found demonstration of medico-legal autopsy as an opportunity to discuss the medico-legal issues with their teachers. Six questions were asked to evaluate the knowledge of participants regarding medico-legal autopsy.

Our study showed that 86% Part I, and 90% Part II students and 85% interns knew that medico-legal autopsy is must in all unnatural and sudden and suspicious deaths. (Table 2)

Majority of the Part I students (98%), and Part II students (98%) and 90% interns were aware that both external and internal examination is carried out during the autopsy. (Table 2) 58% Part I, and 28% Part II students and just 22.5% interns knew the ideal temperature to preserve the dead body for autopsy. (Table 2)

Unexpectedly less number of medical students and interns knew about the commonly used preservative for sending the viscera for toxicological and histo-pathological analysis.

About half of the medical students (50% Part I and 46% Part II) and 40% interns were aware that before conducting the autopsy, an inquest report from investigating officer is a must.

Discussion:

Autopsy plays a crucial role in acquiring medical knowledge, and has been an important part of medical education for centuries. [12-14]

The results of present study indicate that medical students and interns are knowledgeable about the procedures and value of autopsy and that they have positive attitude towards observing the autopsies, which is similar to the survey conducted by Verma. [15]

In our study, demonstration of autopsies was considered a learning experience by most of them. This compares favorably with a study [16] conducted on medical students of BJ Medical College, Ahmedabad, Gujrat, where 96.5% students agreed that autopsy is necessary in medical education and 88%

students recommended that students should watch more postmortem examinations.

In a similar study [17] conducted on Nigerian medical students, most of the students 232 (97%) agreed on the importance of autopsy in medical education and would even encourage medical students to observe and participate in more autopsies. The majority of students (93%) felt that autopsy should not be scrapped from the medical school curriculum.

However in the present study, majority of the medical students and interns felt themselves incapable of performing autopsies independently on becoming physicians.

It is only during the study of Forensic Medicine, when these future ambassadors of the medical profession get a chance to learn about autopsies. Lack of confidence of medical students and interns is indicative of defect in the autopsy training being imparted to them.

The authors recommend that medical teachers should encourage the medical students to become more interested in observing Forensic autopsies. It is suggested that problem based learning during practical training of autopsy must be incorporated as a part of the medical curriculum.

However, more research and discussions are required to create a structured problem based learning program for undergraduate medical students so as to effectively impart the skill to conduct the autopsies independently.

Conclusion:

Autopsy is an important procedure which has the ability to advance medical knowledge and improve clinical practice. It has been central to medical education. Medical students and interns have positive attitude towards observing the autopsies.

But most of them felt themselves incapable of performing autopsies independently

on becoming physicians. Medical students should be encouraged to be more interested in observing Forensic autopsies.

Practical training of autopsies should be more effective to serve the purpose. It is suggested that problem based learning during practical training of autopsy must be incorporated as a part of the medical curriculum.

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Table 1
Responses of MBBS students Final Yr Part I (A), Final Yr. Part II (B) & Interns (C)

Questions	Reply	A (50)	B (50)	C(40)
1. Medico-legal autopsy plays an important role in administration of justice by providing significant information about unnatural death to the court of law.	a. Strongly Agree	23 (46%)	29 (58%)	18 (45%)
	b. Agree	27 (54%)	20 (40%)	17 (42.5%)
	c. Not sure (neither agree nor disagree)	--	--	3 (7.5%)
	d. Disagree	--	1 (2%)	2 (5%)
	e. Strongly Disagree	--	--	--
2. What is your experience regarding demonstration of the autopsies during 2 nd Prof Practical classes?	a. It was a learning experience and wished I could see more autopsies	43(86%)	45 (90%)	32(80%)
	b. I felt very uncomfortable and wished I could avoid seeing the autopsies.	4(8%)	3 (06%)	6(15%)
	c. It was not at all a learning experience.	3 (6%)	2(4%)	2(5%)
3. What was the source of information about medico-legal autopsies during 2 nd Prof MBBS?	a. Medical curriculum books +Lectures by faculty of Forensic Medicine	48 (96%)	48 (96%)	38 (95%)
	b. Medical curriculum books only (teachers played no role)	2 (4%)	1 (2%)	1 (2.5%)
	c. Magazines and Newspapers	--	1(02%)	1 (2.5%)
	d. Internet	--	--	--
4. Demonstration of medico-legal autopsies in the UG curriculum facilitates Problem Based Learning and compliments the didactic teaching.	a. Strongly Agree	7 (14%)	10 (20%)	8 (20%)
	b. Agree	31 (62%)	26(52%)	23 (57.5%)
	c. Not sure (neither agree nor disagree)	8 (16%)	11 (22%)	5 (12.5%)
	d. Disagree	4(8%)	3 (6%)	4 (10%)
	e. Strongly Disagree	--	--	--
5. On becoming a physician if you have to conduct an autopsy, do you think you are capable of performing the autopsy independently?	a. Strongly Agree (yes)	3 (6%)	3 (6%)	1(2.5%)
	b. Agree (yes)	8(16%)	5(10%)	4 (10%)
	c. Not sure (neither agree nor disagree)	20 (40%)	21(42%)	11 (27.5%)
	d. Disagree	15 (30%)	14 (28%)	20 (50%)
	e. Strongly Disagree	4 (8%)	7 (14%)	4 (10%)
6. Actual demonstration of medico-legal autopsy provides an opportunity to the students to discuss with their teachers the medico-legal issues related to autopsy.	a. Strongly Agree	11 (22%)	12 (24%)	11 (27.5%)
	b. Agree	36(72%)	28 (56%)	19 (47.5%)
	c. Not sure (neither agree nor disagree)	1 (2%)	7 (14%)	7 (17.5%)
	d. Disagree	2 (4%)	2 (4%)	2 (5%)
	e. Strongly Disagree	--	1(2%)	1 (2.5%)

Table 2
Responses to the questions (assessing knowledge) by MBBS students Final Yr. Part I (A), Final Yr. Part II (B) & Interns (C)

Questions	Reply	A (50)	B (50)	C (40)
1. Medico-legal autopsy is mandatory in all unnatural and sudden unexpected and suspicious deaths	a. Strongly Agree	27 (54%)	26 (52%)	17 (42.5%)
	b. Agree	16 (32%)	19 (38%)	13 (32.5%)
	c. Not sure (neither agree nor disagree)	6 (12%)	2 (04%)	7 (17.5%)
	d. Disagree	1 (2%)	3 (6%)	3 (7.5%)
	e. Strongly Disagree	--	--	--
2. During medico-legal autopsy following procedure is followed:	a. External Examination only	1 (2%)	--	1 (2.5%)
	b. Internal Examination only	(%)	--	2 (0.5%)
	c. Both external and internal examination	49 (98%)	49(98%)	36 (90%)
	d. Not sure	--	1 (02%)	1 (2.5%)
3. The temperature ideally preferred to preserve the body for autopsy is:	a. - 5° C	17 (34%)	23(46%)	22(55%)
	b. 0° C	3 (06%)	--	6 (15%)
	c. 4° C	29 (58%)	14(28%)	9 (22.5%)
	d. 10° C	1(2%)	3 (6%)	3 (7.5%)
4. Tissues for toxicological analysis are preserved in:	a. Saturated solution of common salt	11 (22%)	4 (08%)	6 (15%)
	b. 10% Formalin	18 (36%)	30 (60%)	28 (70%)
	c. Normal Saline	19 (38%)	15(30%)	5 (12.5%)
	d. Alcohol	2 (4%)	1 (2%)	1 (2.5%)
5. Tissues for histo-pathological analysis are preserved in:	a. Normal saline	20 (40%)	8(16%)	4 (10%)
	b. Formalin	24 (48%)	37 (74%)	26 (65%)
	c. Saturated Salt solution	5 (10%)	3 (06%)	9 (22.5%)
	d. Rectified Spirit.	1 (2%)	2 (4%)	1 (2.5%)
6. Before conducting medico-legal autopsy, following is must.	a. Consent of relatives	24 (48%)	26 (52%)	22 (55%)
	b. Inquest report from investigating officer	25 (50%)	23 (46%)	16 (40%)
	c. Consent of uninterested party	--	--	1 (2.5%)
	d. None of the above	1 (2%)	1 (2%)	1 (2.5%)

Original Research Paper

Gender Determination by Mental Foramen and Height of the Body of the Mandible in Dentulous Patients A Radiographic Study

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Abstract

Distinguishing sex by analyzing the morphological characteristics of bone is important in the field of physical and forensic anthropology. Panoramic radiographs are commonly used in all disciplines of dentistry. This paper emphasizes the determination of sex based on the measurement of the height of the mandible and the position of the mental foramen in dentulous patients on the right side of the orthopantomograph. Orthopantomographs of 102 Dentulous patients were selected for the purpose of the study. The study sample was divided into three groups of less than 25 years, 25 – 50 years and above 50 years. Measurements were made using the reference lines drawn from anatomical landmarks. Four measurements were made on every radiograph on the right side digitally. The data obtained was tabulated and subjected to statistical analysis. The results of the study showed statistically significant difference in comparison of the height of the mandible in males and females ($p < 0.05$).

Key Words: Height of the mandible, Panoramic radiograph, Mental foramen, Gender Forensic study

Introduction:

Distinguishing males from females and the differences in ethnic groups by analyzing the morphological characteristics of bone is important in the field of physical and forensic anthropology. The mandible is the strongest bone in the human body and persists in a well-preserved state longer than any other bone. [1]

Therefore, the morphological features of the mandible are commonly used by anthropologists and forensic dentists in the determination of sex. [2] Sex determination from skeletal remains is an important aspect of the osteologic analysis of a given population. [3]

The radiographs are indispensable tools that can also be used in forensic anthropology. The accuracy of measurements on radiographs is based on the quality of the radiographs. [4] The image quality of the panoramic radiograph is increased by the digital panoramic radiography. [5]

The mental foramen is fairly well depicted in panoramic radiographs. [4] It provides the ability to view the entire body of the mandible and allows a more accurate location of the mental foramen in both horizontal as well as in vertical dimensions. [6] Digital panoramic radiographs can be used to determine vertical height measurements of the mandible. [7]

The aim of the present study was to signify the average measurements from the superior and the inferior borders of the mental foramen to the lower border of the mandible and to the alveolar crest on digital panoramic radiographs on right side in determining the gender.

Objectives:

1. To measure the height of the mandibular body on the right side.
2. To measure the distance between the superior margin of the mental foramen to the inferior border of the mandible on right side.
3. To measure the distance between the inferior margin of the mental foramen to the inferior border of the mandible on the right side.
4. To measure the distance between the superior margin of the mental foramen to the alveolar crest on the right side.
5. To compare the above measurements for gender assessment.

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Materials and Methods:

Orthopantomographs of 102 dentulous patients visiting the department of Oral Medicine and Radiology of our college were selected for the purpose of this study.

The radiographs were taken using Orthophos - DS digital panoramic machine. Criteria for selection of radiographs are:

1. All teeth in the region of measurement had to be present.
2. Evidence of alveolar crest resorption in premolar and first molar regions was minimum or absent.
3. Radiographic images of the mental foramen and the borders of the mandible were distinct, free of artifacts in the site of measurement.

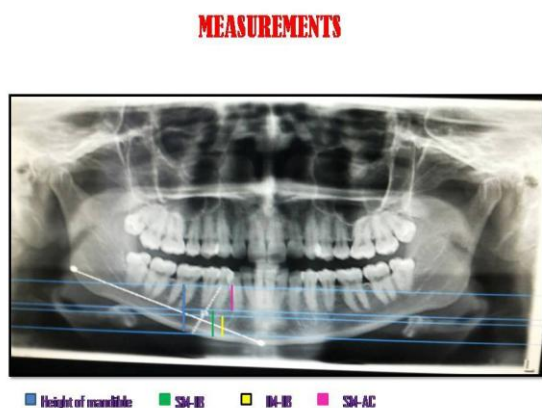
The study sample was divided into three groups of less than 25 years, 25 – 50 years and above 50 years. Each group consisted of 34 radiographs. Two investigators were responsible for selecting the panoramic radiographs and performing the measurements.

Each radiograph was viewed digitally. Measurements were made using the reference lines drawn from anatomical landmarks.

A line joining the most prominent point on the chin the 'menton' and the most prominent point of the angle of the mandible 'joining' was marked using Adobe photoshop.

The mental foramen was identified and marked on the right side. A line perpendicular to this tangent was marked from the inferior mandibular border to the alveolar crest such that it intersected the inferior edge of the mental foramen on the right side. Four measurements were made on every radiograph on the right side digitally: (Fig. 1)

Fig. 1: Measurement



- 1) The distance from the inferior surface of the mandibular body to the height of the alveolar crest on the right side (height).
- 2) The distance between the superior margins of the mental foramen to the inferior border of the mandible on the right side (SM to IB).
- 3) The distance between the inferior margins of the mental foramen to the inferior border of the mandible on the right side (IM to IB).
- 4) The distance between the superior margin of the mental foramen to the alveolar crest on the right side (SM to AC) – were measured.

The data obtained was subjected to statistical analysis using Turkeys multiple post hoc procedures.

Results:

Present study showed that there was a statistically significant difference in the measurements between males and females on the right side in relation to the height of the mandible, SM to IB, IM to IB ($p = 0.0031^*$, 0.0020^* , 0.0077^* respectively); whereas SM to AC measurements between males and females did not show a statistically significant difference. ($p=0.326$) (Table 1)

In this study there was no statistically significant difference between males and females with respect to different variables on the right side in an age group of less than 25 years except for the SM to IB measurement which showed a statistically significant difference between the two sexes. ($p=0.0089^*$) (Table 2)

In our study there was no statistically significant difference between males and females with respect to different variables on the right side in an age group of 25-50 years except for the height of the mandible which showed a statistically significant difference between the two sexes ($p=0.0106^*$). (Table 3)

But statistically significant difference was observed between males and females with respect to the measurements of height of the mandible on the right side in an age group of more than 50 years, IM to IB and SM to AC, ($p=0.0032^*$, 0.0365^* , 0.0013^* respectively) whereas SM to IB measurement did not show a statistically significant difference between the two sexes ($p=0.4947$). (Table 4)

Statistically significant difference was observed in our study in the measurements of height of the mandible and SM to AC in comparison of age groups of less than 25 years and 25-50 years, and on comparison of age groups of 25- 50 years and more than 50 years.

Rest of the variables did not show significant difference between different age groups. (Table 5) Present study also observed

statistically significant difference in the measurements of height of the mandible of males, SM to IB, IM to IB and SM to AC on comparison of age groups of less than 25 years and more than 50 years.

A significant difference was observed in the measurements of height of the mandible, SM to AC on comparison of age groups of 25 - 50 years and more than 50 years. (Table 6)

Similarly Females also showed Statistically significant difference in the measurements of height of the mandible and SM to AC on comparison of age groups of less than 25 years and more than 50 years. Similar results were obtained on comparing different variables in the age groups of 25- 50 years and more than 50 years. (Table 7)

Discussion:

The mandible is the strongest bone in the human body and persists in a well-preserved state longer than any other bone. Therefore, mandibular characteristics are extremely useful or determining sex. [1]

Wical and Swoope described that despite the alveolar bone resorption above the mental foramen, the distance from the foramen to the inferior border of the mandible remains relatively constant throughout life. [8]

Lindh et al and Guler et al also suggested that the stability of this region does not depend on resorption of alveolar process above the foramen.

Therefore, the vertical measurements in panoramic radiography are clinically applicable for the quantification of the height of alveolar bone in this region. [9, 10]

Because of the stability of the basal bone and mental foramen, these landmarks were selected as a point of reference for the present study.

In the present study, the mean values of the height of the mandible were significantly high in males as compared with females, and the results were in accordance with those of Cagri Ural et al, Ortman et al and Baat et al. [7, 11, 12]

Mean height of the mandible was significantly higher in males compared to females in the age group of 25-50 yrs and >50yrs. In the present study, the mean values of SM-IB and IM-IB was significantly high in males as compared with females and the results were in accordance with those of other authors. [13, 14] On the contrary, Vodanovic et al [15] found that the mean value of IM-IB does not exhibit sexual dimorphism.

In the present study the mean value of SM-IB was significantly higher in males

compared to females in the age group of <25yrs. In the present study the mean value of IM-IB was significantly higher in males compared to females in the age group of >50yrs.

In the present study the mean value of SM-AC was significantly higher in males compared to females in the age group of >50yrs.

In our study comparing different variables (height, SM-IB, IM-IB and SM-AC) in different age groups (<25, 25-50 and >50yrs) showed highly significant values in comparison between males and females of height of the mandible and SM-AC in <25 vs >50 and 25-50 vs >50yrs.

In the present study comparing different variables in different age groups of males showed significant values in comparison between <25 vs >50 and 25-50 vs >50yrs.

In the present study comparing different variables in different age groups of females showed significant values in comparison between <25 vs >50 and 25-50 vs >50yrs.

Conclusion:

It is possible to conclude that the height of the mandible and the distance from the superior margin of the mental foramen to the alveolar crest can be used to determine the gender.

The following conclusions are drawn from this study

- A mean height of 35.4mm and 33.9mm in the age group of <25yrs can be considered as male and female respectively.
- A mean height of 37.5mm and 34.2mm in the age group of 25-50yrs can be considered as male and female respectively.
- A mean height of 32.7mm and 31.0mm in the age group of >50yrs can be considered as male and female respectively.
- A mean distance from the superior margin of the mental foramen to the alveolar crest of 16.2mm and 14.8 mm in the age group of >50yrs can be considered as male and female respectively.

However, large study groups and comprehensive assessment of various other parameters related to the height of the mandible and mental foramen may be required for more definitive and confirmatory results.

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Table 1
Comparison of Males and Females in Different Variables on Right Side

Summary	Height			SM to IB			IM to IB			SM to AC		
	Male	Female	Combined	Male	Female	Combined	Male	Female	Combined	Male	Female	Combined
N	52	50	102	52	50	102	52	50	102	52	50	102
Minimum	30	27	27	14	12	12	11	10	10	14	13	13
Maximum	40	40	40	20	20	20	17	17	17	22	22	22
Mean (mm)	34.54	33.08	33.82	17.08	16.08	16.59	13.88	13.08	13.49	17.42	17.00	17.22
SD	2.40	2.47	2.53	1.33	1.82	1.66	1.37	1.61	1.54	1.76	2.52	2.17
SE	0.33	0.35	0.25	0.18	0.26	0.16	0.19	0.23	0.15	0.25	0.36	0.21
95% CI-Lower Bound	33.87	32.38	33.33	16.71	15.56	16.26	13.50	12.62	13.19	16.93	16.29	16.79
95% CI-Upper Bound	35.21	33.78	34.32	17.45	16.60	16.91	14.27	13.54	13.79	17.91	17.71	17.64
t-value	3.0299			3.1746			2.7204			0.9866		
p-value	0.0031*			0.0020*			0.0077*			0.3262		

Table 2
Comparison of Males and Females in Different Variables on Right Side of less than 25 yrs of Age

Summary	Height			SM to IB			IM to IB			SM to AC		
	M	F	Combined	M	F	Combined	M	F	Combined	M	F	Combined
N	16	18	34	16	18	34	16	18	34	16	18	34
Minimum	32	27	27	14	12	12	11	10	10	15	13	13
Maximum	40	40	40	20	20	20	17	17	17	22	22	22
Mean (mm)	35.38	33.94	34.62	17.75	16.00	16.82	14.56	13.39	13.94	17.6	17.94	17.79
SD	2.78	2.67	2.78	1.73	1.91	2.01	1.63	1.75	1.77	1.96	2.41	2.19
SE	0.69	0.63	0.48	0.43	0.45	0.34	0.41	0.41	0.30	0.49	0.57	0.38
95% CI-Lower Bound	33.89	32.62	33.65	16.83	15.05	16.12	13.69	12.52	13.32	16.58	16.74	17.03
95% CI-Upper Bound	36.86	35.27	35.59	18.67	16.95	17.52	15.43	14.26	14.56	18.7	19.14	18.56
t-value	1.5309			2.7853			2.0121			-0.4201		
p-value	0.1356			0.0089*			0.0527			0.6772		

Table 3
Comparison of Males and Females in Different Variables on Right Side of 25-50 Yrs Age

Summary	Height			SM to IB			IM to IB			SM to AC		
	M	F	Combined	M	F	Combined	M	F	Combined	M	F	Combined
N	18	16	34	18	16	34	18	16	34	18	16	34
Minimum	33	30	30	15	12	12	11	10	10	17	15	15
Maximum	39	36	39	19	19	19	16	16	16	20	22	22
Mean (mm)	35.67	34.19	34.97	17.06	16.00	16.56	13.72	13.06	13.41	18.50	18.19	18.35
SD	1.57	1.60	1.73	0.94	2.31	1.78	1.18	2.08	1.67	1.15	2.26	1.74
SE	0.37	0.40	0.30	0.22	0.58	0.31	0.28	0.52	0.29	0.27	0.56	0.30
95% CI-Lower Bound	34.89	33.33	34.37	16.59	14.77	15.94	13.14	11.95	12.83	17.93	16.98	17.75
95% CI-Upper Bound	36.45	35.04	35.57	17.52	17.23	17.18	14.31	14.17	14.00	19.07	19.39	18.96
t-value	2.7153			1.7835			1.1543			0.5173		
p-value	0.0106*			0.0840			0.2569			0.6085		

Table 4
Comparison of Males and Females in Different Variables on Right Side of >50 yrs Age

Summary	Height			SM to IB			IM to IB			SM to AC		
	M	F	Combined	M	F	Combined	M	F	Combined	M	F	Combined
N	18	16	34	18	16	34	18	16	34	18	16	34
Minimum	30	29	29	15	15	15	11	11	11	14	13	13
Maximum	34	34	34	18	18	18	15	14	15	19	16	19
Mean (mm)	32.67	31.00	31.88	16.50	16.25	16.38	13.44	12.75	13.12	16.17	14.75	15.50
SD	1.50	1.55	1.72	0.99	1.13	1.05	1.10	0.68	0.98	1.30	1.00	1.35
SE	0.35	0.39	0.30	0.23	0.28	0.18	0.26	0.17	0.17	0.31	0.25	0.23
95%CI-Lower Bound	31.92	30.17	31.28	16.01	15.65	16.02	12.90	12.39	12.78	15.52	14.22	15.03
95%CI-Upper Bound	33.41	31.83	32.48	16.99	16.85	16.75	13.99	13.11	13.46	16.81	15.28	15.97
t-value	3.1898			0.6908			2.1824			3.5363		
p-value	0.0032*			0.4947			0.0365*			0.0013*		

Table 5
Comparison of Different Variables in Different Age Groups (<25, 25-50, > 50) on Right Side

Summary	Height				SM to IB				IM to IB				SM to AC			
	<25	25-50	>50	Com bined	<25	25-50	>50	Com bined	<25	25-50	>50	Com bine	<25	25-50	>50	Combin ed
N	34	34	34	102	34	34	34	102	34	34	34	102	34	34	34	102
Minimum	27	30	29	27	12	12	15	12	10	10	11	10	13	15	13	13
Maximum	40	39	34	40	20	19	18	20	17	16	15	17	22	22	19	22
Mean (mm)	34.6	35.0	31.9	33.8	16.8	16.6	16.4	16.6	13.9	13.4	13.1	13.5	17.0	17.6	15.5	17.2
SD	2.8	1.7	1.7	2.5	2.0	1.8	1.0	1.7	1.8	1.7	1.0	1.5	2.2	1.7	1.4	2.2
SE	0.5	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.2	0.2	0.4	0.3	0.2	0.2
95%CI Lower Bound																
	33.7	34.4	31.3	33.3	16.1	15.9	16.0	16.3	13.3	12.8	12.8	13.2	17.0	17.8	15.0	16.8
95% CI- Upper Bound																
	35.6	35.6	32.5	34.3	17.5	17.2	16.8	16.9	14.6	14.0	13.5	13.8	18.6	19.0	16.0	17.6
F-value	21.3472				0.6072				2.5752				24.2079			
P-value	0.0000*				0.5469				0.0812				0.0000*			
Pair wise comparison by Tukeys multiple posts hoc procedures																
<25 v/s 25-50yrs		0.7745			0.7890						0.3249			0.4065		
<25 v/s >50yrs		0.0001*			0.5197						0.0697			0.0001*		
25-50 v/s >50vrs		0.0001*			0.8999						0.7041			0.0001*		

Table 6
Comparison of Different Variables in Different Age Groups (<25, 25-50, >50) on Right Side of Males

Summary	Height				SM to IB				IM to IB				SM to AC				
	<25	25-50	>50	Comb ined	<25	25-50	>50	Comb ined	<25	25-50	>50	Comb ined	<25	25-50	>50	Combine d	
N	16	18	18	52	16	18	18	52	16	18	18	52	16	18	18	52	
Minimum	32	33	30	30	14	15	15	14	11	11	11	11	15	17	14	14	
Maximum	40	39	34	40	20	19	18	20	17	16	15	17	22	20	19	22	
Mean (mm)	35.4	35.7	32.7	34.5	17.8	17.1	16.5	17.1	14.6	13.7	13.4	13.9	17.6	18.5	16.2	17.4	
SD	2.8	1.6	1.5	2.4	1.7	0.9	1.0	1.3	1.6	1.2	1.1	1.4	2.0	1.2	1.3	1.8	
SE	0.7	0.4	0.4	0.3	0.4	0.2	0.2	0.2	0.4	0.3	0.3	0.2	0.5	0.3	0.3	0.2	
95% CI- Lower Bound	33.9	34.9	31.9	33.9	16.8	16.6	16.0	16.7	13.7	13.1	12.9	13.5	16.6	17.9	15.5	16.9	
95% CI- Upper Bound	36.9	36.5	33.4	35.2	18.7	17.5	17.0	17.5	15.4	14.3	14.0	14.3	18.7	19.1	16.8	17.9	
F-value	12.1621				4.2459				3.3004				11.2514				
P-value	0.0001*				0.0199*				0.0452*				0.0001*				
Pair wise comparison by Tukeys multiple posts hoc procedures																	
<25v/s25-50yrs		0.9056				0.2478				0.1590				0.2120			
<25 v/s >50yrs		0.0008*				0.0147*				0.0427*				0.0174*			
25-50 v/s >50yrs		0.0002*				0.3834				0.8009				0.0002*			

Table 7
Comparison of Different Variables in Different Age Groups (<25, 25-50, >50) on Right Side of Females

Summary	Height				SM to IB				IM to IB				SM to AC			
	<25	25-50	>50	Comb ined	<25	25-50	>50	Comb ined	<25	25-50	>50	Comb ined	<25	25-50	>50	Combine d
N	18	16	16	50	18	16	16	50	18	16	16	50	18	16	16	50
Minimum	27	30	29	27	12	12	15	12	10	10	11	10	13	15	13	13
Maximum	40	36	34	40	20	19	18	20	17	16	14	17	22	22	16	22
Mean (mm)	33.9	34.2	31.0	33.1	16.0	16.0	16.3	16.1	13.4	13.1	12.8	13.1	16.3	17.2	14.8	17.0
SD	2.7	1.6	1.5	2.5	1.9	2.3	1.1	1.8	1.8	2.1	0.7	1.6	2.4	2.3	1.0	2.5
SE	0.6	0.4	0.4	0.3	0.5	0.6	0.3	0.3	0.4	0.5	0.2	0.2	0.6	0.6	0.3	0.4
95% CI- Lower Bound	32.6	33.3	30.2	32.4	15.1	14.8	15.7	15.6	12.5	12.0	12.4	12.6	16.7	17.0	14.2	16.3
95% CI- Upper Bound	35.3	35.0	31.8	33.8	17.0	17.2	16.9	16.6	14.3	14.2	13.1	13.5	19.1	19.4	15.3	17.7
F-value	12.3041				0.0993				0.6555				14.7652			
P-value	0.0001*				0.9057				0.5239				0.0000*			
Pair wise comparison by Tukeys multiple posts hoc procedures																
<25 vs 25-50yrs		0.9360			1.0000			0.8292			0.9344					
<25 vs >50yrs		0.0004*			0.9186			0.4925			0.0002*					
25-50 vs >50yrs		0.0003*			0.9229			0.8502			0.0002*					

Original Research Paper

Analysis of Custodial Deaths in New Delhi: A 13 Years Study

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Abstract

Custody related deaths are not uncommon in India. A meticulous autopsy becomes a necessary part of the investigation. A retrospective study was done to analyze the prevalence and demographic pattern of custodial related deaths, whose autopsy were conducted at AIIMS, New Delhi. The autopsy reports of 13 years (1999-2011) were analyzed retrospectively. There were total 15 cases of custodial related deaths. All cases were male and majority was in the age group of 25-35 years (8 cases). 9 cases belonged to Hindu and 6 cases belong to Muslim. 10 cases died due to natural disease and 3 cases due to unnatural causes. 10 cases died in the hospital and 5 cases in the custody. Among the 3 unnatural deaths 1 died due to hanging, 1 due to fall from height and 1 from blunt injuries. In 2 cases no exact cause of death could be determined. In India there is overcrowding of prisoners in the jail. In spite of medical screening of the prisoners the infectious diseases like TB is very prevalent in jails. The national human rights commission is taking up the issues to improve the jail conditions in India.

Key Words: Custody; Custodial deaths; Suicide; Human rights

Introduction:

Legally [1, 9], custody is defined as, any point in time when a person's freedom of movement has been denied by law enforcement agencies, such as during transport prior to registering a case, or during arrest, prosecution, sentencing, and correctional confinement.

Death in custody is defined as death occurring in some form of custodial detention, such as police cell or prison. [2]The Royal Commission of Australia into aboriginal deaths, recommended that the definition of a death in custody for the purpose of post-death investigation and for the national monitoring of custodial deaths as follows: [3]

- i. The death wherever occurring of a person who is in prison custody or police custody or detention as a juvenile;
- ii. The death wherever occurring of a person whose death is caused or contributed to by traumatic injuries sustained, or by lack of proper care whilst in such custody or detention;
- iii. The death wherever occurring of a person who dies or is fatally injured in the process of police or prison officers attempting to detain that person; and

- iv. The death wherever occurring of a person who dies or is fatally injured in the process of that person escaping or attempting to escape from prison custody or police custody or juvenile detention.

Death occurring in custody is considered to be a very sensitive phenomenon, as the person is solely dependent on the custodial authority for all of his constitutional rights including access to health care and it is usually considered as unnatural death by the public at large. As such it creates a hue and cry among general population and sometimes, causes political involvement.

But in contrast to general belief, deaths occurring in custody could be due to natural causes along with un-natural causes. Natural deaths may be due to disease or intoxication already existing in the deceased prior to the custody and aggravated thereafter or may have developed after taken into the custody.

These are mainly due to unawareness and sometimes, carelessness on the part of the officials about the health status of the inmates and also, due to poor condition of the cells where inmates are kept. Unnatural death may be due to various causes, such as suicides, various accidents or tortures by the hand of officials and/or fellow inmates and can occur during any period of the custody. [3]

Numbers of studies have been done on custodial deaths by various international agencies and authors in western countries [4-6,

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9-14] but only a few studies have been done in India. [9, 17]

Material and Methods:

The present study is a retrospective demographic study on custody-related deaths, which occurred during the period of 13 years from the year of 1999 to 2011 which were for autopsy to the Department of Forensic Medicine and Toxicology, All India Institute of Medical Sciences, New Delhi. The records were analyzed for demographic profiles, previous history of disease or medication, signs of torture, cause, manner and place of death, and other relevant findings.

Observations:

In this thirteen years retrospective study there were total 15 cases except the year of 2000, 2004 and 2006, when no cases were noted. (Table 1) All the cases were male. Age group of these cases were between 21 to 60 years, maximum cases (8 cases) being between 25 to 35 years. No cases were found below the age of 20 or more than 60 years. (Table 2)

By religion, present study showed that there 9 cases were Hindu and 6 were Muslim. (Fig.1) Out of these 15 cases, 10 deaths occurred in the various hospital and 5 cases were declared brought dead to the hospital. As per manner of death, 10 cases were natural, 3 were unnatural while in 2 cases cause of death remained undetermined. (Fig. 2)

In this study out of 10 natural deaths, 5 cases were of tuberculosis, one case each of cardiac failure, of pneumonia (as a complication of ALL), renal failure, liver failure and septicemia. (Table 3) out of total cases of natural deaths seven cases were having previous history of illness and two cases were of leukemia (ALL). Both the deaths occurred at AIIMS while under treatment. (Fig. 3)

Among the three unnatural deaths, one was of blunt force injury caused by torture, other was of fall from height leading to head injury and last one was a case of suicidal hanging. (Table 3) Only two cases were having concomitant injuries. In one case there was self-inflicted injury in the form of slashing over left arm and died due to head injury consequent to fall from height while trying to escape from custody.

The other case was having history of torture by the hand of authorities.

Both the two undetermined cases were having no history of any previous illness or torture. One died in the custody while the other died at AIIMS hospital during treatment. (Fig. 3)

Discussion:

Custody of a person is defined as when his freedom of movement is denied by law enforcing authority. A person in the custody is under the supervision of the authority and dependent on them. So, any death occurring in the custody is considered to be a fault, in one way or other, on the part of the concerned authority. And, as such it causes a hue and cry among general public and draw a lot of political involvement.

Various studies have been done by international agencies and authors on this topic. They have analyzed custody related deaths according to demographic data, their manner of death and roles played by the various authorities into the cause of these deaths.

According to these studies deaths in custody are not always un-natural, as opposed to general belief, but due to various causes ranging from natural diseases, intoxication, accidents and self-destructive behavior of the inmate to the tortures on the hand of authorities and/or fellow inmates. [4-6, 9-12] Some of these studies have concluded that natural and suicidal cases are more common in custody than accidental, homicidal or torture [9, 10] while other studies shown un-natural deaths to be more common. [11, 12]

As per 2011 NHRC report, there were 14,231 custody related deaths in India during the period of 2001 to 2010. They concluded that majority of these deaths were a direct consequence of torture in custody. [7, 15] Despite this fact, only a few studies have been done on this topic in India. [8]

In present study we have retrospectively analysed all the cases of custodial deaths which came to the department for post-mortem examination during the period of year 1999 to 2011. During this period, 15 cases were brought for autopsy in our department. All the cases were analysed for the cause and manner of death along with other demographic profiles.

Regarding manner of death, majority of cases were natural (10 out of 15 deaths) while only one fifth cases were un-natural. This finding is supported by an Indian study of Y S Bansal et al [8] where they too observed that majority of custody deaths were natural. But these findings are in oppose to the study of Wendy L Wobeser et al and Babita D Bhana [5, 6] where they concluded that un-natural deaths such as suicidal or shootings by police were more common.

Among the various causes of natural deaths, infectious diseases (tuberculosis) made

up to half of all the cases. Our finding is in oppose to the study done by Seena Fazel et al [4] where a 20 year case study concluded that more than half of the cases being of circulatory diseases while respiratory diseases were second. Out of 10 natural deaths, 7 cases were having history of illness but it was not available to the authority at the time of custody.

This finding is supported by the study of Y S Bansal et al. [8] As far as pattern of unnatural deaths are concerned, one case of accidental death was during a police chase when the deceased jumped from height and got his head injured, second case was of a suicide, who was found hanging in his cell where he was kept alone and the third person succumbed to the injuries received on the hand of the authorities.

This study suggests that most of the deaths occurring in custody in this part of India are natural (mainly infectious) and they mainly succumbed to their illness. The authorities were un-aware about their health conditions or neglected their treatment. They were rushed to hospitals only when the condition worsened and most of them were declared brought dead to the hospitals.

An important fact responsible for the deaths occurring in custody is the condition of the jails in India. [16] Overcrowding, unhygienic environment, malnutrition and non-availability of health facilities are the conditions which cause spreading of various communicable diseases such as various vector-borne diseases, blood-borne diseases and sexually transmitted diseases. Besides these, inmates are also prone to various non-communicable diseases such as cardio-vascular diseases, respiratory diseases, mental disorders, neurological disorders, substance abuse disorders and cancers. These are mainly due to physical inactivity, unhealthy and stressful environment, unhealthy food, physical and sexual violence, deliberate self-harm, various drug abuse and mental health problems mainly depression, anxiety, adjustment problems and psychosis.

This fact explains why there are more natural deaths in Indian jails due to infectious diseases. In Delhi the central prison is the Tihar jail. Many cases are referred to AIIMS hospital for treatment. Therefore majority of the cases died in the hospital during treatment and the autopsy was conducted at AIIMS mortuary.

All these cases, be it natural deaths or un-natural, show some sort of carelessness and disrespect for human life on the part of authorities. Authorities are not aware about any history related to health of inmates and they take

action only when the condition deteriorates and the inmates ultimately succumb to their conditions.

Keeping all these in view, National Human Right Commission has instructed the jail authorities to follow a formal medical screening format whenever a new inmate enters the jail so that health status of the inmate can be known beforehand and can be managed accordingly.

It has also made guidelines for investigation into the custodial deaths. As per the guideline, it is mandatory to report all the custody related deaths to the NHRC within 24 hours and the inquiry has to be done by a magistrate. The autopsy should be conducted by board of doctors with complete videography.

A copy of the video has to send to the NHRC. NHRC has also framed a common post-mortem form to be followed in custodial death cases. [2, 17]

Conclusion:

This study concludes that death occurring in the custody is mainly natural and in most of the cases, previous history of illness is present but the authorities are never aware of those facts. However, the number of case in this study is less.

It has been observed that there is overcrowding in majority of the Indian jails which can lead to spread of various communicable diseases like tuberculosis and also increase chances of non-communicable diseases.

This study stresses the need of a complete medical screening, as per NHRC recommendations, of all the inmates entering the prison and to provide them timely and proper medical treatment. There is also a need for proper jail reform to avoid deaths due to suicide, violence and self-harm among the inmates. There is a need to have constant surveillance over them and install Cameras to supervise their activities to prevent violence and suicide.

