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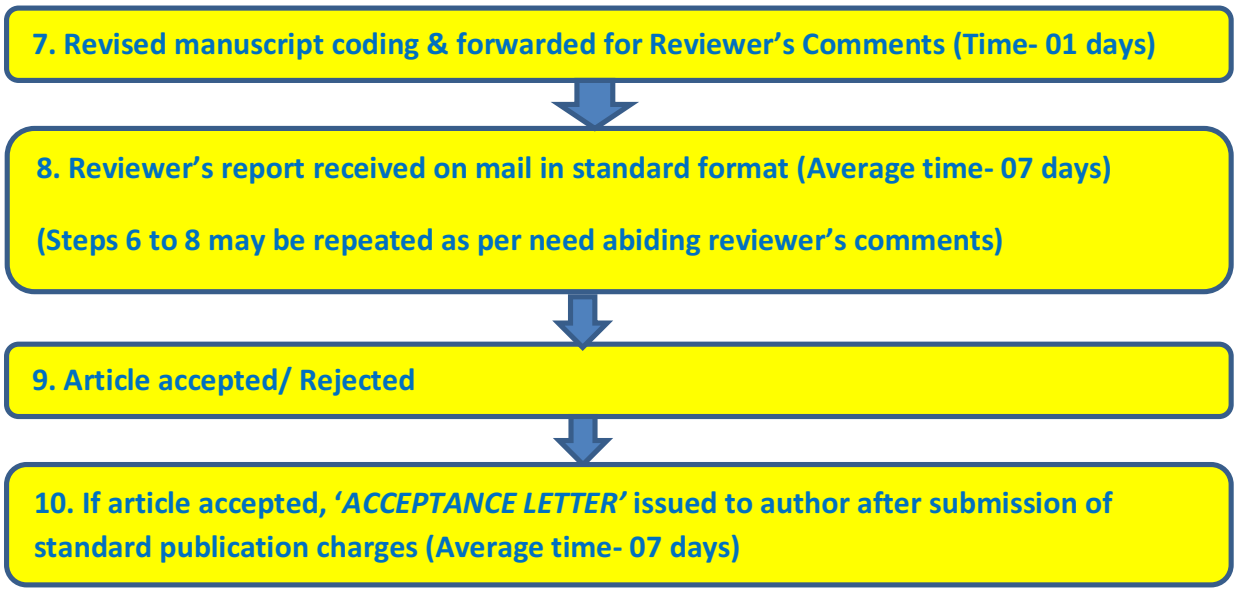

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Editorial

Small Group Discussion: An Important Teaching-learning Method in CBME

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It is mandatory to implement the new Competency-Based Medical Education (CBME) curriculum from the academic year of 2019 in India in all medical institution.[1] The well planned strategic faculty development programmes with appropriate faculty training may help to overcome the challenges and facilitate improved health outcome through CBME implementation.[2] The Medical Council of India (MCI) and now National Medical Council (NMC) is started Curriculum Implementation Support Programme (CISP) for imparting training to faculty on new CBME curriculum. Besides this, the implementation of the CBME curriculum is facing multiple challenges at institutional level. It includes changes in organisational structure of training programmes, change in culture of education, change in process of teaching, evaluation and method of assessment.[3]

The curricula mandated minimum use of didactic lecture as teaching-learning method with maximum use of other modes of teaching such as small group discussions (SGD), clinical teaching and practical's.[1] It emphasised on active learner centred teaching methods with maximum participation from students. Teacher role is mainly to facilitate learning. The teaching-learning sessions mainly in the form of small group discussions facilitated by a trained teacher-cum-facilitator or a peer group discussion on a selected small topic in a subject under guidance of facilitator.[4] Hence, there is need of competent facilitator to shoulder this responsibility with the challenging role of teacher with leadership qualities abiding new CBME curriculum. CBME is used for postgraduate teaching in few medical institutions in India with good results.[5,6]

CBME is gaining momentum all over the globe including India aims towards creating competent graduates to fulfil changing societal needs of healthcare. It is learner-centric process offers flexibility in time, focussing three domains of learning altogether. It emphasised on time-based teaching learning with greater accountability and flexibility of educator. It focuses real-time formative assessment of learner in clinical setting at the end of every teaching-learning session in the form of small group teaching techniques.[7]

Since, the CBME curriculum more focused on outcome towards preparing students competent pertaining to societal healthcare needs, the teaching-learning activities needs to be more skill-based providing hands-on-training experience to students in real clinical settings. The learning outcomes are mostly dependent on the impactful teaching methodology used for imparting knowledge towards desired training. Various traditional & newer small group teaching techniques includes lectures, symposiums, case-based learning, seminar, problem-based learning, small group discussions (SGD), role plays, videos, etc. are used as teaching-learning methods to impart knowledge to students. In this, the small group discussion plays an important role in the teaching-learning techniques in CBME curriculum implementation towards making the graduate competent abiding the societal need of healthcare. It stimulates students thinking with problem-solving approach.[8,9]

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With advancing technology, students have easy access to data and information. But, they need to be competent enough towards applying their knowledge in real clinical settings to solve days to day problems at clinical situations with independent thinking and problem-solving skills.[9, 10]

Small Group Discussion:

It a discussion amongst group members with small numbers generally 5 to 10 or up to 30 individuals. Presenter usually announces the topic/idea before discussion. It allows everyone to contribute on the topic, share ideas in democratic way. Every member gets an opportunity to discuss and reflect upon it which facilitates the interchange of ideas under guidance of group leader.

Main procedural steps in SGD:

Small group discussion mainly contributes to circulate information on pre-decided topic and in-depth discussion. It helps to analyse and evaluate the information with supported evidence by reaching on common agreement on accepted common conclusions. The Important steps are Introduction, directing the discussion by group leader and summarising the discussion at the end. In introduction, the group leader need to prepare for instructional objectives, purpose, relationship of the discussion session. Variations of small group discussion such as cooperative learning group, problem solving group or investigation groups may be used by facilitator.[10]

Advantages of SGD: It is democratic way of discussion, all participants can participate in group actively, multiple ideas may have gathered and discussed with different views, timely correction possible by moderator, in-depth discussion possible, participants who may need more assistance can be identified & help may be provided.

Disadvantages of SGD: It is time consuming process, need of intelligent, skilled moderator/ facilitator, discussion may be easily get off the track, some participants talk too much and some may be just passive listeners.

Limitations of SGD: It involves more talk and less action, careful appropriate prior planning needed for successful results.

Small group competence is one of the essential teaching skill needed for all medical educators. Medical teacher needs to promote active students' learning using optimal small group methods to facilitate learner-centric problem-based learning with free communication between group leader and members. The medical educator need to evolve their skills to facilitate active learning making positive use of differences in attitude and knowledge amongst the participants promoting coordinating healthy group interactions.[2]

The medical educator is not only tutor, instructor or passive chairperson but also need to perform a crucial role as a group leader, moderator and active facilitator who encourage the positive group discussion with minimal intervention. The facilitator should identify errors, misperceptions and correct the errors with providing timely feedback.[8-10]

Small-group discussion develops the learners cognitive and affective abilities stimulates thinking with problem solving approach. It gives insights among the peers with welcoming environment under the able guidance of competent mentor-cum-facilitator with creating a strong team of learners towards focused task-oriented cooperative group.

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Original Research Article

An Autopsy Based Study of Burn Deaths at Jodhpur Region

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Key words
Burn,
Flame,
Accidental.

Abstract

Burn injuries are major public health problem globally. The global estimate of burn injury-related deaths in 2002 was 3,12,000 and contributed to 0.5% of all causes of deaths. An estimated 1,84,000 persons died of burn injuries in the countries of South East Asia Region (SEAR) in 2002 with 6.55 million disability adjusted life years (DALY) lost due to burns. In India 70 Lakh peoples encounter burn injuries and about 1.4 Lakh died every year. In Rajasthan there is no such exact data available. This study was conducted at SN medical college Jodhpur, Rajasthan and burn deaths constituting 19.34% of total medico-legal autopsies. The majority of burn deaths (77%) were observed in the age group of 21 to 40 years of age. Females were more in number with male to female ratio 1: 1.32. Most of deaths due to flame burn 81% followed by electric current accounting 18%. Accidental burn was most common and homicidal burn was least. Majority of burn victims were died in one week of incidence.

1. Introduction

Burn is common in the developing world and associated with the significant mortality and morbidity. Burn represents an extremely stressful experience for both the victims and their relatives. Burn is extremely common and a major public health problem in today's world. An extensive burn profoundly affects to the patient physically, financially and mentally. Burn is suicidal, accidental and homicidal in manner and may occur due to variety of electrical, thermal and mechanical products. Despite many medical advances, burns continue to remain a challenging problem due to the lack of infrastructure and trained professionals as well as the increased cost of treatment, all of which have an impact on the outcome. Previous epidemiological studies from different parts of India have revealed that burn cases are prevalent all over the country.[1]

In Jodhpur region the cases of burns form the major bulk of all medico-legal cases and incidence of these cases are still increasing due to more stress in day-to-day life for various reasons. To provide better facilities medically as well medico-legally it is very important and urgent to know about the profile of cases of burns especially in this region.

2. Material & Methods:

This study was conducted at department of forensic medicine & toxicology S.N. Medical College and associated hospital Jodhpur. Detailed history of the case was obtained from the patient relatives, police and the other available persons who will present at the time of incidence.

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Inclusion criteria: 100 case of burn deaths at mortuary of all associated hospitals of S.N.M.C. Jodhpur. **Exclusion criteria:** Death due to burn but incomplete information

2. Observations & Results:

Total 827 medico-legal were done during Aug.2011 to July 2012, out of which 160 deaths (19.34%) were of burn deaths. These results indicate that burn autopsies accounting major bulk of all medico legal autopsies in India. In this study 100 cases of burn deaths were observed. Maximum number of burn cases was seen in the age group of 21 to 30 years of age, 42 cases followed by 35 cases in age group of 31 to 40 years. 92% burn deaths were observed in age group of 21 years to 50 years of age. Least incidence of one case for each was observed in the age group of <10 and > 60 years (**Table no.1**).

Table no. 1: Age and sex wise distribution of burn cases

Age	Male	Female	Total
<10	01	00	01
11- 20	01	01	02
21- 30	18	23	42
31- 40	15	19	35
41- 50	05	11	15
51- 60	02	03	04
>60	01	00	01
Total	43	57	100

Table no.2: Sex wise distribution of burn deaths

Sex	No	%
Male	43	43%
Female	57	57%
Total	100	100%

Table no.3: Burn death as their marital status

Status	Male	Female
Married	30	46
Unmarried	13	11
Total	43	57

Table no.4: Manner of burn deaths with burn sources

Manner	Flame	Electric	Scald
Accidental	52	18	01
Suicidal	28	00	00
Homicidal	01	00	00
Total	81	18	01

These findings are in favour of that this is the most active group of population in India and burn may occur while working, safety measures are lacking. There were 43 males and 57 female deaths as a result of burn observed in this study. The male to female ratio was 1: 1.32 (**Table no.2**).

Table no.5: Season wise distribution of burn death

Season	No of cases
Summer	34
Winter	39
Rainy	27
Total	100

Table no. 6: Cases according to burn body surface area

% BSA	Male	Female	Total
<40	18	01	19
40- 60	05	08	13
60- 80	09	12	21
80- 100	11	36	47
Total	43	57	100

This is quite explainable that most of housewife is working in kitchen and kitchen related activities where risk of burn accidents is more. Our study showed that 55 cases belong to rural area and 45 cases belong to urban region. Out of 100 deaths 76 cases were married and 24 cases were unmarried. Out of 76 married cases 30 cases were male and 46 were female. In unmarried person male female number were almost same, 13 male and 11 females (**Table no.3**). Present study showed that maximum number of burn deaths were accidental, 71 in no. followed by, 28 cases suicidal and 01 case was homicidal in manner (**Table no.4**).

In this study 81 cases of burn were observed as a result of flame, followed by electric burn, 18 cases and 01 case due to hot liquid. Out of 81 cases of flame burn, we observed that 52 cases were accidental, 28 cases were suicidal and 01case was homicidal in manner of burn. The manner of burn in electric burn and scald was observed accidental in all 19 cases (**Table no.4**). kerosene oil was the major material which was involved in most of flame burn. The kerosene oil routinely is used for domestic purpose easily available for rural poor peoples. Maximum number of burn death was observed during Oct and Nov months, 28 cases followed by Aug and May, 10 cases for each (**Table no.5**).

This is quite explainable that in winter season use of flam is more in India scenario. 74 cases were observed with burn surface area more than 50%. Out of 74 cases 23 were male and 51 (about 70%) were female (**Table no.6**). In this study most of victims died within seven days of incidence and septicemia was most common cause of death.

3. Discussion:

During the study period of one year total 824 autopsies conducted in department of forensic medicine & toxicology S.N. medical college Jaipur. Out of 824 autopsies 160 (19.4%) cases of burn deaths were observed. Almost same findings were observed by the study done by Batra et al.[2] (23.3%), Ambade[3] (21.6%) et at and Gupta et al[4]. Our study showed that the predominant age group was 21-30 (42%) irrespective of sex, followed by 31-40 (35%) age group. Similar findings were observed by Ganesamoni et.al[5], and Jaiswal et.al [6], were also the majority were in the age group 21-30 years. This study is not consistent with results of Albertin et.al.[7]According to present study, females were more frequently affected (57%) than males (43%). Similar results were seen with Ganesamoni et.al[5], Jaiswal et.al[6]. and less than study of Zanjad NP et al[8] (72.1% were female) and Batra AKet al[2].

Accidental burns were more common as compared to suicidal and homicidal burns. These results were consisting with other studies which are done by Indian authors like Batra VN et al, Ambade et al, Gupta RK et al, Singh D et al and Subrahmanyam.[2,3,4,9 & 10] Flame burns comprised of 81% of cases followed by electric burn 18% and scald burn 1%. Similar observation also noted by Zanjad et al, Subrahmanyam, Singh D et al and Gupta M et al.[8,9, 10 &11] The study showed that 74% of victims were having more than 50% of body surface area was affected by burn. Finding was consisting with study of Singh et al[9], Bang RL et al[12] and song et al[13].

In this study most of victims died within seven days of incidence (96%) and septicemia was most common cause of death. These findings are similar to Gupta RK et al[4]. and subrahmanyam M.[10] The hospital acquired infections and extensive burn surface area of body are responsible for development of infection inspire of better care and treatment.

4. Conclusion:

This study concludes with:

1. Male to female ratio 1: 1.32
2. 92% burn deaths were observed in age group of 21 years to 50 years of age.
3. Maximum number of burn deaths was accidental, 71% and followed by suicidal in manner.
4. Most of burn was caused by flame, 81% and 18% caused by electricity.
5. Most of victims 96% died within 7 days and 28% died within 24 hours of incidence of burn.
6. About half of total victim burn had involved more than 80% of TBSA.
7. Females sustained more extensive burn than male victims.

5. Suggestions:

We observed that incidences of accidental burn were more so personal safety measures and equipment for safety should be used during working at fire places. Safety means in factories should be strictly observed by law enforcement agencies.

Ethical clearance- Yes.

Conflict of interest- None declared.

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Original Research Article

A Study of Impact of Medical Records on Healthcare Management at Tertiary Care Teaching Hospital

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Key words
Medical records, impact, Healthcare, Electronic records, Quality Assurance.

Abstract

Background: The comparative and qualitative medical records have a vital role in public health, clinical care and planning for any institution. No institution can properly provide better clinical care without proper preservation and maintenance of good medical record. **Objective**: To study the existing Hospital Information System in the MRD and to evaluate the impact of maintenance of medical records on healthcare. **Methods**: A hospital based cross sectional study was conducted to find out the deficiencies, if any, in the existing Hospital Information System. **Results:** The overall opinion of the Heads of unit, CMOs/MOs, doctors and patients about the existing Hospital Information System in the hospital is satisfactory (77%) and 23% feel that the system is poor. The majority of the Heads of Units, Professors, and CMOs, (80%) agree that the existing Hospital Information System does not help in the Quality Assurance Programme (QAP) as well as in enhancing the functions of the supportive services. Majority of the doctors disagree that the Hospital Information System helps in infection control (62%) and in defining the community needs (88%). Majority of them agree that the Hospital Information System helps in education and research (60%). **Conclusions**: The present scenario in India is that most of the MRD are partially computerized. This system exists in some Health Care facilities, where entries are made by different Health care providers, such as Physicians, Nurses and therapists, into the computer in different nodes in a local area network.

1. Introduction

Medical records are the integral part of medical practice/ medical profession. These records are important documents for the doctor, to the patient and to the society in general, more so in situations like medical emergencies, negligence suits, medical researches etc.[1] Medical records are documentary evidences, which are of immense help not only in medico legal cases but also in defending the doctor

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in cases of negligence suits or allegations against him/her. There are many cases / instances which are decided in favour of doctors only on the grounds of well kept and well reproduced records in consumer courts.[2] Medical records have assumed more importance and significance because of application of Consumer Protection Act to medical profession. However, doctors because of their busy schedule either don't maintain records or records are kept very brief, incomplete, cryptic records which are of no use in court matters.[3] Over the last few decades, medical sciences have made great strides leading to radical improvements in the modes of investigations, therapeutic activities and surgical procedures. This has enhanced the imperative need to have authentic and accurate medical records.[4] India provides quality and affordable service in order to attract health tourists from every nook and corner of the world. The health care provisioning is not equal in the country. The differences are huge, as the as rural and urban areas have vastly different technological landscapes. The adaptation of the technology is also not equal, yet there is certain level of technology has been employed by both private and public level operators.[5] Every department and subsystems in an institution can be viewed basically as an information-processing agency. The Medical Record Department (MRD) is no exception. It is not a place where patient charts, complete or incomplete, are dumped and forgotten thereafter. The administration can actively use this department for monitoring and controlling the quality of patient care; in assessing of the performance of the medical staff; in keeping check on how some of the hospital's resources are being put to use; and in gathering data for short term and long term decisions.[6] Most of the present MRDs have been changed into departments of hospital information management in order to take up responsibilities to function more effectively and efficiently in this regard. This new drift will support the need for an improved Hospital Information System making the MRD the main source of health information. It is no doubt that a carefully planned Hospital Information System and intelligently used information will be a great asset to any health care industry. The Hospital Information managers must have the necessary skills to facilitate and manage this transition and bridge the gap in the changing patterns switch over to 21st century.[7]

2. Objectives:

1. To study the existing Hospital Information System in the MRD.
2. To see the impact of maintenance of medical records on healthcare at tertiary care teaching hospital
3. To identify the shortcomings, if any, in the existing Hospital Information System in the MRD.
4. To suggest the necessary steps to improve the existing Hospital Information System in the MRD.

3. Material and Methods:

Study Settings:

The study was conducted at Pravara Rural Hospital of Rural Medical College, Loni, Tal. Rahata, Dist. Ahmednagar, Maharashtra - a tertiary care teaching hospital with 1275 bedded Multi-disciplinary, Super-specialty hospital in a rural area.

Study population:

The Department of Medical Records of the hospital was studied for assessing the Hospital Information System and its impact on healthcare. Descriptive research approach as adopted for this study. Descriptive statistics have been used to find out the deficiencies, if any, in the existing Hospital Information System. The target population consisted of Faculty (Heads of the Units / Professors) / Specialists / Chief Medical Officer (CMO) / Medical Officers (MO) from clinical departments as Medicine, Paediatrics and Neonatology, Surgery, Obstetrics and Gynaecology, Orthopaedics, Ophthalmology, ENT, TB and Chest, Plastic Surgery, Cancer, Casualty, Dental, etc. along with Nursing Superintendent and Patients in the hospital. The data were collected from a sample of 200, consisting of 84 faculties and specialist doctors from various departments, (Heads of Units / Professors), 1 Medical Superintendent, 1 Nursing Superintendent, 4 CMO's, 7 MO's, 3 Dentists and 100 patients selected by the disproportionate stratified sampling technique. The inclusive criteria for selecting the sample, were the Medical Superintendent, Heads of the Units, Professors, Nursing Superintendent and CMO's who involved in decision making process, doctors with experience of more than five years, and the literate patients, willing to participate in the study.

The tool used to collect the data was a structured, closed ended questionnaire. The questionnaire was constructed with emphasis on

the content, clarity and simple and local language. The scoring for the Medical Superintendent, Heads of the Units, Professors, Nursing Superintendent and CMO's has been done on a four-point scale and the scoring for the patients is on a three-point scale. The scoring has been given according to the nature of the questions. A pilot study was conducted for the patients, to check the validity and feasibility of the study. The tool was administered to subjects, for ascertaining the reliability. The reliability calculated by using split method r = 0.63, 0.81 and 0.71, for Heads of the Units, Professors /Associate Professors, and CMO's and the patients respectively, which was high and satisfactory.

Statistical methods:

The data is presented as the numbers with percentage or mean with Standard Deviation (SD) as appropriate. All the associations were adjusted for potential confounders. The entire data was analyzed using a Statistical Software SYSTAT version 12 (A licensed copy).