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Table1: Case Distribution

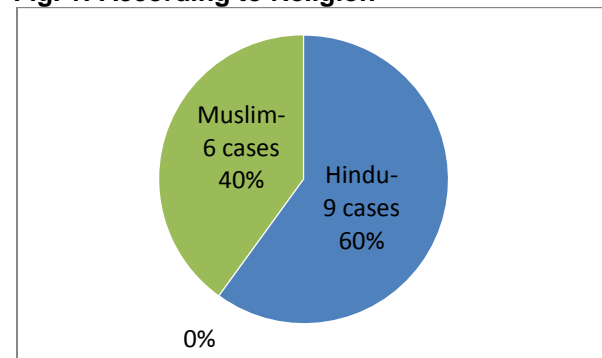
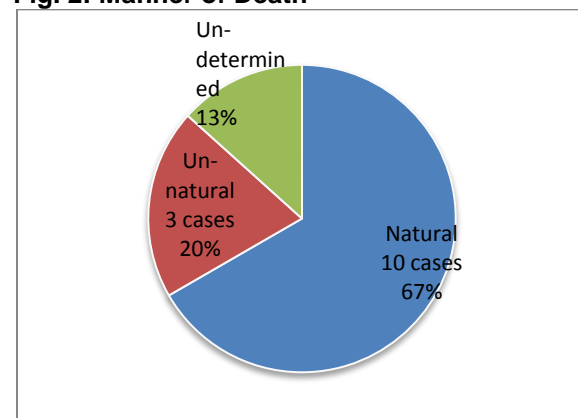
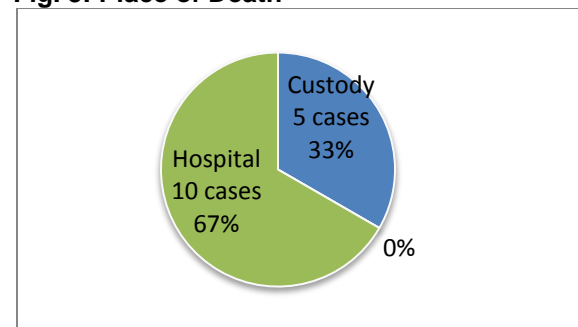
Year	Cases
1999	2
2000	0
2001	1
2002	1
2003	2
2004	0
2005	1
2006	0
2007	2
2008	2
2009	1
2010	1
2011	2
Total	15

Table 2: Age wise Distribution

Age Group(yr)	Cases
18-20	0
21-25	1
26-30	5
31-35	3
36-40	2
41-45	1
46-50	2
51-55	0
56-60	1
>61	0

Table 3: Cause of Death

Natural	Cases
CVS	1
Respiratory System	5
Kidney Disease	1
Liver Disease	1
Septicaemia	1
ALL & its complication	1
Un-natural	
Blunt Injury	1
Head Injury	1
Suicidal Hanging	1
Undetermined	
	2

Fig. 1: According to Religion**Fig. 2: Manner of Death****Fig. 3: Place of Death**

Original Research Paper

A Study of Fingerprint in Relation to Gender and Blood Group among Medical Students in Uttarakhand Region

¹Deepa Deopa, ²Chandra Prakash, ³Ishwer Tayal

Abstract

Finger print (dermatoglyphic) is considered as the best tool of identification. A total of 140 first year and second year MBBS students belonging to the age group 18- 25 year with known blood groups of Government Medical College, Haldwani were included in the study. An attempt has been made in the present work to analyze their correlation with gender and blood group of an individual. Loops were the most common (58.29%) fingerprint pattern while whorls were moderate (37.00%) and arches were the least common (4.71%). Males had a higher incidence of whorls and females had a higher incidence of loops. Loops are predominant in blood group A, B, AB and O in both Rh positive and Rh negative individuals except in 'A' positive blood group where whorls predominate slightly. Whorls were highest in A & AB positive blood group and loops were highest in O & B blood group. Arches were least in all blood groups. There is an association between distribution of fingerprint patterns, blood group and gender and thus prediction of gender and blood group of a person is possible based on his fingerprint pattern.

Key Words: Finger Print, Dermatoglyphic, Identification, Whorl, Loop, Arch, Blood Groups

Introduction:

The various identification data used are fingerprints, handwriting, bite marks, DNA fingerprinting etc. Fingerprints are constant and individualistic and form the most reliable criteria for identification. Fingerprint is one of the oldest, reliable and mature biometric technologies and is considered one of the best, cheapest and legitimate proofs of identification. [1, 2]

Fingerprint patterns are genotypically determined and remain unchanged from birth till death. [3] Fingerprints collected at a crime scene can be used to identify suspects, victims and other persons who touched the surface.

Fingerprint scans can be used to validate electronic registration, cashless catering and library access especially in schools and colleges. The secretions in the fingerprints contain residues of various chemicals and their metabolites which can be detected and used for the Forensic purposes. [1]

Due to the immense potential of fingerprints as an effective method of identification an attempt has been made in the present work to analyse their correlation with gender and blood group of an individual.

This correlation between fingerprint pattern and these parameters may help in using fingerprints as an important aid in sex and blood group determination and vice versa, thus, enhancing the authenticity of finger-prints in detection of crime and criminals.

Dermatoglyphic is defined as the scientific study of epidermal ridges and their configuration on the volar aspect of the palmer and plantar regions. [4] The ridge pattern depends upon cornified layer of epidermis as well as dermal papillae.

The characteristic patterns of epidermal ridges are differentiated in their definitive forms during third and fourth month of foetal life. [5]. Faulds [6] mentioned that the pattern of these papillary ridges remain unchanged in an individual throughout life.

Herschel [7] used finger prints for personal identification in India. Galton [8] classified the types of finger prints depending upon their primary pattern as loops, whorl and arches. Cummins [4] found that the configurations of ridge pattern are determined partly by heredity and partly by accidental or environmental influence, which produce stress and tension in their growth during foetal life.

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Blood group system was discovered in 1901 by Karl Landsteiner. 19 major groups have been identified which vary in their frequency of distribution amongst various races of mankind. Clinically, only 'ABO' and 'Rhesus' groups are of major importance. 'ABO' system is further classified as A, B, AB, O blood group types according to presence of corresponding antigen in plasma. 'Rhesus' system is classified into 'Rh +ve' and 'Rh -ve' according to the presence or absence of 'D' antigen.

Hahne [9] in his study asserted that blood group O is associated with more loops and less whorls than blood group A. Herch [10] found high frequency of loops in blood group A.

Gowda and Rao [11] study in India on Gowda Saraswat Brahmin community of south Kannada district (Karnataka) reported high frequency of loops with moderate whorls and low arches in the individuals of A, B and O blood group. They also found significantly greater number of loops in Rh-Positive and whorls in Rh-negative subjects.

The objective of this study was to ascertain trends of finger prints in individuals with different ABO and Rh blood groups along with evaluation of relationship of finger prints pattern in ABO blood groups and in male female gender. Fingerprints pattern are classified into three patterns by Galton [8]-

1. Loops (60-65%)
2. Whorls (30-35%)
3. Arches (5%)

Apart from use of dermatoglyphic in predicting the diagnosis of genetic disorders, it is used in forensic science for criminal identification. The arrangement of skin ridges is never duplicated in two persons even in monozygotic twins; the similarities are closer among some individuals while in others the differences are marked.

Materials and Methods:

This study was carried out over a period of six months among medical students of Govt Medical College, Haldwani. Total 140 students (65 male & 75 female) belonging to the age group 18- 25 year of batches 2010 and 2011 voluntarily participated in the study. Students with permanent scars on their fingers or thumbs, with any hand deformities due to injury, birth defect or disease, those having worn fingerprints, extra webbed or bandaged fingers were excluded from the study.

For taking dermatoglyphic, Ink Method suggested by Cummins [4] was used. Each subject was asked to wash his hands thoroughly with soap and water and dry them by using a

towel. He was then asked to press his fingertip on the stamp pad and then to the paper to transfer the fingerprint impression.

The same method was repeated for all the finger of both hands. In this way, the plain fingerprints of all the ten digits were taken separately on the respective blocks on the same sheet of paper. Care was taken to avoid sliding of fingers to prevent smudging of the print. After the fingerprints were acquired, details such as name, sex and age were noted.

The details of their blood group were noted. Each subject was assigned a serial number. The fingerprint patterns were studied with the help of a magnifying lens and were identified as: Loops, Whorls and Arches based on the appearance of ridge lines according to Henry's system of classification.

This system assigns each finger a number according to the order in which it is located in the hand, beginning with the right thumb as number one (1) and ending with the left little finger as number 10. The distribution of dermatoglyphic fingerprint patterns in both hands of individuals and its relationship with gender and different ABO and Rh blood groups was evaluated and analyzed statistically.

Observation and Result:

A total of 140 subjects participated in the study out of which 65 were males and 75 were females. Majority of the subjects in the study belonged to blood group B (37.86%) followed by blood group O (28.57%), A (20%) and AB (13.57%) respectively.

Maximum subjects in the study were Rh positive, of which 39.06% belonged to blood group B, 28.13% belonged to blood group O, 18.75% subjects had blood group A while only 14.06% had blood group AB. Among Rh negative individuals, 33.33% belonged to blood group O and A, 25 % belonged to blood group B. 8.33% of the subjects showed blood group AB negative. (Table 1)

Fingerprint pattern analyses showed that, loops were the most common pattern in the study (58.29%), followed by whorls (37.00%) while arches were present in a smaller percentage (4.71%) of the study group. (Table 2) Frequency of loops was highest in both the Rh-positive and Rh-negative subjects of ABO blood groups except 'A' positive blood group where whorls predominate slightly.

Among the subject of different blood groups, blood group O (63.06% & 65.00%) and B (62.00% & 66.67%) showed highest loops and lowest in blood group 'A' (46.25%). Whorls showed highest frequency (47.08 %) in 'A'

positive and AB positive (47.22%) blood group. Lowest in blood group B and O (34.80%, 31.39%). Arches were highest in A, and O positive (7.08%, 5.56%) blood group. Lowest in B blood group (3.20%). (Table 3)

The middle, ring and little fingers of A, B and O blood group showed high frequency of loops i.e. Blood group A (l-24.63%, r-20.15%), blood group B (m-23.94%, l-23.03%) and blood group O (m-24.90%, l-22.45%). While in AB blood group thumb, index middle and little finger show higher frequency of loops (21.05%).

Whorls were more in thumb and ring fingers in blood group 'A' (t-23.44%), 'B' (t-27.87%, r-28.42%) and 'O' (t-27.82%, r-27.07%), AB (r-26.44). Index and middle fingers of all blood groups showed comparatively high frequency of arches then other fingers. Finger print distribution show that loops is highest among all digits and arches are rare. In comparison of Rt and Lt hand digits the digit pattern is same in both hands. (Table 4 & 5)

Discussion and Conclusion:

Many criteria were used for the purpose of identification like race, sex, age, complexion, hair, scar, tattoo, footprint and occupation marks but fingerprint is found to be the most reliable.

The various classification systems used throughout the world are based on the pattern of friction ridges seen on pulp of terminal part of all the ten fingers. Single-finger files are kept only for a limited number of known criminals.

Consequently, for the most part, it is impossible to make identification from fingerprint files on the basis of a single print found at the scene of a crime.

These patterns fall into three general classes called arches, loops, and whorls. Arches are the simplest patterns and also the rarest.

Loops are formed by ridge lines that flow in from one side of the print, sweep up in the centre like a tented arch, and then curve back around and flow out or tend to flow out on the side from where they entered.

Loops are designated as being either radial or ulnar, depending on which side of the finger the lines enter. The loop is the most common of all the patterns.

The present study showed that there is an association between distribution of fingerprint patterns, blood group and gender. Majority of the subjects in the study belonged to blood group B, followed by blood group O, A and AB.

Majority of subjects were Rh positive than Rh negative. The general distribution pattern of the primary fingerprint was of the same order in individuals with A, B, AB and O

blood groups i.e. high frequency of loops, moderate of whorls and low of arches. This is in accordance with other studies. [12-14]

Eboh DEO [15] study of Aniomias and Urhobos population in Nigeria observed loop pattern to have the highest frequency, followed in order by whorl, then arch pattern. Similar findings were seen in Rh-positive and Rh-negative individuals except in blood group 'A' positive where whorls predominated slightly.

In our study highest percentage of loops showed in blood group O and B, and lowest in blood group 'A'. In the study of Mehta AA & Mehta AA [14] Percentage of loops was highest in O blood group and lowest in AB blood group. However, Kshirsagar SV et al [12] observed higher percentage of loops in B and AB blood groups respectively; while lower percentage in O blood group. In this study whorls showed highest frequency in 'A' and 'AB' positive blood group.

Lowest in blood group B and O, which is supported by the study of other authors [13, 14] but Contrary to the findings of Kshirsagar SV et al [12] who observed higher percentage of whorls in O blood group and lower percentage in AB blood group.

Sharma P R [16] found association between blood group type (ABO) and fingerprint pattern within cohorts, but not among different cohorts. In Northern cohort, about 10 % of the participants with blood group O were having whorls while a maximum of 19% were with blood group A in the west cohort. 21% participant of the blood group O had loops In Northern cohort.

Our study is also of northern region and shows that blood group B and O had a higher frequency of loops in comparison to whorl.

Arches were highest in A, B and O positive blood group. Lowest in AB blood group in our study group similar to study of Bharadwaja A et al [13].

Contrary to findings of Mehta AA & Mehta AA [14] study in which percentage of arches in AB blood group was highest and lowest in B blood group which correlates with the finding of Kshirsagar SV et al [12] of lowest percentage of arches in B blood group. On the basis of gender in our study frequency of loops was found to be higher in females than in males whereas whorls were more frequent in males as compared to females.

Arches were present more in females than in males. This is supported by the study of various other authors. [15, 17-19]

On the basis of the pattern of digits the middle, ring and little fingers of A, B and O blood group showed high frequency of loops. While in

'AB' blood group thumb and index finger also shows higher frequency of loop. Whorls were more in thumb and ring fingers in all blood groups. Index and middle fingers of all blood groups showed comparatively high frequency of arches correlated with other studies. [13, 21]

According to Nayak SK. & Patel S [22] commonest occurrence of loop happens to be in finger V and III. The highest percentage of whorls occurred in I and II fingers of AB blood group whereas in IV fingers of all other blood groups. We can conclude that Finger print distribution show loops is highest among all digits after that whorl is common and arches are rare. In comparison of Rt and Lt hand digits the digit pattern is same in both hands. There is also an association is found between distribution of fingerprint patterns, blood group and gender.

Thus prediction of gender and blood group of a person is possible based on his fingerprint pattern.

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Table 1: Blood Group According to Rh factor

Rh factor	Blood Group				Total (%)
	A (%)	B (%)	AB (%)	O (%)	
Rh +ve	24(18.6)	50(39.1)	18(14.1)	36(28.1)	128(91.4)
Rh -ve	4(33.3)	3(25.0)	1(8.3)	4(33.3)	12(8.6)
Total	28(20)	53(37.9)	19(13.6)	40(28.6)	140(100)

Table 2: Fingerprint Pattern According to Gender

Pattern (%)	Gender	
	Male (65)	Female (75)
Loop (58.29)	342 (52.62%)	484(64.53%)
Whorl (37.0)	280 (43.08%)	229(30.53%)
Arch (4.71)	28 (4.31%)	37(4.93%)

**Table 3
Pattern of Fingerprints among A, B, AB, O and Rh Blood Groups**

Type of Finger Print (%)	Blood Group and Digit							
	A(28) & Digit (280)		B(53) & Digit (530)		AB (19) & Digit (190)		O (40) & Digit (400)	
	Rh +ve(24)	Rh -ve(4)	Rh +ve(50)	Rh -ve(3)	Rh +ve(18)	Rh -ve(1)	Rh +ve(36)	Rh -ve(4)
Loops	111(46.3)	23(57.5)	310(62.0)	20(66.7)	87(48.3)	8(80.0)	227(63.1)	26(65.0)
Whorls	113(47.1)	15(37.5)	174(34.8)	9(30.0)	85(47.2)	2(20.0)	113(31.4)	12(30.0)
Arches	17(7.1)	1(2.5)	16(3.2)	1(3.3)	8(4.4)	0(0)	20(5.6)	2(5.0)

Table 4
Fingerprint Pattern according to Digits among A, B, AB & O Blood Groups

Individual Finger	Blood groups											
	A (28)			B (53)			AB (19)			O (40)		
	L	W	A	L	W	A	L	W	A	L	W	A
Thumb (t)	24 (17.9)	30 (23.4)	2 (11.1)	54 (16.4)	51 (27.9)	1 (5.9)	20 (21.1)	17 (19.5)	1 (12.5)	42 (17.1)	37 (27.8)	1 (4.6)
Index (i)	26 (19.4)	26 (20.3)	4 (22.2)	68 (20.6)	28 (15.3)	10 (58.8)	20 (21.1)	15 (17.2)	3 (37.5)	46 (18.8)	25 (18.8)	9 (40.9)
Middle (m)	24 (17.9)	25 (19.5)	7 (38.9)	79 (23.9)	22 (12.0)	5 (29.4)	20 (21.1)	15 (17.2)	3 (37.5)	61 (24.9)	13 (9.8)	6 (27.3)
Ring (r)	27 (20.2)	27 (21.1)	2 (11.1)	53 (16.1)	52 (28.4)	1 (5.9)	15 (15.8)	23 (26.4)	0 (0.0)	41 (16.7)	36 (27.1)	3 (13.6)
Little (l)	33 (24.6)	20 (15.6)	3 (16.7)	76 (23.0)	30 (16.4)	0 (0.0)	20 (21.1)	17 (19.5)	1 (12.5)	55 (22.5)	22 (16.5)	3 (13.6)
Total	134 (47.9)	128 (45.7)	18 (6.43)	330 (62.2)	183 (34.5)	17 (3.2)	95 (50)	87 (45.8)	8 (4.2)	245 (61.2)	133 (33.2)	22 (5.5)

Table 5
Frequency Distribution of Digital Patterns

Patterns (%)	RIGHT HAND DIGITS					LEFT HAND DIGITS				
	RI(140)	RII(140)	RIII(140)	RIV(140)	RV(140)	LI(140)	LII(140)	LIII(140)	LIV(140)	LV(140)
loop (L)	74 (52.9)	83 (59.2)	94 (67.1)	70 (50.0)	94 (67.1)	74 (52.9)	77 (55.0)	90 (64.3)	70 (50.0)	90 (64.3)
Whorl (W)	62 (44.3)	46 (32.9)	38 (27.1)	66 (47.1)	43 (30.7)	65 (46.4)	48 (34.3)	37 (26.4)	67 (47.9)	46 (32.9)
Arch (A)	4 (2.9)	11 (7.9)	8 (5.7)	4 (2.9)	3 (2.1)	1 (0.7)	15 (10.7)	13 (9.3)	03 (2.1)	04 (2.9)

Original Research Paper

A Study of Association of Trauma and Alcohol Consumption in Outpatient

*R. K. Punia

Abstract

Alcoholic beverages have been used in human societies since the beginning of recorded history. Alcohol related problems emerging as a major public-health concern in India. The study was conducted with the aim to highlight association of Trauma and Alcohol Consumption in Outpatient in Department of Forensic Medicine, SMS Medical College, Jaipur. A male predominance (100%) was observed with majority of the victims were of the most productive and active phases of life ranging from 21-50 years (84%). In the study, 27 cases were under influence and remaining 73 cases were not under influence but all the 100 cases had consumed alcohol or congener. Out of 100 cases, about 50% had associated injuries with alcohol consumption. The relation of alcohol consumption and health outcomes are complex and multidimensional, therefore, it is appropriate to implement policies with targeted harm reduction strategies. The crucial need, from a public health perspective, is for regular means of coordination whereby prevention of alcohol-related problems is taken fully into account in policy decisions about alcohol control and regulation in the market for alcoholic beverages.

Key Words: Alcohol consumption, Indian Penal Code, Alcoholic beverages, Intoxication

Introduction:

According to WHO estimates, there are about 2 billion people worldwide who consume alcoholic beverages and 76.3 million with diagnosable alcohol-use disorders. India is showing a phenomenal increase in alcohol consumption, with the initiation age on an alarming decrease. The recorded market and consumption levels are still very low vis-à-vis the global standard. The illicit market (spurious, seconds and thirds) consumption is far more than legal sales. India is generally regarded as a traditional 'dry' or 'abstaining' culture (Bennet et al, 1993).[1] Yet, it has one of the largest alcohol beverage industries in the world.

The UB Group, for example is the third largest spirits producer in the world after Diageo and Pernod Ricard (ICAP, 2006c).[2] India is the dominant producer of alcohol in the South-East Asia region (65 percent) and contributes to about 7% of the total alcohol beverage imports into the region. More than two thirds of the total beverage alcohol consumption within the region is in India.

There has been a steady increase in the production of alcohol in the country, with the production doubling from 887.2 million liters in 1992-93 to 1,654 million liters in 1999-2000 and was expected to almost treble to 2300 million liters (estimated) by 2006-07 (The Planning Commission of India, 2003). Since antiquity alcohol consumption has been described in various contexts.

Not only a social and a health problem, its consumption has legal issues related to it. Section 85 and section 86 of Indian penal code deals with the same. Provisions regarding creating a public menace after liquor intake have been described in section 510 of the Indian penal code.

Prevalence of Alcohol Use:

The prevalence of alcohol use is still low in India as per some studies done around the country. The per capita consumption is 2 liters per adult per year (calculated from official 2003 sales and population figures). After adjusting for undocumented consumption, which accounts for 45- 50% of total consumption, this is likely to be around 4 liters. A recent National Household Survey of Drug Use recorded alcohol use in the past year in only 21 percent of adult males.

Expectedly, this figure cannot mirror accurately the wide variation that obtains in a large and complex country such as India. The prevalence of current use of alcohol ranged from a low of 7% in the western state of Gujarat

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(officially under Prohibition) to 75% in the North-eastern state of Arunachal Pradesh. There is also an extreme gender difference. Prevalence among women has consistently been estimated at less than 5% but is much higher in the northeastern states. Significantly higher use has been recorded among tribal, rural and lower socio-economic urban sections.

Materials and Methods:

The study was conducted at the Department of Forensic Medicine and Toxicology, SMS Medical College from January-December 2012 as a prospective study. The subjects were those who are brought for the medical examination with alleged history of alcohol consumption. On the basis of statistical demands of the study a total of 100 subjects were taken into consideration. The subjects were chosen on random basis in this duration.

The clinical assessment was conducted by the duty doctors and documented in the Performa available at the department. They were then tabulated and analysed by applying simple statistical methods to draw out conclusions and compare the same with the equivalent studies conducted in the past.

Observations:

Our study showed that the prevalence of liquor consumption was maximum in the age group of 21-30 years of age (45%) followed by the age group 31-40 years of age. (Table 1) Muscle coordination is often associated with the Cerebellar functions. In present study muscle coordination was found to be compromised in 8% of the subjects. (Table 2)

Most of the subjects (70%) had findings suggestive of normal mental state and normal higher mental faculties. About one-fifth (21%) of the subjects were of violent and aggressive behavior secondary to the consumption of liquor. (Table 3) This study showed that about one-fourth (27%) of the subjects had a staggering or a typical alcoholic gait. (Table 4)

In present study, 27 cases were under influence of alcohol and remaining 73 cases were not under influence of alcohol but all the 100 cases had consumed alcohol or congener. These findings were based on the clinical examination and observational bias could not be ruled out. (Table 5) Out of 100 cases, 51 cases had associated injuries with alcohol consumption. (Table 6) Most of these injuries were inflicted in alleged assaults as per the history given. (Table 7)

Discussion:

Alcohol ranks topmost amongst the drugs of abuse and dependence. It not only is a

menace to the social and cultural organization but also to the physical and mental health of the individual.[3, 4] Worldwide alcohol has been associated with a huge constellation of pathological processes like liver disease, coronary vascular disease and neoplastic pathologies. [5-7] In the theories of criminology, the triad of youth, alcohol and crime has always been a famous one. The higher incidence of association of alcohol consumption with vehicular accidents and falls has been reported by various authors from time to time.

Alcohol has been consistently associated with violent crime, although the association might not always be causal. Not just criminal intent has been reported to increase under influence of alcohol, but also incidents resulting from outburst of emotions, heightened confidence and increased reaction time have also been reported [8]

In this study about half of the cases of alcohol consumption were associated with traumatic episodes resulting in injury. About three-quarters of them were not under the influence of alcohol at the time of traumatic episode as was evident clinically.

Most examinations had been carried out within a reasonable time of traumatic occurrence. Most of these episodes (58.82%) were attributable to the assaults as per the history given by the subjects.

Conclusion:

The study depicts the preponderance of male population as regards to alcohol consumption. Alcohol consumption is either minimal or under reported among the female population. This study reports a higher incidence of injuries in episodes of assault as compared to those resulting from vehicular accidents and falls, which have been reported more commonly.

This study also showed that alcohol consumption and also associated trauma was most commonly prevalent in the active and productive age groups the incidence of alcohol consumption and trauma is more common during the evening and night hours, the government policies should be made more stringent in this respect. Stricter rules should be imposed on those who voluntarily consume alcohol and resort to driving.

Primary and secondary preventive measures regarding the modern safety devices should be taken into account. Alcohol is not only a legal challenge but an age old socio-cultural problem and for this a multi-faceted approach should be followed by combined effort of various governmental agencies.

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Table 1: Age wise Distribution (n = 100)

Age Groups(Yrs.)	Cases	Percentage
1-10	0	0
11-20	09	9
21-30	45	45
31-40	21	21
41-50	18	18
51-60	04	4
>60	03	3
Total	100	100

Table 2: According to Muscle Coordination (n = 100)

Muscle Coordination	Cases	Percentage
Present	92	92
Absent	08	8
Total	100	100

Table 3: According to Mental Status (n = 100)

Mental Status	Cases	Percentage
Normal	70	70
Polite	09	9
Violent	21	21
Unconscious	0	0
Total	100	100

Table 4: According to Gait (n = 100)

Gait	Cases	Percentage
Normal	73	73
Staggering gait	27	27
Ataxic	0	0
Unable to walk	0	0
Total	100	100

Table 5: According to Opinion (n = 100)

Opinion	Cases	Percentage
Not under influence	73	73
Under influence	27	27
Intoxicated	0	0
Total	100	100

Table 6: According to Injury (n = 100)

Injury	Cases	Percentage
Present	51	51
Absent	49	49
Total	100	100%

Table 7: Trauma associated With Alcohol Intake & Mode of Injury (N=51)

Mode of injury	Cases	Percentage
Road traffic accidents	9	17.14
Assaults	30	58.82
Falls	12	23.52
Total	51	100

Original Research Paper

Estimation of Stature from Inter-Acromial Length in Western Indian Population: A Pilot Study

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Abstract

Stature estimation is a standard practice in the fields of Bio-Archaeology, Forensic, Biological and Palaeoanthropology. It can be accomplished most accurately by anatomical reconstruction, followed by type I regression equations using long bones of the lower limb. The skeletal remains presented to the Forensic departments are often incomplete and thus Forensic experts have to rely on other elements.

As no existing equations are clearly appropriate, this study aims to formulate a regression equation to establish relationship between stature and inter-acromial length of living individuals. Measurements were taken from 100 randomly selected medical students between 22-29 years of age, native to Gujarat, India, using spreading calliper (least count 1 mm). The documented measurement data was analyzed using SPSS software version 11. Three sets of regression equations were derived which revealed that predictive value from the equations was unsatisfactory. The study concluded that inter-acromial length is not a good parameter for stature estimation. Further detailed studies are recommended to support or negate the finding.

Key Words: Inter-Acromial Length, Stature, Correlation, Regression Equation

Introduction:

Stature estimation is one of the four attributes of the biological profile obtained from human skeletal remains. It contributes significantly in developing a biological profile for Forensic identification. The most common method employed for stature estimation is use of regression equations derived from length of long bones. The Karl-Pearson, Dupertius & Hadden and Trotter & Glesser formulae have been derived from predominantly Western populations. [1] However, little previous work has been done on stature estimation among modern Indian population, despite a growing number of Forensic cases in recent years. In India, Siddiqui & Shah, Singh & Soha and Mehta & Thomas have attempted to determine the stature with limited success. [2]

The problem of stature estimation has been addressed by the Athwale et al, Patel et al, Joshi et al, Lal and Lala etc. [1]

It poses a great challenge in commingled mutilated remains to Forensic experts and hence, there is a need felt for studies on estimation of stature from various body parts in different population groups.

Such studies can help in narrowing down the pool of potentially matching identities in cases of dismembered remains.

As no existing equations are clearly appropriate, new sample-specific regression equations formulation is always recommended. An approach is utilized in this study to establish the relationship between statures of western Indians population and their inter-acromial lengths; to develop regression equation formulae from these two variables by simple regression analysis. The formula thus obtained could be used for the determination of stature of individuals of this region.

Method:

The study sample comprised of randomly selected one hundred medical students of a tertiary care institute at Karamsad, Anand, during the period from 1st - 31st Jan 2102. The participants' age was between 22- 29 years with a mean age of 23.21 years (by this age, skeletal growth is presumed to be completed). M: F ratio of the participants was 39:61. The participants constitute mixed

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population (caste and region) of western India. Those with stunted or enhanced bone growth or with history of skeletal injury were excluded from the study. The participants were explained about the purpose and procedure of the study and informed consent was obtained.

The data for the present study were stature and inter-acromial length. The measurements were taken with procedures and landmarks as by Krogman. [1]

Stature:

Participant were asked to stand up erect against the wall with hands hanging down, feet axes parallel or slightly divergent, and head in the Frankfurt horizontal plane, without any headgear or footwear being worn; and stature recorded using an anthropometer rod set. No pressure was exerted since this is a contact measurement.

Inter-acromial length:

Inter-acromial length is the distance between two bony landmarks, i.e. acromial process of scapula on each side. Acromion is the most lateral point on the lateral margin of the acromial process when the subject stands in normal position with his arms hanging by the sides. The measurement from the vertex of head to the ground was taken after bringing down the adjustable cross-bar to the head and the measurement was read from the vertical scale.

Next, keeping point of one static arm of the anthropometer rod on right acromion, the tip of adjustable arm of the anthropometer rod was brought to the left acromion to measure the inter-acromial length in centimetres with the person in the same erect position.

The data were entered in MS Excel Sheet and analyzed statistically (using basic bivariate statistics and simple and multiple regression analyses) by SPSS software, version 11 to formulate regression equation.

The observer bias was reduced as they underwent training for measurement of the parameters. Then 5 cases were measured in front of the 4th author and the findings were confirmed by 4th author and the observer. The difference between both of them was negligible [$\leq \pm 0.2$ cms]. The degree of measurement error [$\leq \pm 0.2$ cms] and reliability are well within accepted standards.

Observations and Result:

Two variables were taken into consideration i.e. stature and inter-acromial [IA] length. Basic bivariate statistics and linear regression analyses was applied to find out correlation between the variables. Three regression equation formulae were obtained by

statistical analysis from the relationship between statures and inter-acromial lengths for females only, males only and males and females combined. (Table 1) As all the subjects were of nearly same age, correlation between age and inter-acromial length was not sought.

When combined data was used, positive correlation between stature and inter-acromial length was found which was statistically significant. (Scatter plot 1) On the other hand, there was insignificant correlation found between stature and inter-acromial length in either of the sexes. (Scatter plots 2 & 3)

Discussion:

Population variations in anthropometric dimensions do exist and are attributed to genetics, dietary habits and environmental factors. This indicates that specific formulae of regression equations used in prediction of stature are only applicable to the population from which the data were collected. [3]

Various researchers have attempted the estimation of stature from long bones by using different statistical methods with variable degree of success. Limitations have always existed in conducting such studies in terms of availability of adequate quantities and choice of bone and trained personnel. [4] Nevertheless, very little work has been reported on the use of these statistical methods to calculate the stature from the inter-acromial length in living.

A study reveals that the standard errors was ± 8 cm (males) and ± 5 cm (females). [5] In yet another study, it was ± 6 (males) and ± 4 (females). [6] The coefficient of correlation was poor in studies for males and females separately. There was some positive correlation when combined data was used but all were not satisfactory. Furthermore, when our data was used to determine stature from formulae derived from above two studies, both failed.

Aforementioned studies were conducted in different parts of India, but a notable difference in the regression equations in these studies is observed. This implies that inter-acromial length is probably not a good indicator for estimation of stature. The most suitable explanation can be that, inter-acromial length is not a fixed parameter, and the distance between the two landmarks varies considerably depending upon the position of the subject.

Furthermore, as the position of scapulae in an individual are predominantly determined by its muscular attachments, and is highly movable, any attempt to measure its distance and thereby formulating a regression equation to estimate

the stature will tend to give an erroneous correlation.

Our study re-emphasizes the fact that, estimating stature from long bones may continue to remain the gold standard in years to come.

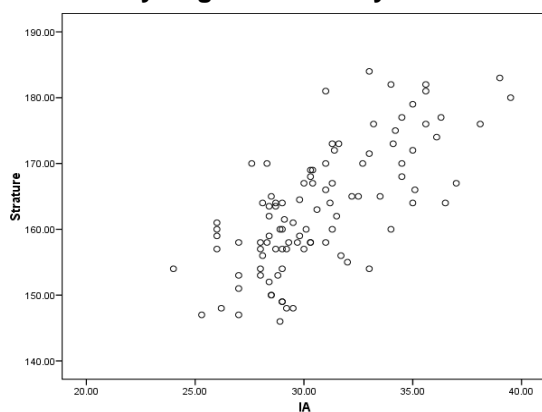
Conclusion:

It is concluded that inter-acromial length has limited forensic value and relatively low reliability in estimating stature in living individuals. Nevertheless, we recommend similar studies in other geographical areas and racial groups to be conducted. Since it is not a comprehensive study but it is aspired that the results may be viewed more as indicative of the feasibility of the technique in providing formulae applicable in the Forensic science work.

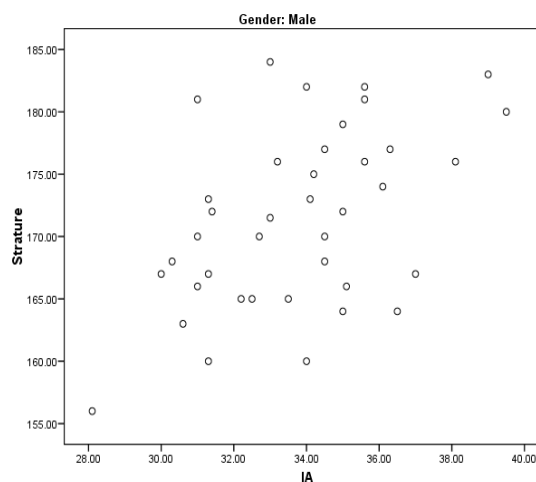
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Scatter plot 1: Positive Association confirmed by Regression Analysis



Scatter Plot 2: Insignificant Correlation in Males



Scatter Plot 3: No or Very Little Association in Females

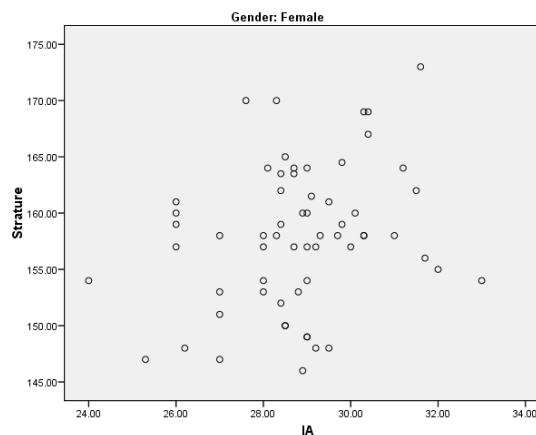


Table 1
Prediction of Stature from Inter- acromial length

Variable	Regression formula for stature (y)	Correlationcoefficient	R ²
Females	129.03+ 1.00 x	0.27	0.072
Males	126.10 + 1.34 x	0.48	0.233
Combined	99.06 + 2.09 x	0.71	0.504

Where x = IA length

Original Research Paper

Fatal Dextropropoxyphene Poisoning An Autopsy Study of 11 Cases

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Abstract

Dextropropoxyphene is an opioid analogue with antitussive and analgesic action. The drug is available widely in the market under various trade names and even without prescriptions. Its abuse is well known and deaths due to its use have been reported. A few fatal cases have been reported from India as well. We hereby describe 11 cases of death due to Dextropropoxyphene poisoning reported in the Department of Forensic Medicine and Toxicology, All India Institute of Medical Sciences, New Delhi during the period from March 2011 to August 2012. The majority of cases were males (90.9%) predominantly of the young adult age group. Six (54.5%) of those deceased, were belonging to North Eastern part of India, staying at Delhi. All were unemployed and majority of them were addicted to multiple drugs. In all the cases, cyanosis of finger nails, congestion of organs and pulmonary edema were observed. The details of the autopsy along with histopathological findings and its preventive measures are briefly discussed in this paper.

Key Words: Dextropropoxyphene addiction; Drug abuse; Death; Autopsy; Prevention

Introduction:

The increasing trend of drug abuse is a global concern, as the most productive age group of a population is affected by this social evil. Abuse of drugs meant for medical purposes makes it more challenging problem to tackle.

Developing countries like India forms one of the major pharmaceutical markets of the world. There are loopholes in law to regulate the restriction of availability of such drugs for other than medical uses. Many such drugs which are banned in developed countries due to their toxicity are still openly marketed. All these factors in combination are costing thousands of lives; Dextropropoxyphene/Propoxyphene is one such commonly abused drug in India. [1]

Dextropropoxyphene and its various combinations are over the counter available drugs in India in the trade name of **Spasmoproxyvon, Spasmocip Plus and Relipen** etc. [2]

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Dextropropoxyphene is an opioid analogue structurally related to methadone. Its L-isomers is responsible for antitussive actions whereas analgesic effect resides in the D-isomers by actions on 'mu'-receptors but less selective than morphine. Due to the selective action on the 'mu'-receptor, it has high addictive potential. Serum peak level is reached within one hour following rapid oral absorption.