4. Observation & Discussion:

It was observed that decentralized filing system is being followed in the MRD of the tertiary care teaching hospital as per the guidelines by statutory authorities like MCI / Govt. of India i.e., the department is divided into two units – Out Patient (OPD) and In-Patient (IPD). The other information available to the hospital management includes:

1. OPD and IPD Statistics
2. Death cases
3. Left against Medical Advice (LAMA) cases
4. Long standing cases
5. Cash and Collection reporting

Structured questionnaires were used to find out the deficiencies in the existing system. The various studies conducted earlier, shows the importance of Hospital Information System (HIS) in an organization. It lays emphasis on the nature of the modern organization, the current legal and social environment; advancing technology and the expanding role of management that have created information needs which cannot be satisfied by traditional means. A closer examination of these four areas will reveal the demand for more sophisticated management information This hospital does not have a separate admission department and all the registration and admission procedures are through the MRD. The MRD is partially computerized. In addition, an in-hour Hospital Information System exists in this hospital. The study reveals that the department is providing information to the health authorities regularly. The overall opinion of the Heads of units/Professors, Medical Superintendent / Nursing Superintendent, CMOs/MOs, Dentists and patients about the existing Hospital Information System in the hospital is satisfactory (82%) and 18% feel that the system is poor (**Table No.1, Fig. 1**).

The primary purposes of the health record are associated directly with the provision of patient care services. The secondary purposes of the health record are related to the environment in which healthcare services are provided.[8] However, it was found that the majority of the Heads of units, Professors, CMOs/MOs (60%), are disagree with the statement that the maintenance of medical records of the hospital helps in discharging effectively their managerial responsibilities as well as in enhancing the inter and intra hospital communication (70%). Nearly 70% of the Heads of units, Professors, CMOs/MOs agree that the statistical information from the MRD helps in decision-making. With an increase in the number of third-party payer's utilization requirements, the admitting and utilization management are in frequent communication.[9]

The majority of the Heads of units, Professors, and CMOs/MOs, (48%) agree that the existing Hospital Information System does not help in the Quality Assurance Programme (QAP) as well as in enhancing the functions of the supportive services.[10] Half of the managerial heads agree that the Hospital Information System does not help as a tool in the various utilization processes.[11] The various studies conducted earlier regarding information system reveals the benefits for doctors and nurses and includes, qualitatively better data, more available data on patients, direct consultations of colleagues and experts, use of decision-based systems, reduced work load, the gain of time, and the availability of administrative support.[6,12,13]

Majority of the Heads of units, Professors, and CMOs/MOs, do not believe that the existing Hospital Information System can help to reduce the cost of patient care (65%) or shorten the stay of the patient in the hospital (66%) (**Table No.2, Fig. 2**).

The majority of the Heads of units, Professors, and

Table No.1: Opinion about the existing system of maintenance of medical records:

Category	Response			
	Good	Moderate	Poor	Total
Medical Superintendent / Nursing Superintendent	2 (100%)	-	-	**02 (1.00%)**
Heads of the Units / Professors	39 (46.43%)	19(22.62%)	26(30.95%)	**84 (42.00%)**
CMO / MO	2 (18.18%)	5(45.45%)	04(36.37%)	**11 (5.50%)**
Dentists	1(33.33%)	1(33.33%)	1(33.33%)	**03 (1.5%)**
Patients	62(62.00%)	34(34.00%)	04(4.00%)	**100 (50.00%)**
Total	**106(53.00%)**	**59(29.50%)**	**35(17.50%)**	**200**

Table No.2: Impact of the existing system of maintenance of medical records:

Impact of the medical records on	Responses			
	Strongly Agree	Agree	Disagree	Strongly Disagree
Decision making	2(1%)	120(60%)	62(31%)	16(8%)
Utilization of resources	2(1%)	80(40%)	114(57%)	4(2%)
Management and review of care	140(70%)	60(30%)	-	-
Reimbursement of care	114(57%)	80(40%)	6(3%)	-
Research	157(78.5%)	40(20%)	3(1.5%)	-
Accreditation	120(60%)	80(40%)	-	-
Enhances communication	-	44(22%)	82(41%)	74(37%)
Strategic planning	-	84(42%)	72(36%)	44(22%)
Quality assurance	-	40(20%)	160(80%)	-
Reduces waiting time	2(1%)	78(39%)	120(60%)	-
Utilization process	2(1%)	92(46%)	64(32%)	42(21%)
Medical audit	46(23%)	102(51%)	52(26%)	-
Reduces the cost	27(13.5%)	42(21%)	131(65.5%)	-
Shorten the stay	-	35(17.5%)	133(66.5%)	32(16%)
Continuity of patient care	12(6%)	24(12%)	9(4.5%)	155(77.5%)
Effective referral system	29(14.5%)	67(33.5%)	101(50.5%)	3(1.5%)

Table No.3: Disadvantages of the existing Hospital Information System (HIS)

Impact of the medical records on	Responses			
	Strongly Agree	Agree	Disagree	Strongly Disagree
Non-Existence of ward Computers is affecting patient care	-	170(85%)	30(15%)	-
OPD consultations take longer time	-	160(80%)	10(5%)	30(15%)
Delay in getting longer time	10(5%)	140(70%)	50(25%)	-

Table No.4: Opinion about current HIS with respect to Internal and Personnel Performance:

Impact of the medical records on	Responses			
	Strongly Agree	Agree	Disagree	Strongly Disagree
Infection control	-	72(36%)	124(62%)	4(2%)
Defining Community needs	-	24(12%)	138(69%)	38(19%)

Fig.1: Opinion about existing system of maintenance of medical records:

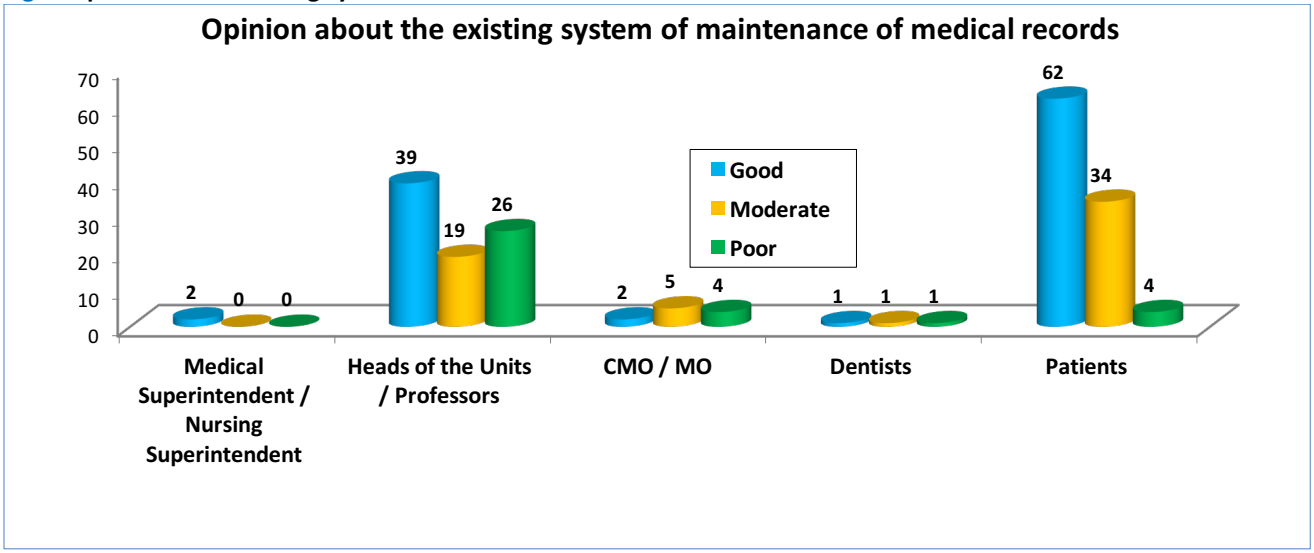


Fig.2: Impact of the existing system of maintenance of medical records:

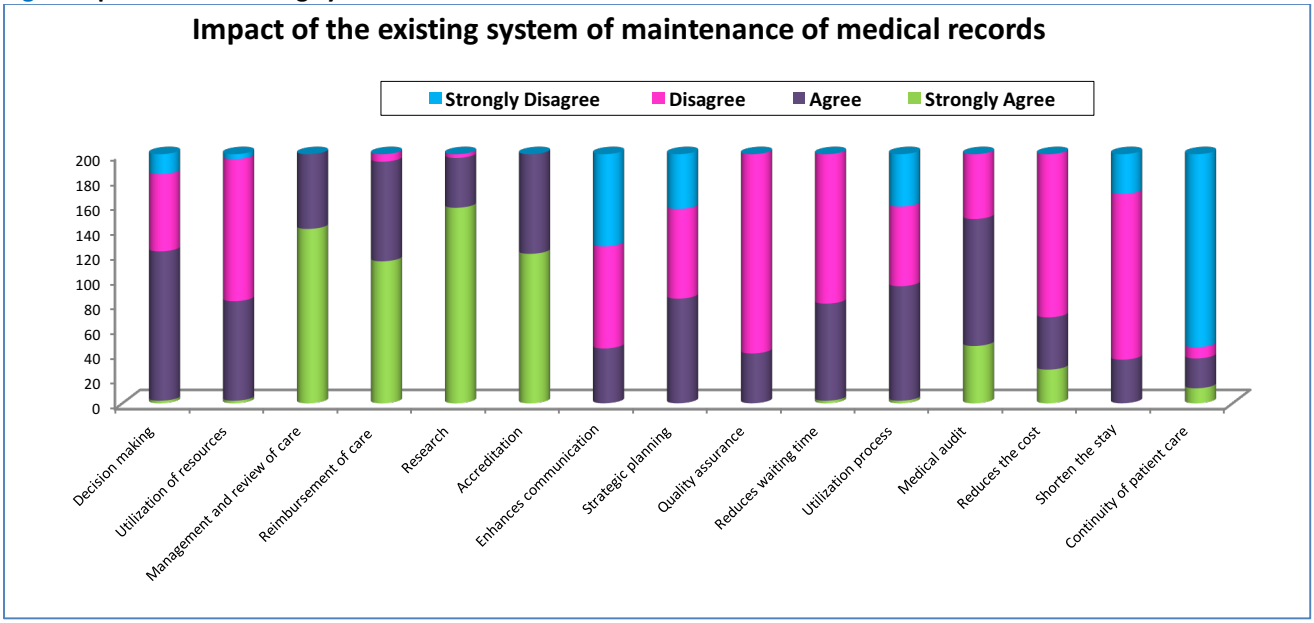


Fig. .3: Disadvantages of the existing Hospital Information System (HIS)

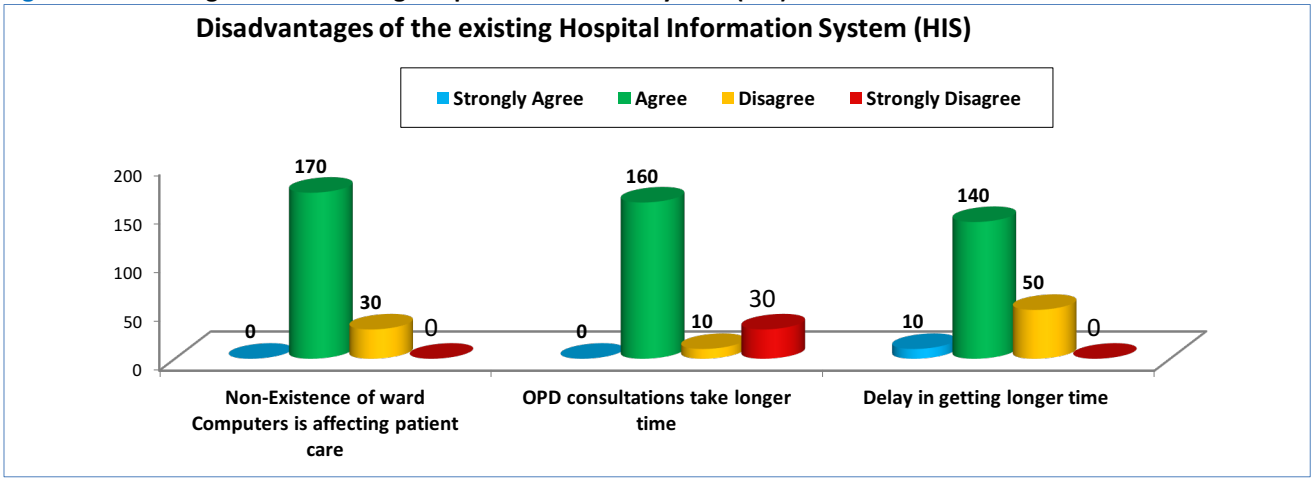
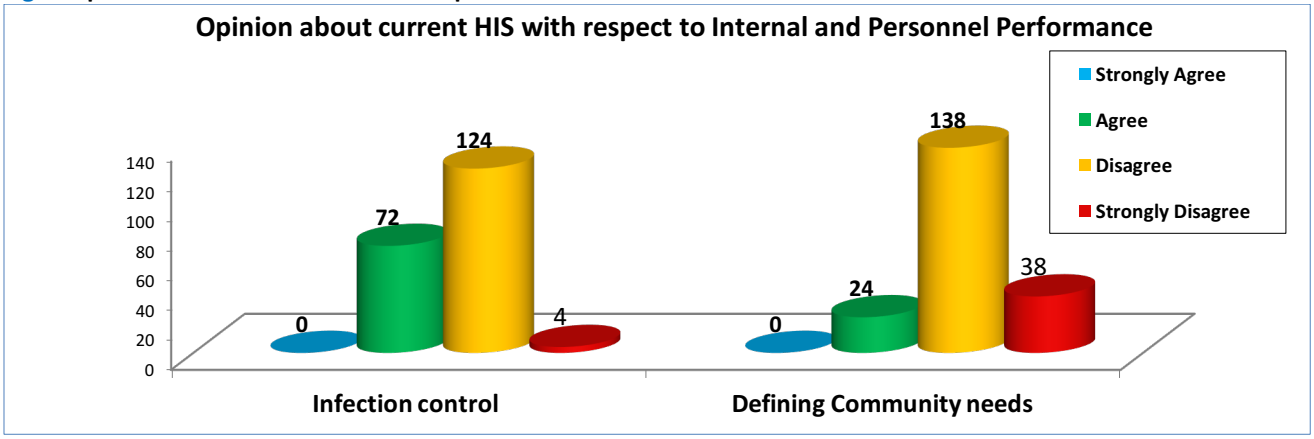


Fig.4: Opinion about current HIS with respect to Internal and Personnel Performance:



CMOs/ MOs (85%), feel that the nonexistence of ward computers are a delay in providing the expected patient care. They also feel that the existing Hospital Information System does not help either in making the OPD consultations quicker or in generating quick laboratory reports (**Table No.3, Fig. 3**).

Majority of the Heads of units, Professors, and CMOs/MOs, disagree that the Hospital Information System helps in infection control (62%) and in defining the community needs (88%). Majority of them agree that the Hospital Information System helps in education and research (60%) (**Table No.4, Fig. 4**). The different benefits of information system to the community are, to prepare a programme of health education for the area (with priorities for the health activities), information on the indicators of health which can help to focus attention on target group for specific health services, and, help to prevent epidemics.[14,15]

5. Conclusions and Recommendations:

The study reveals that the overall opinion of the Heads of unit, CMOs/MOs, doctors and patients about the existing Hospital Information System in the hospital is satisfactory. However, it was found that the majority of the Heads of unit, CMOs/MOs, and doctors are disagreeing against the maintenance of medical records of the hospital helps in discharging effectively their managerial responsibilities as well as in enhancing the inter and intra hospital communication. Also, most of the CMOs/MOs, and doctors are agreeing regarding the statistical information from the MRD helps in decision-making. Majority of them agree that the Hospital Information System helps in education and research.

The present scenario in India is that most of the MRD are partially computerized.[16] This system exists in some Health Care facilities, where entries are made by different Health care providers, such as Physicians, Nurses and therapists, into the computer in different nodes in a local area network.[17] Majority of the beneficiaries of Hospital Information System, are aware about the advantages of computerisation in the Health Information System (HIS) in providing better health care.[18] The exciting possibility of a modern and computerised information system is not too far. In the coming years we can visualize the patient record existing in electronic medium, where a patient can have a single record from birth to death that can be accessed from anywhere in the world.[19]

As the country's technological infrastructure develops further to penetrate rural areas, it can be easy to implement technological solutions like Electronic Health Records (EHR) in the industry for economical development too. According to the results of the study most of the healthcare employees are in need of the sophisticated information technology, as they have to increase the efficiency to face the competition of the sector. They must have a good training in order to function well. These facts show that the Indian health care service should be enhanced with the modern technology. As a final touch the staff of the health care service must get themselves ready to embrace the bliss of the technological development and it is recommended that the solution be implemented in stages while

adapting to technological changes for long term sustainability.

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Original Research Article

Critical Analysis of Cranio-cerebral Injuries in Adult Population at a Tertiary Health Centre: an Autopsy Study

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Key words
Craniocerebral injuries, Intracranial injuries, Skull bone fracture, Intracranial Hemorrhage.

Abstract

Background: Craniocerebral injuries are one of the commonly encountered medicolegal cases. Craniocerebral injuries include injuries to the scalp, skull and the contents of the skull. Adult group individuals are more subjected to various stresses in life and also various physical trauma. **Purpose:** Current study aims to see in details the various characteristics of craniocerebral injuries in relation to various age groups in adult population. In present study all the cases of craniocerebral injuries were studied. These included cases were the manner of death ranged from accident, suicide, and homicide. **Results:** Males outnumbered females in adult cases of craniocerebral injuries. Cases of craniocerebral injuries decreased as the age increased. Majority of cases died on the spot. Maximum cases were of accidental injuries by road traffic accidents. Craniocerebral cases were seen more in extreme temperature season i.e in winter and summer season. Cases were evenly distributed in all adult age groups as per the length of survival.

1. Introduction

Adult aged group population are the energetic, healthy group who are mostly working and earning for the family members. Because of it adult group individuals are more subjected to various stress in life and also various physical trauma. Craniocerebral injuries are one of the commonly encountered medicolegal cases. Craniocerebral injury or head injury is defined "morbid state resulting from gross or subtle structural changes in the scalp, skull and or the contents of the skull produced by mechanical forces".[1]

Craniocerebral injury can cause morbidity and mortality depending upon various factors. The current study aims to see in details the various characteristics of craniocerebral injuries in relation to various age groups in adult population.

2. Material and Method:

A prospective study was conducted in the department of forensic medicine at our tertiary care centre for a period of two years. During the period of study a total of 2048 cases of medicolegal autopsy were evaluated. Out of the total medicolegal autopsy cases a total of 156 cases of death due to craniocerebral injuries in adult age groups were studied in the current study. Necessary permission for the present study was obtained from local institutional ethical committee of our institute. Details of the cases were obtained from the respective investigating agencies.

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Cases with inadequate history, doubtful findings and bodies which were brought in decomposed state were excluded. All the details of the cases were studied in detail in relation to the various age group distributions in adult age groups. Data thus obtained were compiled and evaluated accordingly.

3. Results:

3.1. Sex wise distribution (Table No 1).

139 (89.1 %) cases were males while remaining 17 (10.9 %) cases were females.

3.2. Age wise distribution (Table No 2).

62 (39.7 %) cases were in the age group 21 to 30 years, 43 (27.6 %) cases were in the age group 31 to 40 years, 30 (19.2 %) cases were in the age group 41 to 50 years and 21 (13.5 %) cases were in the age group 51 to 60 years.

3.3. Distribution as per place of death (Table No 3).

96 (61.5 %) cases died on the spot while remaining 57 (36.5 %) cases died admitted in hospital.

Table no 1: Sex wise distribution of cases.

Adult Cases	Male	Female
156	139 (89.1 %)	17 (10.9 %)

Table No 2: Age and sex wise distribution of craniocerebral injury cases.

Sr No	Age group in Years	Males	Females	Total
1	21 to 30	56	6	62 (39.7 %)
2	31 to 40	37	6	43 (27.6 %)
3	41 to 50	28	2	30 (19.2 %)
4	51 to 60	18	3	21 (13.5 %)
Total		**139**	**17**	**156**

Table No 3: Distribution of cases as per place of death.

Sr No	Age group in Years	Admitted in hospital (Observed)	Spot dead (Unobserved)	Total
1	21 to 30	22	40	62
2	31 to 40	16	27	43
3	41 to 50	11	19	30
4	51 to 60	11	10	21
Total		**57 (36.5 %)**	**96 (61.5 %)**	**156**

3.4. Age-wise distribution of cases with respect to seasonal variation (Table No 4).

70 (44.8 %) cases were during winter season, 64 (41 %) cases were during summer season and 22 (14.1 %) cases were during rainy season.

3.5. Age-wise distribution of cases with respect to Length of survival (Table No 5).

49 (31.4 %) cases survived less than 2 hours, 56 (35.9 %) cases survived 2 hours to 72 hours while 51 (32.7 %) cases survived 4th day and more.

Table No 4: Age wise distribution of cases with respect to seasonal variation.