It is metabolized in liver by N-demethylation to produce a more active metabolite nor-propoxyphene. The half-life of propoxyphene is 6 to 12 hours whereas nor-propoxyphene is 37 hours. Due to prolonged half-life, nor-propoxyphene is believed to play a role in the prolonged clinical course following an overdose. [3-5]

The authors studied deaths in which associations with drugs containing Dextropropoxyphene were strongly established after considering the history, histopathological and autopsy findings of cases.

Case Series:

We studied 11 cases of death, over a period from March 2011 to August 2012, with alleged history of propoxyphene poisoning; the autopsies of all such cases were conducted at the Department of Forensic Medicine and Toxicology, All India Institute of Medical Sciences, New Delhi.

History and relevant facts were collected from the submitted inquest papers and by

questionnaires to the relatives, which are documented in a tabular form. (Table 1)

The cases with definite history of addiction to propoxyphene containing drugs and cases in which empty foils of propoxyphene containing drugs are found in the crime scene or in the deceased's clothing/ pocket are included in the study. Causes of death other than poisoning were ruled out in autopsy.

In our study we observed that, 10 out of 11 victims were of the age group between 20-30 years. Only one of the 11 victims was a female. Six out of the eleven victims were from the North eastern region of India.

All the victims were found to be unemployed except the female victim who was a housewife. In five cases, there was a definite history of addiction to propoxyphene containing tablets. In eight cases empty wrappers of propoxyphene containing tablets were recovered either from the crime scene or from the clothing/pockets of the deceased.

In three cases (3, 4, 5) the body of the deceased were found in various stages of decomposition. In all other cases the deceased were brought dead to the hospital. In two cases (6, 10) the deceased had previously attended the de-addiction centers multiple times and were discharged after improvement. In seven cases (2, 4, 5, 6, 8, 10 & 11) along with propoxyphene there was definite history of addiction to multiple agents including alcohol.

Autopsy Findings:

On autopsy, in all the eleven cases cyanosis of finger nails, congestion of organs and pulmonary edema were observed. (Fig.1-4) In 4 cases (1, 3, 6, and 7) minor injuries like small contusions, abrasion and cut were found on the extremities of the body.

On histopathology examination, kidneys showed Medullary congestion and lungs showed edema and congestion. (Fig 5, 6) Histology of other organs was within normal limits.

Viscera of all the cases were sent for chemical analysis and dextropropoxyphene came as positive in one case, whereas the reports of other cases are awaited.

Causes of death other than poisoning had been ruled out by autopsy. Manner of death could not be determined with absolute certainty in our cases but accidental overdose was strongly suspected on the basis of police inquest papers and history.

Discussion:

Propoxyphene was first marketed in 1959 and the first death due to its toxicity was reported in 1964. [6] There after numerous

studies regarding its toxicity were reported from different parts of the globe. The first hundred fatal poisoning due to propoxyphene were reported from North Carolina. 65% of such deaths were due to suicide and the ratio of deaths of women to men was more than two (45 out of 65 suicidal deaths). [7] In India, deaths due to propoxyphene abuse are rarely reported and literature in this regard is scarce. Kaur N et al conducted a review study in which three cases of fatal propoxyphene poisoning were reported. [8]

We have found that majority of the victims were of the age group 20-30 years. This observation may be due to the higher peer group influence in this group of population, who turn into victims of drug abuse. This is in accordance with the study conducted by Birgitta Jonasson et al who observed that "age to be an important characteristic regarding the choice of drug and found that younger people predominantly died of Dextropropoxyphene abuse". [9] Similar finding was observed among the treatment seekers who reported for treatment were youngsters and were more often abusers of drugs like propoxyphene. [1]

The observation that "abuse of drugs was a predominantly male phenomenon" was established by a Focused Thematic study, based on interviews of subjects across multiple sites in India. In our study male victims (90.9%) outnumbered significantly to those of the females (9.1%). This finding further strengthens the above fact. [1] Unemployment, poor education, corruption and organized crime have a vicious relation with drug abuse. [10]

In our study, ten out of eleven victims were unemployed and one was a housewife. This significant finding is in lieu with the above observation. In three cases, the bodies were found in various stages of decomposition in their residence. This observation highlights the social detachment of the victims as well as secluding themselves during the use of such drugs.

In two of our cases (18.1%), the victims had previously attended the de-addiction centre multiple times and were discharged. But they resumed the use of contraband drugs which demands the need of continuous long term support as well as rehabilitation.

In seven cases (63.6%), there were history of addiction to multiple agents, like Diazepam, Ketamine, alcohol and other I.V drugs though many of them started abusing a single drug for recreational purposes, they gradually developed addiction to multiple drugs because of peer groups and other social activities. This observation highlights the

propensity in addicts for multiple drug abuse and proves drug abuse as a psycho-socio-medical problem. In our study 6 out of 11 (54.5%) victims were from North Eastern region of India. In Delhi, the populations of North Eastern origin are meager as compared to total population. So finding of 54.5 % of victims being from the North-eastern region is significant.

Spasmoproxyvon and other similar compositions are one of the most abused drugs in the North Eastern region of India. [1] Probably, the migrated population of these region have carried this particular trend to the study region (South Delhi) and thus showed increase number of death in that ethnic group.

In propoxyphene intoxication, respiratory and the cardiovascular system are most adversely affected. Propoxyphene is responsible for both Central Nervous System and Cardiac toxicity, whereas the major metabolite Nor-propoxyphene contributes only to the cardiac toxicity. This is manifested as dysarrhythmias along with prolongation of QT interval and PR-interval in ECG. These signs and symptoms are developed within 1 hour of intake. [11] This explains the asphyxial signs observed in the victims at autopsy and the sudden nature of death of the victims.

Hudson Page et al found at autopsy that lungs were heavy, edematous and congested with abundant white froth in respiratory tract in their cases. [7] The findings, we observed at autopsy in our cases are in agreement and additional to that observed by them.

Weighing overall balance between risk and benefit, FDA (Food and Drug Association) recommended removing all the products of propoxyphene from the US market. [12] Similarly, European Commission has banned the use of Dextropropoxyphene since 2011. [13, 14] Dextropropoxyphene is listed as a controlled substance in India also under the NDPS Act. [15] Though the drug has been listed in the controlled substances under NDPS act in India, yet it is been widely sold and purchased over the counter leading to unrestrained use by individuals. In this context, the International Narcotics Control Board has urged the Government of India to strengthen measures to ensure that pharmacists comply with prescription requirements and ensure that over the counter pharmaceutical preparations are not diverted to be used for non medical purposes. [10]

The authors observed that there are plenty of pharmaceutical preparations that can substitute the use of propoxyphene and its combinations. These drugs are addictive and

have narrow therapeutic range which creates drug abusers and causes sudden death in victims. After evaluating the present scenario and keeping in view of poor compliance to laws by pharmacies and general population in India, we suggest a complete ban and withdrawal of these drugs from the market, in lieu with United States and European commission guidelines.

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Fig. 1: Cyanosis of Nail Beds



Fig. 2: Congestion of Kidney, Spleen



Fig. 3: Congestion of Brain

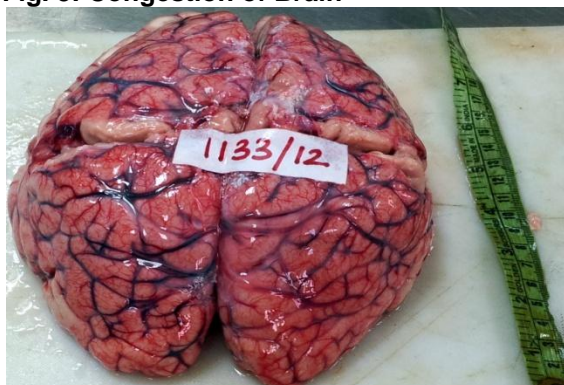


Fig. 4: Pulmonary edema and Congestion in Lungs



Fig. 5: Medullary congestion in Kidney on HPE

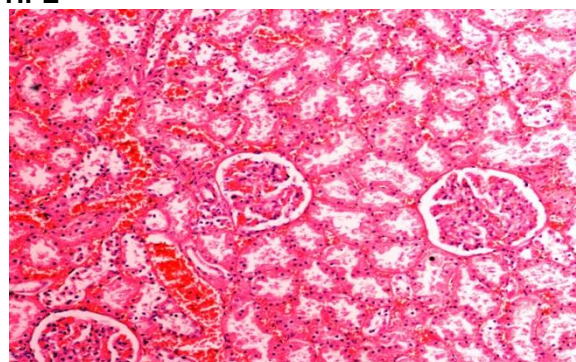


Fig. 6: Edema and Congestion in Lungs on HPE

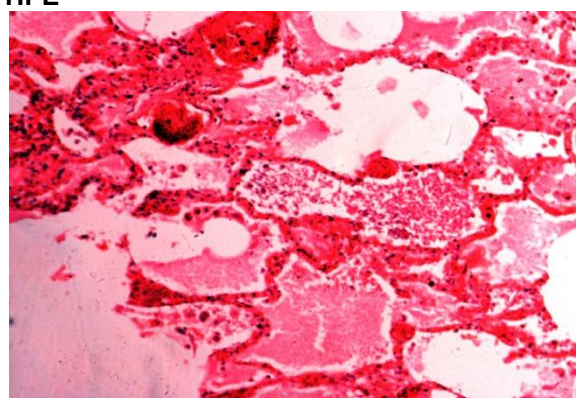


Table 1
History and Relevant Facts obtained through Questionnaires and Inquest Papers

S.N.	Age(yrs)	Sex	Staying at	State of origin	Occupation	Scene of occurrence
1	30	Male	Fatepur beri	Manipur	Unemployed	History of addiction to Spasmoproxyvon tablets
2	25	Male	K.M Pur	West Bengal	Unemployed	Spasmocip plus tablets recovered from home
3	31	Male	K.M Pur,	NE	Unemployed	History of addiction to Spasmoproxyvon tablets
4	28	Male	N.F Colony	Delhi	Unemployed	Empty wrappers of Spasmoproxyvon found in home
5	25	Male	Munirka,	NE	Unemployed	Strips of Spasmocip plus tablets
6	22	Male	Dakshinpuri	Delhi	Unemployed	Empty wrappers of Spasmocip was recovered from the site
7	28	Male	Manipur	Manipur	Unemployed	History of addiction to Spasmoproxyvon since many months.
8	23	Female	S. Vihar,	Delhi	House wife	Three empty wrappers of Spasmocip plus recovered from scene.
9	34	Male	Vasant vihar	Manipur	Unemployed	Empty wrappers of relipen recovered from pocket.
10	22	Male	Bihar	Bihar	Unemployed	History of addiction to Spasmoproxyvon with recovery of empty wrappers from scene.
11	30	Male	Delhi	Delhi	Unemployed	Empty wrappers of Spasmocip was recovered from the site

Original Research Paper

Estimation of Time Passed Since Death by New Biochemical Parameters: MDA (Malondialdehyde) and Total Thiol

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Abstract

Determination of time passed since death is extremely important medico-legal issue. It requires meticulous examination, documentation and subsequent necessary evaluation by various pathological and biochemical examination. Two biochemical parameters, MDA breakdown product of lipid per oxidation and Total Thiol which is responsible for the protection of cells against oxidative stress are measured to estimate Time Passed since Death. Pearson correlation in various causes of death shows MDA level is significantly correlated with time passed since death, whereas Total Thiol level is inversely proportional. This study establishes role of MDA and Total Thiol as biochemical parameters to estimate time passed since death.

Key Words: Time passed since death, Biochemical parameters, MDA, Total Thiol. Causes of death

Introduction:

Determination of time passed since death is extremely important for any investigation into the cause of death in the cases where death is sudden, suspicious or unnatural. [7] The post mortem changes give us clues about the time elapsed since death and this single vital information when calculated accurately has the potential to reveal many unfolded medico-legal mysteries. [8]

Several studies were conducted to see the role of biochemical parameters in determination of time since death. Lactic acid, amino acid nitrogen and non protein nitrogen (NPN), different enzymes like acid and alkaline phosphatases and transaminases (ALT) had shown an increasing trend. [1] LDH levels in serum also showed a linear rise. Lipid peroxidation is defined as the oxidative deterioration of polyunsaturated fatty acid.

The basic structures of all cell and organelle membranes are lipid bilayer, which mainly contain polyunsaturated fatty acid (PUFA) side chains. [6] Free radicals Hydroxyl, peroxy, hydroperoxy, alkoxy etc are capable of oxidizing PUFA.

Free MDA which arises largely from per oxidation of PUFA, measuring is the commonest assay of lipid per oxidation in vitro. [2] Low molecular weight Thiol, an organo-sulfur compound, and their associated enzymatic recycling systems are responsible for the protection of cells against oxidative stress.

Thiol containing compound is a Glutathione peroxidase. The Glutathione peroxidase super family present in plasma, in the cell lining of gastro intestinal tract, in the cytosol of red blood cells and also attached to the inside of the erythrocytic membrane.

During cell death the cell membrane as well as the enzymatic system all destroyed. So there will be certainly a change in MDA and Thiol levels in blood after death.

Materials and Methods:

This cross-sectional study was done in FSM Department and Biochemistry Department of NRS Medical College, Kolkata. Total 90 cases were selected according to cause of death.

Blood sample was collected from the great vessels, the heart of the deceased by the help of disposable syringe in plain vial with known passage of time. The serum was separated from the clotted blood by centrifugation. Estimation of MDA was done by

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method of Ohkawa et al and of Thiol done by M.L.Hu method.

1. MDA (Malondialdehyde) Estimation:

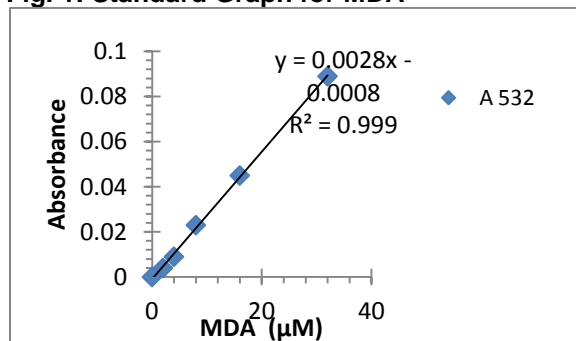
Reagents Used: TBA (Thiobarbituric acid), SDS (Sodium Dodecyl Sulphate), 20% Acetic Acid (pH 3.5), Mixture of n-butanol and pyridine (15:1), MDA as standard

Protocol: Here 1ml of serum was added to 1.5 ml of 0.8% aqueous solution of TBA, 0.4ml of 8.1% SDS and 1.5ml Acetic Acid (pH 3.5). The mixture was finally made up to 5ml by adding distilled water and heated at 95°C in a water bath for 1 hour. After cooling 1ml of distilled water and 5ml of n-butanol, pyridine (15:1) was added. The mixture was shaken vigorously after that centrifuged at 4000 round per minute for 10minutes. The absorbance of the organic layer was measured at 532 nm (A) against water blank (B).

The calculation of MDA is = (A – B)

The standard graph for MDA is plotted and the test values were extrapolated from the standard graph.

Fig. 1: Standard Graph for MDA



2. Total Thiol Estimation:

Reagents used: Tris-EDTA buffer, DTNB, Absolute Methanol.

Protocol: 200 μl serum was mixed with 600 μl Tris-EDTA (0.25M), EDTA (20mM) buffer, at pH 8.2 followed by addition of 40 μl, 10 mM DTNB and 3.16 ml absolute methanol.

It is kept for 15 minutes at room temperature. The absorbance of supernatant is measured at 412 nm (A) spectrophotometrically, and subtracted from a DTNB blank (B) and a blank containing the sample without DTNB (0.03). Total S-H groups were calculated using an absorptivity of 13600 cm⁻¹M⁻¹ (extinction coefficient). The calculation of measurement of total Thiol was (A-B-0.03) X 4/0.2 ÷ 13.6 mM = (A-B-0.03) X 1.47 m

Results:

Table 1: Pearson correlation of Time passed since with MDA and total Thiol in death from different causes

Cause Of Death	Time Passed Since Death	
	MDA	TOTAL THIOL
Burn	0.682	-0.530
Asphyxia	0.382	0.131
Poisoning	0.640	-0.325
Fall from height	0.555	-0.305
Road traffic accident	0.479	-0.275

Discussion:

Lipid oxidation gives rise to a number of secondary products. Malonaldehyde is (MDA) one of the most frequently used indicators of lipid peroxidation. [4] The degree of lipid peroxidation is determined by measuring MDA concentration in postmortem blood. [5] This aldehyde is a highly toxic molecule and should be considered as more than just a marker. [3]

MDA Pearson correlation of Time passed since death with MDA and Total Thiol in the cases of various cause of death shows that MDA level is significantly correlated with time passed since death, i.e. as time elapsed since death increases the level of MDA in post mortem blood also increases as cells are disrupted after death. On the other hand Total Thiol level is inversely proportional with time passed since death, means negatively correlated. it indicate that as time passed since death increases the level of Total Thiol in post-mortem blood decreases and protection of cells from oxidative stress lost.

Conclusion:

This study shows that MDA and Total Thiol can be helpful and important biochemical parameters to estimate time passed since death.

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Original Research Paper

Role of Foot Impressions and Boot Marks A Comparative Evaluation on Soft and Hard Materials

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Abstract

The foot print of a suspected person is valuable Forensic evidence along with other evidences at the place of crime scene investigation. The foot print can be studied by anatomists, anthropologists, physicians, podiatrists and orthopaedicians. Foot can be studied by foot prints and shoe prints. Present study conducted to ascertain the foot impressions and boot marks as means of identification of individuals, to compare dimensions of foot impression and boot mark on papers and POP casts and to know the value of POP cast footprint. The foot prints are lifted by POP cast from the crime scene. The foot prints of suspects can be taken on soft and hard materials for comparison. The evidence on a hard material is difficult to carry as compared to soft materials however both are equally important. Foot prints are found more common in the rural areas mainly in the fields because of mud. It is difficult to find foot print on the cemented structures in urban areas.

Key Words: Foot prints, Crime scene, POP cast, Shoe prints, Evidence, Rural areas

Introduction:

Crime scene investigation requires positive identification of the foot prints evidence left at the crime scene by the criminals. Forensic experts should lift the foot print evidence from the scene of crime, and then they should be able to match the foot prints taken from suspects to make a logical and scientific opinion regarding the evidence. The foot print of a person from a fresh foot mark should be lifted and then compared with the suspected person for identification. During examination careful note should be made regarding flat foot, scars from wounds or callosities. In case of boot mark the arrangement of nails and holes in the sole are important. Foot prints produced while walking are larger than the foot prints while standing.

The skin pattern of the toes and heels and flexion creases are permanent and distinct so some maternity homes take the foot print on paper of newly born for a permanent record. [1]

The footprints records are maintained for all air force flying personnel in most countries since feet often resist destruction by air craft accidents and fire etc. [2]

Aims and Objectives:

- To ascertain the foot impressions and boot marks as means of identification of individuals,
- To compare dimensions of foot impression and boot mark on papers and POP casts and
- To know the value of POP cast footprint.

Material and Methods:

Present study was conducted on the foot impressions of 60 students' bare footed and same 60 students with shoe studying in Maharishi Markandeshwar University, Mullana. Students of both sexes and with any abnormality of foot/lower limb were included in this study

Materials which were used in the study were plaster of Paris having consistency of cream, Mud, Black painters ink, Paint brush, White sheet, Metal scale, Lab tray and Tissue paper. The procedure was explained to the subject and consent was taken. Subject was asked to stand on mud with both feet straight and leave the impression. (Fig. 1)

The prepared POP of consistency of cream was gently poured over the impression, after 10-15 minutes cast was set completely and then POP cast was removed. (Fig. 2)

The same subject was asked to give the second impression. Black painters ink was applied over the both feet uniformly and subject was asked to stand on the white sheet with both feet straight to leave a clean impression. (Fig. 3)

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The same procedure was repeated with the subject wearing shoes. (Fig. 4-6) Now the dimensions of POP casts and impressions taken on white sheet of both subjects (with shoes and without shoes) were measured in centimeters, compared and analyzed statistically.

Results:

In this study, Out of total 60 subjects, maximum subjects were 18 years of age comprising 28.3% of total subjects and minimum subjects were of 26 years age, comprising 5% respectively. Mean age of the subjects was 21.22 ± 2.847 years. (Table 1) In our study 50% of total subjects were male and same 50 percent were females whose samples of foot were taken with shoes and without shoes on POP cast and paper. (Fig. 7) Our study showed positive correlation (Table 2)

- Between the length of right foot taken on paper print and length of right foot taken on pop cast. (Correlation = 98.5%)
- Between the length of left foot taken on paper print and length of left foot taken on pop cast. (Correlation = 99%)
- Between the breadth of right foot taken on paper print and length of right foot taken on pop cast. (Correlation = 94.3%)
- Between the breadth of left foot taken on paper print and length of left foot taken on pop cast. (Correlation = 94.1%)
- Between the length of right foot with shoes taken on paper print and length of right foot with shoes taken on pop cast. (Correlation = 99.6%)
- Between the length of left foot with shoes taken on paper print and length of left foot with shoes taken on pop cast. (Correlation = 97.1%)
- Between the breadth of right foot with shoes taken on paper print and breadth of right foot with shoes taken on pop cast. (Correlation = 97.3%)
- Between the breadth of left foot with shoes taken on paper print and breadth of left foot with shoes taken on pop cast. (Correlation = 92.2%)

Discussion:

Foot prints present at crime scene are helpful in knowing the age, sex and height of the criminal. Kennedy studied the uniqueness of bare foot impressions. He constructed a computer data base using inked bare foot prints from volunteers.

The data consisted of 19 different measurements and tracing of impression of each foot. The data base consisted of 4000 impressions. [3]

Kersholt concluded that trace evidence was more important in legal cases. He investigated shoe print examination and found the differences that exist between beginners and experienced examiners. 12 examiners assessed between a shoe print and a shoe for 8 different cases. A complex case was that when the perpetrator rotated his foot and a simple case was that impression was clear. [4]

Zeybek studied stature and gender estimation in foot measurements. Gender estimation formulas were made from 249 subjects using the length, width, malleoli height, navicular height and measurements of right and left foot. Gender estimation formula was developed with accuracy 95.6% for right foot and 96.4% for left foot. [5]

Sen and Ghosh studied the foot prints of 350 adults Rajbhanshi and 100 adults Meche individuals for estimation of stature from foot length and foot breadth. [6]

Krishan analyzed 2080 bare foot prints of 1040 adult male Gujjars of North India ranging the age from 18 to 30 years. [7]

Kanchan et al studied the stature, foot length and foot breadth of 200 subjects comprising 100 males and 100 females. [8] Moorthy studied the foot prints of Malaysian athletes and non athletes for application during Forensic comparison.

It indicated that the parameters such as foot print length, inter-metatarsal distances and flat index are somewhat different between athletes and non athletes. [9]

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Fig. 1: Foot Impressions on the Mud Bare Feet



Fig. 2: Foot Impressions by POP CAST with Bare Feet



Fig. 3: Foot Impressions on the Paper Bare Feet



Fig. 4: Shoe Impressions on the Mud



Fig. 5: Shoe Impressions by POP CAST



Fig. 6: Shoe Impressions on Paper



Fig. 7: Sex Wise Distribution of the Study Subjects

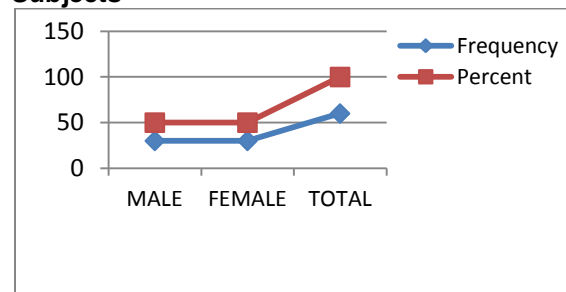


Table 1: Age Wise Distribution

Age (in years)	Frequency	Percent
18	17	28.3
19	10	16.7
20	2	3.3
22	6	10.0
23	7	11.7
24	9	15.0
25	6	10.0
26	3	5.0
Total	60	100.0

Original Research Paper

Evaluation of Histopathologic Role in Providing Cause of Death in Sudden Unexpected Natural Death

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Abstract

Sudden unexpected natural death in an adult is an issue of great concern for medical professionals. Cardiovascular pathology is the most common cause of sudden death. However, no definitive cause of death can be found at post-mortem and subsequent histopathologic examination in a minority of cases. The present study aims to evaluate the role of a histopathologist in providing a conclusive cause of death, to assess the percentage of cases where a conclusive diagnosis could not be offered, age and sex distribution of the cases of sudden death and compare the data with that obtained in other studies. Data from our study showed 89.77% male deaths. Seventy five percent of deaths were seen in < 40 years of age. Maximum number of cases (39.77%) was seen in second decade followed by third decade (26.13%). Cardiac causes of sudden death accounted to 69.13% of the cases. Non cardiac causes contributed 11.36% of cases. In 19.31% cases even after detailed histopathologic examination cause of death could not be concluded.

Key Words: Sudden death; Histopathology; Negative autopsy; Cardiac; Non cardiac

Introduction:

Sudden unexpected natural death cases in adults are steadily increasing world over and is an issue of great concern for medical professionals. [1] Sudden death especially of a young and apparently healthy adult is not only shocking but also has profound impact on the psyche of the society. [2]

The Forensic specialist along with the help of Forensic histopathologist are not limiting themselves to excluding violent causes of death, but are trying to study sudden death cases in depth and unravel the cause behind it. Cardiovascular pathology is the most common cause of sudden death. [3] However, no definitive cause of death can be found at post-mortem and subsequent histopathologic examination in a minority of cases. [4]

The present study aims to evaluate the role of a histopathologist in providing a conclusive cause of death, to assess the percentage of cases where a conclusive diagnosis could not be offered, age and sex distribution of the cases of sudden death and compare the data with other studies.

Methods:

The study is a retrospective study conducted at Department of Pathology of a tertiary care teaching hospital. All the cases of sudden death received over a period of two years between September 2011 and August 2013 were included. These organs are received mostly from Department of Forensic Medicine housed in the same teaching hospital.

Some of the specimens are received as referrals from the health centres located in the surrounding districts. Organs from 554 cases were received during this period for histopathologic examination of which 111 cases were referrals from other health centres. Of the 554 cases received, 88 cases were received with a history of sudden death. Of these 88 cases 5 were referrals and 83 were from our institute. The organs commonly received in a case of sudden death are heart, lung, liver, kidney, spleen and brain.

Sudden unexpected natural death is defined as natural death occurring instantaneously or within 24 hours of onset of

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symptoms in a patient who may or may not have a known pre-existing disease, but in whom the mode and time of death is unexpected. [1]

The autopsies are conducted by Forensic specialists at Department of Forensic Medicine. A total of 7659 cases were autopsied in the two year period. All the autopsies are medico-legal in nature. After a thorough autopsy examination, the Forensic specialist sends organs in 10% formalin to Department of Pathology for histopathologic examination.

In the Department of Pathology, detailed gross examination findings of all the organs received were noted. Tissue sections taken from the organs are formalin fixed, paraffin embedded and slides prepared are stained by routine Haematoxylin and Eosin stain. The slides are viewed under a light microscope and a final diagnosis is given wherever possible.

Results:

Our study showed total 79 (89.77%) male deaths. The youngest case was that of a 16 year old male who died due to rupture of a dissecting aneurysm and the oldest was an 85 year old male who had hypertensive changes in heart and kidney and noncritical narrowing of 2 coronary vessels. Amongst the nine females in this series, the youngest was 20 years who died of myocarditis and the oldest female was 30 years who was a known epileptic of more than 10 years duration. Seventy five percent of deaths were seen in <40 years of age. Maximum number of cases were seen in second decade 35 (39.77%) followed by third decade 23 (26.13%). (Table 1)

Cardiac causes of sudden death accounted to 69.13% of the cases. The non-cardiac causes included cerebral malaria, aspiration of vegetable matter, pneumonia, cerebrovascular accident, SUDEP (sudden unexpected death due to epilepsy) etc. (Table 2)

In this study there were 10 (11.36%) cases of myocardial infarction of which 2 (2.27%) cases showed noncritical narrowing of the coronary arteries. The youngest was 23 years male and the oldest is 65 years male.

There were 3 cases each in 21-30 years age group, 31-40 years and in 61-70 years and 1 in 51-60 years. 30 (34.09%) cases showed evidence of atheromatous plaques in the coronary arteries, of these, 8 cases showed critical narrowing of the coronary arteries with no gross or light microscopic evidence of myocardial infarct and 4 (3.40%) each had features of associated hypertensive changes and evidence of old healed myocardial infarct.

Present study showed 4 (4.54%) cases of hypertrophic cardiomyopathy, 8 (9.09%) cases of myocarditis and 2 (2.27%) cases each of dilated cardiomyopathy, aortic dissection, arrhythmogenic right ventricular dysplasia (ARVD), aspiration and pneumonia. There was 1 (1.13%) case each of rheumatic mitral stenosis with left atrial dilatation, cerebrovascular accident, vasculitis, left ventricular aneurysm, cerebral malaria and acute pyelonephritis with evidence of disseminated intravascular coagulation (DIC). In 17 (19.31%) cases even after detailed histopathologic examination cause of death could not be concluded. (Table 2)

Discussion:

Cardiovascular pathology is the most common cause of sudden death. Coronary artery disease tops the list with 45.45% of cases being attributed to it, followed by myocarditis (9.09%) and cardiomyopathies (9.09%).

Atherosclerosis of coronary arteries and its downstream sequelae are responsible for most of the cardiac morbidity and mortality. [4, 5]

At the early stages of plaque induced stenosis, outward remodeling of the vessel media helps in preserving the luminal diameter. However, as the luminal stenosis progresses, a point is reached at which the demand begins to exceed supply. This is referred to as critical stenosis and it typically occurs at approximately 70% of fixed stenosis. [6]

In the present study 16 cases had critical narrowing of the coronary arteries of which only 8 cases showed light microscopic evidence of myocardial infarction. This could be because of the short interval between the onset and death which precludes the development of characteristic histologic features of myocardial death. 24 cases showed features of noncritical narrowing of coronary arteries.

The atherosclerotic plaque can be seen in one or more of the three major coronary epicardial arteries, i.e. left anterior descending artery (LAD), left circumflex artery (LCX) and right coronary artery (RCA). Significant stenosing lesions can be located anywhere within the vessels but tend to be seen in the first few cms of LAD and LCX and along the entire length of RCA.

In our study, out of 10 cases of myocardial infarction, four cases had triple vessel disease, five cases had 2 vessels affected by atherosclerotic process and 1 case had involvement of only one coronary artery. 8 out of the 10 cases showed evidence of atherosclerotic plaques in left anterior descending artery.

There is one case of left ventricular wall aneurysm. Aneurysms of the ventricular wall are a late complication of large transmural infarcts that experience early expansion. The thin scar tissue in the wall of an aneurysm paradoxically bulges during systole. Death was attributed to contractile dysfunction secondary to the ventricular aneurysm.

Non-atherosclerotic conditions that are associated with sudden death include myocarditis, dilated and hypertrophic cardiomyopathy, rupture of aortic dissection, acquired cardiac arrhythmias, cardiac hypertrophy of any cause including hypertension and miscellaneous causes including drug abuse.

Cardiomyopathies and myocarditis showed equal number of cases in this study (9.09%). Hypertrophic cardiomyopathy (4cases) presents with heart weighing more than 500 gms. Microscopically all the four cases showed haphazard disarray of bundles of myocytes, myocyte hypertrophy with transverse myocyte diameter more than 40µm and evidence of interstitial fibrosis. Rhythm disturbances seen in association of hypertrophic cardiomyopathy can result in sudden death. [7]

Dilated cardiomyopathy presents usually with slowly progressive signs and symptoms of congestive heart failure such as shortness of breath, easy fatigability, and poor exertional capacity. Arrhythmia can occur resulting in sudden death.

ARVC is an uncommon cardiomyopathy accounting for only 2.27% of the sudden death which is much less compared to other studies. [4] It is morphologically characterized by severely thinned out right ventricular wall because of loss of myocytes, with extensive fatty infiltration and fibrosis. [8]

The fibro-fatty replacement leads to ventricular arrhythmias, predisposing the individual to potential sudden death. [4] Eight patients had myocarditis with a macroscopically normal heart. Microscopy showed an interstitial patchy mononuclear, predominantly lymphocytic inflammatory infiltrate associated with focal myocyte necrosis. Most of the cases were seen in <40 years of age (6 out of 8) and 2 of the 8 deceased were females.

Coronary vasculitis is a rare form of coronary artery disease, and even rarer cause of sudden death. [9] In our study there is a case of 22 weeks pregnant woman who was on regular antenatal check-up presenting with vague abdominal complaints. She expired within 6 hours of onset of her complaints. Detailed examination showed evidence of vasculitis involving both LAD and LCX coronary arteries.

There was also evidence of vasculitis involving vessels in liver and kidney.

Rheumatic fever is an acute, immunologically mediated, multisystem inflammatory disease that occurs a few weeks after an episode of group A streptococcal pharyngitis. Acute rheumatic carditis is one of the manifestations of the active phase and it may progress over time to chronic rheumatic heart disease of which valvular abnormalities are key manifestations.

Mitral valve is often involved resulting in mitral stenosis, of which rheumatic heart disease is virtually the only cause. [6] One case in this series was that of a 23 year old male who collapsed and died while at work.

Examination of the heart revealed mitral stenosis with left atrial dilation. Stenotic mitral valve leads to progressive left atrial dilation and may harbour mural thrombi in the appendage or along the wall. Death in this case was attributed to probable embolization of left atrial thrombus.

Aortic dissection occurs when blood splits apart the laminar planes of the media to form a blood-filled channel within the aortic wall.

It begins as an intimal tear through which blood flow under systemic pressure dissects through the media, fostering progression of the medial hematoma. It can be catastrophic if the dissection ruptures through the adventitia and haemorrhages into adjacent spaces. [6, 10] Both the cases in this study presented with a ruptured aortic dissection.

This study showed 19.31% cases having morphologically normal heart in the context of sudden death. It ranges from 1%-23% in various other studies. [2, 4] Various electrical abnormalities of the heart are known to predispose an individual to sudden death.

They include long QT syndrome, Brugada syndrome, short QT syndrome, catecholaminergic polymorphic ventricular tachycardia, Wolff-Parkinson-White syndrome, congenital sick sinus syndrome, and isolated cardiac conduction disease.

The most important of these disorders are the channelopathies, which are caused by mutations in genes that are required for normal ion channel function. The knowledge and awareness on these conditions which are not detected at autopsy has transformed the approach to the negative autopsy. [4, 6, 11, 12]

Non cardiac causes of sudden death in this study include cerebral malaria (1.13%), SUDEP (3.40%), aspiration (2.27%), acute pyelonephritis with features of DIC (1.13%), pneumonia (2.27%) and cerebrovascular accident (1.13%). Cerebral malaria is

characterized by brain vessels plugged with parasitized red cells. It is usually diagnosed ante-mortem. However, occasionally sudden death is known to occur. [13, 14] Epilepsy is a chronic disabling condition of the nervous system. There are 3 cases of diagnosed epilepsy, one of which is of more than 10 years duration. Detailed autopsy examination in these cases did not reveal any definitive cause of death. These 3 cases of sudden death could probably be attributed to sudden unexpected death due to epilepsy (SUDEP).

SUDEP is defined as "sudden, unexpected, witnessed or unwitnessed, non-traumatic and non-drowning deaths in patients with epilepsy, with or without evidence of seizure and excluding documented status epilepticus, in which post-mortem examination does not reveal a toxicological or anatomical cause of death". SUDEP is essentially a diagnosis of exclusion of other causes of death. [15]

Conclusion:

Cardiovascular pathology is a major contributor for sudden death. In most of the patients the first and only clinical expression of coronary atherosclerotic process is sudden death. The role of the histopathologist is to provide a detailed examination of the organs, especially heart, in order to identify a definitive cause of death. However, sudden death with a morphologically normal heart is a very important negative finding at autopsy.

A substantial number of such negative autopsies have been attributed to conduction system abnormalities, channelopathies, long QT syndrome and catecholaminergic polymorphic ventricular tachycardia (CPVT). Thus, though a histopathologist plays a vital role in providing a definitive cause in sudden death, it is imperative that the heart of all young individuals dying unexpectedly be examined by an expert cardiac pathologist. [4] This will help us reduce the number of negative autopsies in the long run and provide a definitive cause of death.

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Table 1: Age wise Distribution of the Cases

Age	Cases (%)
11-20 years	08 (9.09%)
21-30 years	35 (39.77%)
31-40 years	23 (26.13%)
41-50 years	07 (7.95%)
51-60 years	08 (9.09%)
61-70 years	05 (5.68%)
71-80 years	01 (1.13%)
81-90 years	01 (1.13%)

Table 2: Histopathologic Distribution of Various Cases

Cardiac causes of sudden death	Cases (%)
Coronary artery disease	40 (45.45%)
Myocarditis	8 (9.09%)
Hypertrophic cardiomyopathy	4 (4.54%)
Dilated cardiomyopathy	2 (2.27%)
ARVD	2 (2.27%)
Dissecting aneurysm	2 (2.27%)
Lt ventricular aneurysm	1 (1.13%)
Vasculitis	1 (1.13%)
Rheumatic mitral stenosis	1 (1.13%)
Negative autopsy	
Nothing significant	17 (19.31%)
Non cardiac causes of sudden death	
SUDEP	3 (3.40%)
Pneumonia	2 (2.27%)
Aspiration	2 (2.27%)
Cerebral stroke	1 (1.13%)
Cerebral malaria	1 (1.13%)
Acute pyelonephritis with DIC	1 (1.13%)

ARVD- Arrhythmogenic right ventricular dysplasia, SUDEP- sudden unexpected death in epilepsy, DIC- Disseminated intravascular coagulation

Original Research Paper

Profile of Road Traffic Fatalities in Adults A 40 Year Study in Chandigarh Zone of North West India

¹Dalbir Singh, ²Kumaran Moorthi, ³Satinder P Singh, ⁴Sonu Goel

Abstract

Road Traffic Accidents are one of the leading causes of morbidity & mortality in the world. The present study was based on the autopsy records of unnatural deaths occurred in a leading tertiary health care center of North West India. The adult road traffic fatalities constituted 41% of all unnatural deaths with male preponderance (89.6%) throughout the study period. People in the age group 21-30 years (32%) particularly from rural areas (57%) were most affected. The pedestrians and two wheeler users formed the majority of fatalities (78%). Collision between two wheeler and light motor vehicle was the most common crash pattern and injury to head & neck region was the most common cause of death. Maximum number of accidents occurred between 4pm to 8pm (28%) and in the month of November (11%). Unskilled workers, agricultural workers and government employees constituted a larger proportion of fatalities (45%).