Sr No	Age group in Years	Summer (March to June)	Rainy (July to Oct)	Winter (Nov to Feb)	Total
1	21 to 30	25	7	30	62
2	31 to 40	16	9	18	43
3	41 to 50	15	3	12	30
4	51 to 60	8	3	10	21
Total		64 (41 %)	22 (14.1 %)	70 (44.8 %)	156

Table No 5: Age wise distribution of cases with respect to period of survival.

Sr No	Age group in Years	Less than 2 hours	2 hours to 72 hours	4th day and above	Total
1	21 to 30	16	23	23	62
2	31 to 40	10	14	19	43
3	41 to 50	16	8	6	30
4	51 to 60	7	11	3	21
Total		49 (31.4 %)	56 (35.9 %)	51 (32.7 %)	156

3.6. Age-wise distribution of cases with respect to Circumstances of death (Table No 6).

32 (20.5 %) cases were passengers of four-wheeler, 30 (19.2 %) cases were pedestrians, 27 (17.3 %) cases were drivers of two-wheeler motorcycles, 24 (15.4 %) cases were of fall, 17 (10.9 %) cases were of assault, 9 (5.8 %) cases were cyclists, 8 (5.1 %) cases were drivers of four-wheeler, 3 (1.9 %) cases were passengers of two-wheeler motorcycles and 6 (3.8 %) cases were of other causes.

3.7. Age wise distribution of cases with respect to fracture of skull bones (Table No 7).

Fracture of frontal bone was seen in 25 (16 %) cases. Fracture of parietal bone was seen in 27 (17.3 %) cases. Fracture of temporal bone was seen in 3 (1.9 %) cases.

3.8. Age wise distribution of cases with respect to various intracranial injuries (Table No 8).

Extradural hematoma was seen in 10 (6.4 %) cases. Subdural hematoma was seen in 89 (57.1%) cases. Subarachnoid hemorrhage was seen in 77 (49.4 %) cases.

4.Discussion

The current study was conducted in the department of forensic medicine at our tertiary care centre for a period of two years. During the period of study, a total of 2048 cases of medicolegal autopsy were evaluated. Out of the total medico-

Table No 6: Age wise distribution of cases with respect to Circumstances of death.

Sr No	Circumstances of death		21 to 30 years age group	31 to 40 years age group	41 to 50 years age group	51 to 60 years age group	Total
1	Fall		5	10	5	4	24 (15.4 %)
2	Four wheeler	Driver	5	2	1	0	8 (5.1 %)
		Passenger	14	12	3	3	32 (20.5 %)
3	Motorcycle	Driver	16	5	4	2	27 (17.3 %)
		Passenger	1	2	0	0	3 (1.9 %)
4	Cyclist		4	3	0	2	9 (5.8 %)
5	Pedestrian		5	5	14	6	30 (19.2 %)
6	Assault		9	3	3	2	17 (10.9 %)
7	Others		3	1	0	2	6 (3.8 %)
			62	43	30	21	

Table No 7: Age wise distribution of cases with respect to fracture of skull bones.

Sr No	Circumstances of death		21 to 30 years age group	31 to 40 years age group	41 to 50 years age group	51 to 60 years age group	Total
1	Fracture of skull vault	Frontal bone	16	5	3	1	25 (16 %)
		Parietal bone	10	6	8	3	27 (17.3 %)
		Temporal bone	2	0	1	0	3 (1.9 %)
		Occipital bone	0	0	0	0	0
2	Fracture of cranial fossa bones	Anterior	10	4	0	2	16 (10.3 %)
		Middle	13	15	7	3	38 (24.4 %)
		Posterior	8	2	3	2	15 (9.6 %)
3	Fracture of bones	Occiput	1	1	0	1	3 (1.9 %)
		Orbital roof	0	2	0	1	3 (1.9 %)
		Sphenoid	0	1	0	1	2 (1.3 %)

Table No 8: Age wise distribution of cases with respect to various intracranial injuries.

Sr No	Various intracranial injuries	21 to 30 years age group	31 to 40 years age group	41 to 50 years age group	51 to 60 years age group	Total
1	Extradural hematoma	5	2	3	0	10 (6.4 %)
2	Subdural hematoma	34	22	18	15	89 (57.1 %)
3	Subarachnoid hemorrhage	29	21	19	8	77 (49.4 %)
4	Cerebral Contusion	4	4	4	0	12 (7.7 %)
5	Cerebral Laceration	5	2	2	2	11 (7.6 %)
6	Both cerebral laceration and cerebral contusion	3	1	3	0	7 (4.5 %)
7	Cerebellar laceration or/ and contusion	3	3	0	0	6 (3.9 %)

legal autopsy cases a total of 156 adult cases of death due to craniocerebral injuries were studied in present study.

4.1. Sex wise distribution (Table No 1).

139 (89.1 %) cases were males while remaining 17 (10.9 %) cases were females. Majority of adult cases of craniocerebral injuries were males as they are main member responsible for family earning and hence are more outside for working thereby increases their susceptibility for craniocerebral injuries. While in Indian societies adult females are housewives and thus decreases their susceptibility for craniocerebral injuries. Similar findings of males as commonly involved as compared to females are also found in other studies. [2,3,4,5]

4.2. Age wise distribution (Table No 2).

62 (39.7 %) cases were in the age group 21 to 30 years, 43 (27.6 %) cases were in the age group 31 to

40 years, 30 (19.2 %) cases were in the age group 41 to 50 years and 21 (13.5 %) cases were in the age group 51 to 60 years. Cases of craniocerebral injuries decreased as the age group increased. This may be due to the fact that young adults are more enthusiastic and risk taking and they drive in high speeds thereby increases the incidences of accidents. While as a person ages one becomes more responsible and drive safely and hence reduces the incidences of accident.

4.3. Distribution as per place of death (Table No 3).

96 (61.5 %) cases died on the spot while remaining 57 (36.5 %) cases died admitted in hospital. 61.5 % cases died on the spot. This is can be due to the fact that craniocerebral injury cases are more fatal and cause death more instantaneously. Out of the 96 cases who died on the spot 40 cases were in the age group 21 to 30 years, 27 cases were in the age group 31 to 40 years, 19 cases were in the age group 41 to 50 years and 10 cases were in the age group 51 to 60 years. Cases who died on the spot decreases as the age increases in consistency with the distribution of cases. Out of the 57 cases who died admitted in hospital; 22 cases were in the age group 21 to 30 years, 16 cases were in the age group 31 to 40 years, 11 cases were in the age group 41 to 50 years and 11 cases were in the age group 51 to 60 years. Cases who died admitted in hospital were evenly distributed in all age group showing a general predisposition in all age group.

4.4. Age wise distribution of cases with respect to seasonal variation (Table No 4).

70 (44.8 %) cases were during winter season, 64 (41 %) cases were during summer season and 22 (14.1 %) cases were during rainy season. Craniocerebral cases were seen more in extreme temperature season with 44.8 % cases in winter season and 41 % cases in summer season. This is in accordance with Bijleveld F et al. [6] Out of the 70 cases who were during winter season; 30 cases were in the age group 21 to 30 years, 18 cases were in the age group 31 to 40 years, 12 cases were in the age group 41 to 50 years and 10 cases were in the age group 51 to 60 years. Cases who were during winter season shows decrease in number as age increases. This is in accordance with the age wise distribution of overall cases. Out of the 64 cases who were during summer season; 25 cases were in the age group 21 to 30 years, 16 cases were in the age group 31 to 40 years, 15 cases were in the age group 41 to 50 years and 8 cases were in the age group 51 to 60 years. Cases who were during summer season shows decrease in number as age increases. This is in accordance with the age wise distribution of overall cases. Out of the 22 cases that were during rainy season; 7 cases were in the age group 21 to 30 years, 9 cases were in the age group 31 to 40 years, 3 cases were in the age group 41 to 50 years and 3 cases were in the age group 51 to 60 years. Cases who were during summer season shows decrease in number as age increases. This is in accordance with the age wise distribution of overall cases.

4.5. Age-wise distribution of cases with respect to Length of survival (Table No 5).

49 (31.4 %) cases survived less than 2 hours, 56 (35.9 %) cases survived 2 hours to 72 hours while 51 (32.7 %) cases survived 4th day and more. Cases were evenly distributed as per the length of survival. This can be said that adult populations are not predisposed for any period of survival. Out of the 49 cases who survived less than 2 hours; 16 cases were in the age group 21 to 30 years, 10 cases were in the age group 31 to 40 years, 16 cases were in the age group 41 to 50 years and 7 cases were in the age group 51 to 60 years. Cases who survived less than 2 hours were evenly distributed in all age groups as per the length of survival. Out of the 56 cases who survived 2 hours to 72 hours; 23 cases were in the age group 21 to 30 years, 14 cases were in the age group 31 to 40 years, 8 cases were in the age group 41 to 50 years and 11 cases were in the age group 51 to 60 years. Cases who survived 2 hours to 72 hours were evenly distributed in all age groups as per the length of survival. Out of the 51 cases who survived 4th day and more; 23 cases were in the age group 21 to 30 years, 19 cases were in the age group 31 to 40 years, 6 cases were in the age group 41 to 50 years and 3 cases were in the age group 51 to 60 years. Cases who survived 4th day and more were more in early adult groups i.e., 21 to 30 years and 31 to 40 years. This can be due to the fact the protective barrier; skull bone is stronger in early adult age group as compared to late adult age group. Hence skull bone can withstand more force and hence less internal damages in early adult groups and hence more survival period.

4.6. Age-wise distribution of cases with respect to Circumstances of death (Table No 6).

32 (20.5 %) cases were passengers of four-wheeler, 30 (19.2 %) cases were pedestrians, 27 (17.3 %) cases were drivers of two-wheeler motorcycles, 24 (15.4 %) cases were of fall, 17 (10.9 %) cases were of assault, 9 (5.8 %) cases were cyclists, 8 (5.1 %) cases were drivers of four-wheeler, 3 (1.9 %) cases were passengers of two-wheeler motorcycles and 6 (3.8 %) cases were of other causes. Tonge J.I et al[7] in study of 1004 traffic crash fatalities cases found 331 car drivers, 225 car passengers, 306 pedestrians, 76 motor cyclists, 29 pedal cyclists and 37 other category participants. Out of the 32 (20.5 %) cases of passengers of four-wheeler; 14 cases were in the age group 21 to 30 years, 12 cases were in the age group 31 to 40 years, 3 cases were in the age group 41 to 50 years and 3 cases were in the age group 51 to 60 years. Cases of passengers of four-wheeler were more in the early adult age group i.e., 21 to 30 years and 31 to 40 years. Out of the 30 (19.2 %) cases of pedestrians; 5 cases were in the age group 21 to 30 years, 5 cases were in the age group 31 to 40 years, 14 cases were in the age group 41 to 50 years and 6 cases were in the age group 51 to 60 years. Cases of pedestrians were in all age group with particularly more cases in the age group 41 to 50 years. Out of the 27 (17.3 %) cases of drivers of two-wheeler motorcycles; 16 cases were in the age group 21 to 30 years, 5 cases were in the age group 31 to 40 years, 4 cases were in the age group 41 to 50 years and 2 cases were in the age group 51 to 60 years. Cases of drivers of two-wheeler motorcycles were in all age groups with particularly more cases in the age group 21 to 30 years. Out of the 24 (15.4 %) cases of fall; 5 cases were in the age group 21 to 30 years, 10 cases were in the age group 31 to 40 years, 5 cases were in the age group 41 to 50 years and 4 cases were in the age group 51 to 60 years. Cases of falls were in all age groups with particularly more cases in the age group 31 to 40 years. Out of the 17 (10.9 %) cases of assault; 9 cases were in the age group 21 to 30 years, 3 cases were in the age group 31 to 40 years, 3 cases were in the age group 41 to 50 years and 2 cases were in the age group 51 to 60 years. Out of the 9 (5.8 %) cases of cyclists; 4 cases were in the age group 21 to 30 years; 3 cases were in the age group 31 to 40 years and 2 cases were in the age group 51 to 60 years. There was no case in the age group 41 to 50 years. Out of the 8 (5.1 %) cases of drivers of four-wheeler; 5 cases were in the age group 21 to 30 years; 2 cases were in the age group 31 to 40 years and 1 case was in the age group 41 to 50 years. There was no case in the age group 51 to 60 years. Out of the 3 (1.9 %) cases of passengers of two-wheeler motorcycles; 1 case was in the age group 21 to 30 years; 2 cases were in the age group 31 to 40 years. There was no case in the age group 41 to 50 years and age group 51 to 60 years. Out of the 6 (3.8 %) cases of other causes; 3 cases were in the age group 21 to 30 years; 1 case was in the age group 31 to 40 years and 2 cases were in the age group 51 to 60 years. There was no case in the age group 41 to 50 years.

4.7. Age wise distribution of cases with respect to fracture of skull bones (Table No 7).

Fracture of frontal bone was seen in 25 (16 %) cases. Fracture of parietal bone was seen in 27 (17.3 %) cases. Fracture of temporal bone was seen in 3 (1.9 %) cases. Tonge J.I et al[7] found fractures of the skull in 48.3 % of total casualties. Out of the 25 cases of fracture of frontal bone; 16 cases were in the age group 21 to 30 years, 5 cases were in the age group 31 to 40 years, 3 cases were in the age group 41 to 50 years and 1 case was in the age group 51 to 60 years. Thus, fracture of frontal bones was observed to be decreasing with the increase in the age of the victims. Out of the 27 (17.3 %) cases of fracture of parietal bone; 10 cases were in the age group 21 to 30 years, 6 cases were in the age group 31 to 40 years, 8 cases were in the age group 41 to 50 years and 3 cases were in the age group 51 to 60 years. Thus, cases were evenly distributed in all age groups. Out of the 3 (1.9 %) cases of fracture of temporal bone; 2 cases were in the age group 21 to 30 years and 1 case was in the age group 41 to 50 years. There was no case in the age group 31 to 40 years and in the age group 51 to 60 years. Thus, fracture of temporal bones was less frequently found. Fracture of anterior cranial fossa bones was seen in 16 (10.3 %) cases. Fracture of middle cranial fossa bones was seen in 38 (24.4 %) cases. Fracture of posterior cranial fossa bones was seen in 15 (9.6 %) cases. Out of the 16 (10.3 %) cases of fracture of anterior cranial fossa bones; 10 cases were in the age group 21 to 30 years; 4 cases were in the age group 31 to 40 years and 2 cases was in the age group 51 to 60 years. There was no case in the age group 41 to 50 years. Thus, fracture of anterior cranial fossa bones was observed more commonly in early adult age

groups. Out of the 38 (24.4 %) cases of fracture of middle cranial fossa bones; 13 cases were in the age group 21 to 30 years, 15 cases were in the age group 31 to 40 years, 7 cases were in the age group 41 to 50 years and 3 cases was in the age group 51 to 60 years. Thus, fracture of middle cranial fossa bones was observed to be decreasing with the increase in the age of the victims. Out of the 15 (9.6 %) cases of fracture of posterior cranial fossa bones; 8 cases were in the age group 21 to 30 years, 2 cases were in the age group 31 to 40 years, 3 cases were in the age group 41 to 50 years and 2 cases was in the age group 51 to 60 years. Thus, fracture of posterior cranial fossa bones was observed to be distributed in all age groups. Fracture of occiput bone was seen in 3 (1.9 %) cases. Fracture of orbital roof was seen in 3 (1.9 %) cases. Fracture of sphenoid bone was seen in 2 (1.3 %) cases. Out of the 3 (1.9 %) cases of fracture of occiput bone; 1 case were in the age group 21 to 30 years; 1 case were in the age group 31 to 40 years and 1 case was in the age group 51 to 60 years. There was no case in the age group 41 to 50 years. Thus, fracture of occiput bone was less frequently found and was observed in early and late adult age groups. Out of the 3 (1.9 %) cases of fracture of orbital roof; 2 cases were in the age group 31 to 40 years and 1 case was in the age group 51 to 60 years. There was no case in the age group 21 to 30 years and in the age group 41 to 50 years. Thus, fracture of orbital roof was less frequently found and were observed in middle adult and late adult age groups. Out of the 2 (1.3 %) cases of fracture of sphenoid bone; 1 case was in the age group 31 to 40 years and 1 case was in the age group 51 to 60 years. There was no case in the age group 21 to 30 years and in the age group 41 to 50 years. Thus, fracture of sphenoid bone was less frequently found as compared to other bones.

4.8. Age wise distribution of cases with respect to various intracranial injuries (Table No 8).

Extradural hematoma was seen in 10 (6.4 %) cases. Subdural hematoma was seen in 89 (57.1%) cases. Subarachnoid haemorrhage was seen in 77 (49.4 %) cases. Chandra Kumar PC et al [8] also found findings more or less as similar to our study. Tonge J.I et al [7] found intracranial haemorrhages in 60 % of total participants, injuries to the brain were present in 54.5 % cases. Subarachnoid haemorrhage was present in 13.1 % cases, subdural in 12.3 % cases, intracerebral haemorrhage in 7.2 % cases, extradural haemorrhage in 0.9 % cases and combinations of various haemorrhages in 25.8 % cases. Out of the 10 (6.4 %) cases of extradural hematoma; 5 cases were in the age group 21 to 30 years; 2 cases were in the age group 31 to 40 years and 3 cases were in the age group 41 to 50 years. There was no case in the age group 51 to 60 years. Thus, extradural hematoma was observed more commonly in early and middle adult age groups and absent in late adult age group. Out of the 89 (57.1%) cases of subdural hematoma; 34 cases were in the age group 21 to 30 years, 22 cases were in the age group 31 to 40 years, 18 cases were in the age group 41 to 50 years and 15 case was in the age group 51 to 60 years. Thus, subdural hematoma was observed to be decreasing with the increase in the age of the victims. Out of the 77 (49.4 %) cases of subarachnoid haemorrhage; 29 cases were in the age group 21 to 30 years, 21 cases were in the age group 31 to 40 years, 19 cases were in the age group 41 to 50 years and 8 case was in the age group 51 to 60 years. Thus, subarachnoid haemorrhage was observed to be decreasing with the increase in the age of the victims. Cerebral contusion was seen in 12 (7.7 %) cases. Cerebral laceration was seen in 11 (7.6 %) cases. Both cerebral laceration and cerebral contusion was seen in 7 (4.5 %) cases. Cerebellar laceration or/ and contusion was seen in 6 (3.9 %) cases. Tonge J.I et al [7] found contusions of the brain in 22.1 % cases and lacerations were seen in 15.3 % cases. Out of the 12 (7.7 %) cases of cerebral contusion; 4 cases were in the age group 21 to 30 years; 4 cases were in the age group 31 to 40 years and 4 cases were in the age group 41 to 50 years. There was no case in the age group 51 to 60 years. Thus, cerebral contusion was observed in early and middle adult age groups and absent in late adult age group. Out of the 11 (7.6 %) cases of cerebral laceration; 5 cases were in the age group 21 to 30 years, 2 cases were in the age group 31 to 40 years, 2 cases were in the age group 41 to 50 years and 2 case was in the age group 51 to 60 years. Thus, cerebral laceration was observed in all adult age groups. Out of the 7 (4.5 %) cases of both cerebral laceration and cerebral contusion; 3 cases were in the age group 21 to 30 years; 1 case was in the age group 31 to 40 years and 3 cases were in the age group 41 to 50 years. There was no case in the age

group 51 to 60 years. Thus, cases of both cerebral laceration and cerebral contusion were observed in early and middle adult age groups and absent in late adult age group. Out of the 6 (3.9 %) cases of cerebellar laceration or/ and contusion; 3 cases were in the age group 21 to 30 years and 3 cases were in the age group 31 to 40 years. There was no case in the age group 41 to 50 years and in the age group 51 to 60 years. Thus, cases of cerebellar laceration or/ and contusion were observed in early adult age groups and absent in late adult age group.

5.Conclusion

Males outnumbered females in adult cases of craniocerebral injuries. Cases of craniocerebral injuries decreased as the age increased. Majority of cases died on the spot. Craniocerebral cases were seen more in extreme temperature season i.e. in winter and summer season. Cases were evenly distributed in all adult age groups as per the length of survival. Passengers of four-wheeler, pedestrians, drivers of two-wheeler motorcycles, cases of fall and cases of assault are common circumstances of cases. Age wise distribution of various aspects of craniocerebral injuries are important for better understanding.

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Original Research Article

Medico-legal Evaluation of Suicidal Poisoning Cases at Tertiary Care Institution

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Key words
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Survival period.

Abstract

Background: The poisoning was the most commonly used method for suicide in earlier days. Now due to strict regulations on sale and purchase of poisonous substances reduced the availability of poisons to cause suicidal poisonings. **Material & Methods:** Present study is carried out at a tertiary care institution in Mumbai. Out of a total 216 suicide cases, 30 cases (13.9%) were of suicidal poisoning. **Results:** Out of 30 suicidal poisoning cases 19 were male (63.33%) and 11 were females (36.67%). Total 18 deceased (13 male & 5 Female) were married (60%). 11 cases (36.67%) were from age group of 20 to 30 years. In 24 cases (80%), deceased were unemployed. A history of acute depression was present in 5 (16.67%) individuals at the time of suicide**. Conclusion:** Suicide tendency is more common in males as compared to females. Suicide incidences are more seen in young age groups. Unemployment and money crisis is the commonest cause for suicide. The low socioeconomic group is more vulnerable to suicide than the middle and upper socioeconomic groups. Mentally ill persons are highly prone to develop suicidal tendencies. In the menstrual phase, suicidal tendency is more seen. Agricultural chemicals (poisons) are most commonly used for suicide.