Key Words: Accidents, Two-wheeler, Pedestrian, Crash pattern, Unnatural Death

Introduction:

Road Traffic Accidents (RTAs) have emerged as a new health challenge in the world which not only leads to injuries, disabilities and loss of precious human lives but also imparts a substantial economic burden on the family concerned and the nation as whole.

After Ms. Mary Ward, who was the first documented victim of automobile accident that took place on August 31, 1869, [1] the global road traffic fatalities count has raised to about 1.2 million/year. [2] RTAs are the eighth leading cause of death in the world and are expected to rise to the fifth position by the year 2030, if adequate measures are not taken. [2]

Road traffic injuries account for about 38 million disability-adjusted life years (DALYs) lost worldwide. [3] In India one person dies every four minutes as a result of RTAs. [4] In 2010 about 133,938 fatalities occurred in India as a result of RTAs which were 5.5 % more when compared with the previous year. [5]

In order to implement preventive measures a detailed epidemiological data is inevitably required, but unfortunately a complete data is not available even in some of the developed nations like the United Kingdom and the New Zealand. [6]

This study aims to provide a baseline data on RTAs in North West India for the policy makers to plan the human habitation, implement preventive measures and to equip the health care institutions.

Methods and Materials:

This retrospective study analyzed the autopsy records of unnatural deaths in adults that occurred between 1971-2010 at Postgraduate Institute of Medical Education and Research (PGIMER) Chandigarh, India.

Post-mortems on these cases were carried out in the Department of Forensic Medicine. The subjects in the present study were victims of RTAs, between 18-60 years of age and mostly belonged to the states of Punjab, Haryana, Himachal Pradesh and the Union Territory of Chandigarh. (Fig. 1)

The information regarding age, sex, occupation of the deceased, time and mode of accident etc., was obtained from the autopsy records. The road users were classified as occupants of two wheeler, three wheeler, light motor vehicle (cars, jeeps etc.), heavy motor vehicles (trucks, buses etc.), pedestrians and others (animal drawn vehicles like bullock carts, etc.).

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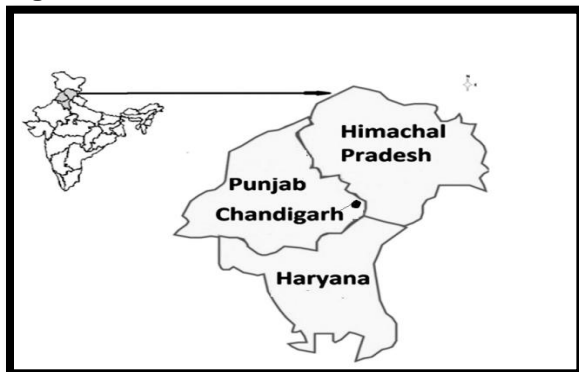
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Fig. 1:



The results were analyzed using Microsoft excel and a statistical software, SPSS 20.

Results:

Out of 15212 unnatural deaths reported in the institution, the adult road traffic fatalities constituted 41% (n=6307). There was a gradual rise in adult road traffic fatalities in the first 25 years of the study varying from 1.5% in the block year 1971-75 to 6% in the block year 1991-95 but after this period the fatalities rose much more steeply and constituted 35% of the total fatalities in the last five years of this study. (Fig. 2) Statistically significant ($p < 0.01$) male preponderance (89.6%) was observed throughout the study period with male to female ratio of 8.6:1.

The most vulnerable age group was found to be 21-30 (31.68%) years, followed by 31-40 years (26.42 %). (Table 1) The fatalities gradually decreased as the age group increased above 30 years. The distribution of fatalities indifferent age groups in the study period was found to be statistically significant ($p < 0.01$).

The RTA fatalities from the state of Punjab (37.51%) were consistently higher than other states viz. Haryana (28.35%), Union Territory of Chandigarh (13.26%) and Himachal Pradesh (9.81%). The rest of the victims (11.07%) belonged to other neighboring states. The proportion of fatalities from Union Territory of Chandigarh gradually reduced after 1995.

The fatalities from rural population were 57.21% and outnumbered urban counterpart in most of the years of the study period. The distribution of fatalities among various states and within rural & urban regions in the study period was found to be statically significant ($p < 0.01$). (Fig. 2, 3)

Highest number of accidents in the study period occurred between 4pm-8pm (28.03%) followed by 8pm-12am (21.67%) and least between 12am-4 am (3.95%). (Fig. 4)

The maximum number of accidents occurred in the month of November (10.94%) while the minimum recorded in the month of January (6.33%).

Unskilled workers were most commonly involved in RTAs (21.82%) followed by government employee (11.75%) and agricultural workers (11.45%). The mortality in different time intervals, months and occupation over a period of 40 years was found to be statically significant. (Table 1) The most common cause of death in the study period was due to head and neck injuries (82.29%) followed by injuries to multiple regions of the body (8.26%) and abdominal injuries (4.50%). (Table 1)

Difference in fatalities associated with various fatal injuries was found to be statistically significant ($p < 0.01$).

Analyzing the victims of head & neck injury and the vehicle they used, 57.59% of casualties were occupants of two wheelers (2WH), 22.72% were pedestrians, 9.19% were occupants of light motor vehicle (LMV), 7.15% were occupants of heavy motor vehicle (HMF), and 2.50% were occupants of three wheelers and 0.85 % was other road users.

The incidence of head injury associated with different types of vehicle users was found to be statistically significant ($p < 0.01$).

In the first 25 years of the study, there was a gradual rise in pedestrian and two wheeler fatalities but after this period the rise was steeper. Fatalities in occupants of three wheelers, light motorized vehicles and heavy motor vehicles were constantly low in the study period. (Fig. 5) On analysis, difference in fatalities with regard to different road users was found to be statically significant ($p < 0.01$).

Two-wheeler hit by a light motor (14.17%) vehicle was the most common type of collision observed in the study period. The other common collisions observed were 2WH hit by HMF (12.11%), pedestrian hit by LMV (6.80%), pedestrian hit by HMF (5.42%) etc. (Table 1)

Skidding and pillion rider falling down (14.48%) were the other common type of accidents occurred in two wheeler users.

About 2.92% of accidents occurred when the vehicles crashed against road side structures like trees, road dividers etc., and 1.41% of accidents occurred due to stray animals on the roads. In 14.36% of fatalities exact crash pattern was not known.

Discussion:

The number of fatalities in RTAs is like a tip of an ice berg when compared with the total number of accidents. According to Martinez, the

ratio between road accident deaths, serious injuries and minor injuries were 1:13:102. [7]

In the present study the number of deaths due to road accidents increased by a factor of 75 (from 7 victims in 1971 to 531 victims in 2010) over a period of 40 years.

From the WHO data it is evident that the road traffic fatalities in the world have increased about 12 times over the past 40 years. [8, 9] Concordant findings were reported from studies conducted in India and other parts of the world. [10, 11] Male preponderance was observed in all age groups and in all years of the study period which was similar to the findings of other studies conducted in India [5, 6, 12-16] i.e. 89% from Rohtak, [13] and 90 % from Delhi. [14]

It might be because of the fact that males are the main bread earners in the Indian families.

They have to move out of their dwellings more frequently and are more exposed to accident prone situations. Moreover, it was also reported that men have a higher level of rule-breaking behavior, thus greater frequency of violating the traffic regulations. [17]

The 21-30 years of age was the most commonly affected (32%) group in the present study which is in harmony with the findings of many studies conducted in India. [12, 14] about 26% and 38 % of fatalities belonged to this age group in a similar study conducted in Manipal and Delhi respectively. [12, 14]

More involvement of this age group might be because of the fact that they use the road more frequently for education, employment, recreational activities etc., than other age groups. It was also noted that the fatalities gradually decreased as the age group increased above 30 years and concordant findings were reported from studies conducted in other parts of India. [12, 14] The proportion of fatalities from Union Territory of Chandigarh reduced gradually in the last 15 years of the study.

The possible reason might be that the UT of Chandigarh is a well-planned city with strict enforcement of traffic rules. [18]

Most of the roads in Chandigarh have sidewalks for pedestrian and perhaps the most walk able city in India with a walk ability index (depends on foot path and facilities available for pedestrian) of 0.91. [19]

The rural preponderance (57.20%) might be because lack of awareness about traffic rules, lack of adequate and immediate medical facilities, inadequate use of protective gears, unsafe roads and vehicles, fatigue associated with travelling long distances. [20]

Unskilled workers, agriculturist and government employees constituted a majority of the fatalities in the present study, which is similar to the observations of other studies from India and abroad. [15,16] The possible reason might be that the people employed in these occupations use the road more frequently than those involved in other occupation.

Head & neck injuries were the most common cause of death (82.3%) and comparable results were seen in a study conducted in Haryana (50.4%). [13] Less use of protective gears (like helmet) could be attributed for such high incidence of head injuries. [21]

Moreover, helmet wearing laws are not strictly enforced in India. [2] Also the dominant populations of Punjab belonging to a particular religion are exempted from wearing helmets. [22] The occupants of two wheelers were most commonly involved in road accidents (55%) followed by pedestrian population (22%).

Studies from other regions of India also show a similar pattern. [23, 24] This might be due to the fact that the two wheelers are more affordable and are much more in number when compared with other vehicles. [7]

In some studies pedestrian forms the majority of fatalities. [14, 25] Two-wheeler hit by the light motor vehicle was the most common type of crash pattern which was similar to a study conducted in Gujarat. [23]

Conclusion and Suggestions:

The vehicle population and the RTAs have increased significantly over the last forty years with maximum fatalities in pedestrians and two wheeler occupants. It is thus the need of the hour to take suitable preventive measures, so that loss of precious lives can be brought down to a minimum.

The following changes in road infrastructure and policy reforms are suggested:

1. The State should have a zero tolerance policy for violation of traffic rules and drunken driving.
2. Since the road accident deaths exceeds more than a lakh per year in India, a separate department to prevent RTA and deaths should be established by a joint venture of Road Transport and Health Ministry.
3. Educating the public regarding traffic rules and lifesaving first aid skills should be done regularly by expert lectures, media and also by including it in teaching curriculum for schools and colleges. Adequate training in first aid methods should also be given before issuing driving licenses.

4. Sidewalks for pedestrians should be made available in all rural and urban roads.
5. Separation of slow and fast moving vehicles by assigning different roads / lanes.
6. The roads should be properly maintained, well illuminated at night and cleared from stray animals.
7. Efficient crash reporting and monitoring system with well-equipped police control room should be established to coordinate immediate rescue measures.
8. Strict enforcement of wearing of helmets should be done for motorized and non-motorized two wheelers.
9. Use of public transport facilities should be encouraged to reduce the road congestion and pollution.

More research should be conducted on the collision dynamics of road accidents and appropriate new technologies should be introduced in vehicles to prevent fatal injuries in different road users.

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Fig. 2: Area and Gender Wise Trend of RTA Fatalities

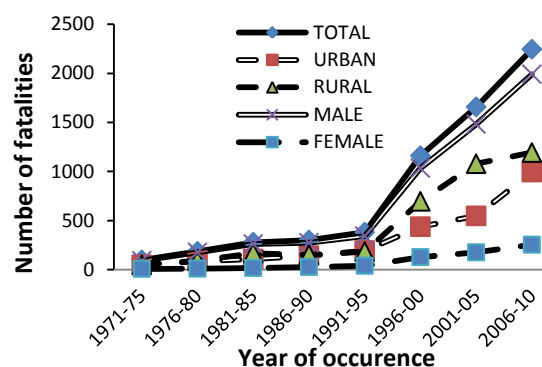
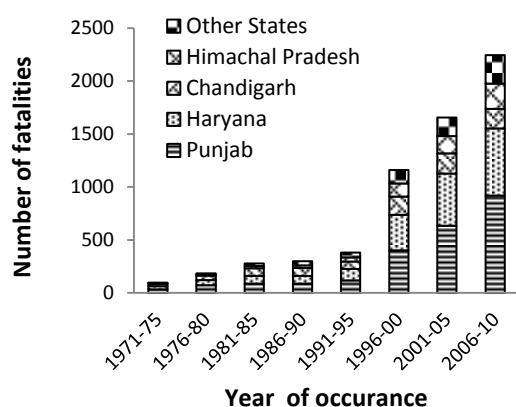
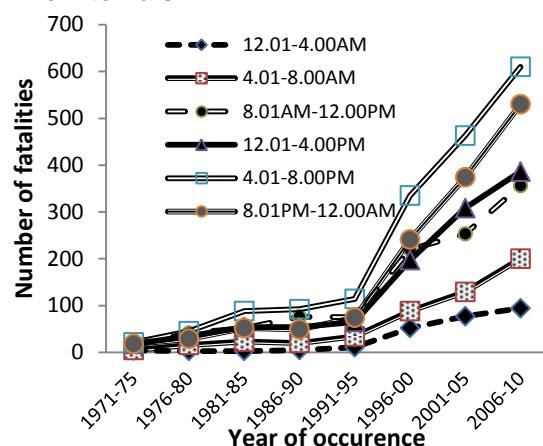
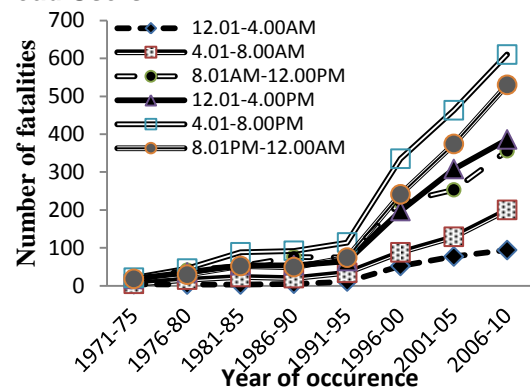


Fig. 3: Trend of RTA Fatalities across Different States**Fig. 4: Trend of RTA Fatalities in Different Time Intervals****Fig. 5: Trend of RTA Fatalities in Different Road Users****Table 1: Distribution of Descriptive Characteristics of Road Traffic Victims over 40 years (1971 to 2010)**

Variables	n	%	Statistical significance
Sex			
Male	5649	89.6	p<0.01, X²=3949.593
Female	658	10.4	
Age			
<20	447	7.1	p<0.01, X²=1206.901
21-30	1998	31.7	
31-40	1666	26.4	
41-50	1321	20.9	
51-60	875	13.9	
Area			
Urban	2556	40.5	p<0.01, X²=3002.229
Rural	3608	57.2	
Unknown	143	2.3	
Cause Of Death			
Head/neck injury	5190	82.3	p<0.01, X²=15373.297
Injury to multiple regions	521	8.3	
Abdominal injury	284	4.5	
Injuries to extremities	229	3.6	
Chest injury	83	1.3	
Road Users			
2WH	3495	55.4	p<0.01, X²=7929.206
Pedestrian	1429	22.7	
LMV	649	10.2	
HMV	502	8.0	
3 WH	117	2.8	
Others [#]	55	0.9	
Occupation			
Unskilled Worker	1376	21.8	p<0.01, X²=4491.951
Government Job	741	11.8	
Agricultural activity	722	11.4	
Sales /Business	569	9.0	
Domestic Worker	505	8.0	
Skilled worker	417	6.6	
Transport worker	394	6.3	
Private Job	325	5.2	
Student	274	4.3	
Professional	153	2.4	
Others and unknown	831	13.2	
Crash pattern[*]			
2WH – LMV	894	14.2	p<0.01, X²=1841.28
2WH- HMV	764	12.1	
Pedestrian – LMV	429	6.8	
Pedestrian – HMV	342	5.4	
2WH -2WH	339	5.4	
Pedestrian – 2WH	295	4.7	
LMV –HMV	265	4.2	
HMV - HMV	150	2.4	
LMV - LMV	94	1.5	
2WH-3WH	64	1.0	

2 WH- Two wheelers, 3WH- Three wheelers, LMV-Light motor vehicle, HMV- heavy motor vehicle, # Animal drawn vehicles, X²-Chi square

*Crashes with less than 1% of incidence and unknown crash patterns were not mentioned

Original Research Paper

The Study of Investigational Profile of Common Pesticide Poisoning Cases admitted at SAIMS, Indore

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Abstract

A prospective study was done in Shri Aurobindo Medical College Hospital, Indore during 1st January 2012 to 20th August 2013. 110 cases were admitted with history of pesticide poisoning during this period, out of them 10 cases were excluded, as they left the hospital within 1-2 hours of hospitalization. Most common poison was Organophosphorus (46 cases). Rodenticides 14 cases, Aluminium Phosphide 12 cases, Ethylene Di bromide 5 cases, others 3 cases and unknown poison was consumed by 2 peoples. Investigations like Liver function test, renal function test and electrolytes were studied in common pesticide poison i.e. Organophosphorus, Aluminium Phosphide and ethylene Di bromide. Liver function test was raised in most of the cases of ethylene Di bromide poisoning. Renal Function Test (RFT) was normal in most of the cases of Organophosphorus and Aluminium Phosphide and EDB poisoning. Sodium, Potassium and Chloride showed normal levels in most of the poisoning.

Key Words: Investigational Profile, Pesticide, Poisoning, Rodenticides, LFT

Introduction:

Poisoning and Hanging are the commonest methods of suicide worldwide. Millions of people die each year due to poisoning. Most pesticide related poisoning in developing countries can be attributed to lack of training in their use, poor regulatory / legislative control towards their access, and carelessness in providing protection to the body during their application. Pesticides have become a common manner of suicidal and accidental poisoning due to easy availability

SAIMS Medical college Hospital, Indore is catering the rural population and many pesticide producing factories are situated nearby. Due to this pesticide poisoning is common in this region. Many patients get admitted at SAIMS hospital, Indore with history of pesticide poisoning. The aim of this study was to follow these patients and to do the investigational study.

Materials and Methods:

A Performa was prepared to study the various investigational parameters of liver, and kidney function test and electrolytes.

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Proforma includes SGOT, SGPT & Serum Bilirubin, Blood Urea, Uric Acid & Serum Creatinine; Serum electrolytes including Sodium, Potassium & Chloride. The outcome of Patient was compared among various poisons.

Poison was confirmed in the toxicology lab of Department of Forensic Medicine and Toxicology, SAIMS, Indore. (Photo 1)

Various biochemical investigations were carried out in the central investigational lab of SAIMS, Indore. Blood, gastric lavage and urine samples were taken from each patient for toxicological analysis. Biochemical findings and other hematological investigations were studied from the report given by the consultant of the central lab.

Photo1: Chemical test for O-P Poisoning



Observation:

Out of total 100 cases, three Poisons were consumed by majority. (63%) These were Organophosphorus (46%), Aluminum Phosphide (celphos) in 12% and Ethylene Di bromide (5%)

cases). So, more emphasis was given on these three poisons. Results of various biochemical tests are as follows:

- **Liver Function Test (LFT):**

A total of 46 patients had consumed Organophosphorus. SGOT was increased in 23 cases. It was normal in 47.82% cases. SGOT was below normal range in one case only.

SGPT was normal in 34 cases (73.9%). Bilirubin analysis was carried out in 30 cases, 50% of them were within normal range. (Table 1) In celphos poisoning SGOT was raised in 50% cases and was normal in 41.66 % cases. SGPT and Bilirubin was raised in 58.33 % cases normal in 33.33 % cases. (Table 2)

Out of total cases 5 had consumed Ethylene Di bromide. SGOT was increased in 80% cases and was normal in 20% cases. SGPT was raised in 40% cases and was normal in 40% cases. Bilirubin was raised in 60% cases and was normal in 40% cases (Table 3)

- **Renal Function Test (RFT):**

Renal function test were carried out in Organophosphorus poisoning, shows normal level of Serum Creatinine in 91.89% cases, Blood Urea in 90.90% cases and Uric Acid in 86.48% cases (Table 4) RFTs in the 12 cases of Celphos ingestion showed normal values of Serum Creatinine (63.63%), normal Blood Urea in 50% and normal Uric Acid in 58.33% cases.

Sukhmindar Jit Singh Bajwa [6] found effect of Celphos on multi-organs including kidney, in only 18% cases. (Table 5)

Among ethylene Di bromide poisoning, Serum Creatinine level was within the normal range in 40%. Urea level was within normal range in 60% cases. Uric Acid was within the normal range in 33% case (Table 6)

- **Electrolytes:**

Sodium level was normal in 69.04% cases of Organophosphorus poisoning. Potassium level was within the normal range in 90.47% cases and below normal in three cases.

Chloride level was within normal range in 39.02 % cases and increased in 24 cases. (Table 7) Sodium level was normal in 58.33% cases of Celphos poisoning. Potassium level was within the normal range in 50% cases.

Chloride level was within the normal range in 42.85% cases (Table 8) Sodium, Potassium and chloride were within the normal range in most of the cases, of ethylene Di bromide poisoning. (Table 9)

Discussion:

David Gunnell et al [1] found that the substances most commonly used for self-poisoning were agricultural pesticides. A. A

Moghadamnia et al [2], at northern Islamic Republic of Iran found Pesticide poisoning was more frequent. S A Kora et al [3] found 148 cases of OP poisoning out of a total of 232 poison cases studied.

Liver function test (LFT) was normal in most of the cases of Organophosphorus poisoning while raised in most of the cases of aluminum phosphide and ethylene Di bromide poisoning. Finding were not consistent with Sahin I et al [4] who found elevated levels of SGOT and SGPT in Organophosphorus poisoning cases. Antonio F. Hernandez et al [5] found increased level of SGOT and SGPT in organo phosphorus poisoning. Clinically no significant hepatotoxicity was observed by him.

Findings were consistent with other authors [6, 7] which showed increase in SGOT and SGPT value in Celphos poisoning.

Similar findings were seen in Manish Nigam et al [8], study which showed raised levels of SGOT, SGPT and Bilirubin (direct) in most of the cases of EDB poisoning. Ashish Goel et al [9] study showed elevated level of SGOT and SGPT in Organophosphorus poisoning while S. Singh et al [10] found hepatotoxicity due EDB poisoning.

Renal Function Test (RFT) was normal in most of the cases of Organophosphorus, Aluminium phosphide poisoning and ethylene Di bromide poisoning.

M. Atef [11] found increased value of Creatinine in (73.1%), urea in (27.8%), and uric acid in 32.1% cases in his study on 40 adult male rats. Manish Nigam et al [8] in his study found normal range of Serum Creatinine in 26 cases out of 27 live cases of EDB poisoning. Blood urea level was within the normal range in 24 live cases of EDB poisoning. Findings are not similar to S. Singh et al [10] who found nephrotoxicity due EDB poisoning.

Electrolytes Sodium and Potassium level was normal and chloride level was increased in most of the cases of Organophosphorus poisoning.

Decreased sodium and increased chloride level was seen in most of the cases of aluminum phosphide poisoning. Sodium, Potassium and chloride were within the normal range in most of the cases, of ethylene Di bromide poisoning.

Findings are similar to other authors' studies which showed [12, 13] no change in sodium level in Organophosphorus poisoning. Mohan Gurjar et al [14] found normal levels of Sodium in most of the cases but hyper or hypomagnesaemia in some cases. Changes in

Electrolyte level are not directly related to poisoning.

Celphos poisoning can cause diarrhea in some case which can lead to Electrolyte imbalance, especially in children. Manish Nigam et al [8] also found normal range of electrolytes in most of the cases of EDB poisoning.

Conclusion and Suggestion:

Toxicology is said to be one of the most neglected area in clinical practice. Two main reasons, responsible for this statement are first being India lacks good referral centers for treatment of poisoning cases. Secondly all poisoning cases are being Medico-legal cases, draws much less interest to the clinicians since they fear of court attendance and moreover less paying, and more time consuming.

Hence forth this study was undertaken to facilitate the clinicians and toxicologist for better judgment in regards to patient condition and co-relation with various investigative findings. Due to the risk involved in treatments of pesticide poisoning, there is general agreement that emphasis should be on preventing pesticide illness rather than relying on treatment.

SGOT was raised in most of the cases of EDB poisoning. RFT and Electrolytes showed normal results in most of the cases of above mentioned three pesticide poisoning. Before reaching to any conclusion further studies should be carried out.

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Table 1: LFT in Organophosphorus

LFT	SGOT	SGPT	Bilirubin
< Normal	1	0	5
Normal	22	34	15
> Normal	23	12	10
Percent of normal	47.82%	73.91%	50%

Table 2: Liver Function Test in Celphos

LFT	SGOT	SGPT	Bilirubin
< Normal	1	1	1
Normal	5	4	4
> Normal	6	7	7
Percent of normal	41.66%	33.33%	33.33%

Table 3: LFT in Ethylene Di bromide

LFT	SGOT	SGPT	Bilirubin
< Normal	0	1	0
Normal	1	2	2
> Normal	4	2	3
Percent of normal	20%	40%	40%

Table 4: RFT in Organophosphorus

RFT	S. Creatinine	Urea	U. acid
< Normal	1	1	2
Normal	34	30	32
> Normal	2	2	3
Percentage of normal	91.89%	90.90%	86.48%

Table 5: RFT in Celphos

RFT	S. Creatinine	Urea	U. acid
< Normal	1	1	2
Normal	7	6	7
> Normal	3	5	3
Percentage of normal	63.63%	48.3%	58.33%

Table 6: RFT in Ethylene Di bromide

RFT	S. Creatinine	Urea	U. acid
< Normal	0	0	0
Normal	2	3	1
> Normal	3	2	2
Percent of normal	40%	60%	20%

Table 7: Electrolytes in Organophosphorus

Electrolytes	Na	K	Cl
< Normal	2	3	2
Normal	29	38	16
> Normal	11	1	24
Percent of normal	69.04%	90.47%	39.02%

Table 8: Electrolytes in Celphos

Electrolytes	Na	K	Cl
< Normal	2	0	0
Normal	7	5	3
> Normal	3	5	4
Percent of normal	58.33 %	50%	42.85%

Table 9: Electrolytes in Ethylene Di bromide

Electrolytes	Na	K	Cl
< Normal	0	0	0
Normal	4	3	3
> Normal	1	2	2
Percent of normal	80%	60%	60%

Original Research Paper

Study of Serum Malondialdehyde and Uric Acid in Pregnancy Induced Hypertension & Its Medico-Legal Significance

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Abstract

Pregnancy induced hypertension (PIH) remains the major cause of both maternal and foetal morbidity and mortality. While dealing with PIH women, the obstetricians have to be very careful to diagnose and properly manage the patients to prevent further progression of PIH disorders and complications so that charges of medical negligence against them may be avoided. The aim of the present study was to determine the association of serum malondialdehyde (MDA) and serum uric acid level with severity of PIH, and to correlate their medico-legal significance in avoiding the medical negligence charges. Study subjects included 70 PIH and 70 normotensive pregnant women of age group 18 - 40 years with gestational age >20 weeks. Highly significant increase ($p < 0.001$) in systolic and diastolic blood pressure was recorded in PIH subjects. Serum MDA and uric acid level was also significantly elevated ($p < 0.001$) in PIH subjects compared to the control subjects. Serum MDA and uric acid may be included as additional parameters for screening and progression of PIH. This may be helpful in effectively managing the PIH patients at an early stage thereby further avoiding medical negligence charges.

Key Words: Pregnancy induced hypertension, MDA, Uric acid, Medical Negligence

Introduction:

Litigations in Obstetrics are far more common than in any other sub-specialty of Medicine. Obstetricians deal with two lives at a time the mother who can be seen clinically, and her developing fetus whose wellbeing can only be predicted. One of the areas of common obstetrics suits is errors or omissions in antenatal clinical screening and diagnosis.

Most important one is the prediction and diagnosis of pregnancy induced hypertension (PIH). [1] PIH includes a group of hypertensive disorders developed due the gravid state after 20 weeks of pregnancy.

It includes gestational hypertension with blood pressure $\geq 140/90$ mmHg without proteinuria; pre-eclampsia, which is gestational hypertension with proteinuria.

Eclampsia, defined as pre-eclampsia with convulsions. Hypertensive disorders complicate 5 to 10% of all pregnancies, and together they form one member of the deadly triad, along with hemorrhage and infection, that contribute greatly to maternal morbidity and mortality rates. [2]

PIH is the most important cause of maternal and neonatal morbidity and mortality. Women with pre-eclampsia/eclampsia are at higher risk of obstetric complications like abruptio placentae and intra-uterine growth restriction as compared to normotensive women. The patho-physiology of PIH is still unclear, but an imbalance between reactive oxygen species (ROS) and antioxidants, also called oxidative stress has been attributed to be an important contributing factor. [3]

In healthy pregnancy, oxidation by free radicals and neutralization by antioxidants remains in balance. When the reactive oxygen species (ROS) are in abundance, oxidative stress occurs which is thought to be the causative factor in PIH.

Malondialdehyde (MDA) is the end product of lipid peroxidation and reflects the oxidative status of the biological system. MDA causes damage to LDL molecules. The altered LDL also called oxidized LDL is taken up by macrophages via scavenger receptors and forms foam cells which later results in

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atherogenesis.[4] Hyperuricemia is believed to result from the decreased renal excretion that occurs as a consequence of the pre-eclampsia but this result is probably also due to increased production secondary to tissue ischemia and oxidative stress. Soluble uric acid impairs nitric oxide generation in endothelial cells. Hyperuricemia induces endothelial dysfunction and may induce hypertension and vascular disease in PIH. [5]

The association of serum MDA and uric acid with PIH is highly suggested to reflect some new diagnostic tools. Estimation of these parameters in pregnancy may be helpful in predicting the development of PIH and its progress can be monitored and managed effectively thereby preventing and/or reducing maternal and fetal complications.

The present study has been designed to determine the association of serum malondialdehyde (MDA) and serum uric acid level with the severity of PIH, and to correlate their medico-legal significance in avoiding the medical negligence charges.

Material & Methods:

This prospective one year (Jan. 2012 - Dec. 2012) case-control study was conducted in the department of Biochemistry in collaboration with the department of Obstetrics & Gynaecology, Rohilkhand Medical College & Hospital, Bareilly, U.P., India. Ethical clearance from Institutional Ethical Committee has been obtained and informed written consent from patients has been taken.

The present study included 140 pregnant women of age group 18 to 40 years with gestational age of >20 weeks. Seventy pregnant women with diagnosis of PIH and 70 healthy normotensive pregnant women undergoing antenatal care in OPD or admitted in the Obstetrics and Gynaecology ward at RMCH, Bareilly were randomly selected and constituted sample size.

The study subjects were divided into four groups as under:

- **Group I:** Women with gestational hypertension (GH), defined by systolic BP ≥ 140 or diastolic BP ≥ 90 mm Hg for first time during pregnancy (after 20 weeks of gestation) without proteinuria (n = 25).
- **Group II:** Women with pre-eclamptic toxemia (PE) with BP $\geq 140/90$ mm Hg after 20 weeks' gestation with proteinuria ≥ 300 mg/24 hours or $\geq 1+$ dipstick (n = 25).
- **Group III:** Toxemic women with eclampsia (E), defined by women presenting with

convulsions/coma along with features of pre-eclampsia (n = 20).

- **Group IV:** Healthy normotensive pregnant women (N) (n = 70).

The enrolled subjects with the history of use of antioxidant supplementation, gestational diabetes, diabetes mellitus, chronic hypertension, coronary heart disease, impaired renal function, liver disorder, severe anaemia, gout, smoking, tobacco addiction & alcoholism were excluded from the study.

The blood pressure was recorded thrice at 5 minutes intervals and mean of three readings was noted following standard procedures. Women once found hypertensive, were screened for presence of protein in urine by using dipstick method.

4 ml of venous blood was taken aseptically in a serum separator evacuated blood tube (vacutainer) without anticoagulant. Samples were allowed to clot at 37 °C for 30 minutes. After clotting of the blood, each blood sample was centrifuged for 15 minutes at 2000 rotations per minute (rpm) to get a clear and cell free serum. The investigations were performed in laboratory of Biochemistry department, RMCH.

Biochemical Analysis included:

- Serum MDA by Thiobarbituric acid (TBA) method; and
- Serum uric acid (SUA) by enzymatic method.

Analysis was done by using semi auto analyzer ERBA and spectrophotometer in the department of Biochemistry.

Statistical analysis of variables was done by using independent student's t-test between PIH and control while ANOVA (analysis of variance) was applied within different study groups. Coefficient of correlation 'r' was determined between different variables by using Pearson product moment correlation. A p-value < 0.05 was considered to be statistically significant.

Observations & Results:

The systolic blood pressure among PIH subjects was higher (156.31 ± 17.66) when compared with the control subjects (116.17 ± 8.57) and was statistically highly significant ($p < 0.001$). Similarly, diastolic blood pressure was also significantly higher ($p < 0.001$) in PIH subjects (107.74 ± 11.04) when compared with control subjects (74.66 ± 7.04). (Table 1)

In this study When the systolic blood pressure of the control group was compared with different PIH sub-groups, the difference was found to be highly significant ($p < 0.001$). Systolic

BP of PIH group II was higher (153.52 ± 12.18) than group I (145.36 ± 7.80) though not statistically significant ($p > 0.05$).

But systolic blood pressure in group III was significantly higher (173.5 ± 19.72) ($p < 0.001$) when compared with the group I and group II. (Table 1)

Diastolic blood pressure in the control group was significantly lower ($p < 0.001$) compared to the different PIH sub-groups. Diastolic BP (mm Hg) of group II was slightly higher (104.24 ± 8.72) than group I (102.64 ± 6.47) but it was not statistically significant ($p > 0.05$). Further diastolic blood pressure in group III was significantly ($p < 0.001$) higher (118.5 ± 11.01) when compared with the group I and group II. (Table 1)

In present study estimation of Serum MDA level and serum uric acid levels were determined in normotensive pregnant women (control subjects) and in PIH subjects and the data were compared.

Serum MDA level (mmols/L) in PIH subjects was higher (1.071 ± 0.26) as compared to the control subjects (0.42 ± 0.11) and this difference was highly significant ($p < 0.001$). A similar significant difference ($p < 0.001$) was noted for serum uric acid level between the PIH subjects (6.65 ± 1.36) and the control subjects (4.72 ± 0.85). (Table 2)

The comparison of serum MDA and uric acid levels within control and different PIH sub-groups were found significantly higher ($p < 0.001$) in PIH I, II and III sub-groups when compared with Group IV (normotensive pregnant women). Similarly MDA level in PIH group III was also found significantly higher ($p < 0.001$) when compared with the other two PIH groups. Uric acid level was also found significantly higher in group III when compared with group I ($p < 0.01$) and group II ($p < 0.05$).

Coefficient of Correlation:

Variables that tend to correlate are likely to be altered during the disease process. Correlation was considered significant where p-values of 'r' was < 0.05 . A strong positive and statistically significant correlation was observed between systolic BP and MDA ($r = 0.567$ and p-value of 'r' 0.000. (Fig. 1)

There was no statistical correlation between systolic BP and uric acid ($r = 0.214$ and p-value of 'r' 0.075). (Table 3) A moderate positive and statistically significant correlation was found between diastolic BP and MDA ($r = 0.443$ and p-value of 'r' 0.000 (Fig. 2), & uric acid ($r = 0.367$ and p-value of 'r' 0.002. (Fig. 3)

A weak correlation was established between MDA and uric acid ($r = 0.291$ and p-value of 'r' 0.015). (Table 3)

Discussion:

Medical negligence has acquired a great significance during last two decades after the inclusion of medical services under the purview of Consumer Protection Act 1986. The number of cases of medical litigation is increasing which are becoming a curse especially in the field of surgery, anaesthesia, and obstetrics and gynaecology. In a retrospective study conducted by Janani et al [6] maximum numbers of medical negligence cases was related to surgical practice among which Obstetrics & Gynaecology ranked the highest (38.18%).

Pregnancy induced hypertension (PIH) continues to be a major health care related problem in pregnant women despite advancements in the field of medical sciences.

The spectrum of clinical presentation in PIH patients varies from mild, presenting only with small increase in blood pressure with/without protein in the urine, to severe maternal and fetal complications.

The major sign of PIH is hypertension, suggesting that it is due to vasospastic events in the placenta, kidney, uterus and brain. In our study, the mean systolic and diastolic blood pressure in PIH subjects were significantly higher ($p < 0.001$) than those of control subjects, this observation was in agreement with other studies. [7-9]

This study indicates that the severity of PIH is associated with increase in blood pressure, both systolic and diastolic (Table 1) and this finding is consistent with the established fact. Hypertension develops through increased chemokine and cytokine expression, induction of the renin-angiotensin system and increased vascular C-reactive protein (CRP) expression in mother. [10] As the severity of the PIH increases, there is increase in the severity of the patho-physiological phenomenon leading to the accentuation of blood pressure.

This elevated blood pressure recovers within one month postpartum suggesting that the after expulsion of placenta which is said to be the reason for PIH, the altered physiology returns to the normal.

In our study the lipid peroxidation marker malondialdehyde (MDA), among the PIH subjects was significantly increased as compared to the normotensive pregnant women. Similar observations were noted by others. [7, 8, 11] Serum MDA was found significantly higher

($p < 0.001$) in all PIH sub-groups when compared with control group in the present study.

Similarly MDA level in eclamptic women was also found significantly higher ($p < 0.001$) when compared with other two groups. Other studies conducted by Hubel et al [12] and Freud et al [13] have also shown that lipid peroxides like MDA were significantly elevated in mild and severe PIH. MDA level has also been noted to be increased during the progression of normal pregnancy as observed by Upadhyaya [14] and Patil et al [15] but these levels are lower than in PIH subjects.

The increased MDA level in PIH is known to be due to increased generation of reactive oxygen species and reduction in antioxidants activity. Reactive oxygen species thus produced can cause enhanced lipid peroxidation in PIH which play a significant role in pathophysiology of PIH. [11]

A similar significant difference ($p < 0.001$) as that of MDA, was noted for serum uric acid level between the PIH subjects and the control subjects. Kashinakunti et al [8] & Latha and Ganesan [9] also noted significant elevation of uric acid ($p < 0.001$) in study group in comparison to controls in conformity with our observations. Hickman et al [16] also observed that women who developed hypertension had significantly higher uric acid levels than women who remained normotensive throughout the pregnancy.

In present study serum uric acid level was found significantly higher ($p < 0.001$) in PIH patient groups when compared with normotensive pregnant women. Uric acid level was also found significantly higher in eclamptic women when compared with gestational hypertension (GH) ($p < 0.01$) and pre-eclampsia (PE) ($p < 0.05$) subjects. Level of serum uric acid in mild PIH was significantly higher than normotensive women noted by Mustaphi et al. [17]

In severe PIH, the mean serum uric acid levels were significantly more than control group and mild PIH group women. Punthumapol & Kittichotpanich [5] have observed that the mean serum uric acid in severe pre-eclamptic women was more than normal pregnant women and mild pre-eclamptic women. But there was no significant difference between normal pregnant women and mild pre-eclamptic women.

Plasma uric acid concentration is typically elevated in PIH. It likely results from reduced uric acid clearance from diminished glomerular filtration, increased tubular reabsorption, and decreased secretion.

Another possibility is from increased placental urate production compensatory to

increased oxidative stress. Recently increased oxidative stress and formation of reactive oxygen species (ROS) have been proposed as another contributing source of Hyperuricemia noted in PIH apart from renal dysfunction. [18]

Though often considered an antioxidant, biochemical and in-vitro data indicates that non-crystalline, soluble uric acid can react to form radicals, increase lipid peroxidation and induce various pro-oxidant effects in vascular cells. [10]

From in-vitro and in-vivo studies, uric acid may contribute to endothelial dysfunction through inducing anti-proliferative effects on endothelium and impairing nitric oxide production in vascular smooth muscle cells (VSMCs). [10] Elevated uric acid levels in PIH women may not simply be a marker of disease severity but possibly contribute directly to the pathogenesis of the PIH. [19]

Correlation of MDA and uric acid was studied with systolic and diastolic blood pressure and a significant positive correlation between MDA and systolic ($r = 0.567$, $p < 0.001$) and diastolic ($r = 0.443$, $p < 0.001$) blood pressure was observed. A significant positive association was also observed by Bayhan et al [20] between serum MDA level and systolic blood pressure in women with severe pre-eclampsia ($r = 0.375$, $p = 0.049$) supporting our findings.

In contrast to our findings, Sahu et al [7] noted a negative correlation of diastolic BP with MDA ($p < 0.05$) in PIH women. Bayhan et al [21] observed no correlations between serum levels of lipid peroxide and systolic-diastolic blood pressure of pregnant women with pre-eclampsia and eclampsia in variance to our observations.

The strong significant relationship between MDA and systolic-diastolic blood pressure in PIH suggests an increased susceptibility to vascular disease and development of PIH which is associated with oxidative stress in these patients. This therefore, suggests that PIH is associated with oxidative stress reflected by elevated MDA level as a result of lipid peroxidation during pregnancy.

On the other hand, uric acid has been significantly correlated only with diastolic blood pressure. For diagnosing PIH, diastolic blood pressure is more specifically taken into consideration as compared to the systolic blood pressure as it may also increase due to other non-specific factors.

Latha and Ganesan [9] correlated blood pressure with uric acid in PIH groups. They showed significant positive correlation of uric acid with both systolic and diastolic blood pressure which is in contrast to our observations except that with diastolic blood pressure.

Mustaphi et al [17] and Varma [22] observed that when the level of diastolic blood pressure increased, the level of serum uric acid was also increased and there has been a positive correlation between diastolic blood pressure and serum uric acid levels.

In contrast, Hickman et al [16] concluded that the serum uric acid level was an unreliable indicator of developing hypertension in the individual woman. Many authors believed that uric acid is one of the most consistent and earliest detectable changing parameter that occurs in PIH and have been cited as a better predictor of fetal risk than blood pressure. [19]

Conclusions:

The association of MDA and uric acid with severity of PIH is highly suggested to reflect some new diagnostic tools. In the present study, a positive correlation has been made out between serum MDA and uric acid with the severity of PIH and these may be useful markers and diagnostic tools for predicting the progression of PIH and thereby preventing and reducing maternal as well fetal complications by timely intervention, thus curtailing charges of negligence and litigations.

Though our study has provided a reasonable level of evidence that these two surrogate markers are important predictor of PIH yet further investigations are required to determine the comprehensive mechanism of this correlation.

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Table 3: Coefficient of Correlation

X-axis Vs. Y-axis		Coefficient of Correlation 'r'	p-value of 'r'
Systolic BP	MDA	0.567	<0.001
Systolic BP	Uric acid	0.214	>0.05
Diastolic BP	MDA	0.443	<0.001
Diastolic BP	Uric acid	0.367	<0.01
MDA	Uric acid	0.291	<0.05

Fig. 1: Correlation between Systolic Blood Pressure and MDA in PIH Subjects

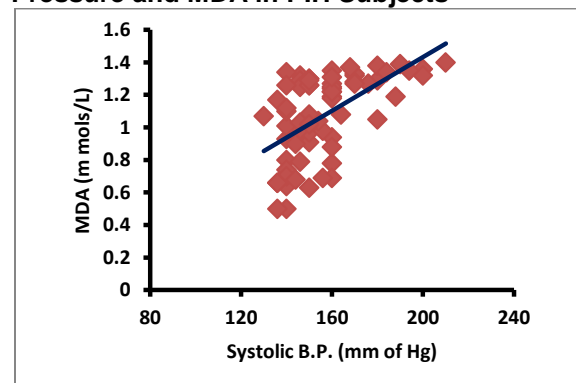
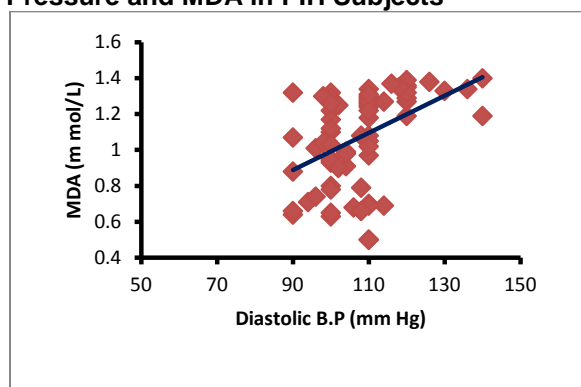
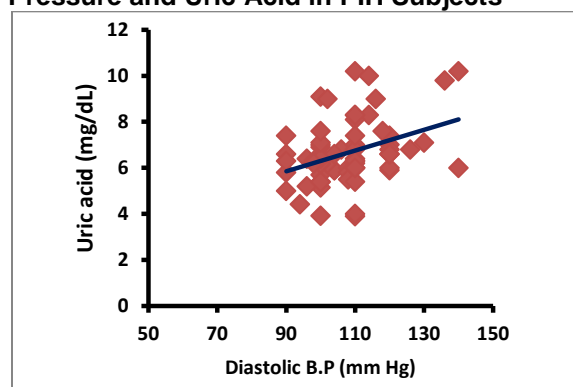


Fig. 2: Correlation between Diastolic Blood Pressure and MDA in PIH Subjects**Fig. 3: Correlation between Diastolic Blood Pressure and Uric Acid in PIH Subjects****Table 1****Comparison of Blood Pressure between PIH and Control Subjects and within PIH sub-groups**

Blood Pressure	PIH Group I (GH) (Mean \pm S.D.) n = 25	PIH Group II (PE) (Mean \pm S.D.) n = 25	PIH Group III (E) (Mean \pm S.D.) n = 20	Total PIH Cases (Mean \pm S.D.) n = 70	Group IV (Control) (Mean \pm S.D.) n = 70
Systolic BP (mm Hg)	145.36 \pm 7.80	153.52 \pm 12.18	173.5 \pm 19.72	156.31 \pm 17.66	116.17 \pm 8.57
Diastolic BP (mm Hg)	102.64 \pm 6.47	104.24 \pm 8.72	118.5 \pm 11.01	107.74 \pm 11.04	74.66 \pm 7.04

Table 2**Comparison of MDA & Uric acid level between PIH with Control Subjects and within PIH sub-groups**

Serum Levels	PIH Group I (GH) (Mean \pm S.D.)	PIH Group II (PE) (Mean \pm S.D.)	PIH Group III (E) (Mean \pm S.D.)	Total PIH subjects (Mean \pm S.D.)	Group IV (Control) (Mean \pm S.D.)
MDA (mmols/L)	0.78 \pm 0.15	1.17 \pm 0.12	1.31 \pm 0.06	1.071 \pm 0.26	0.42 \pm 0.11
S. Uric acid (mg/dl)	5.99 \pm 1.01	6.81 \pm 1.37	7.27 \pm 1.41	6.65 \pm 1.36	4.72 \pm 0.85

Review Research Paper

The Critical Appraisal of Drug Advertisement Directly to Consumers: A Mockery of Drugs and Magic Remedy (Objectionable Advertisements) Act

¹Satin Kalidas Meshram, ²Vipul Namdeorao Ambade, ³Nilesh Keshav Tumram, ⁴Jaydeo Laxman Borkar

Abstract

Media has a profound effect over masses to shape and mould the ideas regarding any product. Thus it is an essential tool for mass awakening and welfare of the public at a large. But regarding drugs this tool of advertisement should be used very meticulously. If pharmaceutical companies are allowed to advertise the drugs, then it leads to increase in self medication and the society has to face the menace of adverse effects for long lasting time. Despite the existing legislations banning the advertisement of drugs in certain diseased conditions, lucrative advertisements of drugs and medical remedies are freely flowing in the Indian mass media nowadays. These advertisements allure the vulnerable consumers thus increasing the threat of self medication in the society.

Through this article it is tried to critically appraise the advantages, disadvantages and remedies regarding direct to consumer drugs advertisement.

Key Words: Drug Advertisement; Drug and Magic Remedy Act; Critical Appraisal, OTC, DTCA

Introduction:

Advertisement is meant to attract or made aware the customers to purchase the products of the company. Direct to Consumer Advertising (DTCA) involves promoting products directly to consumers by the use of popular media. [1] Advertisers have used the traditional mass media as radio, television, newspapers, magazines, and billboards to send their messages and now-a-days these are largely being added by network marketing, home to home advertisement, Internet advertising and cell phones. In our view, it is responsibility of the state to check that the advertisement should be free from obscenity and also to preserve customer rights to purchase the genuine product.

Thus the state has three fold responsibility, first is to prevent the obscenity in the ads so as to preserve the values and culture of the society. Secondly to secure the customers rights by preventing wrong or placebo medical gadgets into the hands of customer.

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Thirdly, to observe strict rules of advertisement regarding drugs to prevent people from self-medicating regard to various diseases and conditions.

Historical Perspective of Advertisement of Drugs and Magic Remedies:

In 1927, in view of the clandestine behavior of the fake medical practitioner, a resolution was adopted by then Council of State recommending to the Central and Provincial Governments to take immediate measures to control the indiscriminate use of medical drugs and for standardisation of the preparation and for the sale of such drugs. Thus the process of regularizing control over drugs initiated for first time in India in pre independence era.

In August 1930, the Government of India appointed the Drugs Enquiry Committee with Sir R. N. Chopra as its Chairman, [2] This Committee made a report pointing out the necessity of exercising control over import, manufacture and sale of patent and proprietary medicines in the interest of the safety of the public and public health. [3]

The Chopra Committee Report also dealt with the popularity of the patent and proprietary medicines in the following words: "The pride of place must be accorded to ingenious propaganda clever and attractive dissemination of their supposed virtues and wide and alluring advertisements.

Perusal of the advertisements of cures' produces a great effect on patients who have tried treatment by medical men without success. Widest publicity is given to these and the preparations become invested with miraculous virtues. The reassurances of cure, the force of argument advanced to guarantee it and the certificates of persons said to have been cured which are all set out in advertisements make a deep impression, especially on those with weak nerves. As a result the 'Drugs Act' was passed in 1940. [3] This is followed by 'Pharmacy Act' in 1948. [4]

The Bhatia Committee in 1953 reported that there were a large number of objectionable advertisements in the Press in regard to patent medicines. The Indian Medical Association had also suggested the barring of advertisements of medicines which claim to cure or alleviate any of the diseases specified by them. [3]

At present the Acts and Rules made there under that govern the manufacture, sale, import, export and clinical research of drugs and cosmetics in India are:- The Drugs and Cosmetics Act, 1940, The Pharmacy Act, 1948, The Drugs and Magic Remedies (Objectionable Advertisement) Act, 1954, The Narcotic Drugs and Psychotropic Substances Act, 1985, The Medicinal and Toilet Preparations (Excise Duties) Act, 1956, The Drugs (Prices Control) Order 1995 (under the Essential Commodities Act) [4-6, 16-18]

Concise Outlook of the Legislations to Control Advertisement of Drugs:

The Drugs and Magic Remedy (Objectionable Advertisements) Act, (DMRA) 1954 [5] has been enacted with a view to control the advertisements of drugs in certain cases and to prohibit the advertisements for certain purposes of remedies alleged to possess magic qualities.

Section 3: deals with the prohibition of advertisement of certain drugs for treatment of certain diseases and disorders.

Subject to the provisions of this Act, no person shall take any part in the publication of any advertisement referring to any drug in terms which suggest or are calculated to lead to the use of that drug for (a) the procurement of miscarriage in women or prevention of conception in women; or (b) the maintenance or improvements of the capacity of human beings for sexual pleasure; or (c) the correction of menstrual disorder in women; or (d) the diagnosis, cure, mitigation, treatment or prevention of any disease, disorder or condition specified in the Schedule, or any other disease,

disorder or condition (by whatsoever name called) which may be specified in the rules made under this Act; The schedule in the Act specifies the diseases and conditions namely mentioned in Table 1

Section 4: Prohibition of misleading advertisements relating to drugs. Subject to the provisions of this Act, no person shall take any part in the publication of any advertisement relating to a drug if the advertisement contains any matter which (a) directly or indirectly gives a false impression regarding the true character of the drug; or (b) makes a false claim for the drug; or (c) is otherwise false or misleading in any material particular.

Section 5: Prohibition of advertisement of magic remedies for treatment of certain diseases and disorders. No person carrying on or purporting to carry on the profession of administering magic remedies shall take any part in the publication of any advertisement referring to any magic remedy which directly or indirectly claims to be efficacious for any of the purposes specified in Section 3.

Section 6: Prohibition of import into, and export from India of certain advertisement. No person shall import into, or export from, the territories to which this Act extends any document containing and advertisement of the nature referred to in Section 3, or Section 4, or Section 5, and any documents containing any such advertisement shall be deemed to be goods of which the import or export has been prohibited under Section 19 of the Sea Customs Act, 1878.

Rule 106 of DCA [6] stated that (1) No drug may purport or claim to prevent or cure or may convey to the intending user thereof any idea that it may prevent or cure, one or more of the diseases or ailments specified in Schedule J. (2) No drug may purport or claim to procure or assist to procure or may convey to the intending user thereof any idea that it may procure or assist to procure, miscarriage in women.

Diseases and ailments (by whatever name described) which a drug may not purport to prevent or cure or make claims to prevent or cure as stated in schedule J in addition to schedule of DMRA are as mentioned in [Table 2]

Similarly Sections 17, 17 A, and 17 B of the Drugs and Cosmetic Act 1940 defines Misbranded drugs, Adulterated drug and Spurious drugs respectively.

Over the counter OTC Drugs and Distance selling and teleshopping of non-prescription medicines [7]: OTC Drugs means drugs legally allowed to be sold "Over the Counter" by pharmacists, i.e. without the

prescription of a Registered Medical Practitioner. OTC has no legal recognition in India, the drugs which are not included in the list of "prescription-only drugs" in Schedule G, H and X are OTC drugs.

OTC drugs registered as Ayurvedic Medicines (i.e. traditional Indian system of medicines containing natural/ herbal ingredients) do not require a drug prescription to sale.

Distance selling and telesshopping of non-prescription medicines is not permitted in India as the sale of drug products can only take place through licensed stores. [7]

Judicial View:

In *Hamdard Dawakhana (Wakf) Lal ... vs. Union of India and Others* on 18 December, 1959 [3] the constitutionality of the Drugs and Magic Remedies Act was challenged pleading that advertisement is a fundamental right of every Indian citizen.

The judiciary opined at that time that, the object of DMRA [5] was the prevention of self-medication and self-treatment by prohibiting instruments which may be used to advocate the same or which tended to spread the evil. Its object was not merely the stopping of advertisements offending against morality or decency.

The provisions of the Act which prohibited advertisements commending the efficacy, value and importance in the treatment of particular diseases of certain drugs and medicines did not fall under Art. 19(1) (a) of the Constitution (which is the right of citizen to speech and expression).

The provisions of the Act were in the interests of the general public and placed reasonable restrictions on the trade and business of the petitioners and were saved by Article 19(1) (g) (which is the right to practice any profession, or to carry on any occupation, trade or business).

Thus it is not fall within the purview of freedom of speech and freedom and to carry on trade or business and the constitutional validity of the act is upheld.

In *Tata Press Limited vs. Mahanagar Telephone-Nigam ...* on 3rd August, 1995 [8] court opined that the *Hamdard Dawakhana's* case was dealing with advertising of prohibited drugs and commodities. The Court came to the conclusion that the sale of prohibited drugs was not in the interest of the general public and as such "could not be a speech" within the meaning of freedom of speech and expression under Article 19(1) (a) of the Constitution.

Areas of Drugs Advertisement Advantages as Propagated by Pharmaceutical Companies:

Switch over to OTC drugs: There are many products with minimal side effects in the prescription drugs (Rx) category like drugs for aches, cough, colds, hyperacidity, indigestion, for minor cuts, wounds and burns, muscle pains and sprains, constipation etc. [7] These drugs to be switch over to OTC drugs category.

It would act as a tool for reducing health care cost. Many countries worldwide have rules and regulations of such transferring but India does not have any such process or legislation.

But still no such need is arises because, practically all prescription drugs can be purchased without a prescription from many pharmacies. And in many instance Doctor's influence is strong in patients purchase behavior. [7] In our view, such permission for OTC should be given only under the reasonable restriction that advertisement directly to consumers is not allowed. If at all permission for OTC is given then it should be allowed only in remote areas where availability of the physician is scarce.

Promotion of responsible self-medication: Traditionally medical journals and medical representatives marketing their drugs to physicians are the only sources of advertisement. However, in 1997 the Food and Drug Administration (FDA) issued new guidelines making it easier for pharmaceutical companies to advertise few prescription drugs on television, print media as well as on the Internet. [1] It is thought to be source of quality patient information.

Direct to Consumer Advertising (DTCA) [1, 9]: If DTCA of prescription drugs are properly used, then it would be a good source of health information to a public at a large.

It would be helpful to early diagnosis, better therapy and improved patient compliance in the acute phase as well as in the continuation phase of the treatment.

But in our view advertisement of any medical information beneficial for public welfare should be in the strict control and supervision of the government agencies and the state should disseminate information of any drug regarding its generic contents in mass media sparing its brand name.

Foods Standard and Safety Act (FSSA): This law was passed in 2006 by Indian Parliament, but guidelines were not in place. Food Standards & Safety Act will finally include guidelines that clearly state which supplements

can be classed as foods instead of drugs, allowing mass market sale.

These guidelines will remove ambiguities and could encourage more pharmaceutical companies to move into OTC, food companies to move into functional foods and cosmetic companies to shift to cosmaceuticals, all under the wellness umbrella. [7] This is really a good step and such guidelines to be implemented immediately.

Areas of Drugs Advertisement Disadvantages:

The advertisements flowing in the market are not accurate, fair, balanced or truthful and are focusing only on the advantages of the drugs curbing their disadvantages. [1, 10] It promotes inappropriate use of prescription drugs, or diverts consumers from better alternatives. [1] Many a time a newly introducing drug with remote ill effect or side effects after a long period or the drug whose side effects are not fully known, might come into the hands of innocent consumers. [1]

Also the consumer will unnecessarily lure towards the costly medicine only due to impact of brand drug advertisement, although the better and cheaper alternatives are available in the market. [1] Further, higher medicine costs leads to higher overall health care costs through substitution of new, expensive drugs without treatment advantages. [1]

If the sale increases mainly due to advertisement then the main expenditure incurred by the pharmaceutical companies will be on advertisement, sidelining the expenditure over drug research and development.

However, many minor ailments do not require medical treatment at all and ones own immunity take care of such conditions. But, the innocent consumer starts consuming drugs for such ailments and falling prey to self medication and unnecessary economic burden.

Direct to Counter (DTC): DTC is prohibited for Schedule H and Schedule X drugs. DTC product promotion is permitted for Ayurvedic proprietary medicines and for homeopathy drugs but sparing the diseases mentioned in schedule of DMRA and schedule J of DCA.

However due to lack of strict implementation of laws the Indian consumers are constantly exposing to the advertisement of prescription as well as non prescription drugs and the drugs of diseases as banned by DMRA and DCA thus increasing the menace of unnecessary self medication. [1]

But there should be strict implementation of laws in regard to DTC; and in

spite of shouldering the whole responsibility to FDA a separate cell to be established immediately to keep vigilance over such illegalities.

As per the code of conduct as laid down by Medical Council of India, the self advertisement by a registered medical practitioner is considered to be an act of Infamous conduct beyond the limits set by MCI. [12] On the other hand the companies which were considered to be a legal personality are freely involved in promoting their drugs by advertisement without any check or control by the government agencies.

They have been permitted only to create awareness about their drug in to medical professionals through the medical representatives and medical educational literature but are now crossing their boundaries freely. Uncontrolled dispensing of such drugs by pharmacist on the demand of the customer by passing the RMPs or technical persons in the health care field paralyzed the main essence of the existing legislations. Thus they should be checked immediately.

Now days the advertisements related to power building drugs and fairness increasing drugs are so common that society is completely insensitive towards illegality of such ads. Even the well reputed news papers and a news channel doesn't consider such ads to be illegal, unsocial and unethical. Many superstars are involved in the ads of fairness increasing creams and lotions as they were ignorant regarding the legislations banning such ads.

Advertisement of sex stimulating drugs crossed all the limits. In one of the advertisement snake has been represented as male genital and has shown that it is been erected after using that product (Japani oil aid).

Similarly, advertisement of Ayurvedic oil which claims 100% cures for quick discharge, nightfall, impotency, gonorrhea, syphilis, infertility, etc. [13] thus not only the violation of these legislations but violation by obscene means has entered into the scenario. FDA, public broadcasting, health and judicial authorities are the mute spectator of the whole scenario although it is clearly mentioned that these are cognizable offences.

All the agencies and general public seems to be immune towards such advertisements. According to us, state should conduct widespread publicity of illegalities of such advertisements. Moreover, the state should sensitize the related authorities/ personnel for not only to ban such ads but also to take strict action against the perpetrator.

Recently, The Food and Drug Administration (FDA) plans to pull the plug on television channels that offer air time to promote medicines which guarantee to cure joint pain, impotence and weight reduction. After sending show cause notices to the firms, the FDA now plans to send letters to the television channels and actors, who are involved in the promotion of such medicines. [14]

The Directorate of Food and Drugs Administration (FDA) has also warned citizens against self-medication loaded by medicine advertisements (including Ayurveda, Siddha, Unani and Herbal) that not only make false claims but are also illegal. [13] Such actions and punishments should also be given wide publicity to deter the other established or upcoming culprits. Recently new issue is striking to the affluent class that one-fourth of students are overweight or obese.

Though junk food and fast food ads aren't completely to blame for childhood obesity but they do contribute to the overall problem. Thus the Australian Medical Association has requested a ban on junk food. [15] In India we fail to even check the drugs add.

The Drug and Magic Remedies Act also does not cover advertisements that appear in various media pertaining to health gadgets of unproven efficacy, like tummy trimmers, bands for blood pressure control, and gadgets to increase height. Hence an immediate amendment in the DMRA is needed.

Advertisement through internet and email, IT and Mobile Telecommunication technologies is another threat to consumers who are not informed of side effects or misinformed with no remedy for complaint or redressal.

There is urgent need for Amendments in IT Act, 2000 and enactment of Cyber Law for prevention of such crimes in India. At present in India, there is no central statutory agency or uniform legislation regulating the advertising industry. The Indian advertising market as a whole is regulated and controlled by a non-statutory body, the **Advertising Standards Council of India (ASCI)**.

False advertisements are restricted under the various legislations including the Consumer Protection Act, 1986; Cable Television Network Rules, 1994; Norms for Journalist Conduct issued by the Press Council of India Act and ASCI Code [19].

Under information and technology act 2000 [20] publishing of Information which is obscene in electronic form:

"Whoever publishes or transmits or causes to be published in the electronic form,

any material which is lascivious or appeals to the prurient interest or if its effect is such as to tend to deprave and corrupt persons who are likely, having regard to all relevant circumstances to read, see or hear the matter contained or embodied in it shall be punished on first conviction with imprisonment of either description for a term which may extend to five years and with fine which may extend to one lakh rupees(Rs.1,00,000/-) and in the event of a second or subsequent conviction with imprisonment of either description for a term which may extend to ten years and also with fine which may extend to two lakh rupees(Rs.2,00,000/-)"

Conclusion:

Advertisement of any drug should be strictly under control and supervision of government agencies; as the main objective of government agencies is to prevent certain diseases and thus policies are directed towards public welfare in contrast to the money making by the pharmaceutical companies.

Advertising of prescription drugs is currently allowed only in the USA [9] and up to year 2005 in New Zealand. [10] The European Parliament has emphatically opposed advertising to patients in line with the "precautionary principle". Internet transcends country boundaries and it is more difficult to control and regulate. So there is an urgent need to increase vigilance with respect to any inappropriate use of DTCA on internet. [1]

Accountable drug information services and health campaigns should be identified and promoted by governmental agencies. [16] There is need of clear guidelines and specifications regarding the diseases to be included or excluded from the schedules of the said Acts.

There is a strong need to closely monitor the range, availability, clarity and particularly the quality of independent and unbiased information regarding prescription drugs on mass media and Internet. Only a vigilant today could lead to a safe tomorrow.

Thus an urgent review and amendment of the legislations and their strict implementation is a need of an hour.

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Table 1
Prohibition of Advertisement of Certain Drugs for Treatment of Certain Diseases and Disorders under DMRA

S.N.	Diseases & Disorders	S.N.	Diseases & Disorders
1	Appendicitis	28	Hydrocele
2	Arteriosclerosis	29	Hysteria
3	Blindness	30	Infantile paralysis
4	Blood poisoning	31	Insanity
5	Bright's disease	32	Leprosy
6	Cancer	33	Leucoderma
7	Cataract	34	Lockjaw
8	Deafness	35	Locomotor ataxia
9	Diabetes	36	Lupus
10	Diseases and disorders of the brain	37	Nervous debility
11	Diseases and disorders of the optical system	38	Obesity
12	Diseases and disorders of the uterus	39	Paralysis
13	Disorders or menstrual flow	40	Plague
14	Disorders of the nervous system	41	Pleurisy
15	Disorders of the prostatic gland	42	Pneumonia
16	Dropsy	43	Rheumatism
17	Epilepsy	44	Ruptures
18	Female diseases (in general)	45	Sexual impotence
19	Fevers (in general)	46	Smallpox
20	Fits	47	Stature of persons
21	Forms and structure of the female bust	48	Sterility in women
22	Gall stones, kidney stones and bladder stones	49	Trachoma
23	Gangrene	50	Tuberculosis
24	Glaucoma	51	Tumors
25	Goitre	52	Typhoid fever
26	Heart diseases	53	Ulcers of the gastro-intestinal tract
27	High or low blood pressure	54	Venereal diseases, including syphilis, Gonorrhea, soft chancre, venereal granulomas and lymphogranuloma

Table 2
Diseases and Ailments to Prevent or Cure or Make Claims to Prevent or Cure under DMRA

S.N.	Diseases and Ailments	S.N.	Diseases and Ailments
1	AIDS	36	Maintenance or improvement of the capacity of the human being for sexual pleasure
5	Baldness	37	.Mental retardation, sub-normalities and growth
10	Change in colour of the hair and growth of new hair	41	Parkinsonism
11	Change of Foetal sex by drugs	42.	Piles and Fistulae
17.	Encephalitis	43.	Power to rejuvenate
18	Fairness of the skin	44.	Premature ageing
21	Genetic disorders	45	Premature graying of hair
28	Increase in brain capacity and improvement of memory	47.	Sexual Impotence, Premature ejaculation and spermatorrhoea
30	Improvement in size and shape of the sexual organ and in duration of sexual performance	48	Spondylitis
31	Improvement in the strength of the natural teeth	49	Stammering
32	Improvement in vision	51	Varicose Vein
33	Jaundice/Hepatitis/Liver disorders		

Table 3
Diseases for which advertisement of treatment is banned

S. N.	Disease /Illness	S. N.	Disease /Illness
1	Asthma	12	Stature
2	Blindness	13	Gallstones
3	Cancer	14	Kidney Stones
4	Cataract	15	Bladder Stones
5	Deafness	16	Paralysis
6	Diabetes	17	Insanity
7	Menstrual and Uterus Disorders	18	Leucoderma
8	Nervous disorders	19	Obesity
9	Dropsy	20	Rheumatism
10	Epilepsy	21	Sexual Impotence
11	Structure of female Bust	22	Sterility in women and HIV/AIDS, etc.

Source: The Times of India October 7, 2006: 13, Advertisement by Secretary, Government of India, Ministry of Health and Family Welfare, Department of Ayurveda, Yoga, & Naturopathy, Unani, Siddha & Homeopathy (AYUSH) IRCS Building, Red Cross Road, New Delhi

Review Research Paper

Technical Aspects of Crime Scene Photography

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Abstract

A characteristic aspect of Forensic science is that it is the comparison of evidence samples to reference samples. A crime is a violation of a statutory law. Therefore, a crime scene might be defined as any location or item connected with the crime. The interval between the crime event and examination of the scene, affects our ability both to recognize evidence as such and to relate it to the crime event. Crime scene photography helps to capture the scene and analyze it at a later date. It provides a permanent record of the scene & helps to understand the complexities and details of the case. Forensic photography is quite different from the regular photography. Forensic photography highlights mainly on the case as it provides a concrete proof which can be used as evidence in the court of law. It makes the judges and the lawyers understand the complexities of the case and tackle the issues in an efficient manner. It is mandatory to know about the basic concepts of photography and the art of crime scene photography to deal and record the evidence in a efficient manner.

Key Words: Forensic Photography, Crime Scene, Evidence, Judges & lawyers

Introduction:

Traditional definitions of "evidence" include the ideas, "to make evident, something that makes plain or clear, data presented in court in proof of the facts". [1] It is a known fact that a picture is "worth a thousand words". [2]

Photography provides a permanent record of the scene that is taken which helps the individual who know nothing about the case to understand the complexities and details of the case. Describing a case in mere words will be difficult to make a person understand.

Remember that the photographs speak about the case and it should be relevant to what you are trying to say through words. In other words, it is better to capture the scene and the surrounding areas that provide useful information. Photos should be taken, as if it makes none of them to misrepresent the fact in any way. Forensic photography is quite different from the regular photography.

Regular photographer would like to take the shots which are quite appealing to the person who visualizes it. Contrary to it, Forensic photographer takes the shots which are very disturbing to the person who visualizes it. Forensic photography highlights mainly on the case as it provides a concrete proof which can be used as evidence in the court of law. It makes the judges and the lawyers understand the complexities of the case and tackle the issues in an efficient manner.

Investigation of a crime begins with the information about the crime. Upon such information the investigating officer visit to the scene of crime to make a note about the facts enumerated in the complaint. If the investigating officer is satisfied that a crime has been committed, suitable photographs are taken and proceed with further investigation.

Photograph of the Scene of Crime:

The first photograph of the scene should depict what was present at the scene when it was first seen or when the investigating officer first arrived at the scene. It is better to make a note that nothing is moved or changed before the scene is documented by photography.

Crime scene photography should provide the most comprehensive sense of the scene by taking photographs from three different perspectives: long range or overall views, mid-range or medium views, and short range or close up views. [3] The dividing line between "long shot" and "medium shot" is fuzzy, as is the line between "medium shot" and "close-up". [4]

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In the overall views, it should show as much of the scene as possible.

The authors have provided a beautiful example, if the scene of crime took place in the bedroom, the overall views should include the front of the house, and then follow the progression to the actual crime scene, ending with shots of the entire bedroom. The medium or mid-range views should show the evidence in relationship to the other items in the room.

In other words, if you have blood spatter on a wall, shoot that evidence first at mid-range so that it is clear that it is on a wall, not on the floor or ceiling. Then photograph the blood spatter from close-up to get as much detail as possible. Use close-up views for all of the evidence collected. By using these three different views, a record can be made to show the entire scene and the relationship of the evidence to the scene.

After the entire scene and its evidence are photographed, photograph the surrounding area to add perspective. These photographs may include the neighboring homes and streets or fields. [3] The overall views that are needed to be taken vary from case to case.

Equipment:

Equipment required to take a better shot of the scene of crime is very important. Forensic expert cannot compare himself with a professional photographer and has to keep in mind that Forensic photography doesn't necessarily need the most sophisticated and most expensive camera in the market. A regular digital camera can be used for such purposes.

But one can resort to a DSLR camera from fairly basic models to high end models with interchangeable lenses when one has the option of choosing a camera for scene photography.

It is important to make sure that the person who takes photographs can operate the camera well and that provides high quality pictures. Whether the photograph has been taken on a film or a digital camera, remember that all pictures taken at the crime scene have to be accounted for. It's easy to delete photos with a digital camera, but it has to be remembered that photos should never be deleted that are taken at a crime scene.

If any photos are deleted then, that can invite lot of controversy in the court of law. The unedited photos have to be saved on a compact disc and sent to the court along with the other documents pertaining to the case. [5] The person who takes the photographs in a digital camera has to authenticate that the photographs has been taken by him and none of the photos has

been altered by any means. If required, then that individual has to depose evidence in the court of law as to its authenticity.

When photographing evidence the right features on the camera and the right accessory equipment are required. For example, to show a scene in perspective, a wide angle lens. When taking a close-up shots of blood spatter, fingerprints, tool marks, etc., use of macro photography to get a photograph with the level of clarity and fine details that are needed. In addition, to document properly taken photographic evidence of tool marks and foot prints, portable lighting in addition to the inbuilt flash, is required since using these light sources together provides oblique lighting that enhances the appearance of the print.

Use of Force Documentation: [1]

At times people will make frivolous claims of excessive force and injuries resulting from arrests and uses of force in an attempt to get personal gain. In such situations photography can back up the narrative report and through light to the allegation made there by saves time, effort and perhaps money.

In such cases, the use of micro photography to get a photograph with the level of clarity and fine details that is needed.

Panoramic Images:

Panoramic photography is a technique of photography, using specialized equipment or software that captures images with elongated fields of view. It is sometimes known as wide format photography. [6]

The term has also been applied to a photograph that is cropped to a relatively wide aspect ratio. If the help of professional photographer is sought at the crime scene then it is better to capture the panoramic images which create a virtual tour of the scene in addition to the typical crime scene photography.

There are two types of panoramas that are useful to the Forensic community:

- Spherical Panorama which captures a 360° field of view in all directions around the photographer.
- Object VR (Virtual Reality) which allows a photographed object to be rotated in all directions.

A. Spherical Panorama: [7]

There are multiple ways of creating spherical panoramas.

Part one: Only five pieces of hardware are needed to create a panoramic image:

1. **Digital SLR camera**
2. **8mm Fisheye Lens:** Any lens will work; however, more images needs to be taken to

complete a sphere with a longer focal length than a wide angle lens. For example, an 8mm fisheye lens will capture the entire 360° sphere with just four images in a single row versus a 16mm lens that requires six or more images in two rows. The fewer the number of images, the fewer stitches that need to be prepared, which means less computer processing time.

3. **Panoramic Head:** Parallax is the movement of a foreground object in relation to the background which causes some degree of misalignment between two adjacent photographs during the stitching process.

Parallax errors occur when photographs are captured by rotating the base of the camera on a standard tripod instead of rotating the lens.

To completely eliminate parallax errors, the camera needs to rotate about the entrance pupil (nodal point) of the lens which is generally around the front barrel of the lens. Panoramic heads are designed to position the nodal point of the lens over the center of the rotation of the tripod. There are numerous different styles of panoramic heads available.

4. **Tripod:** Using a tripod minimizes camera movement during an exposure. Most importantly, when shooting panoramic images for stitching, the tripod allows you to maintain consistent alignment between the images, thus improving the stitch process.
5. **Shutter Release:** In photography, shutter speed or exposure time is the length of time a camera's shutter is open when taking a photograph. The amount of light that reaches the film or image sensor is proportional to the exposure time.

Shutter speed is one of several methods used to control the amount of light recorded by the camera's digital sensor or film. It is also used to manipulate the visual effects of the final image beyond its luminosity. [8]

Part Two: Image Acquisition:

The basic idea is to capture all 360° of the scene by overlapping multiple photographs, roughly 20–30% with each adjacent photograph. Keep in mind that there are certain key requirements unique to panorama photography that must be adhered to in order to create a seamless panorama.