1. Introduction

The world health organization defines a suicidal act "as the injury with varying degrees of lethal intent and suicide may be defined as a suicidal act with fatal outcome." Eighty-four percent of global suicides occur in low and middle-income countries (LMICs); India and China alone account for 49% of global suicides.[1] Precipitating factors may include domestic quarrels, loss of employment, financial difficulties, substance abuse, chronic disease, or mental illness.[2]

The word “suicide” was first introduced in the 17th century, said to be derived from the Latin words Sui (of oneself) and caedere (to kill). Apparently, Sir Thomas Browne – a physician and a philosopher – was the first to coin the term suicide in his Religio Medici (1642).[3]

In India, the highest suicide rate is in the age group of 18-30 years. Some of the highest rates of suicide in India are reported from Pondicherry, West Bengal, Madras, and Bangalore. [4]

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Tamil Nadu has reported the highest number of suicides (16,927) accounting for 12.5% of total suicides followed by Maharashtra (16,112), West Bengal (14,957).[4] Acute organic insecticide poisoning is a major health problem all over the world, particularly in developing countries, where organophosphates (OPs) are the most common suicidal poisons with high morbidity and mortality and account for a large proportion of patients admitted to intensive care units. Several hundred people around the world die each year from OP poisoning.[5] Some persons intentionally or often impulsively take poisons or an overdose of drugs, after a disagreement with a close person. Most persons who take a deliberate overdose of drugs are found to be psychologically disturbed.[6]

Aims and objectives:

1) To study age and the sex-wise incidences.
2) To study the factors like race, religion, marital status, occupation, socio-economic status, environment, and mental health in suicidal deaths.

2. Material and methods:

This study is a prospective study carried out at a tertiary care hospital attached to a medical college and associated with a medico-legal post mortem center in Mumbai. The study duration is from 01 October 2012 to 30 September 2014. The permission was taken from the ethics committee before starting the study. The cases were studied with consideration of age, sex, education, occupation, employment, socioeconomic status, place, time, environment, privacy for suicide, etc. History was studied for previous suicide attempts, history of addiction, alcoholism too.

In hospitalized victims, the hospital treatment case papers were studied for psychiatric history, chronic illness, behavioral changes, current mental status, nature of provocation, duration of admission, menstrual history, and history of marital status & marital period. The treatment papers, post mortem findings, and chemical analysis reports were analyzed before finalizing the cause of death. The opinion about the manner of death whether suicide or not was made after a detailed review of the above features in every case.

3. Results:

During the study period, a total of 3429 cases were referred for medico-legal post mortem examination to the Forensic Medicine department of a medical college in Mumbai. Out of these 1669 cases were natural and 1314 (38.3%) cases were unnatural. Out of 1314 unnatural cases, 216 are suicidal, which contributes 16.43% of all unnatural cases. Out of a total of 3429 cases, 216 cases (6.29%) are of suicide. Out of a total of 216 cases of suicide 30 cases (13.9%) were of suicidal poisoning while accidental poisoning was seen in 73 cases which were excluded from the study. Every case of poisoning was studied in detail and the results are as follows, viscera were preserved for chemical analysis in all 30 cases (100%).

Sex: Out of 30 poisoning cases 19 were males (63.33%) and 11 were females that are 36.67% and the Male to female ratio is 1.7:1 (Fig. 1, Table 1).

Figure 1: Sex distribution

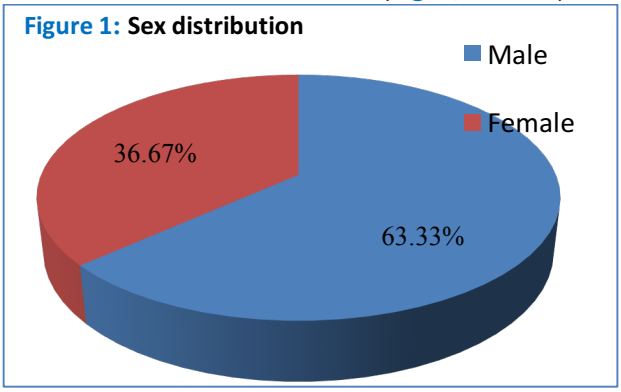
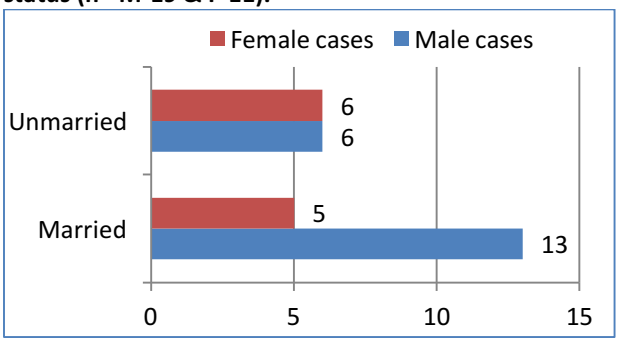


Table 1: Age group-wise distribution of male and female [F- Female, M-Male, %- Percentage].

Age Group (Years)	Sex					
	F	%	M	%	Total	%
11-20	3	27.27	2	10.52	5	16.67
21-30	**5**	**45.46**	**6**	**31.58**	**11**	**36.67**
31-40	2	18.18	6	31.58	8	26.66
41-50	1	9.09	3	15.79	4	13.33
51-60	0	0.0	2	10.52	2	6.67
Total	**11**	**100**	**19**	**100**	**30**	**100**

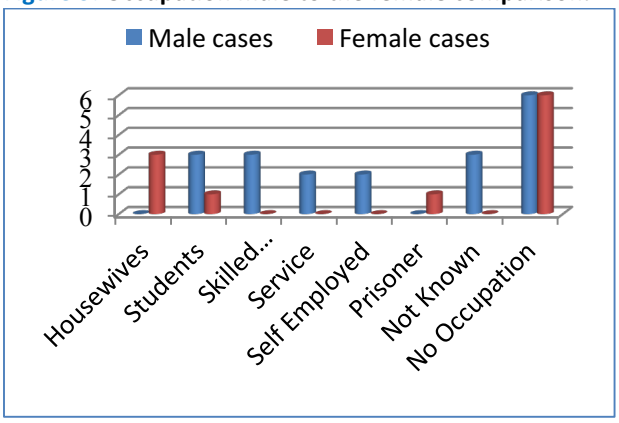
Marital status: Out of 30 cases 18 (13 were male & 5 females) cases were married (60.0%), 12 (6 were male & 6 females) cases (40.0%) were unmarried.

Figure 2: Male to female cases comparison of marital status (n= M-19 & F-11).



Occupation: According to occupation grouping is done as follows, Government or private service- 2 cases (6.67%), Self-employed those including businessmen comprises of 2 cases (6.67%), Housewives- 3 cases (10.0%), Laborers are classified in three groups depending upon work as Skilled laborer- 3 cases (10.0%), Unskilled laborers and Casual laborers no case found. Students- 4 cases (13.33%), Prisoners- 1 case (3.33%), those having no job at present 12 cases (40.0%). However, in 3 cases (10.0%) occupation of the victims was not specified.

Figure 3: Occupation male to the female comparison.



Socioeconomic status: Depending upon the education and occupation of the head of family and income of the family, four groups were made as per Kuppuswamy's socioeconomic scale as follows, Upper class having higher income group- no case, Middle upper class- 1 case (3.33%), Middle lower class- 10 cases (33.33%), lower economic group or class- 19 cases (66.33%).

Religion: Out of 30 cases 17 cases were Hindu (56.67%), 13 cases were Muslim (43.33%). While all the cases were Indian nationals.

Place of suicide: Place of suicide selected by victims were home or residence in 25 cases (83.34%), Work Place was in 1 case (3.33%), one case committed suicide while in police custody (3.33%). Public Place was in 3 cases (10.0%).

Period of year: Out of 30 cases, 9 individuals (30.0%) committed suicide in the duration of the month January to April, 6 cases from May to August (20.0%), and 15 cases from September to December 50.0%. Privacy for suicide was maintained by selecting a lonely place by 1 case (3.33%) but not so by 29 cases (96.67%).

Previous attempts: In the present study in all 30 cases previous history of previous attempts of suicide was traced. By detailed inquiry with relatives and investigating agencies. In 2 cases (6.67%) there was a definite history of previous attempts of suicide. The first case was a married female with a history of previous unsuccessful attempts and the second was a married male having three unsuccessful attempts were found. In 28 cases (93.33%) there was no previous attempt and victims committed suicide in the first attempt.

Nature of provocation: It is determined by reading ADR and inquest Panchnama, statements of relatives provided by police, and interviews of relatives wherever possible. Out of a total of 30 cases in 28 cases (93.33%), suicide was committed following sudden provocation & in 2 cases (6.67%) suicide act was planned and pre-decided.

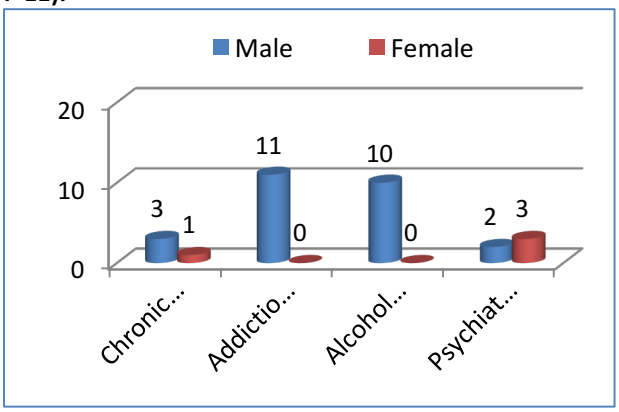
Hospitalization following attempted suicide: Out of 30 cases, 29 cases (96.67%) were alive when brought to the hospital, which was subsequently succumbed during treatment. However, one case (3.33%) of attempted suicide died before hospitalization.

Survival period: Out of 30 cases 1 case (3.33%) was found dead before admission and 29 cases (96.67%) were alive after attempting suicide, which was hospitalized and subsequently died in hospital during treatment. The survival period in hospital grouped as follows, Less than 24 hours in 3 cases (10.0%), 1 to 3 days in 10 cases (33.33%), 4 to 7 days in 11 cases (36.67%), 1 to 2 weeks in 2 cases (6.67%) and 3 victims (10.0%) died after more than two weeks of hospitalization.

Chronic illness: In 26 cases (86.67%) there was no history of chronic disease process or illness while in 4 cases (13.33%) has documented chronic illness as a reason for suicide. In all these cases pathological

disease process observed which is studied in detail as chronic illness is one of the etiological factors to develop depression which is a provocative factor behind suicide.

Figure 4: Gender wise various comparisons (n= M-19 & F-11).



Type of chronic illness or disease: Distribution of chronic illness or disease cases (n=4) as follows, Tuberculosis- 1 case, high BP, and Gout in 1 case, however in 2 cases nature of the chronic illness was not mentioned in inquest papers, so it is taken as unknown. Out of four 3 were males and one was female.

Psychiatric illness: A history of acute depression was present in 5 (16.67%) individuals at the time of suicide. Out of five 3 were females and 2 were males. In 25 cases (83.33%) there was no history of psychiatric illness or acute depression.

Behavioral changes: Information gathered about change in attitude and behavior of the deceased just before an attempt and few days before incidence, dialogue with relatives and friends. Behavioral changes were noticed by relatives in 26 cases (86.67%), changes like become silent and less talkative, short-tempered, violent or rowdy, etc. However, no behavioral changes were noted by relatives in 4 cases (13.33%).

Addiction: Out of 30 cases the history of addiction was present in 11 cases (36.67%) and no history of addiction was observed in 19 cases (63.33%). All the victims were males.

Alcohol consumption: Out of 30 cases the history of alcohol consumption before the act was present in 10 cases (33.33%) and no alcohol consumption before committing suicide in 20 cases (66.67%).

Preparation made: In 29 cases (96.6%) the availability of required poison was made by victims themselves, except in 1 case (3.33%) in which poison was made available through relatives without intimating them about motive. 37 years woman told her daughter to bring acid for cleaning the toilet and then she consumed the same corrosive as poison.

Period of menstruation (n=11): History of menstruation was present in 1 case (9.09%) out of 11 females at the time of suicide which was confirmed during the autopsy. However, 9 females (81.82%) were not in the menstruating phase. In one case (9.09%) history of menstruation could not be traced.

Suicide within seven years after marriage: In the present study out of 11 females 6 females (54.54%) were unmarried and five females (45.46%) were married. Four women (80.0%) had completed more than seven years of marriage. However, 1 female (20.0%) were within seven years of marriage. These observations were confirmed from inquest papers & interviews with relatives of the deceased.

Type of poisoning: In all poisoning cases the viscera samples were preserved for chemical analysis. The ADR, inquest Panchnama, treatment papers, gastric lavage analysis reports, and chemical analysis reports were analyzed in detail. Out of 30 cases in 7 cases (23.33%) were of insecticide poisonings, 6 cases (20%) were of Organophosphate poisoning, 3 cases (10%) were of Rodenticide poisoning, and 3 cases (10%) of corrosive poisoning. In 11 cases (36.66%) type of poison was not known so it is labeled as unknown poison.

4. Discussion:

The possibility of the manner of death when suicide is tried to establish based on scientific study findings. The results are compared with previous different studies in which different factors are studied based on critical analysis conclusions are drawn. Suicide by poisoning are predominantly noted in males i.e. 63.33% compared to females i.e. 36.67% (**Fig. 1**). It is consistent with the study of Sachil Kumar et al[7] (56.61%), Bennett and Collins et al[8] (79.5%), and Chavan KD et al[9] (59.4%). Most commonly affected age group was between 21 to 30 years (36.67%), followed by 31-40 years (26.66%) (**Table no. 1**). It correlates with studies of Ambade VN et al[10]. In this productive younger and vulnerable age group, the suicidal tendency is more frequently observed may be due to frustration & and acute depression resulting in suicidal attempt secondary to exam failure, unsuccessful love affair, marital

disharmony, unemployment, etc. which are the associate factors in the present study. **Figure 2** describes the prevalence of suicide is more in married people 63.33% followed by unmarried 36.33%. It is correlated with the study of Kadu Sandeep et al[11] (74.68%), but Panarat Sritus et al[12] observed unmarried (46.7%) were outnumbered married (17.5%).

Maximum victims 56.67% were Hindu, which is consistent with studies of Kadu Sandeep et al[11] (87.0%). As per **figure 3**, the rate of suicide by poisoning was more noted in students (13.33%) followed by housewives (10.0%). It was observed that in the present study maximum of 66.33% cases were in the low socioeconomic group followed by the middle-lower socioeconomic group 33.33% cases. It is consistent with Kadu Sandeep et al[11]. The lower and middle socioeconomic groups are more vulnerable to suicides because these groups are exposed to the continuous financial and daily stress of life. Suicide by poisoning was more common in unemployed victims 80.0% followed by employed victims 16.67%.

Table 2: Place of suicide in male (M) vs. female (F)

Place	Gender			
	F	M	Total	%
Home	9	16	25	83.34
Public Place	1	2	3	10.0
Work Place	0	1	1	3.33
Custody	1	0	1	3.33
Total	**11**	**19**	**30**	**100**

Place of suicide was own home (residence) in 83.34% of cases of suicide (**Table no. 2**). Consistent with Lisa B. E. Shields et al[3] (63.9%). As described in table 3 maximum cases have occurred in the afternoon period (40.0%) followed by morning (26.67%) This finding correlates with studies of Chavan KD et al[9] and Kadu Sandeep et al[11]. In the afternoon family members are outside from home for a job so that female victims get privacy for their suicide act. This may be the cause of more suicides in the afternoon. The 50.0% of cases of suicide due to poisoning are seen in September to December. It is consistent with Kadu et al[11] (41.77%). In 93.33% suicide was committed following sudden provocation & in 6.67% of cases, the suicidal act was planned and pre-decided. A study of this factor was not observed in available previous studies. In 6.67% there was a definite history of previous attempts of suicide while in 93.33% of cases there were no previous attempts and victims committed suicide in the first attempt. Bagadiya *et al*[13] *reports* 7% of victims had a history of previous attempts, of which 2.4% had more than one previous attempt. Victims with a history of previous attempts were more prone to suicide compared to those who have no history of previous attempts.13 *96.67%* were alive when brought to the hospital, which was subsequently succumbed during treatment, however in 3.33% of attempted suicide, the victim died before hospitalization. 3.33% was found dead before admission and 96.67% were alive after attempting suicide. Was hospitalized and subsequently died in hospital.

In 36.67 % of cases, the survival period was 4 to 7 days followed by 1 to 3 days in 33.33% cases. As described in **figure 4** the 13.33% of cases have documented chronic illness as a reason for suicide. It is consistent with Kadu Sandeep et al[11] (9.49%). A positive history of addiction was present in 36.67% of cases. All cases were male. In 33.33% of cases, a history of alcohol consumption before suicide was found. Alcohol consumption history was positive in 10 males (52.63%) out of 19 males. History of acute depression was present in 16.67% of individuals at the time of suicide. In 83.33% there was no history of psychiatric illness or acute depression noted. Sachil Kumar et al[7] reports mental depression in males (10.9%) and females (27.3%). History of acute depression was present in 29 (23.38%) individuals 9 females & 18 males at the time of suicide. Behavioral changes were noticed by relatives in 86.67% of individuals, changes like become silent and less talkative, short-tempered, violent or rowdy, etc. A study of this factor was not observed in available previous studies.

5. Conclusions:

After critical analysis of all suicidal cases following conclusions are drawn: Suicide tendency is more common in males as compared to females. Suicide incidences are more seen in young age groups i.e. between 21 to 30 years. 63.33 percent of suicidal poisoning victims were married. The commonest cause of suicide in housewives is marital disharmony. Unemployment and money crisis is the commonest cause for suicide. The low

socioeconomic group is more vulnerable to suicide than the middle and upper socioeconomic groups. The time of suicide is afternoon in 40.0 percent of cases of suicides. It was found that the Place for suicide was own home or residence preferred by a maximum (83.34%) victims. Suicide in police custody was observed in 3.33 percent of cases. In 93.33 percent of cases, suicide was committed following sudden provocation. Behavioral changes were noticed by relatives in 86.67 percent of cases.

In the present study maximum suicides are in September to December ie. 50.0 percent cases. Privacy for the suicidal act is maintained by 3.33 percent of victims only. In 6.67 percent of cases, there was a definite history of the previous attempt. Chronic illness is one of the contributing factors for suicide noted in 13.33 percent of cases. History of addiction is noted in 36.67 percent of cases. Consumption of alcohol is noted in 33.33 percent of cases at the time of suicide. Mentally ill persons are highly prone to develop suicidal tendencies. In the menstrual phase, the suicidal tendency is more seen. Suicide within seven years of marriage in females is observed in 20.0 percent of cases. Agricultural chemicals (poisons) are most commonly used for suicide. The Maximum survival period is 4 to 7 days in 36.67% of cases.

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Original Research Article

Comparative Study of Epiphyseal Fusion Around the Elbow Joint in Sports Persons and General Population of Age Group Between 12 to 18 Years in Mumbai Region

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Epiphyseal growth,
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Abstract

Background: Developmental maturation of different tissues and bones occurs at different biological ages and is influenced by the physical activity, especially during adolescence. Exercise is positively associated with Epiphyseal growth plates, increased bone mineral content and mass compared with normative data. **Aim:** The aim of this paper was to compare study of epiphyseal fusion around the elbow joint in Sports persons and general population of age group between 12 to 18 years. **Material and methods:** Study was conducted in 50 equal number of cases enrolled in two groups i.e. sports person and general population. Radiological assessment for fusion or no fusion of ossification centre of Elbow joint was done. **Results:** It was observed that Fusion at elbow joint occurs 1 to 2 years earlier in sports person than in general population. **Conclusion:** The purpose of this study is to present an overview of the effects of physical activity on the function of the epiphyseal growth plate.

1. Introduction

Over the past decade, there has been a surge in the number of sports opportunities available to young athletes.[1] The effects of exercise on the molecular nature of secreted human growth hormone (GH) or its biological activity are not well understood.[2] Yet it is known that children have more elastic soft tissue and more potential for remodeling than adults.[3] Epiphyseal growth plates are often less resistant to deforming forces than ligaments or joint structures. A child's skeletal system shows pronounced adaptive changes to intensive sports training.[4,5] The growing skeleton is said to be more responsive than the mature skeleton to the osteotrophic effect of exercise.[6] Most long bones end near the joint in a separate epiphysis which at first consists of cartilage and is later ossified. This epiphysis becomes fused with the shaft of the bone and in most cases only at the

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end of puberty.[7] Thus the stage of growth and development of the child is suggestive of the amount and intensity of exercise that can be performed and tolerated.