Camera Settings:

Each of the photographs taken must use an identical setting since any inconsistency in exposure, focus, or white balance between shots will create a mismatch during the stitching

process. The same holds true for the lens' focal length if a zoom lens is in use; tape down the lens barrel if necessary.

- Ensure the resolution is at the largest setting and ISO at the lowest to get the best quality and cleanest images.
- Lock white balance according to the current environment lighting condition (shooting RAW files).
- Set the camera to full manual mode "M" (Manual mode only if photographer is well versed with camera settings, other wise use aperture/auto mode) and the shutter speed as required for correct exposure.
- Set the aperture of the lens somewhere in the mid-range apertures of f/8 to f/11 to produce the sharpest images. The temptation to set it to f/22 or higher may yield more depth-of-field but will degrade image sharpness.
- Manually lock focus on the main subject or use the hyper focusing method for best results. Since the fisheye lens captures images at such an extreme angle, it has a very large apparent depth of field. This means that the photograph will appear sharply focused from front to back even at a wide aperture.
- Avoid using on-camera flash. Use a slower shutter speed or off camera lighting that can stay consistent throughout the rotation of the camera. [9]

Landscape or Portrait Mode:

With a full-framed sensor camera, the fisheye lens will capture a full 180° view in all directions and produces a complete circular image at the center of the frame surrounded by black unexposed areas on the outer edges of the frame; therefore, the camera can be used in either orientation. However, landscape mode will probably be more stable.

Part Three: Software

Depending on the end results of the panoramic project, a standalone scene or a virtual tour of multiple scenes, two types of software will be needed:

1. **Stitching software**
2. **Touring software**

Stitching software will seamlessly stitch, blend, and then export images as a single scene. They also have additional features such as RAW import, viewpoint corrections, and High Dynamic Range (HDR) panorama creation. Three of the most used stitching software products are PTGui Pro, Panoweaver, and Autopano Pro.

Touring software organizes multiple scenes into an interactive virtual tour. The viewer is then able to navigate the scene and access it from one location to another via mouse drag, buttons, and mapping. The basic elements for all touring software are the clickable "hotspot" creation. The hotspot can be programmed to open another scene, display a photo, open an external file such as a video, or to display contextual information in a popup window. The software also supports the final virtual tour output in readily available non-proprietary software formats such as Adobe Flash or HTML5 for playback.

Inexpensive, off-the-shelf software is also available to stitch the images together. Some of these products include:

- Photoshop Elements (with its Photo merge feature) from Adobe, www.adobe.com
- Photo Vista Panorama from iSeeMedia, www.iseemedia.com
- PanaVue Image Assembler (Windows Only), www.panavue.com

B. Object VR (Virtual Reality): [10]

VR photography is the art of capturing or creating a complete scene as a single image, as viewed when rotating about a single central position. Normally created by stitching together a number of photographs taken in a multi-row 360-degree rotation, the complete image can also be a totally computer-generated effect, or a composite of photography and computer generated objects.

VR panoramas are viewed through movie players, such as Apple's QuickTime software, which may be part of a Web browser plug-in or a stand-alone player application.

QuickTime VR (QTVR) was the original interactive panorama format, but there are now a growing number of different players and plug-ins. Many of these are based on Flash, but some use Java, Silver Light, custom

programming using OpenGL and WebGL, and even JavaScript. Most of the players can be seen in the Panorama Player Comparisons project.

Conclusion:

A properly taken photograph of the scene of crime clearly, brief the investigative team where they could focus the investigation from the onset and save time, pages of reports, and the cost of personnel for that department.

A picture makes the witness who has made observations to recall the event on that fateful day, at the time of trial some years down the road. Use of proper photograph by panoramic images one can actually depict the whole scene as seen through the eyes of a photographer (viewed at the scene of crime).

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Review Research Paper

Forensic Pathologist as Expert Witness

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Abstract

A common witness is one who testifies only to the facts observed by him; his evidence requires only common intelligence and knowledge. He is not capable of forming of opinion or drawing conclusions from the facts observed by him. This principle is known as firsthand knowledge. Section 45 IEA deals with opinion of experts. An expert witness, or skilled witness, is one who is skilled in scientific, technical, or professional matters, and who on account of his professional training, experience, and ability, is capable of forming opinions, or drawing inferences an expert witness is especially skilled in Forensic Medicine, science or law, or art. Medico-legal expert, when mentions the nature of injuries and whether they were caused during life or after death, is an expert witness. Personally, the doctor abhors the vicious cross examination of some few trial counsels who resort to degrading the expert medico legal witness when no other means are available to reduce the impact of his direct medical testimony.

Key Words: Indian Evidence Act, Expert Witness, Forensic Pathologist, Forensic, Law, Science, Art

Introduction:

According to Sec. 45 of Indian Evidence Act "Expert witness is the person who is especially skilled in foreign law, technical or professional matter or art or occupation in connection with identity, hand writing or finger impressions etc".

An expert witness is one who, is capable of deducing opinions from knowledge, skill and experience or from the facts observed by him or noticed by others. [5, 6]

Medical experts will be the persons, skilled and adept in any branch of medicine. Opinion of medical experts on the point of medical science is relevant and admissible in evidence under Sec.45 of Indian Evidence Act.

A medico-legal witness can act both as an ordinary as well as an expert.

When he states, what he has seen or describes any wound on the body as to its situation and measurements etc. He will be a common witness. But when he states, death was due to shock or hemorrhage as a result of injuries described, anti-mortem or post-mortem and homicidal, accidental and suicidal in nature or when he opines that the injury was sufficient to cause death in ordinary course of nature, he will be an expert witness. [5]

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A medico-legal expert should be relevant, reliable, clear, honest, and impartial.

He should give definite opinion with reasons and his answers should be to the point, brief and precise. The expert witness is the prime source of evidence upon which legal decisions are founded.

His effective use in the administration of justice in the courts is an absolute necessity for a peaceful and orderly society. The expert witness evidence alone and by itself does not prove or disprove the case for prosecution. The court of law will give due consideration to it in the context of other corroborative evidences. [5]

The court can be guilty of judicial superstition, if it fails to appreciate, the problem against scientific background of medical science. The court shall also consider the deposition of medical experts when he answers hypothetical questions.

The value of an expert does not depend upon his qualification; rather upon the soundness of the reasoning advanced by him. The opinion by an expert is of advisory nature and is not a binding upon the court. If the law has made a physician a witness, he should remain a man of science; he has no victim to avenge, no guilty person to convict and no innocent person to save. [4]

The following persons will act as expert witness:

1. Forensic pathologist or medico-legal expert
2. Chemical examiner
3. Finger print expert /foot print expert
4. Hand writing expert

5. Ballistic expert
6. Serologist or immunobiologist

The Forensic Pathologist he is a person who possesses specialized technical knowledge in fields of science. In case of conflicting opinion of two doctors, the court has the right to accept one and reject the other, specially that one is usually accepted which tallies with the version of the prosecution. It is for the court to decide the competence of witness as an expert if a dispute arises over competency. [6]

The Forensic Pathologist is a vital source of information in medico-legal investigation, and plays a great role in administration of justice by clarifying the issues in the court as expert witness.

Discussion:

1. Know your role
2. Scientific validity
3. Personal impartiality
4. Be prepared
5. And remember
6. Learn from each experience

Careful and proper documentation of injuries, collection of toxicology specimens and collection and submittal of other evidence are important in medico-legal examination cases. Every case should be approached as the case, which eventually goes to trial. Occasionally case that is initially viewed as solved or otherwise unimportant may suddenly become important when new investigative information is provided.

Forensic pathologists are often called on to provide testimony as expert witnesses in court regarding their autopsy findings or to testify on behalf of a colleague forensic pathologist.

A witness is anyone who can provide information to a court. There are different types of witnesses, and an expert witness should be differentiated from a fact witness.

A fact witness merely provides personal observations of an event without interpretation or opinion of it, whereas expert witness is one who has scientific, technical or other specialized knowledge that will help others understand evidence. The opinion of the expert on an issue is described as within reasonable medical probability, within reasonable certainty or similar wording that allows for possible, but unlikely, situations or events as an expert witness.

The Forensic Pathologist has an important role in conveying clear, understandable, and truthful information to the court in an unbiased fashion with experience; one learns how to become a better expert witness. The following are recommendations

provided to aid a Forensic pathologist to become good and efficient expert witness:

Know your Role:

The Forensic Pathologist should understand what his or her role is in the legal process before providing testimony. He is a competent and acute observer in the laboratory that testifies as to his/her factual findings and opinions in a clear, straight forward, unbiased, and professional manner.

The testimony actually begins in the autopsy room where the anatomic studies are conducted and at this time, the Forensic pathologist must recognize, collect, and preserves medical evidence and prepares a report of such findings for possible future testimony. Once on the stand, the Forensic expert testimony revolves around autopsy findings and the correlation of the autopsy findings with other case information.

This requires expending the case file and critical review of the information to the fullest. This may involve ancillary information collected to enhance to findings and support conclusions. The Forensic expert interprets how a death came about and may be questioned on various aspects of the death such as what type of instrument may have been used to inflict an injury, how long an injured individual may have survived, and how long an individual may have been dead until he was found.

The Forensic Pathologist does not carry the full burden of the case and does not win or lose a case although the anatomic findings and opinions are important and necessary, rarely do they alone permit the court to come up with an enlightened verdict. The Forensic Pathologist's opinion must never be biased for or against the prosecution or defense. It is a factual presentation of evidence collected during the course of an entire death investigation.

In the end, a well-prepared Forensic Pathologist, who knows his role in the legal process is less likely to be stressed and, therefore, more likely to provide efficient testimony.

There are two key features of sound medical testimony: scientific validity and personal impartiality.

Scientific Validity:

Forensic Pathologist is to restrict his testimony to facts objectively noted, analyzed in detail, and accurately recorded, and to opinions solidly derived from these data. The Forensic Pathologist's observations must be of high professional caliber and be thoroughly and well documented. Few things are as meaningful and

indestructible as testimony based on well-documented, solid, factual observation in the end, the verdict can be no better than the factual data and expert opinion on which it is based. [1]

Personal Impartiality:

The Forensic Pathologist, although usually called to testify by the prosecution, must give fair and dispassionate testimony and must not permit himself to become a prosecuting witness or, worse yet, a persecuting witness. [1] The testimony of Forensic Pathologist must not be a prosecution minded or defense minded.

The goal is to present the truth, willingly and unemotionally which is possible within the bounds of unbiased and disinterested observations, to help the court to reach a just verdict. [1] As quoted by Paul C.H. Brouardel, a French medico-legalist,

"If the law has made you [the physician] a witness, remain a man of science; you have no victim to avenge, no guilty person to convict, and no innocent person to save. you must bear testimony within the limits of science". [1]

Be Prepared:

The Forensic Pathologist needs to review the case file to be familiar not only with the case information, but also the scientific principles behind any findings. He must review any toxicological results and determine what, if any, role drugs might have had in the person's death one might anticipate questions and formulate answers. Often times, this comes only with experience, but the better one can anticipate the important issues in a case, the easier time one will have answering those questions in court.

Examples of this are endless, but commonly include whether an individual would have been conscious after an injury, which injuries most serious, what physical abilities might have been possible after a certain injury, and how long an individual might have lived after being injured. One must realize that it is not always possible to know the answers to all questions, and it is important to state "I do not know" when asked a question that is not immediately solvable.

In some situations, it may be proper to estimate, but even estimates may not be broad. Finally, one should arrange the data for rapid, succinct review when on the stand.

And remember.....

- Conjecture is not evidence.
- Presumption is not proof.

The value of the most competently performed autopsy is diminished in the court room if the information derived from it is

presented by poor witness: one who mumbles, argues with judiciary persons, or commits a number of other violations of good or proper testimony that "damn his testimony in the judgment of the court". [1]

Learn from Each Experience:

Every court appearance is a learning opportunity, no matter how many times you have previously testified in the court.

Prepare a clear summary of findings including pertinent information. Modify formats, procedures, and policies to improve data collection and arrangement and minimized wasted time. Prepare a clarification diagram in the case file. The autopsy report and case file should be constructed to allow for the quick, efficient retrieval of easily interpreted, pertinent information.

Deficiencies that are identified should not be taken personally, but rather viewed as an opportunity to make changes to enhance one's format. This may include rearranging the autopsy report to include a separate "injury section" to uniformly sub divided the injury section or to provide a concise "findings" section near the end of the report.

The finding section of a multiple gunshot wound case may provide skeleton information about each gunshot wound including entrance site, injury and whether or not a bullet was recovered or if the bullet exited the body. Other improvements may include refining collection methods of toxicology specimens, or better documentation of clothing and other personal effects or valuables.

Providing expert testimony he should not be feared from event that induces anxiety or panic. When he remembers what his role is, what is expected from him, knows the limitations of what he can say, and knows that it is up to the advocate to ask the appropriate questions to win or lose the case, then the expert witness, through experience, will be more comfortable in his role and provide effective, appropriate, and proper testimony. Like so many other aspects of other professions, it is important to learn from each experience and to strive to do a better job each time.

If problems arise, procedures can be modified to prevent that problem from happening it again. Various resources are available to help improve one's understanding of legal process and improve one's expert witness. [2, 3, 7]

Do:

Always tell the truth 'Say: I don't know' or "I don't remember" when uncertain about something. It is better to admit to not knowing

something than to guess and potentially provide false information; a speculative opinion is of no use. Make it clear when questions or issues fall outside of your area of expertise-admit to the limits of your knowledge. Be a neutral witness.

Provide an objective, unbiased opinion. Speak in a clear, loud voice. Be alert, objective, and unemotional. Maintain dignity, credibility, and self-control. Sit still and stay organized. [4]

Acknowledge the magistrate when he is asking a question, then turn your attention to the prosecution or defense and direct your answer to the magistrate. Provide answers in a matter of fact, manner and be concise.

Pause briefly when answering questions posed during cross examination to allow the opposing by prosecution or defense to may any objections. If you have begun to answer a question when an objection is raised, do not complete an answer until instructed to do so by the judge, because if the objection is sustained, the question should not be answered. Answer only the question being asked.

Don't:

Be smug, self-assured, or dogmatic and adversarial. Fiddle with a ring, watch, necktie, or other object, shift your weight or repeatedly/repetitively change your body position; these unconscious behaviors can give the appearance that an expert witness is uncomfortable.

Look at the advocate who called you to testify when answering questions posed during cross examination. This may give the appearance that you are being coached by the opposite advocate.

Allow yourself to be "pinned down" to a narrow window of possibility when you are not comfortable with it; examples include attempts to replace a replay of "likely with" 65 percent probability of occurring" or narrowing a likely

survival time from "a few hours or so" to "between 60 and 90 minutes".

Do not discuss the case until the trial is over or observe any other aspects of the trial if a "witness rule" has been invoked. This is done to ensure that the testimony of another witness is not influenced by the testimony of an opposing witness. Do not answer beyond the scope of a question. Allow yourself to be forced to answer "yes" or "no" to a confusing, nebulous, or compound question, if you must, ask the judge if you may explain your answer.

Do not allow yourself answer to a question to be interrupted before you can finish in instances when an inadequately or partially answered question may give an inaccurate interpretation that you did not intend.

Conclusions:

An expert witness can volunteer a statement in a court which a common witness cannot. As experienced and trained Forensic Pathologist knows that the opinion on crime will surely give clear idea about the nature of crime, how it has committed. The Forensic Pathologist as expert witness should limit his role as a doctor and medico-legal expert, nothing more and nothing less.

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Review Research Paper

Unknown Dead Bodies: Problems and Solutions

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Abstract

Identification means determination of individuality of a person, or, in the case of the dead, "individualization by attribution of birth name or other appropriate name to human remains". Trying to establish the identity of unknown dead bodies always pose a challenge to the police, and taxes the resources of the most experienced forensic experts. The usual reasons of non-identification of the dead body are: no proper history available, body often highly decomposed, face crushed or destroyed, mutilation/dismemberment of body parts either by animals or vultures when disposed in isolated lonely places or when the bodies are recovered in skeletonized form, etc. Mass disasters like Earthquakes, railway accidents, tsunami's, bomb explosions, air-crash, etc. are other common instances where the problem of identification arises. Another important reason for non-identification of the dead body is the lack of interest by the police to properly work out the case. This paper aims at understanding the principles of cadaver identification and the problems faced by the relatives, police and the autopsy surgeon in establishing the identity of the dead, particularly, the unknown/ unidentified bodies.

Key Words: Unknown bodies, Identification, DNA profiling, Cause of death, Negative identification

Introduction:

Identification is the act of identifying a person. It means determination of individuality of a person. [1, 2] It can also be defined as "individualization by attribution of birth name or other appropriate name to human remains". [3] Establishing the identity of the unknown dead bodies always poses a challenge to the police and to the forensic experts. The questions of identification of an individual are of everyday occurrence in life, both in civil and criminal cases. [4, 5] Identity has to be established even after death to perform the last rites of the remains. The golden rule for identification is "Sooner is better for victim identification".

It is a fact that the chances of identification are inversely proportional to the time since death. The greater the time since death, the lesser are the chances of correct identification.

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The gravity of the problem of identification is further enhanced and taxes the resources of even the experienced Forensic experts when the bodies are recovered in skeletonized form/ decomposed state or in mutilated state. [5] Mass disasters like earthquakes, bomb explosions, air-crash, railway accidents, tsunamis, etc. are other common instances where problem of identification arises. [1, 6] Proper recovery and identification of human remains is essential for the healing of families and even whole communities. [7]

Forensic investigation of human remains has two objectives. The first is to recover and examine the remains for criminal investigations, including establishing the cause and manner of death; the second is to identify the remains and, if possible, return them to the family of the dead person. [8]

Identification is a process that involves one or more of the following means:

- Visual and other customary means of identification. This usually involves relatives or acquaintances of the missing person(s) viewing the remains
- Systematic comparison of ante-mortem and post-mortem data
- Scientific/objective means which would involve matching of:
 - Post-mortem and ante-mortem dental radiographs;

- Post-mortem and ante-mortem fingerprints;
- DNA samples from the human remains with reference samples;
- Other unique identifiers, such as unique physical or medical traits, including skeletal radiographs,
- Numbered surgical implants/prostheses. [9]

Problems:

Mutilation of the dead body may be done by criminals to destroy all traces of identity or to facilitate the disposal of the body. [1] The various methods of attempted disposal of the body by the criminals are: [6]

- 1) Mutilation (slashing, gouging, pounding or other attempts at regional disfigurement or obliteration)
- 2) Dismemberment (so that only widely scattered parts are found)
- 3) Use of corrosives for specific or general destruction
- 4) Burns

Another important challenge for the forensic expert is to find out the cause/ manner of death in unknown dead bodies as there is very little or no proper history available, body may often be highly decomposed and the police may not be interested in properly working out such cases.

Identification can be done by matching information from the deceased (physical features, clothes, artifacts etc.) with information from individuals who are missing or presumed dead. Direct comparison of the dead body by the relatives of the deceased according to the memory or available photographs, is the primary method of identification. [10]

But this method is prone to errors and may lead to incorrect identification thus leading to serious embarrassment to the relatives, and may put the relatives in legal difficulties. Even where physical characteristics are matched for identification, there is great danger of ambiguity; an incorrect identification of a firefighter was announced based on a gold necklace and a rare congenital malformation of a neck bone. [11]

So, this kind of identification should be supported by some scientific methods. The early work of police, non-specialists in managing the dead (especially proper recovery from the scene, documentation and proper methods of storage etc.) will determine the success of future identification by forensic specialists. [10]

Injuries to the deceased especially on the face, or presence of blood, vomitus, fluids, or dirt, will increase the chance of mistaken

identification. In cases of mutilation of the dead body any separate body part which proves that a person is dead should be managed as though it is a whole body. [10]

Problems Related to the Public:

The public faces a lot of reluctance from the mortuary attendants when requested to show the dead body repetitively to the relatives.

The act of identification of a dead body in itself is a very distressing situation for the relatives and they have to be handled sympathetically, and their emotions as well as the religious beliefs have to be kept in mind while showing the dead bodies.

They have to be told about the incident, site from where the dead body or body parts were recovered, belongings of the deceased and any other relevant facts pertaining to the dead body so that proper identification is possible. It is usually customary to allow only 2-3 relatives or neighbors of the deceased for identification process and usually one of the relatives decides whether it is their relative's body or not.

This process usually ends in wrong identification, especially when the body is in advanced stage of decomposition or is skeletonized, or when the body is identified based on personal artifacts, or there is massive trauma to the head and face.

Sometimes deliberate refusal by the relatives of the dead to identify their relative may be due to socioeconomic reasons – poverty/ drug addict/ bad character, etc. All the above mentioned factors when combined will result in not recognizing their own relative or wrongly recognizing somebody else as their own relative.

It is on records that wrong identification has resulted in suspension/ termination of services of doctors and/ or the police personnel. So it is of utmost importance to make every effort to establish the identity.

Some of the solutions for the problems faced by the public are:

1. Proper storage facilities like cold chambers/ice to decrease the rate of decomposition so that the public has a larger time period to identify their relatives.
2. Public to be treated sympathetically and their emotional state as well as the religious beliefs to be kept in mind while showing the dead bodies 10 (**manual**)
3. Be allowed to view the body as many times as they want under the supervision of mortuary staff, and it should be arranged quickly.

4. Ask questions as to how they have recognized the body and this will give a fair idea to the forensic expert/ mortuary attendant of the basis of identification 10. (manual)
5. Photography of the unknown dead body should be arranged quickly and as soon as possible after arrival at mortuary so that facial features and other identification data are relatively well preserved in photographs. These photographs are handy, less time consuming to show to the relatives and can be shown any no. of times.
6. These photographs will possibly be the best information available in mass fatality for identification purposes.

Problems Related to the Police:

One major problem of the police is that they are always overburdened and do not have enough time to properly work out the unknown cases. Another problem is the inadequate training / lax attitude of the police personnel in handling the unknown cases. Punjab Police Manual states minimum time limit as 72 hrs before which a postmortem examination of the unknown dead body is not to be done, but it does not specify the maximum time limit and this serves as an excuse to "delay the post mortem".

All of these inadvertently result in further decomposition of the dead body, thus again decreasing the chances of correct identification.

Sometimes there is deliberate delay on the part of police officials to get the postmortem done so that the body gets decomposed and the cases of murder may be passed off as simple cases of natural death and some ulterior motive of the police official is served.

Taking and preserving fingerprints, publishing photographs in dailies/ newspapers, pasting pamphlets outside mortuaries/ hospitals/ police stations/railway stations, etc. are some of the routine steps undertaken by the police in a bid to trace the unidentified but these are cumbersome, time and money consuming so not preferred by the police or are often bypassed.

Besides these, advertisements in the local TV channels are aired and a thorough enquiry is made in the locality in which the body was found. All these formalities require a lot of time and coordination, and the police usually request a postmortem examination only after completing the above mentioned formalities to avoid unwanted allegations by the relatives at a later date when the body is identified, but this process itself decreases the chances of correct identification.

Some of these problems may be solved by simply taking the photographs of the deceased and then getting the postmortem examination done after 3 days. Prior to photographing the dead body, it is advisable to assign a unique reference number sequential to each body or body part and the same should be visible in all the photographs. [10]

These unique reference numbers must not be duplicated. These must be written on a waterproof label which should be securely attached to the body or body part. A waterproof label with the same unique reference number must also be attached to the container for the body or body part (e.g., body bag, cover sheet or bag for the body part).

The body should be cleaned sufficiently to allow facial features and clothing to be properly represented in the photographs. The photographs should include at least:

1. A full length clear view of the body, front view;
2. Whole face; and it should fill the entire picture;
3. Any obvious distinguishing features;
4. Photographs must be taken close to the dead body;
5. The photographer should stand at the middle of the body when taking the picture, not at the head or feet;
6. The photograph must include the visible unique reference number, to ensure that identification made using the photograph matches the correct body, and a scale, to calculate the size of features in the photo.

If circumstances permit, or at a later time, additional photographs can be included with the unique reference number of the following:

- Upper and lower part of the body;
- All clothing, personal effects, and distinguishing features [10]

Solution to the rest of the problems faced by the police lies with the senior police officials. They can arrange for training of their juniors in dealing with the unknown dead bodies, increase efforts to identify the victims, coordinate with other state agencies in identifying the deceased, etc.

Problems Related to the Autopsy Surgeons:

One important problem faced by the autopsy surgeon dealing with such cases is trying to establish identity through the external features in a decomposed/ mutilated body. [12]

In order to decrease the incidence and degree of decomposition, proper preservation

measures are required on arrival of the dead body and this usually is not a problem unless there is a massive influx of dead bodies from a disaster site. Usually mortuaries in India are equipped to handle 6-12 bodies at a time but if all the chambers of the cold storage are full then it is the unknown dead bodies which are put out in the open to accommodate known dead bodies.

Even if accommodating the bodies by placing them one over the other, this may distort the face of the victim thus may lead to non identification of the victim.

If there are a number of unknown dead bodies then again the problem of plenty arises; resulting in neglect by the mortuary staff, or cursory examination by the doctor. The solution to this problem is to anticipate need for refrigerated holding areas.

Mobile or portable refrigeration units (refrigerated containers or trucks) should be available on call or use of other preservative measures like Calcium hydroxide, formol and zeolite should be available in the mortuary so that if need arises one can use these to preserve the body.

Another, though less common, problem faced by the doctor is the accidental exchange of the unknown dead bodies or conducting post mortem examination on the wrong body.

Cases are on record where there was accidental exchange of unknown dead bodies as there is no one to identify the dead body, police personal paying least attention in recognizing the body which they had brought from the scene of crime, and the mortuary staff paying minimum attention towards the unknown dead body, for obvious reasons.

Then again, the disease status of the unidentified person poses a problem for the surgeon. May be he/she was suffering from TB, HIV +ve, hepatitis B/C and in these type of cases extra precautions would have to be taken while conducting post mortem, all the instruments would have to be sterilized after post mortem; disposal of such cases also poses a problem.

The autopsy surgeon, besides doing the routine efforts as described above, also helps in preserving samples for analysis for positive identification (DNA analysis), or get the body X rayed, identification through photographic superimposition or medical implants/dental records, etc. Blood grouping of the individual will help in negative identification. Most of these methods require ante-mortem records for comparison.

For identification through dental records and DNA analysis, investigators have to have some idea or guess as to who the body might be in order to search for ante-mortem records or relatives. For DNA testing, any biological sample known to have come from the deceased can be used to get an ante-mortem profile, if it can be salvaged properly.

Biological samples such as samples from surgery or donor samples from the deceased's tooth or hair brush can be used to obtain ante-mortem records, as long as only the deceased used these items.

DNA identification can also be made if both parents of the deceased are alive and claim the body as to be theirs or if the deceased had a child. If the deceased had a child, the child and the child's other biological parents can be matched to the deceased in much the same way. DNA analysis is integral to the accurate identification of human remains from mass disasters. Forensic DNA typing allows the identification of any biological sample and the association of body parts, as long as sufficient DNA can be recovered from the sample(s).

This is true even when the conditions are such that the victims' remains are fragmented and the DNA degraded. [13]

Dental identification may be based on pathological conditions, disturbances of tooth eruption, malocclusions and on dental treatment. The identity of an individual may be established on the basis of the uniqueness of concordant ante and postmortem dental features.

A comparison between ante mortem records and postmortem findings may thus often lead to identification or provide convincing proof to rule out a particular identity. [14]

Using medical implants to make a positive identification does not require any ante-mortem records beyond the manufacturing data and serial number associated with the implant. Pacemakers and other surgical implants, such as artificial hips and the like, have serial numbers etched into them.

And all surgical implants require documentation of insertion in a database, any medical implant found in a dead body can be traced to the manufacturer, the doctor who implanted the device, the hospital where it was done, and of course the name of the person who received it. Such serial numbers are often used to determine the identity of an unknown corpse.

Be humane and treat unknown sympathetically. Pay extra attention to the unknown as they have no one to take care of them

Conclusion:

A man is born with an identity and deserves to die with the same. This is a fundamental right of being born a human. However, due to natural calamities, mass disasters, intentional/unintentional acts of fellow human beings, a number of instances of "unidentified bodies" come to fore.

Advancement in the field of computers, genetic engineering including DNA analysis, etc. have lead to development of newer methods of identification. What is eventually required is a sympathetic, humane and scientific approach to the whole problem to find a suitable solution for establishing the identity of the dead.

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Case Report

Non-Information of Side Effects and Precautions of Drugs: Deficiency in Service

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Abstract

Non information of important side effects of drugs may amount to deficiency in service on the part of the doctor. It is a case in which a doctor prescribed an antidiabetic drug to a patient who was alcoholic and diabetic without proper diagnosis and side effects of hypoglycaemia was not informed and precautions of antidiabetic drug that it should be taken before food was also not informed. In a case before District Forum no negligence was found, but in appeal SCDRC reverses the order of District Forum and pronounced well reasoned judgment and ordered for compensation for non discharge of duty by the doctor and declared it as deficiency in Service, which was confirmed by the NCDRC in appeal by the treating doctor. Deceased was father of a doctor who fought his own case on behalf of his mother, complainant in this case. This case will create awareness among doctors for taking informed consent in such case implied oral consent and help in preventing future litigations of such nature.

Key Words: Diabetic, Alcoholic, Antidiabetic Drug, Side Effects, Precautions, Death, Deficiency in Service, Damages, Compensation

Introduction:

This case related to non information of serious side effect of antidiabetic drug, manner of administration i.e. taken before food and avoiding alcohol during treatment. NCDRC considered it as duty of doctor and this conduct on the part of doctor amounts to deficiency in service under the Consumer Protection Act.

NCDRC observed that the following questions required considerations in a revision petition [1] were:

- (a) Whether a medical practitioner before prescribing a drug, which has side effects, should be careful or not in informing the patient about its side effects such as hypoglycaemia etc.?
- (b) Whether, a doctor should give treatment for diabetes to a person who is alcoholic, straightway on the basis of urine test report.
- (c) Without confirming by proper pathological test that the patient is diabetes and thereafter without informing the patient that the medicine should be taken before food and alcohol should be avoided?

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In NCDRC view, it was the duty of the doctor, before prescribing diabetic drug, to inform the patient about the side effects of a drug, particularly to an alcoholic person and he should be informed that alcohol may increase sugar level and that diabetic drug should be taken before food.

NCDRC further opined that it is not done and it will be a deficiency in service.

Questions for Consideration before the NCDRC:

- Why the D-1 wanted to test the urine of Late P-1 when he was brought in with the complaint of chronic cough and cold?
- Whether the D-1 was right in coming to the conclusion that the patient was having diabetes on the basis of urine test conducted by him?

Following Abbreviations were used to protect identity of all stake holders: D: Doctor [D-1, D-2, D-3, D-4] H: Hospital: H [H-1, H2], P: Patient (P-1, P2, P-3 etc.) I: Insurance Company

Background of the Case:

This Revision Petition arises from the order dt.1.7.2002 passed by the State Consumer Disputes Redressal Commission, Goa, in Appeal No.76 of 2000, reversing the order dt.22.2.2000 of the District Forum, Panaji in Complaint No.310 of 1993.

Brief Facts of the Case:

The P-2 filed a petition before the District Forum stating that her husband Pralhad

Korgaonkar, aged about 45 years was taken to the D-1 at village Aldona on 23.2.1993, as he was having chronic cough and cold.

D-1 gave some medicines and asked him to come back on 26th February, 1993 with a sample of urine for test.

Accordingly on 26.2.93, P-1, presented himself before the D-1 with the urine sample. The D-1 who tested the urine mentioned that the urine sample showed sugar, which is indicative of diabetes and prescribed one tablet of 5 mg. of Euglucon per day for five days.

The P-2 stated that after taking Euglucon tablet, for 3 days, P-1, in the early morning hours of 3.3.1993 at about 2.00 A.M., began sweating very much and had convulsions and became unconscious. He had to be rushed to H-1 at Mapusa at 4.00 A.M., on 3rd March, 1993. At the H-1, soon after admission, P-1 went into coma for about 4 days and thereafter recovered consciousness, but remained in the hospital for 40 days and was discharged on 10th April, 1993.

P-1 was advised to take the treatment at home. P-1 was again admitted in the H-1 on 22.5.1993 for a few days. However, on 5.8.1993, P-1 passed away.

Alleged Negligence:

The P-2 alleged that the D-1 prescribed the tablet Euglucon a specific drug for diabetes without ascertaining properly whether the patient was in fact suffering from diabetes.

Evidence:

Medical literature was produced to show that Euglucon is a very sensitive drug and needs to be administered with care and the dosage is to be regulated carefully depending on the level of blood sugar.

It was alleged that P-1 went into coma due to hypoglycaemia and that subsequent treatment in the H-1 did not really help him to recover and **that his death is directly attributable to rash administration of Euglucon tablets by the D-1.**

Observations of the District Forum/SCDR:

The District forum which heard the matter dismissed the complaint on the ground that no negligence has been proved. In Appeal, however, the decision was reversed holding that;

- a. In the first instance the D-1 did not even ascertain whether the patient was suffering from diabetes at all;
- b. Without so ascertaining, a specific and very sensitive anti-diabetic drug, dosage of which

has to be regulated with care, has been administered;

- c. The tablets were prescribed in a routine manner without advising the patient who is an alcoholic that he should not consume alcohol and that the drug should be taken only after the food;
- d. That the patient developed Coma because of the adverse effect of Euglucon.

Appeal before NCDRC:

The present appeal is filed by the D-1 against the said order.

Arguments of D-1:

NCDRC heard both the parties and carefully perused the evidence on record. The arguments of the P-3 i.e., D-2 was:

- a. That testing of urine sugar is one of the first steps used by general practitioners like him in detecting diabetes;
- b. That sugar in the urine indicates that the patient had diabetes;
- c. That the dosage of Euglucon prescribed was the minimum;
- d. That no evidence has been produced as to when and how the deceased consumed the tablets of Euglucon;
- e. That there is no evidence produced to link the development of Coma on 3.3.1993 with the prescription of Euglucon given on 26th Feb 1993;
- f. That the P-1 in fact never came back to the D-1 after taking prescription on 26.2.1993;
- g. That no medical record of the H-1 was produced to show as to what had transpired in the hospital;
- h. That one of the random blood tests at the H-1 on 3.3.1993 showed that blood sugar as 185 mg confirms that the P-1 was a diabetic;
- i. That the test which took-place in August-1993 can be of no stretch of imagination be said to have been caused by consumption of three Euglucon tablets of 5 mg each in February, 1993;
- j. That the decision of the District Forum was correct; and urged that the order of the State Commission should be set aside.

P-3 Defence Argument:

The P-3 argued the case for the P-2. He submitted;

- i. That for testing whether a person is diabetic or not, testing urine for the same is not a definite test to establish diabetes;
- ii. That the urine test can be positive for sugar under various other conditions including alcoholism;

- iii. That the D-1, knew that P-1 was an alcoholic and urine test can be false positive;
- iv. That P-1 was not suffering from any serious disease other than chronic cough and cold when P-1 went to the doctor;
- v. That there was no reason for P-1 to go into a Coma soon within 4 to 5 days after seeing the D-1;
- vi. That the development of Coma can only be attributed to the consumption of tablets prescribed by the D-1.

Medical [Hospital] Records:

It was also argued that while unfortunately no record of the H-1, could be produced because they were inadvertently destroyed or misplaced by the H-1 authorities, evidence of the D-2, D-3, D-4 who also submitted themselves to cross-examination was very much on record and it can be relied upon.

Observations of the NCDRC:

NCDRC heard both the parties at length and after careful consideration of evidence on record NCDRC was of the opinion that the D-1 was **totally negligent in discharge of his duties and that there is a clear deficiency in service** provided by him for the following reasons:

Why the petitioner doctor (opposite party) wanted to test the urine of late Korgaonkar when he was brought in with the complaint of chronic cough and cold?

The first question that arises is as to why the D-1 wanted to test the urine of P-1 when P-1 was brought in with the complaint of chronic cough and cold. The D-1 himself answered this by saying that P-1 was smelling alcohol and was in a drunken state and D-1 had suspected P-1 to be an alcoholic. D-1 argued that this is what prompted D-1 to ask the P-1 to bring his urine for test after four days for possible diabetes.

Medical Evidence:

The medical literature produced on record shows that Euglucon is a drug belonging to "Sulfonyl Ureas". This is a specific anti-diabetic drug, which is required to be administered after testing blood sugar levels.

As a matter of fact, when diet, exercise and weight reduction do not lower the blood sugar, then the patient is put on drug therapy, with drugs like Euglucon and even then the dosage needs to be adjusted periodically depending on the blood sugar levels.

The literature further shows that "Severe Hypoglycaemia" (lowering blood sugar levels) can be induced by Sulfonyl Ureas. These drugs

increase release of insulin. Therefore, these drugs like Euglucon are required to be administered immediately after intake of food.

Literature further shows that intolerance of alcohol may occur in patient treated with Sulfonyl Ureas. Therefore the patients are strictly advised to avoid alcohol while taking the drug.

NCDRC find that none of the precautions were given to the P-1 and the D-1 merely prescribed Euglucon 5 Mg. for five days.

Secondly, the record of admission of the patient to the H-1 on 3.3.1993 clearly shows that P-1 was admitted at 4.00 A.M. on complaint of convulsions. The P-1's relatives P-2, P-3 told the D-2, that the P-1 was not talking since 2.00 A.M., that P-1 had convulsions and frothing at the mouth, and that P-1 had a similar convulsions at 8.00 P.M. on the previous night.

P-2, P3 told the D-2 that the P-1 had taken one tablet of 5 mg. Euglucon for the previous 4 days. D-2 confirmed these facts in his cross-examination, and stated that his diagnosis was that of Hypoglycaemia (fall in blood sugar level) due to consumption of Euglucon, with chronic bronchitis. D-2 stated that he had taken a blood sample to find out random blood sugar level, and thereafter administered 2 ampoules of 24% glucose to restore the blood sugar level.