In order to estimate age with more precision and accuracy, dental status and physical examination including secondary sexual characters should be taken into consideration along with ossification test. It is not possible to enunciate in a hard and fast rule for age determination from this union for the whole India because India is composed of areas which differ in climatic, dietetic and disease factors which affect skeletal growth. This study aimed to formulate references in future to compare the epiphyseal fusion in sport persons and general population category.

Aims and objectives

The objectives were:

1. To compare the appearance & fusion of ossification centers around the Elbow joint in sports persons and general population.
2. To know variation if any and exception of skeletal maturity affecting appearance and / or fusion of centers of ossification around the elbow joint.

2. Material and methods

This is a comparative study involving age estimation of cases in the age group 12 to 18 years referred by Sports authority of India in last one year and forthcoming 6 months' duration. X-rays of elbow joint were taken routinely as per Sports authority of India form. Study was conducted in 50 equal number of cases enrolled in two groups (sports person and general population). These subjects are Sports individual coming for medical age estimation sent by various State Association approved by sports authority of India in State of Maharashtra, belonging to schools, Colleges of different cities, predominantly of western Maharashtra and Medico legal cases (General Population) came for age estimation. The cases selected after ruling out the nutritional, developmental, and endocrinal abnormality which affects the skeletal growth. Authorization of institutional ethical committee was obtained by submitting the study project. Informed consent of subject obtained prior to examination. Chronological age was affirmed after evaluating proof of date of birth. General and physical examination (Secondary sexual characters, height and weight) was done in Department of Forensic Medicine and Toxicology, of this institute.

X-ray of elbow joint was taken at department of radiology. Radiological assessment for fusion or no fusion of ossification centre of Elbow joint was done. After taking radiographs, these radiographs were examined at the Department of Forensic Medicine &Toxicology.

The epiphysis of elbow joint were observed for appearance (A) and not appeared (NA) and different phases of fusion were graded according to Dr. William Sangma et al and Mckern and Stewart 5 stages[8] as follows:

Stage 1 (F1): Non-union – when the epiphysial cartilage did not begin to decrease in thickness.

Stage 2 (F2): Commence of union – when the thickness of epiphysial cartilage was found to be reduced appreciably (1/4thunited).

Stage 3 (F3): Incomplete union – when the epiphysis have begun to fuse with shaft and complete union was well underway (1/2 united).

Stage 4 (F4): Complete union – when the epiphysial cartilage was bony in Architecture and its density indistinguishable from the epiphysis and diaphysis in its neighborhood but an epiphyseal line called epiphysial scar could still be distinguished. (3/4 united)

Stage 5 (F5): Complete union – with absence of epiphysial scar.

- Skeletal maturity was evaluated radiologically studying the various centers of ossification and the results were compared with the previous known standard studies.
- Master chart was prepared and tabulated. It was classified, analyzed and compared. Data analysis was done in computer using SPSS software. At the conclusion, conclusions were drawn which were compared with accessible results of various past studies.

3. Results

In this study, age estimation of total 100 cases i.e. 50 equal number of cases enrolled in two groups (sports person and non-representative sample of general population) was carried out in which 20 cases were males and 30 cases were females in each category. In sports person and general population category, maximum number of cases belonged to 12-14 years of age group. Out of total sport persons examined in this study, 38.0% were handball players followed by 24.0% swimmers

and 16.0% were Judo players. There was only one cricketer examined.

Table No. 1: Trochlea in General and Sports Persons Cases: In general population cases beginning of fusion (F2 Stage) was noted in 1 case whereas near fusion (F4 Stage) was seen in 2 cases in 12 years age group. sports persons in the age category of 12 years, 27.27 % cases each were in F4 Stage and F5 Stage of Fusion. In the age group of 13years, 50.0% cases showed complete fusion in general cases whereas 70.0% cases showed complete fusion in sports cases. In the age group of 14 years, 42.8% of cases were in F4 stage and 28.6% in f5 stage in general cases, all cases of sports persons showed complete fusion. In general population, age category of 15 years, 37.5% and 62.5% cases were in F4 Stage and F5 Stage respectively whereas sports persons showed complete fusion. Hence, it can be interpreted that the fusion of trochlea occurred between 13 to 16 years in general population whereas 12 to 14 years in sports persons.

Table No. 2: Lateral Epicondyle in General and Sports Persons Cases: In general population cases, the centre of ossification for lateral epicondyle did not appear in 1 case in both 12 years and 13 years' age group whereas in all other 48 cases it appeared. Similarly, in sports persons it did not appear in only one case in 12 years' age group whereas in all other 49 cases it appeared. beginning of fusion (F2 and F4 stage) was noted in 1 case each in 12-year group in general cases whereas in sports persons 40.0% cases showed fusion in F4 and F5 Stage Each. In the age group of 13 years of general population, 28.57% cases showed complete fusion whereas in the age group of 14 years, 42.85% of cases were in F4 stage and 28.57% in F5 Stage. while in sports persons, 80.0% cases in the age group 13 years, complete fusion was noted. in the age category of 14 years, almost all cases showed complete fusion. similarly, in the age category of 15 years, 25.0% and 75.0% cases were in F4 Stage and F5 Stage respectively in general cases whereas in sports cases of age 15 years and onwards showed complete fusion. Hence, it can be interpreted that the fusion of lateral epicondyle occurred between 13 to16 years in general population whereas 12 to14 years in sports persons.

Table No. 3: Medial Epicondyle in General and Sports Persons Cases: Beginning of fusion (F2 Stage) was noted in 1 case in 12 years' age group in general population cases while 18.18% cases showed complete fusion in sports persons. In the age group of 13 years, 25.0% cases showed complete fusion, whereas, 71.42% and 62.5% cases showed complete fusion in the age group of 14 years and 15 years respectively. In general cases while in the sports persons age group of 13 years and 14 years, complete fusion was observed in 50.0% and 72.72% cases respectively. Almost all cases of general population in the age group of 16 years onwards showed complete fusion. in sports persons, age group of 15 years and onwards showed complete fusion. Hence, it can be interpreted that the fusion of medial epicondyle in non representative sample of general population occurred between 13 to 16 years whereas 12 to 15 years in sports persons.

Table No. 4: Head of Radius in General and Sports Persons Cases: Beginning of fusion (F2 Stage) was noted in 1 case in 13 years' age group whereas 2 cases showed near fusion in general population and in sports persons in the age group of 12 years, beginning of fusion was observed in 1 case whereas near fusion was observed in 4 cases. In the age group of 13 years, 40.0% cases showed near fusion (F4 Stage) and 30.0% cases showed complete fusion (F5 Stage). Similarly, 1 general case also showed near fusion in age group of 14 years whereas in sports persons near fusion and complete fusion was observed in 72.73% cases and 18.18% cases respectively. In the age group of 15 years' general population cases, 37.5% cases each shared near fusion (f4 stage) and complete fusion (f5 stage) while complete fusion was observed in 71.43% cases in sports cases. Similarly, in the age group 16 years, near fusion (F4 stage) and complete fusion (F5 Stage) were observed in general cases and in sports showed complete fusion above 16 years onwards. Complete fusion was observed in all general cases after the age of 17years. Hence, it can be interpreted that the fusion of head of radius in general population occurred between 15 to17 years whereas 13 to 16 years in sports persons.

Olecranon in General and Sports Persons Cases: Incomplete fusion (F3 Stage) was observed in 1 case in the general cases of age group of 13 years, whereas near fusion (F4 Stage) was observed in 2 cases and 1 case in the age group of 13 years and 14 years respectively. While in the sports cases age group of 12 years, near fusion (F4 Stage) and complete fusion (F5 stage) was noted in 30.0% and 10.0% cases respectively. Similarly, 44.45% cases and 33.33% cases in the age group of 13 years showed near and complete fusion respectively. in the general cases age group of 15 years, near fusion

Table No. 1: **Trochlea in general and sports persons**

Trochlea									
Age	**Category**	**Appearance**		**Fusion**					
		Not appeared	**Appeared**	**F1**	**F2**	**F3**	**F4**	**F5**	**Total**
12	General	0	8	5 (62.5%)	1 (12.5%)	0 (0%)	2 (25.0%)	0 (0%)	**8 (16.0%)**
	Sports	0	11	2 (18.19%)	0 (0%)	3 (27.27%)	3 (27.27%)	3 (27.27%)	**11 (22.0%)**
13	General	0	8	3 (37.5%)	0 (0%)	1 (12.5%)	0 (0%)	4 (50.0%)	**8 (16.0%)**
	Sports	0	10	0 (0%)	0 (0%)	2 (20.0%)	1 (10.0%)	7 (70.0%)	**10 (20.0%)**
14	General	0	7	0 (0%)	0 (0%)	2 (28.6%)	3 (42.8%)	2 (28.6%)	**7 (14.0%)**
	Sports	0	11	0 (0%)	0 (0%)	0 (0%)	1 (9.09%)	10 (90.91%)	**11 (22.0%)**
15	General	0	8	0 (0%)	0 (0%)	0 (0%)	3 (37.5%)	5 (62.5%)	**8 (16.0%)**
	Sports	0	7	0 (0%)	0 (0%)	0 (0%)	0 (0%)	7 (100%)	**7 (14.0%)**
16	General	0	10	0 (0%)	0 (0%)	0 (0%)	1 (10.0%)	9 (90.0%)	**10 (20.0%)**
	Sports	0	6	0 (0%)	0 (0%)	0 (0%)	0 (0%)	6 (100%)	**6 (12.0%)**
17	General	0	5	0 (0%)	0 (0%)	0 (0%)	0 (0%)	5 (100%)	**5 (10.0%)**
	Sports	0	5	0 (0%)	0 (0%)	0 (0%)	0 (0%)	5 (100%)	**5 (10.0%)**
18	General	0	4	0 (0%)	0 (0%)	0 (0%)	0 (0%)	4 (100%)	**4 (8.0%)**
	Sports	0	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	**0 (0%)**
Total									**50 (100%)**

Table No. 2: Lateral epicondyle in general and sports persons

Lateral epicondyle									
Age	**Category**	**Appearance**		**Fusion**					
		Not appeared	**Appeared**	**F1**	**F2**	**F3**	**F4**	**F5**	**Total**
12	General	1	7	5 (71.42 %)	1 (14.29 %)	0 (0%)	1 (14.29%)	0 (0%)	**7 (14.0%)**
	Sports	1	10	0 (0%)	0 (0%)	2 (20.0%)	4 (40.0%)	4 (40.0%)	**10 (20.0%)**
13	General	1	7	4 (57.14 %)	0 (0%)	1 (14.29 %)	0 (0%)	2 (28.57%)	**7 (14.0%)**
	Sports	0	10	0 (0%)	0 (0%)	1 (10.0%)	1 (10.0%)	8 (80.0%)	**10 (20.0%)**
14	General	0	7	1 (14.29 %)	0 (0%)	1 (14.29 %)	3 (42.85%)	2 (28.57%)	**7 (14.0%)**
	Sports	0	11	0 (0%)	0 (0%)	0 (0%)	1 (9.01%)	10 (90.91%)	**11 (22.0%)**
15	General	0	8	0 (0%)	0 (0%)	0 (0%)	2 (25.0%)	6 (75.0%)	**8 (16.0%)**
	Sports	0	8	0 (0%)	0 (0%)	0 (0%)	0 (0%)	8 (100%)	**8 (16.0%)**

16	General	0	11	0 (0%)	0 (0%)	0 (0%)	0 (0%)	11 (100%)	**11 (22.0%)**
	Sports	0	6	0 (0%)	0 (0%)	0 (0%)	0 (0%)	6 (100%)	**6 (12.0%)**
17	General	0	6	0 (0%)	0 (0%)	0 (0%)	0 (0%)	6 (100%)	**6 (12.0%)**
	Sports	0	5	0 (0%)	0 (0%)	0 (0%)	0 (0%)	5 (100%)	**5 (10.0%)**
18	General	0	4	0 (0%)	0 (0%)	0 (0%)	0 (0%)	4 (100%)	**4 (8.0%)**
	Sports	0	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	**0 (0%)**
Total									**50 (100%)**

Table No. 3: Medial epicondyle in general and sports persons

Medial epicondyle									
Age	**Category**	**Appearance**		**Fusion**					
		Not appeared	**Appeared**	**F1**	**F2**	**F3**	**F4**	**F5**	**Total**
12	General	0	8	7 (87.5%)	1 (12.5%)	0 (0%)	0 (0%)	0 (0%)	**8 (16.0%)**
	Sports	0	11	7 (63.64%)	1 (9.09%)	0 (0%)	1 (9.09%)	2 (18.18%)	**11 (22.0%)**
13	General	0	8	6 (75.0%)	0 (0%)	0 (0%)	0 (0%)	2 (25.0%)	**8 (16.0%)**
	Sports	0	10	2 (20.0%)	1 (10.0%)	0 (0%)	2 (20.0%)	5 (50.0%)	**10 (20.0%)**
14	General	0	7	0 (0%)	1 (14.29 %)	0 (0%)	1 (14.29 %)	5 (71.42%)	**7 (14.0%)**
	Sports	0	11	0 (0%)	0 (0%)	0 (0%)	2 (18.18%)	8 (72.72%)	**11 (22.0%)**
15	General	0	8	0 (0%)	1 (12.5%)	1 (12.5%)	1 (12.5%)	5 (62.5%)	**8 (16.0%)**
	Sports	0	7	0 (0%)	0 (0%)	0 (0%)	0 (0%)	7 (100%)	**7 (14.0%)**
16	General	0	10	0 (0%)	0 (0%)	0 (0%)	1 (10.0%)	9 (90.0%)	**10 (20.0%)**
	Sports	0	6	0 (0%)	0 (0%)	0 (0%)	0 (0%)	6 (100%)	**6 (12.0%)**
17	General	0	6	0 (0%)	0 (0%)	0 (0%)	0 (0%)	6 (100%)	**6 (12.0%)**
	Sports	0	5	0 (0%)	0 (0%)	0 (0%)	0 (0%)	5 (100%)	**5 (10.0%)**
18	General	0	3	0 (0%)	0 (0%)	0 (0%)	0 (0%)	3 (100%)	**3 (6.0%)**
	Sports	0	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	**0 (0%)**
Total									**50(100%)**

Table No. 4:- Head of radius in general and sports persons

Head of radius									
Age	**Category**	**Appearance**		**Fusion**					
		Not appeared	**Appeared**	**F1**	**F2**	**F3**	**F4**	**F5**	**Total**
12	General	0	8	8 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	**8 (16.0%)**
	Sports	0	11	6 (54.55%)	1 (9.09%)	0 (0%)	4 (36.36%)	0 (0%)	**11 (22.0%)**

13	General	0	8	5 (62.5%)	1 (12.5%)	0 (0%)	2 (25.0%)	0 (0%)	**8 (16.0%)**
	Sports	0	10	2 (20.0%)	1 (10.0%)	0 (0%)	4 (40.0%)	3 (30.0%)	**10 (20.0%)**
14	General	0	7	6 (85.71%)	0 (0%)	0 (0%)	1 (14.29%)	0 (0%)	**7 (14.0%)**
	Sports	0	11	0 (0%)	0 (0%)	1 (9.09%)	8 (72.73%)	2 (18.18%)	**11 (22.0%)**
15	General	0	8	2 (25.0%)	0 (0%)	0 (0%)	3 (37.5%)	3 (37.5%)	**8 (16.0%)**
	Sports	0	7	0 (0%)	0 (0%)	0 (0%)	2 (28.57%)	5 (71.43%)	**7 (14.0%)**
16	General	0	10	0 (0%)	0 (0%)	0 (0%)	5 (50%)	5 (50%)	**10 (20.0%)**
	Sports	0	6	0 (0%)	0 (0%)	0 (0%)	0 (0%)	6 (100%)	**6 (12.0%)**
17	General	0	6	0 (0%)	0 (0%)	0 (0%)	0 (0%)	6 (100%)	**6 (12.0%)**
	Sports	0	5	0 (0%)	0 (0%)	0 (0%)	0 (0%)	5 (100%)	**5 (10.0%)**
18	General	0	3	0 (0%)	0 (0%)	0 (0%)	0 (0%)	3 (100%)	**3 (6.0%)**
	Sports	0	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	**0 (0%)**
Total									**50 (100%)**

was observed in 25.0% cases and complete fusion was observed in 62.5% cases. The sports cases in the age group of 14 years and 15 years showed near fusion in 70.0% cases and 62.5% cases and complete fusion in 30.0% and 37.5% cases respectively. Similarly, 30.0% and 70.0% general cases showed near fusion and complete fusion in the age group of 16 years respectively. While all the sports cases above 16 years and onwards showed complete fusion. all the general cases above 17 years and onwards showed complete fusion. Hence, it can be interpreted that the fusion of olecranon in general population occurred between15 to 17 years whereas 12 to 16 years in sports persons.

4. Discussion

Out of total sport persons examined in this study, 38.0% were handball players followed by 24.0% swimmers and 16.0% were Judo players. These sports are predominantly played in the urban region on competitive basis hence higher percentage of subjects in these sports were observed owing to predominantly higher urban population.

In this study, it was observed that the fusion of trochlea in majority of the general population subjects occurred between the age 13 to 16 years and complete fusion was observed in cases of age 16 years and above. In majority of the sports person subjects it was observed between 12 to 14 years and complete fusion was detected in cases of age 14 years and above. Fusion of the lateral epicondyle in most of the general population subjects was observed in the age between 13 to 16 years with complete fusion in the age above 16 years. In most of the sports person subjects it was between12 to 14 years of age with complete fusion after the age of 14 years. Similarly, fusion of the medial epicondyle in majority of the general population subjects occurred between the age 13 to 16 years and complete fusion was observed in cases of age 16 years and above. In larger part of the sports person subjects it was observed in the age between 12 to 15 years and complete fusion was observed in cases of age 15 years and above. Fusion of the head of the radius and olecranon was observed in majority of the general population subjects in the age 15 to 17 years whereas in sports person subjects' fusion of the head of the radius occurred between the age 13 to 16 years and fusion of the olecranon occurred between12 to 16 years.

In this study, subjects were belonging predominantly from urban region i.e. 90.0% females in sports persons' category and 93.34% females in General Population category. This is attributed to the fact that most of the subject populations were referred from Mumbai region and urban western Maharashtra. The subject populations were belonging predominantly to Class-II, followed by Class-III of socioeconomic status according to Kuppuswamy's scale. In sports persons it was 40.0%

in the class-II, whereas in general population 56.67% in class-III. This could be because of the fact that most of the population belongs to urban region where better facilities and opportunities are available in the field of sport and higher socioeconomic class can be attributed to financial well-being, literacy and awareness.

The epiphyseal growth plate is a dynamic entity. Growth is dependent not only on intrinsic factors such as hormones and other regulatory factors but on extrinsic factors. These extrinsic factors are based totally on the biomechanical demonstrate. Exercise, a positive aspect for the epiphyseal growth plate needs to be moderated through carefully crafted activities especially during pubertal growth spurts. The effects of exercise on the epiphyseal growth plate needs further research to comprehend the entirety of this dynamic anatomical and physiological entity.

5. Conclusion:

From observation and discussion in study following specific scientific conclusions were drawn: Fusion at elbow joint occurs 1 to 2 years earlier in sports person than in general population which is consistent with the literature.

1) References for the estimation of age in the sports persons and general population should be standardized in order to prevent malpractices. This study can be used as one of those references in Mumbai region.
2) Estimation of the age from the X-rays can have inter-observer differences. Hence it is always desirable to conclude age after studying ossification in multiple joints.
3) The opinion about age should be given always in the range. From this study range of 1-2 years including margin of error can be concluded.
4) In this study, commencement of fusion was observed relatively earlier in some cases. This could be due to fact that study group involved sports persons and majority of them were from upper middle socioeconomic class. However, to establish strong co-relation, extensive research on larger study population is required.

6. Limitation of study

In present study sample size is limited, representative sample of general population shall be considered for the study. Owing to the variations in climatic, dietetic, hereditary and other factors affecting the people of different states of India, it cannot be reasonably expected to formulate a uniform standard for the determination of age of the union of epiphysis for entirely India.

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Original Review Article

Autopsy Study of Head Injury Cases in Road Traffic Accidents

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Road traffic injuries, Medicolegal Autopsy, Subarachnoid haemorrhage, Scalp Injury.

Abstract

Introduction: Road Traffic Injuries are one of the leading causes of deaths, hospitalizations, disabilities and socio economic losses in India. Head injury is associated with higher morbidity and mortality in patients with RTA. **Aim & objective:** To study the autopsy findings in head injury in patients with Road traffic accidents. **Methodology:** Present study was a cross sectional study carried out at a tertiary health care centre. The study included 200 Medico legal autopsy cases of road traffic accidents brought to tertiary care institution for autopsy. Data was collected with pre tested questionnaire. Data included demographic data of the person, epidemiological data and details of injury and autopsy findings. **Results & discussion:** Majority of the patients were from the age group of 21-30 years (29%) followed by 31-40 years (19%). Male to female ratio in our study was 2.7:1. Maximum number of road traffic incidents occurred between 6AM-9AM (28%) followed by 9AM-12Noon (18%). Most commonly found scalp injury was contusion 92(46%) followed by laceration 36 (18%). The most common autopsy finding in our study was subarachnoid haemorrhage 156 (78%) followed by subdural haemorrhage 146(73%). **Conclusion:** Head injury leading to intracranial haemorrhages is the leading to higher morbidity and mortality in patients with RTA.