This record at the time of admission in the H-1 is a **contemporaneous record** and has to be relied upon.

It was clear from the above that in the very first instance when the P-1 was brought to the H-1 in a comatose condition, the D-2 felt that it was a case of Hypoglycaemia resulting from the administration of 4 tablets of Euglucon over the past 4 days. This tentative diagnosis has been confirmed by the very first blood sugar test taken on 3.3.1993 soon after admission of the P-1 in the H-1, which showed the Random blood sugar at less than 50 mg. It was clear that the culprit was Euglucon administered to a non-diabetic patient.

Whether the opposite party was right in coming to the conclusion that the patient was having diabetes on the basis of urine test conducted by him?

The third issue to be considered is whether the D-1 was right in coming to the conclusion that the P-1 was having diabetes on the basis of urine test conducted by D-1.

Observations of the SCDRC:

The State Commission in its speaking order quoted extensively from medical literature to show that the D-1 was wrong to come to such conclusion.

Literature Referred:

Literature referred [2] stated as follows:

"The presence of Glycosuria never establishes the diagnosis, and blood sugar determination must be made to confirm or eliminate the diagnosis of diabetes. Renal and alimentary Glycosuria must be differentiated from diabetic Glycosuria as discussed later.

Other Meliturias and non sugar reducing substances in urine which may give **false positive reactions for glucose** also must be considered." [2]

In another textbook [3], it is stated:

"Glycosuria.... the **most serious disadvantage** in the use of urine test diagnostically arises from individual variations in renal threshold, so that on the one hand some undoubtedly diabetic people have a **negative urine test for glucose due to raised renal threshold**, and on the other those with a **low renal threshold give a false positive test**. In order to distinguish cases of this type from patients with mild diabetes, **suitable tests of carbohydrate tolerance is required.**" [3]

NCDRC Observations:

A perusal of the above authorities on the subject show a **unanimity of opinion that blood sugar estimation and glucose tolerance test are mandatory before confirming diagnosis.**

Further, the D-1 himself in his affidavit-in-reply has admitted, "The patient was suffering from chronic alcoholism and all types of complications." He further admitted in his cross examination that, "sometimes the urine shows positive sugar test even though there is no sugar. However, it is in certain cases like pregnancy and chronic alcoholism etc."

Both the statements clearly show that the D-1 [opposite party] was aware that the patient being alcoholic, urine test could show a false positive. The D-1 clearly ignored standard medical practice and was further negligent in discharge of his duty to the patient.

Whether administration of the prescribed dosage of Euglucon can cause the damage that the patient suffered in this case?

The last issue to be considered was whether administration of the prescribed dosage of Euglucon can cause the damage that the patient suffered in this case.

D-3, who attended to the patient in the H-1 has stated in her **examination in chief**; "at the time of discharge of the P-1 he had behaved abnormalities due to prior irreversible,

3. "Principle and Practice of Medicine", 15th Edition, 1987, on page 467.

neurological damage suffered by the P-1 following drug induced hypoglycaemic coma";

In **cross**; "I say that one tablet of Euglucon per day given to a normal person can cause hypoglycaemia causing lack of supply of glucose to the brain resulting in irreversible damage to the brain. This can also occur in patients taking normal diet".

Similarly, D-4 at the H-1 issued a certificate dt.25.8.1993 stating that P-1 was diagnosed as a case of "chronic alcoholism with drug induced Euglucon hypoglycaemic coma with irreversible neurological damage".

This opinion remained unshaken and unrebutted in cross-examination. The deposition of the D3, D4 [two doctors] as well as the initial diagnosis of Hypoglycaemia by D-2, discloses a unanimous opinion that the P-1's hypoglycaemic coma was induced by the drug Euglucon.

In view of the findings **NCDRC fully endorsed the well-reasoned order of the State Commission** and dismissed the revision petition. There shall be no order as to costs.

Compensation Awarded:

The opposite party was directed to pay the complainant an amount of Rs.109000/- along with interest at 18% and he was also to bear a cost of Rs.5000/-. [1]

Recommendations:

- To avoid such situations in future, doctor should inform in writing important, life threatening adverse effects, side effects, precautions to be taken by the patient and or their relatives in their language.
- Standard protocols for common diseases like diabetes; hypertension etc. should be followed in making diagnosis, investigations and prescribing treatment.
- Specific instructions regarding drug interactions, avoiding of alcohol intake and dietary instructions as per the need of the case.

Above all recommendations may be considered as a part of informed consent needed for decision making on the part of patient and or their relatives as the case may be.

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Case Report

RTA fails, Cyanide Succeeds: A Case Report

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Abstract

This is a rare case of homicidal cyanide poisoning. It was a case of Head injury due to Road traffic accident admitted in hospital for treatment. After more than a month of treatment, the patient recovered from head injury and was about to get discharge; when suddenly he became unconscious and died within two hours in spite of resuscitation. At autopsy other than the findings of head injury, the stomach contents had a peculiar smell and the organs were bright red in colour which created suspicion. Hence, the organs were sent for chemical analysis which revealed cyanide poisoning. These are the days where debate is going on regarding the necessity of autopsy in RTA cases. So, by presenting this case we would like to stress the importance of autopsy in RTA cases and the need of Chemical analysis of viscera even in admitted cases if there is any suspicion of foul play.

Key Words: Road traffic accident, head injury, cyanide poisoning

Introduction:

Cyanide is the one of the most lethal poisons known to man. Since the days of ancient Rome, cyanide and the derivatives of this highly toxic substance have been used as weapons. Although substances containing cyanide had been used for centuries as poisons, it was isolated in 1782 by a Swedish chemist Scheele. [1] Cyanides are often used for suicidal purposes, especially by terrorist because of their swift and sure action. But they are rarely used as a homicidal poison, as they are easy to detect owing to their characteristic odour and perceptible taste. [2-4]

Here we present a rare case of homicidal cyanide poisoning in a road traffic accident case with head injury, who was admitted in hospital for more than a month.

Case Report:

A 42 yrs male person was hit by an ambassador car when he was traveling alone in a two wheeler. He was admitted to hospital in an unconscious state, Pulse 120/min, B.P. 160 /110mmHg, Glasgow coma scale 9 / 15. He was investigated and was found to be having diffuse axonal injury.

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Patient was treated conservatively. Repeat CT scan revealed, Bilateral Subdural Hygroma in both frontal regions

This was evacuated by doing bifrontal burr hole under local anaesthesia. 12hrs after surgery patient started regaining consciousness, and he gradually recovering. On 35th day of admission he was fully recovered and was decided to be discharged from hospital. On the day of discharge suddenly patient became unconscious; they resuscitated but died within two hrs.

At autopsy, patient had multiple healed abrasions all over the body. Healed sutured wound on both frontal regions with burr hole was present. On dissection of Skull revealed dark colour contusion 6cm x4 cm in right Frontal lobe region. Stomach contains light brown colored fluid with a peculiar smell. Visceral organs were bright red in colour which suggested that the cause of death could not be head injury. Viscera were sent for chemical analysis which revealed cyanide poisoning.

Discussion:

Hydrocyanic acid or Cyanogens is very potent, extremely lethal and most rapidly fatal. [3] On ingestion of a large dose the symptoms usually appear within a few seconds or even during the act of swallowing. [3, 4] The toxic action depends largely upon the hydrochloric acid contents of the stomach. The onset of action is fast if it is taken in an empty stomach.

Alkaline cyanides when consumed are converted by hydrochloric acid in the gastric juice into chlorides, and hydrocyanic acid. This hydrocyanic acid is a powerful protoplasmic

poison which prevents the tissues from utilizing the oxygen from the blood by interfering with the action of enzyme Cytochrome oxidase and thus producing cytotoxic hypoxia resulting in death.

As death occurs very rapidly, there is hardly any time for treatment. The postmortem findings are very minimal, like bright, glistening and dilated pupils, cherry red hypostasis and characteristic bitter almond smell [2-5], but this smell cannot be appreciated by all and it fades quickly on opening the body. About 20-40% persons cannot smell the gas, and the ability to detect it is a sex-linked recessive trait. [5]

As death due to cyanide poisoning is very rare, there is every chance to miss this condition unless we have strong suspicion and viscera are sent for chemical analysis with a special request to look for it.

In the present case, a road traffic accident case with head injury, which has undergone neurosurgery and had been recovering in the hospital for more than a month, the chances of acute cyanide poisoning, is out of question. The only clue was sudden death of the patient who had fully recovered from head injury and was about to get discharged on the day of death. A cautious and meticulous autopsy by the forensic expert suspecting some foul play, made him to send the viscera for chemical analysis.

Otherwise routinely viscera will not be sent for chemical analysis in a patient who had been admitted in hospital for 35days, as any poison would have got excreted during that period. Sudden death, peculiar smell on opening the body and cherry red color of the viscera made him suspect cyanide poisoning in this case. Toxicological analysis confirmed it to be

cyanide poisoning, thus the cause of death in this case changed from head injury to cyanide poisoning. On re-investigation by the police, they found out that the deceased wife was the culprit who was present with the victim all the time in the hospital.

Her illicit relationship with another person was the reason for the murder of her husband. The road traffic accident which the deceased met was also planned by her. When it failed, she planned a fool proof method to get rid of him. She administered cyanide through the Ryle's tube which resulted in sudden death of her husband. Thus RTA fails and Cyanide succeeds. Later on the Investigating Officer changed the Sec. 304A IPC to Sec. 302 IPC and the accused was arrested.

Conclusion:

In any Road traffic accident case, autopsy is mandatory and if there is any suspicion chemical analysis of the viscera should be asked for even if the patient was alive for some period or hospitalized. A meticulous autopsy by the forensic expert with an open mind will always pay.

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Case Report

Non Traumatic Sub Dural Haemorrhage Following Long Term Oral Contraceptive Use

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Abstract

Unusual and accidental findings are sometimes very confusing for Forensic experts to interpret particularly when proper history and treatment records are not available. It often leads to wrong interpretation and miscarriage of justice. The case reported is of an elderly female with history of intermittent fever, found unconscious at home and declared brought dead in casualty. The post-mortem findings showed the presence of subdural haemorrhage in left parieto-occipital region, which raised suspicion of blunt trauma to head. However there was absence of any scalp/skull injuries. The detailed history revealed long term use of oral contraceptive pills by the deceased. The cause of death was concluded as spontaneous subdural haemorrhage, as a complication of long term use of oral contraceptives. This case report highlights the importance of referring previous medical records and history taking before the autopsy in unusual cases which will eliminate most of doubts and also helps in corroborating the findings at autopsy.

Key Words: Subdural Haemorrhage, Oral Contraceptive Pills, Blunt Trauma

Introduction:

Subdural haemorrhage results from direct blunt trauma either as the result of an assault, fall or vehicular accident.

Subdural hemorrhages can also result from sudden acceleration-deceleration of the head such as occurs with a rear-end collision by a motor vehicle, blast injury or violent shaking during torture. [1] However, acute spontaneous subdural haemorrhages without any traumatic history or vascular anomaly are rarely reported in literature.

Few documented risk factors include hypertension, vascular malformations, and haematological malignancies causing thrombocytopenia, prolonged contraceptive use, and solid tumours with dural metastases, infection, hypervitaminosis, coagulopathy and alcoholism. Bleeding from cerebral artery aneurysms or cortical arteries has also been reported. [2]

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Despite the general acceptability, and the obvious advantages attributed to contraceptive use, some serious side effects have been reported in women taking the pills. Epidemiologic studies have indicated a relationship between contraceptive use, platelet changes and thromboembolic phenomenon. Prolonged intake leads to bleeding manifestations in the body. [3]

We describe a case in which an elderly female with history of prolonged intake of oral contraceptives developed spontaneous unilateral subdural haemorrhage which emphasized on careful assessment and consideration of pathological factors than traumatic etiology in the development of subdural haemorrhage.

Case Summary:

A 45 year old woman brought to Safdarjung Hospital with a history of intermittent fever where she was declared brought dead. Body was sent for post-mortem and treatment records were deposited in record section of the hospital. On enquiring relatives before conducting autopsy, they revealed that she used to take mala-D tablets regularly since her last child birth which was 16 years ago..

External Examination:

The body was that of obese female wrapped in white coloured hospital cloths. Rigor mortis was fully established. Post-mortem hypostasis was present over the dependent areas. On examination purpuric spots were

noted on her lower limbs. No external injuries present over the body.

Internal Examination:

Head and Neck: Scalp and skull were normal without any signs of injury. (Fig. 1) Brain showed softening with congestion and oedema. A Thin film of subdural haemorrhage was present over left parieto-occipital region without any mass affect. (Fig. 2) Rest of the brain was normal.

Uterus and its appendages were normal except for hypertrophic changes. No abnormality was detected in rest of the body systems. No investigations were done and hence haemogram records were not available.

Cause of death was given as “**Cerebral haemorrhage and its sequelae**”.

Discussion:

Acute subdural haemorrhage is a life-threatening injury with a high mortality rate. Most cases are a result of trauma leading to bleeding from subdural portion of bridging veins.

Intracranial haemorrhage presenting as subdural haemorrhage is an extremely rare presentation in adults and only few cases have been documented. [4] Oral contraceptives have been the preferred method of birth control because of their ease of use and high rate of effectiveness. However, its long term use increase the concentrations of many coagulation factors and reduce that of antithrombin III, increase platelet adhesiveness and reduce venous flow velocity by increasing venous distensibility and whole-blood viscosity.

All of these effects increase the risk of thromboembolism and susceptibility to bleeding. The association between arterio-venous thromboembolism and use of oral contraceptives is well established. [5]

In our case there was neither pre-existing history of any trauma nor any past haemorrhagic diathesis. It is conceivable that thrombocytopenia and abnormal platelet function along with disturbance of coagulation profile as a side effect of contraceptive use might have increased the risk of subdural haemorrhage. Medical records play a vital role in these cases. We tried to access previous treatment records which were available with relatives and corroborated it with our post-mortem findings which helped us in coming to the diagnosis. Taking proper history from police, relatives and referring previous medical records in unusual cases carries lot of importance while framing the diagnosis.

So it is imperative that all unusual findings must be meticulously examined, photographed and if needed, history and prior

treatment records may be looked upon prior to autopsy.

Conclusion:

Interpretation of autopsy as well as clinical findings with diligence is one of the prerequisite in any medico-legal case. Before deriving any conclusion at post-mortem, proper history and treatment records should be looked upon to eliminate most of doubts which also helps in corroborating the findings at autopsy.

Doctors concerned with medico-legal autopsies, should be well versed with these unusual findings while concluding their opinions and to aid in the administration of justice.

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Fig. 1: No evidence of Subscalpal Hemorrhage



Fig. 2: Left Sided Sub Dural Hemorrhage



Case Report

Scorpion Sting Masquerading As Myocardial Infarction

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Abstract

Scorpion stings are common in rural India and envenomation by scorpions can result in a wide range of clinical effects, including, cardiotoxicity, neurotoxicity and respiratory dysfunction. In general, scorpions are not aggressive. They do not hunt for prey; they wait for it. Scorpions are nocturnal creatures; they hunt during the night and hide in crevices. Scorpion venom is a water-soluble, antigenic, heterogenous mixture, as demonstrated on electrophoresis studies. Out of 1500 scorpion species known to exist, about 30 are of medical importance. The life-threatening complication of myocarditis and pulmonary edema is known in red scorpion. Most deaths occur during the first 24 hours after the sting and are secondary to respiratory or cardiovascular failure. In spite of advances in patho-physiology and therapy the mortality remains high in rural areas due to lack of access to medical facilities. In absence of clear history, the cardiac toxicity of scorpion sting may be misdiagnosed.

Key Words: Scorpion Sting, Myocardial Infarction, Envenomation, Cardiotoxicity

Introduction:

Scorpions are shy creatures and only sting if threatened. Indian red scorpion (*Mesobuthus tamulus*) is one of the most toxic envenomation in animal kingdom. Scorpion stings cause a wide range of conditions, from severe local skin reactions to neurologic, respiratory, and cardiovascular collapse. Early medical attention is crucial part of treatment. But situation may be difficult to manage if patient presents late, and history of scorpion sting could not be elicited. But the still worse may be the situation where the patient's investigation misleads you to some other diagnosis where treatment modality is entirely different.

Case History:

A 17-year-old male laborer, living alone in farmhouse, found unconscious in his room and brought by his friends in emergency room with BP less and pulse less condition, with froth from mouth with stertorous breathing. No other positive history could be elicited from patient's friends.

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On examination pupils were mid-dilated sluggishly reacting to light, CVS examination revealed tachycardia with summation gallop, chest examination – B/L wet crepitation up to the mid thoracic region, and spO_2 at the time of presentation was 66%. C T head and random blood sugar were within normal limits.

ECG suggested ST segment elevation from v_2 - v_6 with upward coving (Fig.1); chest radiograph was suggestive of the pulmonary edema. (Fig. 2) Based on finding a provisional diagnosis of the acute anterior wall myocardial infarction with pulmonary edema with shock with hypoxic encephalopathy was made and patient was shifted to ICCU and managed by giving Dobutamine infusion at the rate of 2.5-10 Microgm/kg/min along with mechanical ventilatory support.

Patient responded to the treatment and his blood pressure and SPO_2 improved, once his systolic BP stabilized to 90mmHg, single IV dose of 20mg Frusemide given. Following the dose of diuretic, crepitation in chest decreased, and gradually weaned out of the ventilatory support in 24 hours with minimal basal crepitation.

Patient regained consciousness and after regaining consciousness a further history was taken from patient. Patient disclosed the fact that he was stung by a scorpion in small finger of left hand in the mid of night, but he could not seek medical help as he was far from the medical facility and no one was around him to help him. Soon after the scorpion sting he had several vomiting and sweating, and later he

developed excessive breathlessness with cough, followed by loss of consciousness.

Based on the history the diagnosis was revised, and a diagnosis of scorpion sting with Myocarditis with pulmonary edema with shock was made.

On investigation Hb 16 gm/dl, TLC 26800 cells/cc, P₈₃, L₁₄, S. bilirubin 0.8 mg/dl, SGPT- 54IU/L, SGOT- 115 IU/L, S. Creatinine- 1.4 mg/dl, CK (MB)- 112, Troponin t – positive. Echocardiography revealed moderate global hypokinesia of LV, LV globular in shape, LVEF 40-42%, mild MR.

Patient gradually became haemodynamically stable and inotropes weaned on 3rd day, diuretics was given for 5 days and he continued to show improvement, anti venom could not be used because of non availability, the ECG changes gradually settled to the normal on the tenth day and repeat echocardiography suggested improvement of LV function with LVEF 55 %. Patient was discharged on tenth day from the hospital.

Discussion:

Scorpion venom is a water-soluble, antigenic, heterogenous mixture, as demonstrated on electrophoresis studies. This heterogeneity accounts for the variable patient reactions to the scorpion sting. [1]

Scorpion venom contains a neurotoxin, haemolysins, agglutinins, haemorrhagins, leucocytolysins, coagulins, ferments, lecithin and cholesterin. [2] The clinical manifestations, pathological lesions and electrocardiographic changes are due to sudden massive liberation of catecholamines in to circulation. Both sympathetic and parasympathetic twigs are stimulated.

Most deaths occur during the first 24 hours after the sting and are secondary to respiratory or cardiovascular failure resulting from autonomic excitation. Cardiac dysfunctions attributed to catecholamine-induced increases in myocardial metabolism and oxygen demand.

It leads to myocardial ischemia-induced myocardial hypoperfusion and to the direct effects of the toxin (leading to Myocarditis).

Victim can die suddenly due to lethal ventricular arrhythmias, which occur within 15-30 minutes of sting. Several types of arrhythmias (both tacky and Brady types) have been reported. [3, 4] The ECG changes are nonspecific but may sometimes suggest myocardial infarction. [5, 6] Development of early pulmonary edema is also an ominous feature in scorpion sting.

Early presentation and treatment especially by alpha-receptor blockers have improved the prognosis. Prazosin decreases the after load and pre load and helps to prevent cardiotoxicity. Bawaskar and Bawaskar reported in their study that the development of pulmonary edema 4-8 hours after scorpion sting even in hospital settings and recommended early Prazosin medication by rural health workers to prevent pulmonary edema. [7]

Since our patients presented late, contrary to common presentation of hypertension requiring Prazosin, [8] patients had hypotension and hypoxemia. Thus the first line of treatment in our case was respiratory support with intubation with mechanical ventilation and inotropes in the form of dobutamine infusion.

Factors like hypoxemia and hypercarbia contribute to pulmonary hypertension. Hyper-oxygenation by positive pressure ventilation at high FiO₂ helped to reduce pulmonary hypertension. PEEP helped by alveolar recruitment and by shifting edema fluid away from the alveoli. In severe scorpion envenomation, dobutamine infusion is reported to improve impaired heart function. [8]

In our case not only presentation was late but also history suggestive of scorpion sting was also not available as the patient was unconscious. Initial presentation with frank ST segment elevation with pulmonary edema may be mistaken as acute myocardial infarction with pulmonary edema specially if the patient is having various risk factors for development of coronary event but similar situation in a young patient with no risks for coronary artery disease should make one to think of other causes of ST segment elevation with pulmonary edema.

But the fact that advanced coronary events has been reported at very young age in Indian population make situation difficult to diagnose in emergency room with few investigations.

Conclusion:

Unsuspected scorpion sting presenting with ST segment elevation may be a diagnostic dilemma if the history of scorpion sting is unavailable. Timely diagnosis of scorpion Myocarditis with pulmonary edema and the initiation of ventilatory and inotropic support in ICU was the mainstay in treatment.

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Fig.1: ECG showing Sinus Tachycardia with significant ST elevation in leads V₂ to V₆ on day of Admission

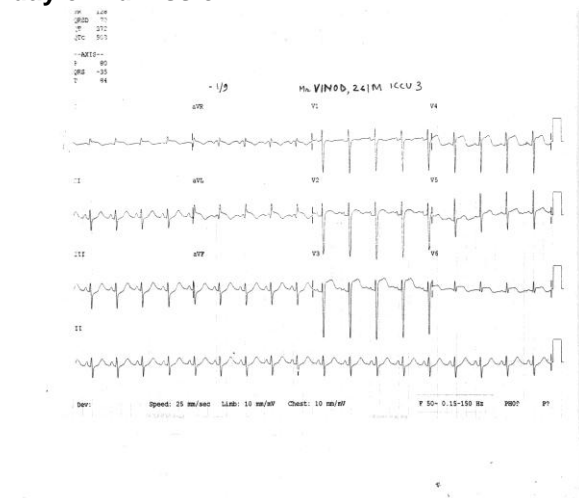


Fig. 2: X- ray chest PA view showing Globular Cardiac Shadow with Bilateral Increased Hilar Prominence (suggestive of pulmonary edema)



Case Report

Unusual Fatal Bitemporal Crushing Head injury By Industrial Baler Machine

¹Pannag S. Kumar, ²Silvano Dias Sapeco

Abstract

A peculiar case of crushing head injury is presented, which was caused by compression of the head by a machine known as "Industrial Baler", which is used for compressing and packing scrap. Most cases of head injury are caused by "acceleration-deceleration" or "direct impact" forces, and crushing head injuries are relatively fewer in frequency of occurrence. Also, amongst the cases of crushing head injury, most cases involve both dynamic and static forces acting on the head. This case is peculiar in the sense that only "pure-static" forces were involved. The pattern of scalp and vault injuries also was unusual as although caused by compression by a blunt flat object having a large surface area, the appearance was that of injuries caused by impact by a heavy, cutting (chopping) edged object. In jobs that require working with any sort of industrial machinery, there is a potential risk of injuries or death of workers handling them in the event of an accident so workers need to ensure that they operate the machine in only the correct manner and do not bring their bodies in close proximity to heavy machinery,

Key Words: Bitemporal compression; Crushing head injury; Baler machine

Introduction:

A baler is a machine which compresses various waste materials and shapes them into bundles called "bales". Balers may be vertical balers or horizontal balers. A vertical baler has a broad surface area flat metal block called as "platen" that moves up and down and compresses the scrap material. After the material has been compressed by the machine and is ready, the worker ties it with straps or wires in order to keep it in place after ejecting it from the machine. Lack of adequate care and safety precautions while handling such industrial machinery can result in fatal injuries.

In this case, apparently, an improper method of operating a vertical baler machine resulted in fatal compression of the head and spot death of the victim.

Case History:

The victim was a worker in a small scale unit dealing with pressing of scrap in baling press machines and packaging it for recycling.

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There were no eyewitnesses who actually observed how the victim actually got trapped within the machine and had his head crushed. However, another person who worked as a driver of a rickshaw transporting material to and from the packaging unit gave testimony that when he reached the site, he observed that the press-machine was "on" and "in motion", and that the victim's head had got crushed.

His hand was seen caught in the machine; and there was nobody else in the unit at that time and as such the victim had been alone at the time the incident happened. It was also observed that the victim had not been wearing any safety headgear in the form of a helmet. From the position of the body as seen in the photograph, the following sequence of events is reconstructed by the authors.

The right upper limb of the victim got trapped in between the platen (the horizontal slab of metal that moves up and down and causes compression of the scrap material) and the body of the baler machine; and as he was unable to free his upper limb, his head was compressed in between the platen and the bale of scrap that was placed within the baler machine. The bale of scrap had been compressed and was tied with cords and ready for ejection from the machine.

At this time, the victim would have opened the front door of the baler machine to make way for the bale to be ejected from the

machine, and would have proceeded to the back side of the machine. At this time, the platen would have been in the "down" position, over the top of the bale, and would have had to be lifted up in order to eject the bale.

For this purpose, the victim would have leaned from the back side of the machine over the top of the platen onto the front side, in such a way that his body was within the baler machine; and he would have put on the switch which was located on the front side of the machine, with the intention of pushing the bale out from the back to the front side, when the platen would move up.

At this time, the platen would have begun to move upwards, but the sleeve of the victim would have got caught in between the platen and the back of the body of the baler machine. Even as the platen would have continued to move upwards, the victim would have tried to free his shirt, but his upper limb would have got trapped and as a result, he would have been further unable to free himself.

As the switch of the machine would continue to be "on", the platen would have completed its upward motion and then started to move downwards, during which time, the head of the victim would have got compressed in between the platen and the un-ejected bale, resulting in instant death, as the injuries were necessary fatal in nature and grossly incompatible with life.

Autopsy Findings:

The platen compressed the head in the transverse plane, resulting in circumferential laceration of the scalp in the transverse plane along the "hat-line" and separation of the entire skull vault as one unit, with scalp hair remaining intact on the detached skull cap. The edges of the skull bones along the line of separation (i.e. along the "hat-line") showed relatively clean splitting of both tables, exposing the diploe.

The inner aspect of the separated skull cap showed separation (diastasis) of the frontal bone from the two parietal bones and side to side compression of the parietal bones, as evidenced by buckling inward of the lateral parts of the parietal bones, with multiple linear fractures running in the antero posterior direction along the line of bend. However, the sagittal suture did not show any diastasis.

The exposed base of the skull showed transverse lines of fractures running across the base of the anterior and middle cranial fossae, from temporal to temporal direction, again indicating a side to side compression of the head. Remnants of crushed brain matter along

with torn and crushed dura were visible within the exposed base of the skull.

Some of the brain matter was pulped and extruded out at the scene of accident, and was visible over the top of the bale in the baler machine, along with copious blood staining the bale and some of it was produced separately by the police in a plastic bag.

The right upper limb showed an extensive pressure abrasion suggestive of compressive force, over the entire length of the right arm over its entire circumference. The right axilla showed an extensive open contused laceration involving the proximal antero medial aspect of the right arm, the anterior aspect of the right deltoid area of the shoulder, the entire axilla and infra axillary area.

There was exposure of the underlying muscles namely the anterior part of the deltoid muscle, the lateral most part of the right pectoralis major muscle, the right biceps brachii, lateral part of the right latissimus dorsi, and upper part of the right serratus anterior muscles.

The exposed muscles showed bruising; and the skin surrounding the open laceration showed extensive contusions. The injury over the upper limb was consistent with the fact that the limb was trapped in the machine between the moving platen and the rear side of the body of the machine, resulting in compression of the arm between the platen and the body of the machine and also overstretching and tearing of the axilla owing to motion of the platen.

Discussion:

Most cranio-cerebral injuries are caused by mechanisms of acceleration and/or deceleration. Traumatic injuries following progressive compression to the head are certainly unusual. [1, 7] A crush injury occurs when a body part is subjected a degree of sustained force or pressure, usually after being trapped between two heavy objects or hard surfaces. [1] Crush injuries are produced by static or quasi-static applied forces, which are defined as those that occur over a longer period of time (>200 ms) and are applied over a large area (as opposed to a point).

These static forces squeeze or slowly deform an object, like the cranium, until it is crushed beneath the load. [2] Multiple fractures through the cranial base are the most commonly described pattern in adult crush injuries. The fractures associated with crush injuries occur both at the site of contact of the crushing object and remotely, because the force is transmitted throughout the cranial base. [2] With an extensive striking surface, the skull bone tends

to break into irregular fragments. If the skull is supported when a blow is struck, the tendency is always to cause greater damage. [3]

As such, a crushing force applied to the head would normally be expected to produce a generalized deformation of the skull and as such cause comminuted fracturing of the entire skull vault with the skull vault appearing as multiple fragments of bone. In addition there would be multiple fissure fractures expected to involve the sides of the skull.

Takeshi et al [4] have reported seven cases of crushing head injury out of which one patient had sustained crushing of the head by a press machine and the said patient expired after 4 days. Multiple temporal and parietal bone fractures have been observed in the said patient [4] However, in the instant case, the unusual pattern of injury was that the skull cap was circumferentially detached from the base of the skull with no fragmentation of the bones of the skull cap into multiple pieces.

The two parietal bones showed a good degree of plasticity on being subjected to the continuous sustained compression between the platen and the bale, as demonstrated by the fact that there was buckling inwards of the lower halves of the two parietal bones with longitudinal fissure fractures of the two table along the line of bend. Unusually, although the skull cap had got compressed by the platen, the sagittal suture did not show any diastasis.

Also, though the coronal suture did show diastasis and separation of the frontal bone from the two parietal bones, there were no comminuted fractures of the frontal bone itself. No radiography of the cadaver could be carried out owing to logistic impediments.

However, there appeared to be no facial fractures as was judged from the absence of crepitation or abnormal mobility in the areas of the facial bones. The bilateral critical pressure applied to the skull produces a fracture that often runs in the same direction as the applied force. [1, 3, 8] In this case, the base of the skull showed transverse fractures across the base of the anterior and middle cranial fossae, indicative of the fact that the compression was bi-temporal in direction.

The bilateral application of static forces on the head can occur in any region, however in most cases, it often occurs in the bi-temporal region. [1] The exposed edges of the skull bone along the line of separation of the skull base from the skull vault was relatively cleanly cut with much less fragmentation of the bones unlike expected, and as such resembled an injury which would have been caused by an

impact with a heavy, cutting edged object, probably akin to the blade of a guillotine if it were to strike across the head.

Crush injuries are usually described in the context of industrial accidents. However, various other case reports have described compressive head injuries in various other scenarios. Crush injuries in natural disasters, such as earthquakes, have been described, but these situations are uncommon in clinical practice. More often in neurosurgical practice, static or quasi-static loading injuries occur in children when the patient's head is crushed beneath a moving vehicle or when a heavy object has been pulled down accidentally and has pinned the child's head. [2]

Purely static force, as was generated by Russell and Schiller in their experimental study, is rarely seen clinically, as the victims either fall a few feet to the ground before being run over by a vehicle or being hit by a falling object. [5] As such, in the majority of patients seen in clinical practice, injuries are biomechanically mixed, including a dynamic component and a static component. [2, 5] However, even in those compression injuries which have both static and dynamic forces involved, the static loading is considered to be a greater factor in causing injuries, than the dynamic force.

For example, when a person is knocked to the ground by a falling object the crushing weight of the object is considered to be a greater factor in the injury than the dynamic force involved in falling to the ground. The short distance of the falls is not likely to have been of sufficient force to generate severe injuries, in cases where the victims fall from a standing or squatting position rather than from a height. [5]

However, in the instant case, "purely static" forces were involved and there was no involvement of any dynamic component.

Echizenya et al [6] have reported two cases of bi-temporal compression head injury caused by static loading mechanism in which low velocity, low acceleration, high energy forces were involved as in the present case. In one case, the head of a coal miner was trapped in between an excavator and a prop due to a "cave-in" in a coal mine, resulting in gradual compression of both temporal regions. In the other case, the head of a lumber mill worker was caught between a log and an operating machine. Both cases were non-fatal. [6]

Tortosa et al [7] also have reviewed clinical and radiological features in a series of patients who had sustained a special type of cranial crush injury produced by the bilateral application of rather static forces to the temporal

region. They reported a case of a 10 year old boy whose head got trapped in a packing machine but was not fatal and the victim did not lose consciousness.

Other cases described by them include case of head being trapped in packing machine, head crushed by automatic door, head rolled over by sewer pipe, head trapped between two marble blocks, head run over by automobile wheel, head crushed by wooden beam, head trapped under wooden post, head trapped between pallet truck & wall. [7]

Russell and Schiller [8] have carried out clinical and experimental observations on crushing injuries to the skull in which, bi-temporal compression of the head was experimentally shown to produce a bilateral narrowing and antero-posterior elongation of the skull. This has not been observed in the instant case.

Clinical cases described by them included case of head being caught between hatches, head crushed by fall of rock in mine, head crushed between railway carriages, head crushed between backing lorry and wall, head crushed between two motor vehicles, head crushed under the axle of a motor vehicle, head crushed under an overturned lorry, head crushed under oil drums, head crushed under several 100-lb. Shells and head crushed under gun-wheel. In these cases, transverse fracture of the base of the skull was observed, running in the direction of the compression.

With sufficient pressure the base of the skull was actually broken in two, the parts articulating on a transverse hinge.⁸ Such transverse fracturing of the base of the skull has been observed in the instant case too, as mentioned above, though "hinge-like" movement was not observed.

Conclusions:

In jobs that require working with any sort of industrial machinery, there is a potential risk of injuries or death of workers handling them in the event of an accident. Hence, it is necessary to ensure that more than one person should operate the machine at any given time. Also, it is necessary to ensure that workers are provided with safety gear including helmets to minimize the risk of injuries.

Most importantly, workers need to ensure that they operate the machine in only the correct manner and do not bring their bodies in close proximity to heavy machinery, as in such cases, presence or absence of safety equipment and headgear would be of little use in preventing injuries and death, in cases where the bodies or

parts of bodies get entrapped within heavy machinery.

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Fig. 2: Extensive Open Contused Laceration of the Right Axilla



Fig. 3: Exposed Base of Skull and Separated Skull Vault Along With Extruded Brain Remnants



Fig. 4: Separated Skull Cap

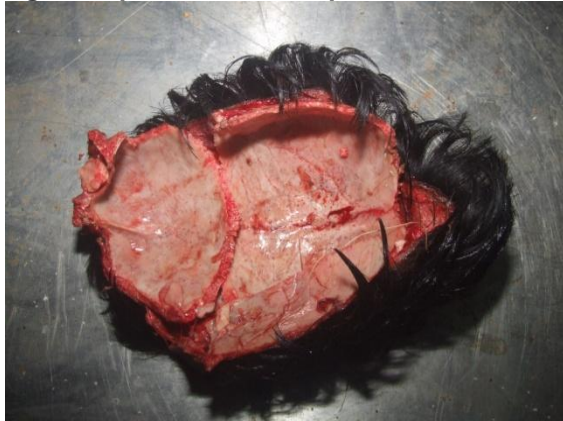


Fig. 6: Scene of Accident Showing the Body trapped in Situ in Baler Machine



Fig. 5: Scene of Accident Showing the Body trapped in Situ in Baler Machine



Fig. 1: Victim's body with an Overview of the Head Injury



Case Report

Hemopericardium with Subdural Hemorrhage: A Rare Case

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Abstract

The incidence of simultaneous occurrence of intracranial hemorrhage and hemopericardium due to the rupture of a dissecting aneurysm is very rare. We describe an autopsy case of a 52-year-old male with hypertension who died suddenly. He had been treated for hypertension. During post-mortem examination we found pericardial cavity filled with blood and blood clots. This hemopericardium was due to rupture of dissecting aortic aneurysm. Ascending aorta shows ruptured dissecting aortic aneurysm [De Bakey type 2]. Intramural hematoma present in the wall of ascending aorta. Histologically, the wall of the aneurysm revealed cystic medial necrosis, which appears to idiopathic in nature. There was also evidence of subdural hemorrhage. After analyzing the findings the opinion as to the cause of death was "Hemopericardium due to rupture of dissecting aortic aneurysm along with intracranial bleeding." As per our view in present case the subdural hemorrhage was occurred after the rupture of dissecting aortic aneurysm when the venous pressure increases, leading to the rupture of bridging vein in subdural space.

Key Words: Intracranial Hemorrhage, Hemopericardium, Post-mortem, Aortic Aneurysm

Introduction:

Hemopericardium is a rare but important cause of sudden death. The etiology may be traumatic or spontaneous. In spontaneous occurrence there may be rupture of heart dissecting aortic aneurysm. The incidence of aortic dissection is estimated to be 2.9 to 3.5 per 100,000 person-years. Approximately two-thirds of those with an aortic dissection are males. [1] The mortality from aortic dissection ranged between 0.5 and 2.7% per 100,000 people from 1950 to 1981. [2] Males are more frequently affected from aortic dissection than females. [3]

Acute aortic dissection results from a tear in the intima and media of the aortic wall, with the subsequent creation of a false lumen in the outer half of the media and elongation of this channel by pulsatile blood flow. Dissection of the aorta is associated with a high degree of morbidity and mortality despite continuing improvements in techniques. [4] Hypertension is present as the most common cause in 70–90% of patients with aortic dissection. [5] We describe an autopsy case of a 55-year-old male with hypertension who died suddenly.