1. Introduction

Various types vehicular accident occurring on the roadways are termed as Road Traffic Accident (RTA) i.e. originating on, terminating on, or involving a vehicle partially on the roadway.[1,2] Road traffic accident ranks among the top causes of death in the world and after Ischemic Heart disease.[3] The World Health Organisation (WHO) states that 1.24 million people die annually on the roads in its Global status report on road safety 2013.[4] India accounts for about 10 percent of road accident fatalities worldwide, 85% of all road accident deaths occurring in developing countries, and nearly half in the Asia-Pacific region.[5]

Sudden trauma to head leading to brain damage called as Transient Brain Injury (TBI) or acquired brain injury or simple head injury.

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TBI may occur if head hits violently and suddenly to a static or moving object) or if an object penetrates the Skull and injures brain tissue.[6] Population explosion and increase number of vehicles are major factors for increased rate of road traffic accidents. [7] In India, most of the deaths due to road traffic accidents (RTAs) take place within 24 h of injury, mostly before reaching the hospital. Delay in access to a health-care facility. The major problems of trauma care in India are first aid services scarcity, more transport time, delayed survivor's transfer to healthcare facility, no triage, and lack of adequate facilities to dealt with head injury cases promptly in most of the hospitals. These major contributing factors are leading to increased deaths due to road traffic accidents in India.[8-10]

Head was the most common site to be injured in road traffic accidents. Head injuries are more important because of location of brain in the skull. Though there is lot of advancement of technology and medical sciences, morbidity and mortality due to road traffic accidents has been increasing at an alarming rate. Correct knowledge and interpretation of head injuries in road traffic accidents will be helpful for policy decisions. Autopsy findings will be helpful for better understanding and treatment for the doctors.

Aim & objective: To study the autopsy findings in head injury in patients with Road traffic accidents

2. Material & methods:

Present study was a cross sectional study carried out at a tertiary health care Centre. Study population was all medico legal autopsy cases of road traffic accidents during the study period of one year. **Inclusion criteria:** 1. Institutional Medico legal autopsy cases of road traffic accidents. **Exclusion criteria:** 1. Decomposed bodies 2. Doubtful RTA cases. Institutional ethical committee approval was taken. A valid written consent was taken from the accompanied person of the patient after explaining study to them. Data was collected with pre tested questionnaire. Data included demographic data of the person, epidemiological data and details of injury. Thorough and complete autopsy was performed on the dead body and findings were recorded. While conducting autopsy, First, a thorough examination of the whole body with particular reference to head was made, then apart from opening the thorax and abdomen, the scalp was cut from one mastoid region to the other and was reflected forwards and backwards with a search for injuries and extravasation of blood in the layer of scalp. Then the skull was examined for fractures, after the skull cap was sawed and removed, a look for extradural haemorrhages was made above the duramater. Then the durameter was cut open on either side of midline to look for subdural and subarachnoid haemorrhage. Then the surface of brain was examined for contusions, lacerations, oedema, softening, infections etc. Then the brain was removed as a whole by cutting its basal attachments of nerves and vessels along with tentorium cerebella.

Spinal cord was cut as distal as possible then examined thoroughly with particular reference to contusions, lacerations, then duramater was stripped from the base of the skull and looked for any basal skull fracture. Coronal sections of cerebral lobes of brain from front to back, of 1 cm thickness were sliced to analyse any parenchymal pathology. Cerebellum and brain stem were cut horizontally into multiple slices in search of any parenchymal pathology. Then with all these findings, post mortem conclusion as to the cause of death in each case were drawn and recorded. The results were studied using appropriate statistical methods. Data analysis was performed by using SPSS 20 software. Microsoft word and excel were used for generating charts and graphs.

3. Results:

Fig. 1 shows distribution of patients according to age group. Majority of the patients were from the age group of 21-30 years (29%) followed by 31-40 years (19%). Patients from the age group of 41-50 were 13% and 51-60 years were 15%. Minimum patients were found in the age group of 0-10 years (3%) and above 80 years were 1%. (As mentioned in **Table no 01**). In our study, majority of the patients were male 146(73%) and 54(27%) were females. Male to female ratio in our study was 2.7:1. In our study we found that maximum number of road traffic incidents occurred between 6AM-9AM (28%) followed by 9AM-12Noon (18%). Between 12 Noon -3 PM we observed 11% cases. 15 % cases were found in 3 PM-6PM and 6PM-9PM each. Between 9PM-12 Midnight we observed 13% cases.

Out of total 200 patients 18 (9%) reached our institute within 1 hour i.e., the golden hour. Majority of the patients 110 (55%) reached our institute within 2-6 hour after injury. About 32 (16%) patients reached the institute in 6-24 hours. Among the 200 patients 120 (60%) died within first 24 hours. 30% died 2-7 days after reaching the hospital.

Table 2 showed distribution of head injury patients according to scalp injuries. Most commonly found scalp injury was contusion 92(46%) followed by laceration 36 (18%). Stitch wound was observed in 28 (14%) and crush injuries were observed in 22 (11%). Hematoma was observed in 12 (6%) patients. abrasions and puncture wounds were observed in 4% and 1% patients respectively. Chop wounds and incised wounds were not observed in any patient.

Autopsy findings in our study are shown in **table 3.** The most common autopsy finding in our study was subarachnoid haemorrhage 156 (78%) followed by subdural haemorrhage 146(73%). 18 (9%) patients had both SAH and SDH. Extradural haemorrhage was seen in 16 (8%) patients. Intraventricular haemorrhage was seen in 20 (10%) patients. 10 patients had isolated SAH without any intracranial damage.

Brain contusions were seen in 92 (46%). Skull fractures were observed in 126 (67%) patients. skull fractures included fissure fractures, depressed fractures, communited fractures and crush fractures. Most commonly observed fracture was fissure fracture (52/126) followed by depressed fracture (24/126). Least common fracture was base fractures (4/126). Four patients had isolated skull fracture without any other intracranial lesion.

Table 1: Distribution of head injury patients according to age group

Sr no	Age group (years)	No of patients	Percentage
1	0-10	06	3
2	11-20	16	8
3	21-30	58	29
4	31-40	38	19
5	41-50	26	13
6	51-60	30	15
7	61-70	16	8
8	71-80	08	4
9	>81	02	1
10	Total	200	100

Fig 1: Distribution of head injury patients according to sex

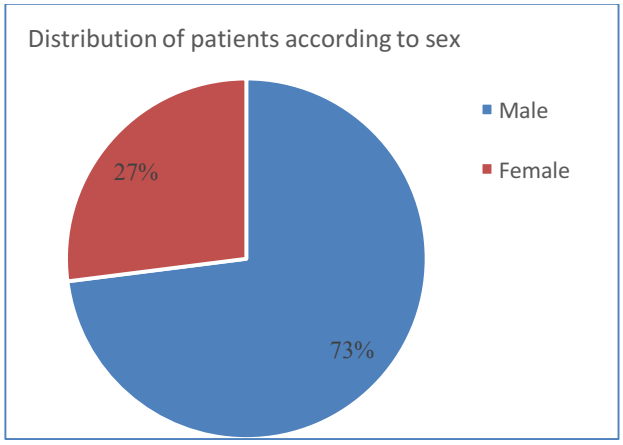

Table 2: Distribution of patients according to scalp injuries

Sr no	Scalp injuries	No of patients	Percentage
1	Contusion	92	46%
2	Laceration	36	18%
3	Stitch wound	28	14%
4	Crush	22	11%
5	Hematoma	12	6%
6	Abrasions	08	4%
7	Puncture wound	02	1%
8	Chop wound	00	0%
9	Incised wound	00	0%
10	Total	200	100%

Table 3: Distribution of head injury patients according to autopsy findings

Sr no	Autopsy findings of head injury	No of patients	Percentage
1	Extradural haemorrhage	16	8%
2	Subdural haemorrhage	146	73%
3	Subarachnoid haemorrhage	156	78%
4	Intraventricular haemorrhage	20	10%
5	Brain contusions	92	46%
6	Skull fracture	126	67%

4. Discussion:

In our study, Majority of the patients were from the age group of 21-30 years (29%) followed by 31-40 years (19%). Similar findings were seen in previous studies.[11-13] Persons in this age group are frequently outdoors due to social, educational and

job-related works. In our study, majority of the patients were male 146(73%) and 54(27%) were females. Male to female ratio in our study was 2.7:1. Similar findings were seen in previous other studies. [14-16] Males are more exposed to external environment as compared to females so the prevalence of RTA is more in males.

In our study we found that maximum number of road traffic incidents occurred between 6AM-9AM (28%) followed by 9AM-12Noon (18%). similar findings were seen in Singh H and Dhattarwal SK et al. [17]Lack of sleep, overnight continuous driving can be the causes for maximum occurrence of these cases. Morning hours are timings for school and office hours can be a contributing factor for the occurrence of accidents. Contrary to our study Menon A et al found that maximum number of accidents occur in evening hours. [18]

The most common autopsy finding in our study was subarachnoid haemorrhage 156 (78%) followed by subdural haemorrhage 146(73%). 18 (9%) patients had both SAH and SDH. Extradural haemorrhage was seen in 16 (8%) patients. Intraventricular haemorrhage was seen in 20 (10%) patients. similar findings were seen in Pathak et al. [11] The most common type of intracranial haemorrhage in their study was subdural haemorrhage (SDH) involving 83% followed by subarachnoid haemorrhage (SAH) in 28% cases and IVH in 17%. In a study by Amit M et al, least common type of head injury was EDH. [19]

5. Conclusion:

Head injury leading to intracranial haemorrhages is the leading to higher morbidity and mortality in patients with RTA.

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Original Review Article

Forensic Journalism and Its Socio-ethical Aspects

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Forensic Journalism, Forensic Journalist, Investigative Journalism, Interpretive Journalism, Social, Ethical.

Abstract

In this COVID19 pandemic era, where everyone is confined to their room or home, virtual world and online media is the only way-out for communication. Not only doctors, but reporters and media persons also have to be cautious and ethically driven to people present the information and service correctly to the home-confined common people. ***Investigative Journalism*** means unveiling of particular subject matter involving crimes or political corruptions or corporate wrong doings that are concealed deliberately or accidentally behind some grey facts and/or circumstances. ***Forensic Journalism*** is an evolutionary by product of investigative journalism. A ***forensic journalist*** discovers the truth and identifies lapses through study and research from it in whatever media may be available and thus they are guided by 'Ten Golden Rules. Though not new in western developed countries, *forensic journalism* is a new branch in our country. It is tough to pursue this as a career opportunity as it needs passion, hard work, perseverance, patience and my other qualities to be a good *forensic journalist*. Often, the aspirant is misguided and fooled by the glamour and myths related to it. In this review paper, a detailed discussion has been attempted on this emerging and trending topic. The definition, role, responsibility, quality, career opportunity, future trends and some myths related to forensic journalism has been covered.

1. Introduction

The whole world is going through a tough time these days due to the COVID 19 pandemic and due to that virtual world and online media is taking upper hand. In this time the duties and responsibilities of everyone is increasing. Not only the medical personnel, but the media personalities and journalists have to be more cautious and ethically driven to deal his situation, so that home-confined common people get the information and service correctly. Though the access to different sectors decreased these days, but people are gradually being interested to be involved in newer jobs and professional works. A job which is interesting, introspective and analytical in professional field is always a coveted possession. Forensic Journalism is such an existence and possibility.

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Though not very new in developed western countries, but in India it's definitely an emerging field which has lots of possibilities in near future.

Forensic journalism- what it is actually?

As defined by the American Press Institute, "Journalism is the activity of gathering, assessing, creating, and presenting news and information. It is also the product of these activities."[1] On the other hand, Cambridge Dictionary describes the work of collecting, writing and followed by publishing of news and articles in newspapers and magazines or broadcasting them on television and radio as Journalism.[2] The role of forensics is to apply the medical or scientific knowledge to answer legally bound questions in order to serve the Law and in turn disbursement of justice.[3] Interestingly, there is something common to both of these. Journalists and forensic experts always try to find and present the answer to **5W1H** i.e. What, When, Why, Where, Who and How.[4] A reasonable and justifiable answer to these six questions ultimately leads a journalist towards a good report and a forensic expert to a successful investigation.

Forensic Journalism, in that sense, is a combination of presenting a combination of science and law amalgamated to journalism. The origin of this is based on the existing debate of influence of news media on crime and criminal justice system. In a country like India, where the crime rate is high, forensic journalism can be treated as an evolutionary outcome of investigative journalism.[5] Investigative Journalism simply means unveiling of particular subject matter involving crimes or political corruptions or corporate wrong doings that are concealed either deliberately by someone in a position of power, or accidentally behind a chaotic mass of disorganized or puzzled facts and circumstances followed by analysis and exposure of all those to the public.[6] Forensic Journalism is one step forward to investigative journalism and thus it crucially contributes to freedom of expression and media development related to public interests.

Why Forensic journalism?

Journalism intends to inform society about itself, as much as possible in the truest sense, and to make events public that would otherwise have been remained private.[7] One of the major duties of a journalist is to be a civic watchdog and to achieve this, investigation and in-depth work through proper knowledge-based research, digging, interviewing and writing is needed. All reporters are investigators who are trained to ask questions, then to uncover information and finally write the most complete true stories possible.[8] So it is quite clear that such a report presentation on ethical, legal or social wrong-doing needs much research work, rational thinking, explanatory mind and much investment of time through which the objectivity, anonymity and public disclosure is warranted. It is not instantaneous work; rather it is developed through specifically identified stages of planning followed by reporting to adhere to accepted standards of accuracy and evidentiary value.[8]

In this present time of widening communications-based ecosystem, journalism needs to clearly show its key value-add to the public interest.[6] In this era of media burst, often the reliability of the information is at stake. Common people do not get much source or opportunity to check the truthfulness of the news presented before them. Rather they are often driven by the glamour and glitter of presenting interface so as to hardly have the courage to disbelieve the matter even if it's a work of fiction. A forensic journalist discovers the truth and identifies lapses through study and research from it in whatever media may be available.

Duties and responsibilities of a Forensic journalist

Forensic Journalism is said to be practiced when a journalist, through proper knowledge and research, crosses the border of journalism to law in order to attain some socially important and relevant views.[5] The work must be in accordance with the issue of 'public interest' which is referred to a quality to decide whether society will be disadvantaged by not knowing the information or will be benefitted by knowing it materially or by informed decision making.[8] Forensic Journalists works somehow like detectives who go in depth of a questionable subject matter to formulate a hypothesis pertaining to social meaning.

A Forensic Journalists must remember the following **Ten Golden Rules**:[9]

- It's about digging deeply into an issue or topic.
- The issue or topic has to be of public interest, binding to Law, especially a crime.

- It's a process, not an event, so time consuming. 'Truth first, not hurries' is the rule.
- The report work must be original, proactive and introspective.
- The report work should produce new information or put together previously available.
- Information must be presented in a new way to reveal its significance
- It should be multi-sourced (even hostile sometimes) yet reliable.
- Because of its in-depth nature, it calls for greater resources, team working and time than a routine news report.
- The aim is not to accuse someone or something directly; rather the report should be presented in indirect statement.
- The more objective and truthful it is, the more ethically appealing it appears.

Ten 'must have' qualities of a good Forensic journalist

Some good qualities make a forensic journalist better than others:[8,10,11]

- Passion to work in the field
- Curiosity to look into deep
- Ability to take initiative
- Logical thinking, organization and self-discipline to control instantaneous emotions
- Flexibility to acceptance
- Team-working ability and good communication skills to gather information
- Well-developed reporting skills
- Broad general knowledge and good research skills
- Determination and patience to invest time and perseverance
- Fairness and strong ethically driven character to avoid false reporting
- Discretion to increase objectivity of the report
- Courage to tell the truth and avert bias.

Some myths about Forensic journalism[8]

Forensic Journalism, as it comes from its umbrella existence of 'Investigative Journalism' comes with some myths and faulty interpretations prevailing in the common and expert community.

Focus only on 'bad news

Majority believes this, but it's not true as the role of forensic journalism is to discover the wrongs to correct them in future. It has role in uncovering positive news, nullifying the negative image of people or community through investigative stories.

It is about simply good reporting

Some believe that a defensive, anonymous and objectively framed report is sufficient. But journalists, in common sense, are watchdogs of the society who sniff out the wrongs and blame the culprit to bring about the change. It is important to look beyond the culprit to the faulty system to that permits or compels the wrong-doer to do such behavior.

It is a work of Lone Ranger

This is not true at all as forensic journalism cannot sustain and work without an orchestrated team effort.

Journalists are bigger than their reports

Forensic Journalism is a responsible public service; no right to openly disregard professional and ethical code of conduct is offered. This is not about enjoying an ego syntonic emotional drive.

A glamorous field gives celebrity status

This is absolutely a false impression, as work flow of this field is boringly monotonous, time consuming and often dangerous.

A field which is private media driven

Partly this is true, but not completely. There is fair number of examples where government-owned media agency lead ground breaking investigation against government itself.

Conclusion

Journalism, in current days, mostly concentrates and focuses on problem, but forensic journalism is to find an answer to it in an ethically correct and honest way.[5] Though it often appears as a synergistic or compromising relationship between a media organization and law binding agency, but it serves interest of both the parties in a larger perspective of public interest. The minute details and angles of the crime can be addressed through a well-timed research-based work of forensic journalist. In short, Forensic Journalism will be much more impactful in near future at it reports a crime more legally.

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Original Review Article

Medico legal Management of COVID 19 Pandemic- Challenges and Solutions

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Dead body management,
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Abstract

In the existing scenario of management of the ongoing pandemic of COVID -19 there are various pitfalls and challenges that the doctors are currently facing. To name a few we have continuously changing treatment protocols, lack of trained staff, interrupted supply of personal protective gears, many legal and ethical issues. In addition to the primary responsibility as doctors we are catering to the secondary needs of hospital administrative services like data monitoring & digitization, quarantine, logistics, cleanliness, security concerns, dead body management and many more. The forensic medicine experts are primarily concerned with the handling of dead bodies and with conducting post mortem examination of brought dead cases with lack of history or any relevant records which could aid in decision making to avoid conducting a post mortem examination. Hassel faced by the forensic experts in the department varied from managing relatives concern while disposing dead body to various functional issues like crematorium readiness, sanitization of vehicle, body bags availability, availability of body packers, coordination among doctors, staff and relatives, issue of transport of body and interference by bureaucrats and community leaders were some of the challenges mentioned here.

1. Introduction

Pandemics clearly expose the strength and weaknesses of the healthcare systems in different countries, as well as the obstacles and inequities of access to healthcare.[1] Handling a dead body with a Covid tag would run chills down the spine of anyone who would be in front line to handle such cases. Every forensic medicine expert have been facing issues related to conducting post mortem examination on brought dead cases and has also been exposed to the virus in doing the same. Changing treatment protocols and handling medical and administrative issues ensuring all relevant ethical norms and keeping in mind various laws along with ensuring control of spread of disease has been challenging to all. It's a tedious work to keep our self updated with all the guidelines issued by the government. Psycho-social support should be adapted to needs, culture, and context and should consider local coping mechanism,[2] this article attempts to have a consoli-

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dated document containing the relevant information. The entire article focuses on aspects of the management of various responsibilities dealt with at the Government Medical College, Khandwa.

2. Ethical Concerns:

In a pandemic scenario where we need to cater to the health needs of a large number of populations with limited experts to handle the situation and the risk involved in treating them gives rise to many ethical and legal issues which are difficult to address. The doctors from various branches of medicine and even doctors who are not trained in the allopathic system of medicine have been deployed as frontline Corona warriors to address the health needs of the population. Medical professionals have been serving in the hour of need to fight against the deadly virus, in spite of having a potential risk of carrying the infection home has been one major concern.

The doctors have been following guidelines issued by the government in terms of treatment protocols which even lack scientific validity and are mere assumptions to combat the virus. The impact of the nationwide lock down on the mental status of the medical professionals and the general public at large gave rise to many human right issues pertaining to the right to health and safety.

3. Measures by the Government:

The Central and state government have rightfully addressed many ethical and legal issues that rose in the pandemic, from supply of food and basic amenities to the medical needs by creating various COVID-19 hospitals and COVID-19 care centers. Government has announced Insurance coverage of 50 lakhs for Health Care Workers working for Corona Pandemic[3] the issue faced is the difficulty related to addressing the claims for the same.

Law: Government has invoked various Acts to strategically face the Pandemic dilemmas:

1. National Disaster Management Act 2005 (Restriction of movement)
2. Epidemic Disease Act 1897 (Prevention & Containment)
3. Article 355 and entry 29 of concurrent list of constitution of India. (Lockdown)
4. Essential Commodities Act (ECA) 1955 (e.g., Provision of Masks &other commodities)
5. Essential Services Maintenance Act (ESMA) 1981(Essential services to be regulated).
6. Sec 144(Restriction of Assembly of 4 or more)
7. 174 & 176 (Death & Autopsy related Provisions).

4. Current Testing Strategy for Covid-19:

1. All asymptomatic individuals who have undertaken international travel in the last 14 days:
   - They should stay home quarantined for 14 days.
   - They should be tested only if they become symptomatic (fever, cough, difficulty in breathing)
2. All family members living with a confirmed case should be home quarantined.
3. All symptomatic contacts of laboratory confirmed cases.
4. All symptomatic health care workers.
5. All hospitalized patients with severe acute respiratory illness (fever and cough and/or shortness of breath).
6. Asymptomatic direct and high-risk contacts of a confirmed case should be tested once between day 5 and day 14 of coming in his/her contact.

5. Dead body management:

The department faculty was given the responsibility to handle the dead body handling and disposal task for all COVID-19 positive and suspected deceased at the District hospital attached to the medical college. To ensure health and safety of all the department developed a SOP for careful handling and proper disposal of bodies. The basis of which was laid upon the Central government issued Standard Precautions to Be Followed by Health Care Workers While Handling Dead Bodies of COVID-19: Guidelines as Per Directorate General of Health Services (EMR Division), Ministry of Health & Family Welfare, Government of India.

Those cases which were brought dead to hospital without COVID-19 testing report following **history** was sought.

1. History of travel to any other country or area in last 15 days where COVID-19 -19 has been reported.
2. History of contacts with suspected or confirmed cases of Covid-19
3. History of home quarantine for flu symptoms.

4. History of travel and symptoms as per case definition of Covid-19.
5. History of being tested for Covid -19 as per protocol at authorized laboratory.
6. Professional history – healthcare worker, laboratory worker, chemist.

Standard Infection Prevention Control Practices should be followed at all times. It Includes-

1. Proper hand hygiene.
2. Use of personal protective equipment (PPE)
3. Safe handling of sharps.
4. Disinfect instruments and devices used on the patient.
5. Disinfect linen and clean and disinfect environmental surfaces.
6. Staff handling dead bodies in the isolation area, mortuary, ambulance and crematorium / burial ground should be trained in the infection prevention control practices.

PPE recommendations:

- Wear sterile, nitrile gloves when handling potentially infectious materials.
- If there is a risk of cuts, puncture wounds, or other injuries that break the skin, wear heavy-duty gloves over the nitrile gloves.
- Wear a clean, long-sleeved fluid-resistant or impermeable gown to protect skin and clothing.
- Use a plastic face shield or a face mask and goggles to protect the face, eyes, nose, and mouth from splashes of potentially infectious bodily fluids.

Precautions to Be Taken While Transferring Body from The Isolation Area to The Mortuary:

- The health worker handling dead body should perform hand hygiene; ensure proper use of PPE.
- All tubes, drains and catheters on the dead body should be removed and disposed in triple layered yellow plastic bags for incineration.
- Any puncture holes or wounds (resulting from removal of catheter, drains, tubes, or otherwise) should be disinfected with 1% hypochlorite and dressed with impermeable material.
- Apply caution while handling sharps such as intravenous catheters and other sharp devices. They should be disposed into a sharp's container.
- Plug oral, nasal orifices of the dead body to prevent leakage of body fluids.
- All used/ soiled linen should be handled with standard precautions, put in bio-hazard bag and the outer surface of the bag disinfected with hypochlorite solution.
- Used equipment should be autoclaved or decontaminated with disinfectant solutions in accordance with established infection prevention control practices.
- Place the dead body in leak-proof plastic body bag. The exterior of the body bag can be decontaminated with 1%hypochlorite.
- The body bag can be wrapped with a sheet
- The body will be either handed over to the relatives or taken to mortuary.
- If the family of the patient wishes to view the body at the time of removal from the isolation room or area, they may be allowed to do so with the application of Standard Precautions.
- Provide counseling to the family members and respect their sentiments.
- All medical waste must be handled and disposed of in accordance with Bio-medical waste management rules.
- The health staff who handled the body will remove personal protective equipment and will perform hand hygiene.
- All surfaces of the isolation area (floors, bed, railings, side tables, IV stand, etc.) should be wiped with 1% Sodium Hypochlorite solution; allow a contact time of 30 minutes, and then allowed to air dry.

Precautions to Be Taken While Handling of Dead Body in mortuary:

The main driver of transmission of COVID-19 is through droplets. There is unlikely to be an increased risk of COVID infection from a dead body to health workers or family members who follow standard precautions while handling body.[4]

- Ear mark a few boxes for bodies of Covid-19.
- Keep VTM (Viral transfer media) for transferring swabs collected from suspected cases.
- Mortuary staff handling COVID dead body should observe standard precautions.
- Dead bodies should be stored in ear marked cold chambers maintained at approximately4°C.
- The mortuary must be kept clean.
- Environmental surfaces, instruments and transport trolleys should be properly disinfected

with 1% Hypochlorite solution.
- After removing the body, the chamber door, handles and floor should be cleaned with sodium hypochlorite 1%solution.
- While handing over the body to relatives only next of kin (with PPE) should be shown the body from a distance of 01 meter and only designated mortuary staff should handle the body after following all standard precautions.
- Embalming of dead body should not be allowed.

Precautions to Be Taken While Transportation:
- The body, secured in a body bag, exterior of which is decontaminated poses no additional risk to the staff transporting the dead body.
- The personnel handling the body may follow standard precautions
- The vehicle, after the transfer of the body to cremation/ burial staff, will be decontaminated with 1% Sodium Hypochlorite.

Precautions to Be Taken at The Crematorium/ Burial Ground:

The Crematorium/ burial Ground staff should be:
- Sensitized by public health department that COVID-19 does not pose additional risk.
- The staff to practice standard precautions of hand hygiene, use of masks and gloves.
- When the body is handed over to the police and relatives after autopsy, then they must be advised not to open the bags or touch the body and not to gather together to minimize spreading infection.[5]
- Religious rituals such as reading from religious scripts, sprinkling holy water and any other last rites that does not require touching of the body can be allowed.
- Bathing, kissing, hugging, etc. of the dead body should not be allowed.
- The funeral/ burial staff and family members should perform hand hygiene after cremation/ burial.
- The ash does not pose any risk and can be collected to perform the last rites.
- Large gathering at the crematorium/ burial ground should be avoided as a social distancing measure as it is possible that close family contacts may be symptomatic and/ or are shedding the virus.
- Boards displaying above information should be displayed at prominent places in the crematorium/burial ground.
- Proper provisions for hand washing and sanitizer must be made available for relatives before leaving the crematorium.

Precautions to Be Taken While Performing Autopsies on Covid-19 Dead Bodies

The death in hospital or under medical care due to COVID-19 is a not a medico legal case and no Forensic Autopsy will be conducted. The certification of death and issuance of Medical Certificate of Cause of Death (MCCD) will be done by the treating doctor of the hospital.[6]

If autopsy is to be performed for special reasons like suicide, homicide, accident, custodial deaths, allegations of negligence in treatment.

The following infection prevention control practices should be adopted:
- The Team should be well trained in infection prevention control practices.
- The number of forensic experts and support staff in the autopsy room should be limited preferably one doctor (Forensic Medicine/Pathologist) and one support staff to ensure judicious use of human resource.
- The team of doctors who would be involved in autopsies should be trained in collection of nasopharyngeal (preferable) and oropharyngeal swab and/ or swabs from bronchial tree & also blood for culture.
- The chief of mortuary services should make provisions for adequate number of: PPEs, Instrument sets, Culture bottles, VTM with swabs, Plastic body bags & Linen, 1% sodium hypochlorite.
- Human resource - to prepare duty list so that staff is used sparingly and with adequate rest so that they are available when ever required.
- The Team should proper PPE (coveralls, head cover, shoe cover, N-95 mask, goggles / face shield).
- Round ended scissors should be used.
- PM40 or any other heavy-duty blades with blunted points to be used to reduce prick injuries.
- Only one body cavity at a time should be dissected.

- Unfixed organs must be held firm on the table and sliced with a sponge – care should be taken to protect the hand.
- Negative pressure to be maintained in the mortuary.
- An oscillator saw with suction extraction of the bone aerosol into a removable chamber should be used for sawing skull, otherwise a hand saw with a chain- mail glove may be used.
- Needles should not be re-sheathed after fluid sampling – needles and syringes should be placed in a sharps bucket.
- Reduce aerosol generation during autopsy using appropriate techniques especially while handling lung tissue.
- Avoid spillage of body fluid during autopsy. In case of spillage wash immediately and clean with 01% sodium hypochlorite/disinfectant.
- Instruments should be kept in 1% sodium hypochlorite.
- After the procedure, body should be disinfected with 1% Sodium Hypochlorite and placed in a body bag, the exterior of which will again be decontaminated with 1% Sodium Hypochlorite solution.
- The body thereafter can be handed over to the relatives.
- Autopsy table to be disinfected as per standard protocol.

Postmortem Specimens from Deceased Persons Suspected for COVID-19:

If an autopsy is performed, collection of the following postmortem specimens is recommended:

1. Upper respiratory tract swabs: Nasopharyngeal Swab AND Oropharyngeal Swab (NP swab and OP swab).
2. Lower respiratory tract swab: Lung swab from each lung, Separate clinical specimens for testing of other respiratory pathogens and other postmortem testing as indicated.
3. Formalin-fixed autopsy tissues from lung, upper airway, and other major organs.

If an autopsy is NOT performed, collection of the following postmortem specimens is recommended:

1. Upper respiratory tract swabs: Nasopharyngeal Swab AND Oropharyngeal Swab (NP swab and OP swab).
2. Separate NP swab and OP swab specimens for testing of other respiratory pathogens.

- If the swab comes positive for corona virus the MCCD should be filled.
- If the swab comes negative for corona virus, the autopsy should be conducted as per protocol taking proper precautions.
- If swab is taken, then the relatives should be counseled and informed to wait till the receipt of the report.[7]

6. Autopsy concern

Various studies done on post mortem specimens have revealed results bringing forward the various pathological changes that are caused by the corona virus. Lisa M Barton et al stated that autopsy revealed diffuse alveolar damage and chronic inflammation and edema in the bronchial mucosa.[8] of a COVID confirmed case. Hanny Al-Samkari et al stated that patients with coronavirus disease 2019 (COVID-19) have elevated D-dimer levels. Early reports describe high venous thromboembolism (VTE) and disseminated intravascular coagulation (DIC) rates, but data are limited.[9] Hence, collecting of histopathological samples to figure out the pathological changes that occur in COVID-19 is the need of the hour to fight the virus.

Challenges:

1. Addressing issues that delay the handing over the body of the deceased is essential due to delay in procedural issues like Crematorium readiness, Sanitization of vehicle, Body Bags availability etc.
2. Procurement of PPE, Drugs, and Sanitizers etc was a big challenge tackled well by the government
3. Biomedical Waste Management was tedious task that required daily checks.
4. Updating all the concerned with regularly changing government guidelines required regular teaching sessions.
5. Catering to the needs of asymptomatic patients in CCC was mammoth task as entertaining them in hospital was new concept, never done before in India.
6. Data reporting to Government officials was tremendous and on the toes task which required computer awareness.
7. Working in PPE kit for Doctors, Nurses, Ward boys, housekeeping, Guards changed for people working with PPE kits was exhaustive.

Recommendations:

1. All deaths during Pandemic should be cremated, if buried ensure its far from residential area: 400 meters away from drinking water, 1 meter separated from each other and depth of more than 3 meter in area demarcated.
2. In confirmed cases, no autopsy should be done and death should be certified immediately.
3. MLC registration should be done judiciously in cases like-Death within 24 hours of admission.
4. In such cases, cause of death can be given depending on clinical and laboratory findings.
5. COVID-19 suspected cases brought dead to the hospital should have a provision of testing followed by verbal autopsy and provision to issue a death certificate without performing the complete autopsy.
6. If autopsy surgeon proposes the need of Nasopharyngeal / oro-pharyngeal swab it should be done by ENT specialist.
7. Autopsy should be preferably performed by autopsy surgeon along with a pathologist.
8. Autopsy surgeon should be provided adequate PPE and other cleaning/disinfectant material etc.
9. Granting health care professionals and health care facilities with immunity from suit and civil liability for damages, alleged to have been sustained by an act or omission occurring in the course of providing health care services during the period of the COVID-19 emergency, provided the health care services were provided in good faith and damages were not caused by gross negligence, recklessness, or conduct with an intent to harm or discriminate.
10. Strengthening and stabilizing the capacities of the healthcare system.
11. Further expansion of test capacities for the diagnosis and detection of (preliminary) immunity (serological tests, currently under development).
12. Enhance ongoing data collection on individual and group immunity, model development to assess the effectiveness of interventions.
13. Broad promotion and support of research on vaccines and therapeutics, and preparation of support structures for their mass production and roll-out.
14. Support for interdisciplinary research on the social and psychological effects of the Covid-19 pandemic, including future risk perceptions.
15. Continuous re-evaluation of measures restricting freedom of movement, where justifiable, their gradual withdrawal and a resumption of social and economic activity.
16. Development of effective and tolerable protection and isolation strategies for risk groups.
17. For younger high-risk groups in particular, it is important to note that effective self-isolation is dependent on the option of (preventive) sick leave or other forms of leave for those affected and the other members of their household.
18. Sound information strategy: Transparent and regular communication on actions taken and policy making decisions in relation to highly infectious diseases.
19. Concrete calculations of the expected costs of measures taken and alternative scenarios

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Original Review Article

Adult Male Victims of Rape: Need of Legal Recognition in India

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Abstract

Framing sexual violence as a feminist issue has ignored to recognize male victims of sexual violence as distant reality. The less reporting of male sexual violence with shyness of victims to come forward much contribute to lack of legal action concerning male sexual victimization. Historically, the sexual victimization of adult males was deemed to be, if not possible, then certainly rare. Non-acknowledgment of adult male victims of sexual assault or rape has made availability of legal services and other remedial measures underdeveloped and unimportant relative to those for female survivors. For a moment considering females suffer more than males as a victim, it may be argued that the punishment should be based on sameness of crime and not on sameness of effect, to ensure equality before law. There is need to bring full attention to the definitions, categories, type of sexual victimization that should be revised to eliminate gender bias.

1. Introduction

The early decades have seen sexual violence as a social evil with the emphasis given to the ordeal of female victims or survivors of sexual crime. Feminists have conceptualized the sexual victimization of women by men as a manifestation of power within a rape-supportive patriarchal society. [1] As a result, many legal and support services have been established for women victims to mitigate the adverse effects of sexual violence. As per Fisher N and Pina A, these feminist movements have made a considerable contribution to the academic and public awareness of rape. [2]

However, framing sexual violence laws, male victims of sexual violence are ignored. The less reporting of male sexual violence with shyness of victims to come forward much contribute to lack of legal action concerning male sexual victimization. Historically, the sexual victimization of adult males was deemed to be, if not possible, then certainly rare. Non-acknowledgment of adult male victims of sexual assault or rape has made availability of legal services and other remedial measures underdeveloped and unimportant relative to those for female survivors. A flurry of research since the mid-1990s, has begun to explore the prevalence, scope and consequences of male sexual victimization, with new ideas for service delivery to help male survivors now considered as important. [3] It is seen that men are more likely to be the aggressors and women the victims, earlier research-

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ers were not able to capture the full range of sexual violence by viewing men as only perpetrators and women as only victims. [4-5]

The Indian Society has achieved significant success in accomplishing equal rights for all, irrespective of sex and race. One such short coming in dispensation of equal rights in the current scenario is un-recognization of "Rape of adult male", a crime penalized in other developed countries through their legal provisions. If victim of sexual assault is major male the legal help is limited, and the situation becomes worst if the assailant is a female. While sexual assault in minor children (male and female) is well covered in gender neutral POCSO Act, 2012 (The Protection of Children from Sexual Offences Act 2012), [6] the Indian rape law covering only female victims has left some adult male victims in grey zone of Indian law.

This review paper is an attempt to overview academic literature on adult male survivors of sexual violence where they are acknowledged and provided with legal and remedial services. The Indian legal definition of rape is critically discussed in comparison with legislation of other developed countries where the offence of rape is gender neutral in legal eyes.

2. Prevalence

Early research has reported that approximately 3 to 8% of American and British men report of having experienced an adulthood incident of sexual assault in their lifetime [7-10] and between 5 to 10% of rape victims were male. [11-13] These rates may underestimate the magnitude of the problem of male rape given that men are often unwilling to report sexual assault experiences. [14-16]

According to The National Intimate Partner and Sexual Violence Survey (NIPSV) 2010 Summary Report, approximately 1 in 71 men in the United States (1.4%) reported having been raped in his lifetime. [17] Among these victims, 4.8% of men reported that they were forced into penetrating someone else at some point in their lives. Since such male victims rarely report the incidence, the actual number of male victims of sexual violence is likely to be much higher. Similarly, NIPSV survey done in 2014 reveals that; approximately 1 in 15 men (6.7%) reported that they were made to penetrate someone else during their lifetime. [18] However, in a study of the United Nations, found that 3% of Chinese men who were surveyed, acknowledged having been raped by another man during their lifetime. This suggested that the proportion of male rapes as a percentage of all rapes was 14.4%. [19]

Recently, the Delhi based Centre of Civil Society found that approximately 18% of Indian adult men surveyed reported being forced to have sex, of which 16% claimed female perpetrators and 2% claimed male perpetrators. [20] Although studying male sexual assault is an important issue, it has largely been "overlooked", dismissed, or ignored and is an understudied issue). [21-23] Few case examples from India are mentioned below for better illustrations of the existence of the offence of male rape.

Case 1 [24]

A Tihar Jail inmate was sentenced to 2.5 Years in Jail for Sodomising his Co-prisoner. Metropolitan magistrate sentenced the accused after convicting him under S. 377 (unnatural sex) of the IPC and sentenced him to the period already spent by him in jail during the trial of the case in 2017. Here the difference in quantum of punishment for the same kind of crime is clearly visible, only because of the victim's gender.

Case 2 [25]

In June 2019, Amboli police arrested a 42-year-old man as he had allegedly forcefully performed unnatural sex on a 37-year-old manager of an Andheri based advertisement firm, while his associate absconded. As per the police, the victim met the two accused in a bar who then invited him to their flat in a nearby building under the pretext of getting another drink. Further the complainant narrated that he was offered a cigarette after which he felt heavily intoxicated thereby the accused taking advantage of this conditions forcefully performed unnatural sex on him. After that the victim left the flat and narrated this ordeal to his friend who then advised him to approach the police. The medical examination of the victim confirmed sexual assault on him.

The above sited examples are enough to point out that male victim of sexual assault is a reality and the victims of such crime are denied of due justice if they are "a major male". The faulty assertion that male victimization is uncommon has also been used to justify the exclusion of men and

boys from recognition thereby fueling isolation and underreporting.

3. Legal position of world on male rape

The FBI's (Federal Bureau of Investigation) Uniform Crime Report of 2012, modified the definition of rape and redefined to include penetration of vagina or anus however slight with any body part or object or oral penetration by a sex organ of another person, without the consent of the victim. [26] Thus, for the first time this definition identifies rape as an offence which includes any gender of victim and offender. Additionally, the United States law now recognizes that rape with an object can be as serious and traumatic as non-consensual penile penetration. [27]

The earlier English law did not recognize male rape as a criminal offence and recorded such acts as non-consensual buggery. This however changed with time and amendments in the English law. The Criminal Justice and Public Order Act. 1994 was the first Act to recognize that male can be a victim of rape. The section 142 of the act says that it is an offence for a man to rape a woman or another man thereby recognizing male victims. Further, as per the Sexual Offences Act 2003, a person commits an offence of rape if he intentionally penetrates the vagina, anus or mouth of another person with his penis. Additionally, the Sexual Offences (Scotland) Act 2009 and the Sexual Offences (Northern Ireland) Order 2008 recognized men, can be both perpetrators and victims. [28]

The Republic of South Africa (Criminal Law Amendment Act 2007) too have recognized this problem and have amended their laws of rape to address female and male victims alike. [29] The Criminal Law (Sexual Offences and Related Matters) Amendment Act, 2007 defines rape as any person ("A") who unlawfully and intentionally commits an act of sexual penetration with a complainant ("B"), without the consent of B, is guilty of the offence of rape. Further this amendment has defined sexual penetration but has retained its gender-neutral nature.

The French Penal Code defines rape as "any act of sexual penetration, whatever its nature, committed against another person or on the perpetrator, by violence, constraint, threat or surprise, is a rape", thus terming it as a gender-neutral crime. [30] Philippines is a country which recognizes that both male and female can be a victim of rape, but the punishment is different, in case of female victim it is life imprisonment while in case of male victim it is 6 to 12 years. [31]

4. Understanding definition of rape

Medically, male rape is defined in the Segen's Medical Dictionary as " male rape usually refers to sexual violation of a man by another man through a forced anal intercourse, either during incarceration or in aberrant socioeconomic settings" a penetrative sexual act (forced anal intercourse) committed by a male or female in which the victim is unable or unwilling to give uncoerced consent". [32] The World Health Organization (WHO) and United States government have recently redefined rape for the inclusiveness of both genders. WHO defines sexual violence which includes rape "as the physically forced or otherwise coerced penetration-even if slight-of the vulva or anus, using a penis, other body parts or an object by male or female". [33] While as per the FBI's updated definition, rape includes penetration however slight of the vagina or any body part or object, oral penetration by a sex organ of another, without the consent of the victim (The US Department of Justice Archives 2012).