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Case History:

A 55 years old male was brought by relatives to a private hospital with history of a syncopal attack. The patient had one episode of vomiting followed immediately by loss of consciousness. He was immediately taken to the hospital, examined and subjected to routine investigations. His B.P. was 90/60mmHg. ECG findings suggestive of ischemic heart disease and changes of left ventricular hypertrophy.

CT scan of head was done. The CT scan did not reveal any abnormality. He had to be intubated and placed on ventilatory support.

His B.P. did not improve even with IV fluids and dopamine. He succumbed within a period of 24 hours and was referred for post-mortem examination.

Autopsy Findings:

External Examination:

Dead body of male person was averagely built, cold. Postmortem lividity present over back and buttocks except over pressure points, fixed. Rigor mortis well marked present in whole body. Therapeutic intravenous injection mark present on dorsum of both hands.

Internal Examination:

Subdural hemorrhage present about 90 ml, and red. Subarachnoid hemorrhage was present all over brain surface as a red thin blood film. Brain congested. Pericardial sac filled with blood and blood clots~500ml. Heart congested, weight 460 gms. Ascending aorta shows ruptured dissecting aortic aneurysm [De Bakey type 2]. Intramural hematoma present in the wall

of ascending aorta. Both kidneys small contracted. Cortical surface is granular, on cut section architecture of cortex & medulla are slightly obscured. Other organs congested.

Histopathological Findings:

Sections from the wall of the ascending aorta showed myxoid degeneration in the media. There was elastic tissue fragmentation and separation of the fibromuscular and elastic elements of the media by numerous cystic cleft like spaces in the media containing basophilic amorphous extracellular matrix/ground substance. There was increased fibrosis of the media. These findings are consistent with Cystic Medial Necrosis.

After analyzing the findings the opinion as to the cause of death was **"Hemopericardium due to rupture of dissecting aortic aneurysm along with intracranial bleeding."**

Discussion:

Dissection of the aorta is associated with a high degree of morbidity and mortality. [4] The highly lethal nature of acute aortic dissection was confirmed by studies analyzing both, proximal and distal untreated dissection published during the following decades. 30% of patients were dead within 24 hours and a rate of 50% mortality at 48 hours and about 95% at one month was reported. The reported deaths were related in three fourth to dissection into the mediastinum, pleural cavity and pericardium. [6]

We found ruptured aortic aneurysm which is limited only up to the ascending aorta.

Here the ruptured site at the external surface. In case of aortic aneurysm there is also intimal tear. But in this case there is no evidence of intimal tear. Studies have shown that in such cases when there is no evidence of intimal tear, the medial cystic necrosis is considered to be abnormality responsible for dissecting aortic aneurysm. Many patients with ascending thoracic aortic aneurysms appear to have nothing more than idiopathic cystic medial degeneration, where it is unclear as to what specifically predisposes to the development of medial degeneration.

The cause of medial cystic necrosis is not known. It is considered to be non specific changes in the aorta in response to hemodynamic stresses. Some authors believe that hypertension, accelerates the development of medial cystic necrosis. Histologically, as in the instant case, cystic medial necrosis is characterized by elastic tissue fragmentation and separation of the fibromuscular and elastic elements of the tunica media by small cleft like

spaces where the normal elastic tissue is lost, these areas are filled with the amorphous extracellular matrix of connective tissue. Hypertension is a common risk factor. Other risk factors are Toxemia, nicotine, hyperadrenalism, infectious aortitis, great vessel arteritis. [7-9]

Aoyagi S et al has reported a case of spontaneous non-traumatic rupture of the thoracic aorta in a hypertensive patient. The clinical findings suggested acute aortic dissection, and a large pericardial effusion was detected by echocardiography. Autopsy revealed a longitudinal intimal tear and a rupture in the postero-lateral aspect of the ascending aorta. [10] Dettmeyer R et al in their study have presented two rare cases of sudden deaths.

Autopsy and morphological examination in these cases revealed a dissection of the aorta. In both cases mucoid deposits in all layers of the media and rarefactions of the elastic fibers were found, rendering cystic medionecrosis as the cause of the aortic dissection. [11]

The simultaneous occurrence of cerebral hemorrhage and hemopericardium due to the rupture of a dissecting aneurysm has been previously reported only in one case.

The authors described an autopsy case of a 45-year-old man with hypertension who died suddenly following both of these conditions. He had been treated for hypertension.

Because rupture of the aorta invariably causes a marked fall in blood pressure, the occurrence of cerebral hemorrhage following hemopericardium is highly unlikely. [12] Hemopericardium leads to Cardiac tamponade.

Cardiac tamponade is a clinical syndrome caused by the accumulation of fluid in the pericardial space, resulting in reduced ventricular filling and subsequent hemodynamic compromise. When there is no laceration of the pericardium, there is no escape route for the blood from the pericardial sac. When sufficient blood accumulates, the pressure in the pericardial sac increases and begins to prevent the passive filling of the atria during diastole.

The cardiac output falls, as does the systemic blood pressure and the venous pressure rises. If unrelieved, death follows. [13]

Subdural hemorrhage results from bleeding of the subdural portion of bridging veins, which has been identified as more fragile than the subarachnoid portion of the vein.

Cerebral atrophy, from ageing or alcoholism, accentuates the degree of traction on the bridging veins. In the absence of trauma, subdural bleeding might instead result from sudden increase in intravenous pressure. [14]

On anatomical and physiological grounds alone subdural hemorrhage could occur when raised intra-thoracic or intra-abdominal pressure is transmitted to intracranial circulation. [15] Yamashima & Friede concluded that not only sudden acceleration or deceleration of head, but also sudden increase in venous pressure can lead to augmentation of tension especially subdural portion of bridging veins, thus inducing subdural bleed. [16]

In present study we found both ruptured dissecting aortic aneurysm [De Bekey type 2] and subdural hemorrhage. The simultaneous occurrence of cerebral hemorrhage and hemopericardium due to the rupture of a dissecting aneurysm has been previously reported only in one case. [9] They presumed that rupture of the aorta occurred after the cerebral hemorrhage. But as per our view in present case the subdural hemorrhage was occurred after the rupture of dissecting aortic aneurysm when the venous pressure increases leading to the rupture of bridging vein in subdural space.

Conclusion:

A careful clinical examination and proper investigation is helpful for diagnosis of such cases. A detailed post mortem examination is indispensable to confirm the cause of death.

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Fig. 1: Hemopericardium



Fig.2: Aortic Aneurysm



Fig. 3: Intramural Hematoma



Fig. 4: Heart after Post-mortem Dissection



Case Report

Gossypiboma a Diagnostic Dilemma or Medical Negligence A Case Report

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Abstract

Gossypiboma or textiloma is a rare avoidable surgical disaster which has got medicolegal repercussions. It is a mass lesion due to a retained surgical cotton sponge surrounded by foreign-body reaction. The aim of this study was to review the literature on forgotten sponges to identify incidence, risk factors, mechanism of intraluminal migration and preoperative diagnostic modalities. A 50-year-old lady presented with palpable abdominal mass seventeen years after appendectomy. A clinical diagnosis of mesenteric cyst was made. Ultrasound revealed a heterogeneous mass with variable echogenicity. On laparotomy, retained foreign body (cotton sponge) was found. Retained foreign body (RFB) should always be considered in the differential diagnosis of any postoperative patient who presents with pain, infection, or palpable mass or with unusual symptoms.

Doctrine of 'Res Ipsa Loquitur' along with 'discovery rule' may be applied in some cases, depending on whether fact brought to the notice of the patient or relatives and grievance of patient with the doctor or hospital as the case may be. Since these facts comes to notice after a long gape, cause and effect relationships is very difficult to prove.

Key Words: Gossypiboma, Sponge, Retained foreign body, Textiloma, Boma, Textilis

Introduction:

Biggest and avoidable surgical mishap is a retained sponge in abdomen or pelvic and rarely after mandible surgery. [1] Gossypiboma is a term used for a retained surgical sponge and is derived from gossypium (Latin cotton) and "boma" (Swahili place of concealment).

Another term, "textiloma" which originated from the "textilis" - weave in Latin and "oma" - disease, tumor, swelling in Greek. It refers both to a fabric body unknowingly left in the abdomen of patient during surgery and the inflammatory reactions due to its presence. [2] Retained foreign body (RFB) can behave as acute emergency like exudative inflammatory reaction with the formation of an abscess.

It usually leads to early discovery and surgical removal. The other type of reaction is aseptic reaction to the cotton material which results in fibrosis and a mass. [3]

As these cases are under reported due to fear of legal suits, the actual incidence of gossypiboma is difficult to establish.

However, the reported incidence in literature is one in every 3000 to 5000 abdominal operations and the most common site is the abdomen. [4, 5] The reported incidence of retained foreign bodies like sponge, needle or part of instrument following surgery is of 0.01% to 0.001%, of which gossypibomas composes up 80% of cases. [6]

We present a 50 years old lady who was having vague abdominal pain for the last five years.

Case Report:

A 50 years old lady presented with vague pain and mass in right lumbar region for the last five years. She complained pain off and on. There was no history of vomiting, constipation and loss of appetite. She was operated for appendectomy 17 years back.

On examination, a mobile, non tender and firm mass 6 X 5 cm was palpable in the right lumbar region. A clinical diagnosis of mesenteric cyst was made. All blood investigations were within normal limits. Ultrasound (US) revealed a heterogeneous mass of 6 x 5 cm in the right

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lumbar beneath the anterior abdominal wall. Hypo-echoic areas suggestive of necrosis/ cystic degeneration were seen within it. The mass was abutting the terminal ileum with ileal mural thickening. Rest of the viscera was normal. Lymph nodes measuring 6 to 7 mm in diameter were seen in the surrounding mesentery.

Depending upon US report, possible diagnosis of desmoids tumor, gastrointestinal stromal tumor was made. Exploratory laparotomy was done which revealed an encapsulated sponge surrounded by omentum which was removed in piece meal. (Fig.1, 2) Postoperative period was uneventful.

Discussion:

As per National Library of Medicine's Medline, one hundred seventy cases of gossypiboma have been reported over a period of 33 years (1978 to 2011). About 45 cases of gossypiboma with transmural migration were found during the literature review over the period of 2000–2010. [7] As these cases are under reported due to fear of legal suits, the actual incidence of gossypiboma is difficult to establish.

However, the reported incidence in literature is one in every 3000 to 5000 abdominal operations and the most common site is the abdomen. [4, 5] The reported incidence of retained foreign bodies like sponge, needle, rubber tubing or part of instruments following surgery is of 0.01% to 0.001%, of which gossypibomas composes up 80% of cases. [6]

Reported mean age of gossypiboma is 49 years (6 to 92 years) and most common site of gossypiboma is abdomen (56%), pelvis (18%) and thorax (11%). Nearly 50% of retained gauze pieces are discovered at least after 5 years of surgery. One third of all patients remain symptom free and Gossypiboma is discovered incidentally. [8] A surgical sponge can be retained after any surgery but is more common after hysterectomy, appendectomy and cholecystectomy [9].

Gossypibomas can present with pain, infection (42%), palpable mass (27%), fever (12%) or with unusual symptoms similar to tumors and abscesses.

Due to non specific clinical picture, early diagnosis is difficult and it results in considerable patient morbidity. [10] Two major types of reaction occur in response to retained surgical foreign bodies. In the first type, an abscess may form with or without a secondary bacterial infection. The second reaction is an aseptic fibrinous response, resulting in tissue adhesions and encapsulation and eventually foreign body granuloma. [11] Symptoms may not present for

long periods of time, sometimes months or years following surgery. [11]

Complications included adhesion (31%), abscess (24%), fistula (20%) and migration. Omentum and loops of small intestine have got tendency to surround the foreign like sponge. The encapsulated foreign body causes pressure and irritation on the bowel loops and thus can result in pressure necrosis of the intestinal wall. The sponge can erode partially or entirely into the lumen of the bowel.

The intestinal perforation closes after complete migration of sponge. Peristaltic activity may advance the mop in the terminal ileum and can result in obstruction. [7] Patients develop symptoms of abdominal pain, nausea, vomiting, anorexia, and weight loss resulting from obstruction or a malabsorption type syndrome caused by the multiple intestinal fistulas or intraluminal bacterial overgrowth. [12]

Various Risk Factors:

Gawande et al [9] identified several risk factors for gossypiboma and it was nine times more common during emergency surgeries and four times more common when an operation required an unanticipated change during surgery. In each of these circumstances disorganization is expected and it becomes trickier to keep track of intra abdominal sponges thus resulting in a failure of proper count of sponges and instruments. (Table 1)

Gossypiboma can easily be diagnosed by plain abdominal radiography, when a radio-opaque marker is seen. But X-ray abdomen is of no use when these markers get disintegrated or fragmented over time. USG is another diagnostic modality which can display foreign bodies. Ultrasonography images can be classified into two groups, a cystic type and a solid type. The former showed a cystic lesion with zigzag echogenic bundle.

The latter showed a complex mass with hyper and hypo echoic regions. [13, 14] Computed tomography (CT) and magnetic resonance imaging (MRI) reveal comprehensive details about the mass in most cases. However, CT findings of gossypiboma, particularly in long standing cases, may be indistinguishable from intra-abdominal abscess, since air bubbles and calcification of the cavity wall as well as contrast enhancement of the rim may be seen in both conditions. It may mimic GIT tumour (as in our case). Barium meal follow through is helpful when a fistula develops between the cavity containing the foreign body and the gastrointestinal lumen as it may show the exact site of the fistula tract. [15]

Any patient presenting with postoperative unusual and vague complaints can have gossypiboma. High degree of suspicion can clinch the diagnosis, thereby avoiding the mental agony on the part of patient and treating surgeon. Surgery is treatment of choice and is curative. Reopening the previous operative site is one possibility, but endoscopic or laparoscopic approaches may be attempted.

Percutaneous retrieval of intra peritoneal sponges has been accomplished successfully by interventional radiologists. [16] During surgical removal of RFB, minor perforation of adherent bowels can occur which may be missed thus may cause more harm than the item itself.

How to Prevent Avoidable Surgical Disaster?

To prevent gossypiboma, sponges are counted by hand before and after surgeries. This method was codified into recommended guidelines in the 1970s by the Association of peri-Operative Registered Nurses (AORN).

Four separate counts are recommended: the first when instruments and sponges are first unpackaged and set up, a second before the beginning of the surgical procedure, a third as closure begins, and a final count during final skin closure. [17]

All these counts are written on the board in operation theatre by the floor nurse. Other guidelines have been promoted by the American College of Surgeons and the Joint Commission. [18] New technologies are being developed that will hopefully decrease the incidence of RFB.

Tagged surgical sponges can be used so that an electronic article surveillance system can do counting before wound closure. Bar coded sponges can be counted with the help of a bar code scanner. Recently, use of radiofrequency devices are used to identify the sponges to avoid possibility of retained sponge. Hand held radiofrequency identification device has been found to have 100% accuracy when performed correctly. [19]

Medico-legal Aspect:

Medico-legal problems between the patient and the doctor may arise because of retained surgical sponge. No doubt, Retained Foreign Body (RFB) is distressful for patient but it causes equal mental suffering and embarrassment to surgeon. Nothing can compensate for the lost of reputation. Medical sciences as well as human body are too difficult to be easily understood. There is unexplained risk in all surgical procedures. There is learning curve for doctors also as far rest of society.

No doubt, doctors cannot escape from responsibility because they have duty to make surgeries with zero errors and thus making life safer and to abolish the possibility of recurrence of negligence in future. As the medical services are the noblest of all, a private complaint may not be considered unless the complainant produces prima facie evidence.

Res Ipsa Loquitur:

The Supreme Court in Pushpabhai Purshottam Udeshi & Ors v/s. M/s Ranjit Ginning & Pressing Co. (P) Ltd. & Anr [20] has explained the doctrine of Res Ipsa Loquitur in the following words:

"The normal rule is that it is for the plaintiff to prove negligence but as in some cases considerable hardship is caused to the plaintiff as the true cause of the accident is not known to him but is solely within the knowledge of the defendant who caused it, the plaintiff can prove the accident but cannot prove how it happened to establish negligence on the part of the defendant. This hardship is sought to be avoided by applying the principle of res ipsa loquitur. The general purport of the words res ipsa loquitur is that the accident "**speaks for itself**" or **tells its own story**.

There are cases in which the accident speaks for itself so that it is sufficient for the plaintiff to prove the accident and nothing more. It will then be for the defendant to establish that the accident happened due to some other cause than his own negligence."

Applicability of Maxim res ipsa loquitur:

Salmond on the Law of Torts [21] states:

"The maxim res ipsa loquitur applies whenever it is so improbable that such an accident would have happened without the negligence of the defendant that a reasonable jury could find without further evidence that it was so caused". [22]

Exception to the General Rule of Evidence:

In Halsbury's Laws of England, [23] the position is stated thus: "An exception to the general rule that the burden of proof of the alleged negligence is in the first instance on the plaintiff occurs wherever the facts already established are such that the proper and natural inference arising from them is that the injury complained of was caused by the defendant's negligence, or where the event charged as negligence 'tells its own story' of negligence on the part of the defendant, the story so told being clear and unambiguous".

Burden of Proof:

Where the maxim is applied the burden is on the defendant to show either that in fact he was not negligent or that the accident might more probably have happened in a manner which did not connote negligence on his part." [22]

Conclusion:

RFB should be considered in the differential diagnosis of any postoperative patient who presents with pain, infection, or palpable mass in abdomen. To spot a sponge on an intra-operative radiograph is difficult.

The best diagnostic modality to rule out a RFB should be a CT scan. One possible complication during surgical removal of RFB is missed perforation of adherent bowels. Gossypiboma has got medico-legal repercussions. The surgeon should always remain watchful and careful, as the harm to reputation once, is done forever. So, always be vigilant to prevent this avoidable complication.

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Fig.1: Retained Sponge in Between Small Gut Loop



Fig. 2: Pieces of Removed Gauge Sponge



Table 1: Risk Factors for Retention of a foreign body after Surgery in 54 patients [9]

Characteristics	Risk Ratio	Range
Operation performed of emergency basis	8.8	2.4 – 31.9
Unexpected change in operation	4.1	1.4 – 12.4
>1 Surgical team involved	3.4	0.8 – 14.1
Change in nursing staff during procedure	1.9	0.7 – 5.4
Body mass index (Per 1 unit increment)	1.1	1.0 – 1.2
Volume of blood lost (per 100ml increment)	1.0	1.0 – 1.10
Counts of sponges and instrument performed	0.6	0.03 – 13.9
Female Sex	0.4	0.1 – 1.3

Case Report

Reconstruction of Scene by Forensic Animation Two Case Reports

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Abstract

Traditionally, reconstruction of sequence of events of the crime has been in form of sketches, images, pictorial diagrams etc. However the advancement in the technology has helped the Forensic specialists to demonstrate the interrelationship of chain of evidence related to the case using various tools. Forensic animation is a tool having significant application in the investigation of civil and criminal cases. Though this technique has been used in many countries, but in India its use in crime investigation is not well documented in literature. We present two cases of firearm related injuries in which the forensic animation technique was used to demonstrate the possible angle of fire and relative position of the victims while sustaining firearm injuries. The cases are discussed with review of literature. This technique may provide a fresh perspective or new insight relevant to the case/incident under investigation and also helpful to judiciary for better understanding of facts related to the case. However, in India use of forensic animation is yet to withstand judicial scrutiny.

Key Words: Technology, Forensic Animation, Crime Investigation

Introduction:

Historically, static images such as diagrams and charts have been used to explain the complex testimony of an expert witness. [1]

Recent advancements in digital technology have given new dimensions to forensic sciences not only in gathering, exploration and interpretation of evidences but also its demonstration in the court room.

Forensic Animation is a computerized technique of representing the possible likely pattern of a scene or incident. [2] It has two distinct forms. Substantive Forensic animations emphasize on known facts with specially designed computer programmes, while Demonstrative Forensic animation considers visual illustration of happening of things.

Worldwide, it has been increasingly used by investigating and law enforcing agency. It has been used in diversity of civil and criminal situations including reconstruction of scene of occurrence with exploration of multiple possibilities which might have occurred.

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It not only increases persuasiveness of an row but visual demonstration can also aid the judiciary in better appreciation and longstanding retention of the facts related to the case.

However, for courtroom admissibility of evidences, its presentation through digital media requires special caution and consideration. In India, its use in crime investigation is not well documented in literature.

Case One:

A 42 year old male sustained firearm injuries while going to morning walk in a park. He was fired on by the assailant from the window of right front gate while victim was sitting on the driver's seat. One firearm entry wound was present on right side lower part of front of neck, three were on the front of right side chest, one on back of right hand while one entry wound was on the left scrotal region going upwards through abdomen and bullet was recovered from back of right thoracic region.

Doubt was raised by the defence counsel using the expert testimony of defence witness during trial stage that the entry wound from left side scrotal region in below upward direction was unlikely while victim is in sitting position on driving seat until the bullet is fired from the front of vehicle. But there were no signs of fire from front side of vehicle.

The animated reconstruction of bullet trajectory was done (Fig. 1) after considering the anatomical location of injuries on the body of victim and testimony of eye witnesses.

Case Two:

A 45 year old male sustained firearm injuries in an exchange of fire. He was shifted to nearest hospital, where he was operated upon but died during the course of treatment.

The entry and exit wounds on the body of deceased as observed at the time of autopsy were as under

1. Surgical therapeutic incised wound on lt. shoulder and lt. Upper arm of size 12 x 1.5 cm x muscle deep with extravasations of blood in underlying muscular layers. A small area of size 3 x 2 cm of contusion was seen on both sides of wound margin 3 cm lateral to medial end of wound on lt. shoulder. [Entry wound – Explored and debrided].
2. Surgical therapeutic incised wound vertically placed in middle 1/3rd of lt. arm laterally of size 9 x 2 cm x muscle deep with extravasations of blood in muscular layers underneath. The wound was situated 18 cm below lt. shoulder top & 8 cm above left elbow joint. [Exit wound – Explored and debrided].
3. Surgical therapeutic incised wound on left hypochondriac region of anterior abdominal wall of size 4 x 2 cm x peritoneal cavity deep with small area of blackish abrasion collar (1.2 cm).
4. The wound is situated 14 cm below lt. nipple, 117 cm above lt. heel of foot, 55 cm below top of head and 10 cm lateral to midline. [Entry wound–Explored and debrided].
5. Lacerated wound with outward protrusion of tissue through hole of wound of size 1.5 x 1 cm x pelvic bone deep with underneath extravasation of blood, situated on Rt. upper thigh postero-lateral aspect. [Exit wound]. Fracture of right hip bone (upper iliac region).

The case was investigated by police, national human right commission and also examined by highest courts of India.

The animated representation of position of victim while sustaining firearm injuries was prepared. [Fig. 2]

Discussion:

Forms of newer technology used in crime investigation or in court room ranges from video recording showing pieces of evidence on the monitor to computer generated new forms of evidences. [3-5] Forensic animation has its applications in variety of situations such as motor vehicle accidents, accidental air crash, bullet trajectory, fire and smoke spread pattern, anatomical location of injuries and explosions.

This technique includes known information about the scene or incident and other evidences which could be helpful in explaining the facts related to the case and explore all possible different scenarios that might have ensued. Some of the cases wherein computer generated graphical evidence has been used includes Delta flight 191 crash (1985) in USA [6], Bloody Sunday (1972) Inquiry in Northern Ireland [7], Road traffic accident and fatal shooting in UK. [8, 9]

The advanced digital technology is not only helpful in reconstruction of the scene or incident but also helpful in examination and identification of bite marks on various objects like food. [10]

However the issues concerning its acceptance as evidence in Court of Law include:

1. Relevance-It should accurately and objectively represent the evidence, to which it relates to,
2. Accuracy and Authenticity-The testimony of reconstruction expert, use of their data for production of animation and accurate illustrations are important for foundational and authenticity requirements for a forensic animation.

Animation is required to be based on accurate, coherent and authentic information free from contradictions and

3. Full and complete disclosure of underlying data, scientific principles mathematics, physics, programming, hardware, software, supporting documents or studies. [11-13]

In a case Clark v Cantrell (529 S.E.2d 528, S.C. 2000) from South Carolina the trial judge ruled that a forensic animation of a high-speed automobile accident was inadmissible as demonstrative evidence. [12]

Studies have suggested that more research is required for effective presentation of the case through animation. [5]

Inadequate presentation of evidences through animation based on testimony of eye witnesses may lead to rejection of animation as evidence in the courtroom. Higher cost of the production of animation is another most important limiting factor for its frequent use in crime investigation.

Schofield [14] has suggested that number of fundamental implications inherent in the shift from oral to visual mediation and number of facets of this modern evidence presentation technology need to be investigated and analyzed. We have used animated reconstruction of sequence of events in cases of firearm injuries sustained by the victims.

The anatomical location of injuries, statement of eyewitnesses and body positions were used for reconstruction using animation.

However, in our case, animated reconstructions remain confined to investigation and could not be subjected to judicial scrutiny. Portraying of bullet trajectory using animation has earlier been reported' [9]

Subke K et al [15] has also used computer enhanced reconstruction (Three dimensional geometric model) in order to get clues concerning the course of the traumatic event in cases of lethal firearm injuries using all relevant anatomical data as well as the careful documentation of the injuries and a three-dimensional model of the characteristic outlines of the weapon true to scale.

A series of simulation sequences is created by variation of the body positions and the grasp of the weapon.

They also observed that, anatomically impossible positions in view of the physical characteristics of the victim and the site and direction of the bullet path are automatically excluded from the reconstruction.

Conclusion:

The use of technology in Forensic science has significantly contributed in advancement of investigation.

In India, the animated reconstruction of sequence of events which are now more often used to illustrate the incident in various television news channels is required to be demonstrated in the courtroom environment.

However, appropriate and careful consideration of the confirmed facts and views of reliable witnesses related to the case are the key factors for its preparation by the experts and

more so, interpretation and acceptance as evidence by the prosecutors and judiciary.

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Fig. 1
Animation of Case one

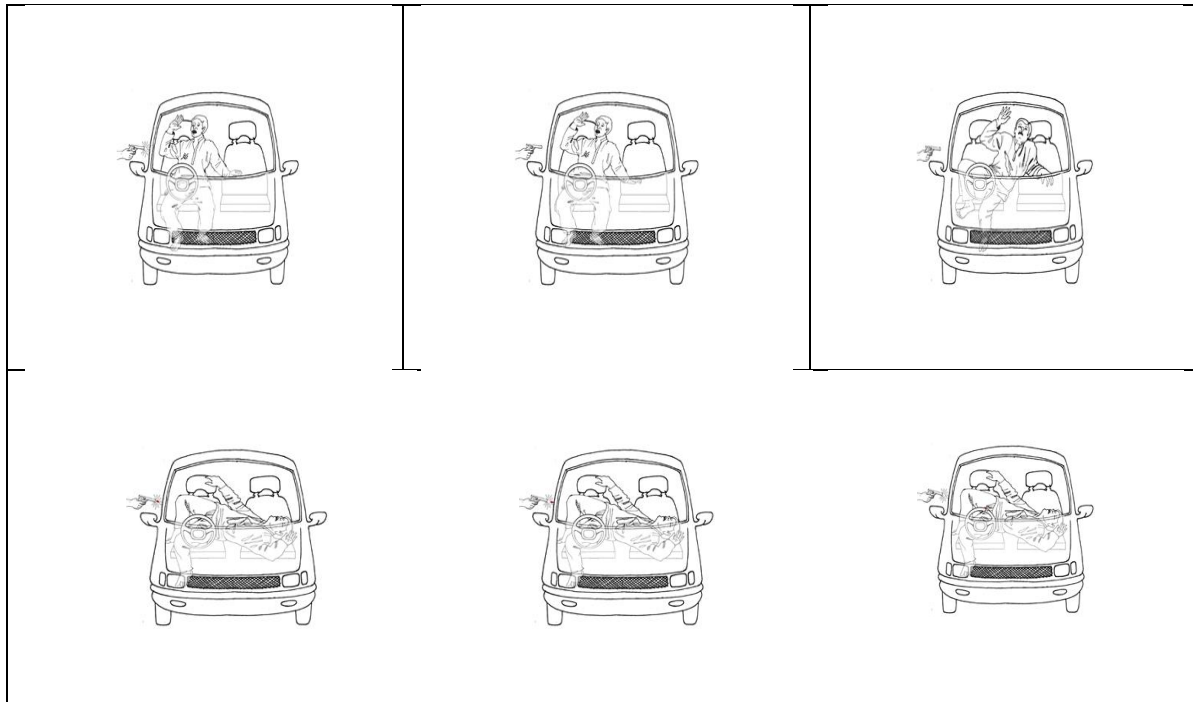
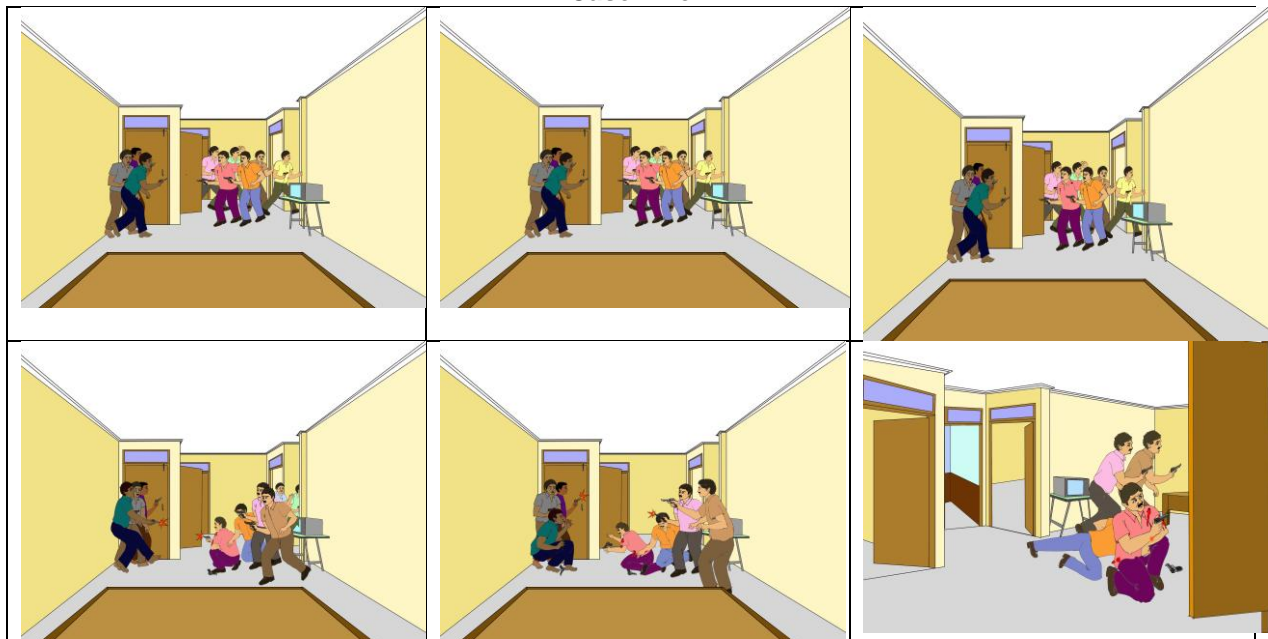


Fig. 2
Case Two



Case Report

Gas Geyser a Silent Killer in Bathroom: A Case Report of Carbon Monoxide Poisoning

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Abstract

In the ever changing world with increasing population and limited resources, development of alternate sources to restricted energy assets, which though have made life easier, also has its side effects which may vary from minor consequences to fatality. Heating appliances especially gas geysers, though an efficient means of energy conservation especially during the winter months are no exception to it. Here, we present the case of a 32 year old female with fatal carbon monoxide poisoning from a running gas geyser. The victim had no history of chronic diseases or any other ailment and was in fair health. She was found dead in her bathroom floor. The subsequent autopsy findings, crime scene examination and investigation confirmed the cause and manner of death to be accidental carbon-monoxide poisoning. This case will bring into light, the ongoing trend of using gas geysers instead of traditional electric geysers mainly based on cost effectiveness which has in turn led to an alarming rise in such accidents. We will also suggest the routine precautions which can be followed to prevent such tragic accidents.

Key Words: Accidental, Carbon-monoxide, Fatal air poisoning, Gas geyser

Introduction:

Deaths in the bathroom are not so common. We report a case of death due to leakage of gas geyser while bathing with water collected continuously from a running gas geyser. Gas geyser is mostly used in the winter season for bathing, probably being economic as is claimed by companies who manufacture it.

Carbon monoxide (CO) is emitted from the gas geyser while being used to boil the water for taking bath. Carbon monoxide is one of the leading causes of accidental poisonings.

It is difficult to estimate the incidence of CO poisoning cases, because the symptoms resemble many other common ailments [1, 2]

This is more so in India, where there is improper reporting of morbidity and mortality attributable to suspected CO poisoning.

High index of suspicion, clustering of such cases in winter months and a careful history helps in making the diagnosis. [3]

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Thus, this case assumes importance for reporting the triad of autopsy findings, scene of death examination and laboratory investigations along with suggestion to avoid the causalities in future as CO is one of the gases which pollute the environment and cause the harm to living beings particularly in closed atmosphere like a bathroom.

Case History:

In the month of February during the late winter season, a 32 year old married female staying, in her in-laws house went for bath in the bathroom. However, when she did not come out for a long time, the family members first called her name and tried to open the door when no reply came. They had to call a carpenter as it was locked from inside.

There they found her naked body lying dipped in the water tub. She was immediately taken to private hospital, where she was declared as "Brought Dead". The police papers mentioned a gas geyser being installed in the bathroom that was used as a source of hot water for taking bath.

The gas emitted from that gas geyser was alleged to be cause of death. When the parents of the victims were informed, they were shocked and suspicious and wanted to know the cause and manner of death.

Autopsy Findings:

The dead body was of a young adult female with eyes and mouth closed and the cherry red blood was oozing out from mouth.

Pink-post mortem staining was present on the face, upper part of chest, and both upper limbs. (Fig 1) Rigor mortis had passed off. A reddish contusion of size 3x2cm was present on the vertex region of scalp. On dissection underlying scalp layers were ecchymosed; no bone injury was found present underneath. The brain and membranes were congested and healthy.

The lungs were somewhat edematous and congested; right side of heart contained little blood but left side was empty. Stomach was containing approximately 50 cc of watery material. Small intestine contained semi digested food material. Large intestines contained fecal matter and gases.

Liver, spleen and kidneys were congested and healthy. Bladder was empty. Organs of generation were healthy and uterus was empty. On dissection the blood was cherry red in colour. (Fig 2)

Viscera along with blood were preserved for chemical analysis and histopathological examination. Bones were preserved for diatom detection.

The result revealed no common poison in the viscera; blood showed presence of carbon mono oxide qualitatively but on asking about the quantity of carbon monoxide, the FSL team informed that this quantity was not estimated due to lack of facility. However, the histopathological examination showed oedema and marked congestion in the lungs and other organs were reported as congested.

Discussion:

Carbon monoxide (CO) is a colorless, tasteless, non-irritant gas produced due to incomplete combustion of carbon. Sources include coal gas, smoke from fires, defective heating appliances e.g. furnace, stove, water heater, fire places, burning oil lamps, heating devices burning fuel and snow obstructed exhaust system of motor vehicles. [4]

CO is classified as an air pollutant in the occupational/environmental poison. The average concentration in the atmosphere is about 0.1ppm; and the fatal dose is 0.04% if the victim is in an ill ventilated room. [5]

Cherry-red livor mortis of the skin, mucous membranes, blood, and viscera is a common feature of CO poisoning. [6] This color is attributed to the high affinity of CO for hemoglobin, reportedly 240 times greater than that of oxygen, and its continued bonding to hemoglobin in the absence of fresh oxygen and this renders the hemoglobin incapable of carrying oxygen resulting in tissue anoxia.

The cherry red colour of skin and the mucus membrane is relatively uncommon in clinical practice; but when present indicates a severe degree of poisoning. [7] In a typical case the body is cherry-red which is evident in the skin of the face, shoulders, front of chest, and thighs. The internal solid organs are found to be congested, and pinkish on appearance. [8]

Carbon monoxide poisoning may have to be differentiated from alcoholic intoxication, diabetic/insulin coma, cerebral hemorrhage, head injury, uremia, barbiturate, narcotic poisoning.

The two features which may be confusing are-

- (i) Occasional bullous lesion which may stimulate second degree thermal burns,
- (ii) Tendency of the dying victim to wild, flailing movements with disturbing clothing and furniture to give an impression of a violent quarrel and creating suspicion of homicide. [7]

Putrefaction has very little effect on carboxy Hb, which is extremely stable; and carbon monoxide retards putrefaction, but is not a product of putrefaction, and may be detected in blood several days after death. [7]

The spot examination conducted by the Forensic Lab team reported that the door of the bathroom was locked and it was opened with the help of the carpenter and the body was lying naked with face in water tub. The results of chemical analysis of blood showed presence of carbon monoxide. Test for diatom was negative.

The histopathological examination showed oedema and marked congestion in lungs where as all other organs were reported as congested. These findings indicated accidental death of this female due to carbon monoxide poisoning.

Conclusion:

The medico-legal consequences of not determining the correct and exact manner and cause of such a death may lead to misdirection of the police investigation that may lead to harassment of the innocent people, claims of insurance, medical liability, and disposition of property etc. at large. For survivors, the acceptance, understanding, and grieving of such a death are markedly different in the event of suicide versus accidental or natural death.

Prevention always takes precedence over everything else. The geyser should not be switched on after locking the bathroom from inside, ventilation should be kept open and gap should be maintained between two people

taking bath to avoid increase in the carbon monoxide density.

Gas geyser unit should be placed outside the bathroom with a hose of hot water going inside. Gas geyser switch should ideally be at such a height that it can be switched off easily. These precautions can decrease the incidence, mortality, and morbidity due to accidental CO poisoning. [9]

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Fig. 2: Pinkish PM Staining on Face, Neck and Face



Fig.3: Pinkish PM Staining of Blood and Organs



Fig. 1: The Normal Appearance of Body