The above definition of rape is emphatically gender neutral thereby recognizing the fact that such offence can be committed on both male and female. It also mentions that forced or coerced penetration need not be always by a sex organ but can also be done by any body part or object into the vagina, vulva, mouth, or anus of another person.

While the Indian law defines rape under section 375 IPC [34] as, "a man is said to commit rape if he-

a. Penetrates his penis, to any extent, into the vagina, mouth, urethra, or anus of a woman or makes her to do so with him or any other person; or
b. Inserts, to any extent, any object or a part of the body, not being the penis into the vagina, the urethra or anus of a woman or makes her to do so with him or any other person; or
c. Manipulates any part of the body of a woman so as to cause penetration into the vagina, urethra, anus or any part of such woman or makes her to do so with him or any other person; or
d. Applies his mouth to the vagina, anus, urethra of a woman or makes her to do so with him or any

other person, under the circumstances falling under any of the seven descriptions.

International laws have evolved from viewing rape as just a penile-vaginal to penile-orifice and then to penetrative-orifice, all in a non-consensual manner. Considering this insertion of penis or object/part of any body by a man into the anus or mouth of woman also qualifies as offence of rape. Thus, from the Indian legal perspective, rape is something that only a man can do to a woman and thus ignores the fact that even a male can be subjected to this offence and be a victim of such crime. Also, it does not acknowledge the fact that there could be female perpetrator to this crime.

5. Is rape on adult male different from female?

We fail to understand how the impact of sexual violence on men can be different from women though they may indeed experience it differently. Categorizing the forms of sexual victimization that men typically experience as different and lesser than the forms of victimization that women typically experience would require considered justification. [35] We propose the following may be considered as elements central to the offence of rape:

1. Violation of autonomy of one's body
2. Non-consensual and forcible sexual penetration by sex organ/object

The main essence of the offence is violation of autonomy of one's body which every person being individual enjoys over his/her own body and that includes sexual satisfaction and sexual orientation. The offence of rape violates this basic right of sexual autonomy subjecting the victim to humiliation and traumatic experience which may last for decades. We believe that bodily autonomy is individualistic and matter of choice and is a part of dignity. Violation of bodily autonomy with forcible penetration either with sex organs or by other objects leads to psychological trauma and many times physical injuries which may be so severe that the victim may suffers from permanent vegetative state or may die from the consequences of such injuries.

Sexual offence of rape on a woman usually fulfill the above elements of rape and thus satisfies the legal requirement for law enforcing agency to investigate and prosecute the offence. The same holds true for rape on males or transgender victims who are sodomized or subjected to anal penetration. But in absence of gender-neutral nature of Indian rape law such offence will be fall outside the ambit of stricter sec 375 IPC in comparison to section 377 IPC when punishments are concerned.

6. Legal remedy for male victim/survivor of sexual assault as per current Indian Law

There are certain scenarios which demonstrates how a male victim is at the mercy of interpretation of Indian laws such as:

1. If a male is sexually assaulted by a male, it is covered under IPC section 377 and if he is assaulted by a female there is no specific legal section dealing with the crime.
2. Insertion of foreign object into the anus/urethra/vagina of female without consent is considered rape as per 375 IPC but there is no legal provision for such offence if done on male except grievous hurt or physical assault.
3. Sexual offence on 3rd gender/transgender is again an ambiguous topic and possibly punishable under section 377 IPC.

Considering a situation where an adult male is subjected to sexual assault, the perpetrators of such crime may be prosecuted only under section 377 of IPC and nothing else. Section 377 IPC says "whoever voluntarily has carnal intercourse against the order of nature with any man, woman or animal, shall be punished with imprisonment of either description for a term which may extend to ten years, and shall be also be liable to fine". [36] But this legal provision inherently lacks from the following:

1. No clarity on the term carnal intercourse.
2. It does not consider act done with common intention by more than one offender like gang rape.
3. It does not consider the clause of penile-orifice and penetrative-orifice.
4. No provision of punishment for statutory rape, repeat offenders and for severe punishment if the victim dies or suffers from persistent vegetative state.
5. There is no penal provision of life imprisonment or death.

Section 377 IPC provides punishment for the offence of carnal intercourse against the order of the nature where it does not consider insertion of foreign object or part of the body into the anus of male as a form of sexual assault whether natural or

unnatural similar to the clauses mentioned in section 375 IPC.

The maximum punishment of imprisonment for ten years under section 377 IPC may not be enough if the victim suffers from death or remains in permanent vegetative state due to such offensive act. The physical and psychological trauma suffered by a male victim of such crime is nevertheless less criminal than the offence of rape committed on a woman.

Recently in December of 2018 Delhi HC passed a judgement making IPC Sec 354 A gender-neutral by which sexual harassment of 3rd genders were covered and made punishable under 354 A IPC. [37] Moreover, a transgender is neither a male or female and are used as a passive agent in sodomy, and no legal remedy exist for non-consensual sexual assault in such victims. On the contrary, whether sexual assault on them will fall under 375 or 377 of IPC is not clear.

7. Recent developments of acknowledgement

Rape of males in India is very often not reported due to obvious cultural reasons, even if some survivor manages to report the crime, the legal system lacks in law for acknowledging it and providing strict punishment. The law does not always acknowledge these experiences and perpetuates myths such as “men cannot be raped”, “male victims are not affected by rape”, and “male rape is not important”. Addressing to this scenario, individuals like Jai Vipra at New Delhi, Think-tank Centre of Civil Society, argues that the phrasing of rape law should be gender neutral. [38] As section 375 of Indian Penal Code states, rape is something a man can do to a woman it does not acknowledge the fact that even males can be raped and there may be female perpetrators of such crime. Though, sexual assault on child survivors of both sexes are covered by POCSO Act 2012, but the segment of adult male victims is left out in open for variable interpretation. The provision of section 114 A of Indian Evidence Act [IEA] available to female victim of rape is not granted or applicable to the victim of section 377 IPC. [39]

After the Nirbhaya incident, male rape survivors also began to voice their ordeal, including one Chennai based man who posted a blog about his memories of being raped which went viral overnight. In 2013, Centre passed its stop-gap Criminal Law (Amendment) Ordinance which substituted “sexual assault” for “rape”, thus making the crime gender neutral from both perpetrator and victim aspect thus removing the gender bias word “rape”. This move of government was opposed by some human rights advocates and women right activists. These group argued that rape was explicitly patriarchal crime directly uprising from abuse of male power and privilege thus resulting in the fall of ordinance Centre for Civil Society 2014). It could be argued that making the offence of rape gender-neutral will not dilute the seriousness of the crime nor its prosecution. Rather its scope of applicability will widen by including and recognizing male and transgender victims of such crime.

8. Conclusions

We presume that the crime of sexual assault may have its origin from the abuse of power in patriarchal society, but the suffering of the victim does not depend upon the biological sex. As much as the offence of rape is concerned the victims of either sex are traumatized for their rest of life and will suffer through worst ordeal. The various statistical data on world’s prevalence of male victim, it is confirmed that male rape is no figment of imagination. If we can make sexual assault on minor’s gender neutral, why not the Indian rape laws be on similar stands. Replacing the term “rape” with “sexual assault” in the definition is a way which may solve the problem of gender bias like POCSO Act.

For a moment considering females suffer more than males as a victim, it could be argued that the punishment should be based on sameness of crime and not on sameness of effect, to ensure equality before law. Gender of perpetrator should not matter, however low the percentage of major male victim is, in a country with 133 crore population, even that percentage does matters.

We admit that sexual victimization poses a great threat for women and girls but there is vast cohort of male victims who have been overlooked in research, media, and governmental responses. To better capture the forms of sexual victimization, a gender-conscious analysis studies of sexual victimization is needed that facilitate disclosure and reporting of adult male sexual assault.

Since most of the international laws recognize male sexual victimization through their gender inclusive rape laws, Indian rape law also needs to be

amended to penalize rape on adult male with prosecutory provisions and rehabilitative reforms. In fact, the gender bias in legal definition of rape may indirectly contribute to the relative paucity of research on male victims of sexual assault and researchers relying on legal definitions may operationally define rape in such a way that it excludes male victims. [40] Therefore, it is necessary to bring full attention to the definitions, categories, type of sexual victimization that should be revised to eliminate gendered and heterosexual bias.

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Original Review Article

A Review on the Post mortem Findings of COVID-19 patient

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Abstract

COVID-19 has swamped the entire world and created a storm in the modern medicine. It was first detected in Wuhan, China in December 2019 and was declared a pandemic by WHO in March, 2020. Over the years' multiple health concerns associated with various coronavirus strains have been identified, namely, The Middle Eastern Respiratory Syndrome (MERS), Severe Acute Respiratory Syndrome (SARS) and the COVID -19. With the ongoing pandemic of the COVID-19, the medical fraternity revolves around the conjectures of the challenges coming up. It has been a task to understand the mechanism of action of the virus or the disease pathology, due to it being a novel virus. Another major reason for less data availability is cited to be comparatively lesser autopsies. Autopsy findings may provide new insights into the pathogenesis and might potentially assist in formulating therapeutic strategies for reducing disease mortality. Complete and detailed autopsy may help to understand the tropism and extent of the disease on different organs and tissues. This article highlights the important postmortem findings and the importance of an autopsy with appropriate guidelines.

1. Introduction

Autopsies are an essential tool for better understanding of a novel disease or an unidentified cause of death.[1] However, a great reluctance to perform autopsies is observed worldwide. With the onset of the pandemic, the experts of medicine were urged to focus on the development of vaccine and other effective treatment modalities.

It was also found that the SARS- COV2 is similar to the genomic sequence, clinical manifestation and biological behavior of SARS- COV. Although it is believed that SARS-COV-2 is comparatively more virulent. The spike surface glycoprotein, small envelope protein, matrix protein and nucleocapsid protein are the four major structural proteins present. Angiotensin converting enzyme 2 (ACE2) binds the spike proteins to the host receptors. [2 3 4]

Despite the understanding being difficult and new findings coming up, there was a reluctance in performing autopsy at the start. Various countries started performing autopsy eventually and adapted their own methodology. As per the paper written by S. Tian et al on Pulmonary Pathology of early phase

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2019 coronavirus in two patients of lung cancer. Biopsies of living and deceased patients' lung were performed. China published their first full autopsy in a medico legal journal in February 2020.[5] It is also seen that in countries like Germany, Italy, USA, Britain autopsies are performed in a good number. In India, non invasive autopsies are conducted for the COVID 19 patients. The in-hospital deaths undergoing COVID-19 treatment are considered as non medico legal, the suspected or latent status brought dead to hospital are considered as medico legal. Considering the high transmission rates of the virus, autopsy is considered to be a high-risk procedure. In order to save the health care workers from acquiring the infection, switching over to non invasive autopsy techniques or performing partial or no autopsy is being considered. This will also prevent the needless autopsies happening in our country. [6]

Having said that, the main reason for the reluctance worldwide to perform autopsies is the concern about getting infected from the deceased person. It is advised to follow proper protocols and sanitation measures to prevent contamination and infection. It is said that "what we do not find alive, we find in dead" and autopsy reports give us an insight of the reality.

2. Systemic autopsy findings

Following are the systemic autopsy findings as per various references:

i. Pulmonary Findings

a) The Broncho-alveolar fluid has shown a large quantity of chemokine from the macrophages in patients with severe COVID-19. [7]

b) The hyper inflammation in severe COVID-19 patients shared similarities with cytokine release syndrome, also leads to the hypothesis of the dysregulated activation of the mononuclear phagocyte compartment. [8]

c) Damage to alveolar structure with minor serous and fibrin exudation and hyaline membrane formation. The findings show that the coronavirus particles in the bronchial epithelia and type 2 alveolar epithelia and immunohistochemical staining were positive for the 2019- nCov antigen and the PCR analysis was positive for 2019 - nCov nucleic acid. [9]

d) 58% incidence of DVT of which 33% of patients had pulmonary embolism as a direct cause of death. [10]

ii. Cardiovascular Findings

a) **Macroscopic**

- Cardiomegaly with right and left ventricular dilatation. [11]
- Pericardial Effusion- gray, red fish like. [12]

b) **Microscopy**

- Scattered individual cell myocyte necrosis suggestive of viral myocarditis. [11]
- Inflammatory cells- lymphocytes and macrophages. [12]

c) The myocardial damage from COVID-19 that led to the death of patients is about 7% and one of the contributory factors in death in 33% cases. [13]

d) Myocarditis, Myocardial Infarction, Arrhythmias, embolism, and DIC are the main complications in patients with cardiovascular comorbidities. [14]

e) SARS-CoV-2 causes acute respiratory failure and multiple organ failure until death. [14]

iii. Renal Findings

a) Kidney can be damaged with marked microthrombi of the glomerulus which can be a sign of Disseminated Intravascular Coagulation. [15]

b) Renal Proximal Tubular Injury was the main finding correlating with AKI. It was typically mild as compared to AKI. [16]

c) In Light Microscopy RBC aggregates were found in peritibular capillaries. It is seen that direct parenchymal infection of tubular epithelial cells and podocytes with marked acute tubular injury and erythrocyte aggregation occurs in severe lethal COVID-19. [17]

iv. Hematological Findings

a. Hematological dysfunction can be explained by the virus induced procoagulant and coagulopathy, virus invasion and damage of lymphocytes. This leads to predisposition of DVT and pulmonary thromboembolism. [18]

v. Neuropathological Findings

a) Patients show hemorrhagic white matter lesions throughout the cerebral hemisphere with macrophages and a surrounding axonal injury. [19]

b) Hemorrhagic and PRES- related brain lesions are often observed in postmortem brain MRI. [20]

c) SARS-CoV-2 related olfactory impairment seems to be limited to olfactory bulbs. [20]

vi. Spleen

a) T and B lymphocyte in the spleen decrease in varying degrees, lymphoid follicles are atrophied, the number of NK cells do not change significantly. [21]

vii. Liver

a) Hepatic Staetosis, Portal Fibrosis, Acute Liver Necrosis. [22]

b) Ductal Proliferation

viii. Pancreas

a) Focal Pancreatitis [22]

b) Degeneration of the islet cells [23]

ix. Reproductive System

a) TUNEL assay- Increased apoptotic spermatogonic cells. [23]

b) Extensive Germ Cell Destruction [23]

c) Thickened Basement membrane with peritubular and vascular congestion [23]

x. Other Causes

a) Adrenal cortical Hyperplasia [22]

b) Epidermis- Paraketosis, acanthosis, necrotic keratinocytes, lymphocyte satellitosis and pseudoherpetic [23]

c) Extra pulmonary findings from certain co-morbidities like Diabetes and Hypertension are related to septic shock, superficial perivascular dermatitis, orchitis, myositis, myocarditis, alteration in the renal glomeruli etc. [19]

3. Conclusion

An ocean of information is yet to be deciphered about the COVID-19 virus, which has led to complete lockdown globally. From asymptomatic forms to multi-organ dysfunction syndrome resulting in sepsis or shock, COVID-19 has a wide range of clinical symptoms. To highlight, the organs most commonly affected by COVID-19 include lung, heart, kidneys, vasculature and the central nervous system. Of these, pulmonary findings are the most significant postmortem findings.

It is of utmost importance to identify the extra pulmonary findings as well, through further research. By understanding the pathology of the virus, a better treatment plan can be decided. Although a lot of significant work is being done in various parts of the world for COVID-19 vaccine, finding the treatment is all the more important. Autopsy findings obtained from patients can provide new insights into the pathogenesis and might potentially assist in formulating therapeutic strategies to reduce disease mortality. It is important to perform full and detailed autopsy to understand the tropism and extent of the disease on different organs and tissues.

The extent of postmortem examination varies in different studies ranging from the microbiological sampling to limited examination of organs of interest. Infrastructure, availability of biosafety conditions, protocols and attempts to minimize exposure and various other factors play an important role for the variability found in different studies. However, proper safety protocols must be followed while performing the autopsy. Our article highlights the important postmortem findings and the importance of an autopsy with appropriate guidelines.

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Original Review Article

Assisted Reproductive Technology: A Literature Review

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Abstract

"Assisted reproductive technology" indicates all the methods which takes effort to achieve pregnancy by keeping sperms or the oocyte external to the human body and shifting the gamete or the embryo into the female reproductive tract. Assisted Reproductive Technology (ART) includes artificial insemination, In Vitro Fertilization and surrogacy**.** "Artificial insemination" suggests methods of placing the semen into the female reproductive system using artificial means which may be husband's semen or donor's semen. ART (regulation) bill 2020 clearly mentions child born of ART will be considered as natural child of commissioning couple and will be having all the privileges and rights of natural child. It also mentions that the donor will not be having any parental right over the child. The prevailing laws in India does not clearly specifies legal implications of ART. Since ART was very essential for many childless couples for having children, it is destined to escalate over period of time. To circumvent the difficulties and untoward situations, appropriate legislative provisions has to be enacted, else the child born out of AID will experience great hardship which will unfair. The Assisted Reproductive Technology (regulation) bill 2020 if implemented effectively as an act will curb the exploitation of commissioning couple or donor and can be instrumental in providing appropriate rights to the child conceived of ART.

1. Introduction

"Assisted reproductive technology" indicates all the methods which takes effort to achieve pregnancy by keeping sperms or the oocyte external to the human body and shifting the gamete or the embryo into the female reproductive tract. Assisted Reproductive Technology (ART) includes artificial insemination, In Vitro Fertilization and surrogacy.[1] "Artificial insemination" suggests methods of placing the semen into the female reproductive system using artificial means which may be husband's semen or donor's semen.[2] Since last few years artificial insemination has received great importance in various parts of the world as it can be considered as a practical solution for several childless couples.

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This method of artificial insemination is considered to be favoured method as child is hereditarily connected to at least one of the parents.[3]

The initial incidence of artificial incidence was stated to be towards the end of thirteenth century, when john hunter performed on the wife of a linen Draper resulting in normal gestation. Louse Brown born in 1978, was the world first test tube baby who gave birth to the child without utilizing the method of artificial insemination.[4] World's second test tube baby was born at Calcutta.[5] Over period of time, there has been rapid rise in commercial Artificial reproductive techniques (ART) being utilized in India, making it worldwide leader. About 400 million rupees were obtained from surrogacy from around 3000 ART clinics.[6] For proper functioning of the ART clinics, regulation is needed to avoid the misuse of the advanced facilities for illegal and unethical practices.

2. Artificial Insemination

Types of artificial insemination.

1) A.I.H. Artificial insemination with semen attained from the husband.
2) A.I.D. - Artificial insemination with semen attained from a donor.
3) A.I.H.D.- Artificial insemination with semen attained from a husband and donor[5]

There is no practical issue of parenthood in case of AIH as the semen is obtained from the husband. The child obtained from AIH is considered as legitimate and this method is considered to be reasonable as well as agreeable. While in the case of AID, child is hereditarily connected to the person other than husband. The benefit of AIHD was that the child obtained can be considered as due to father's semen. This can decrease the guilt and mental agony in the mind of the father that child does not belong to him. With more admissibility of AID in the society, there is decline in AIHD but still can be utilized.[7]

Since last few years there has been substantial increase in the Assisted Reproductive technology globally in both developed and developing countries. With increase in GDP of many countries, many infertile couples are capable for opting ART for conceiving child. This ultimately resulted in mammoth growth in number of ART clinics. India is also not excluded from that and has huge growth in number of ART clinics. Hence there has been questions raised about the safety and efficacy of ART as well as many ethical and legal issues.[8]

Legal issues related to artificial reproductive techniques:

1) Legitimacy of the child: Question arise whether the child will be considered as legitimate child of the couple seeking child or surrogate mother along with the person donating the sperm. Child is considered as illegitimate as it is not the product of lawful marriage.
2) Divorce or Nullity of marriage: If ART is due to sterility then it does not amount to nullity of marriage or is ground for divorce. But if it is due to impotence, then it can be considered as ground for nullity of marriage or divorce.
3) Adultery: Even though there is no punishment for adultery as per Indian law but still it is ground for divorce. But child produced due to ART does not amount to adultery as there is no natural intercourse.
4) Incest: There is possibility of incest between the children born by ART and children of the donor. But as per Indian law, Incest is not liable for punishment.[9]
5) Consummation of Marriage: Conceiving of child by ART including AIH does not amount to consummation of marriage in spite of child born is biologically of the husband. Marriage still remains voidable.
6) Posthumous AIH: Child born through ART to widow by using stored sperms of her deceased husband must be considered as legitimate which may be in contrast to current law as mentioned in Section 112 IEA which states that child born after 280 days of the death of husband is illegitimate.[10]

There is variation in status of the children born out of ART in different countries

Status in United states of America

There was big confusion regarding the status of A.I.D. child in relation to the legitimacy. Few cases regarding these issues were in favour of legitimacy while few were against it.

1) Strand vs Strand was the first case to address the issues about legitimacy of the child born of A.I.D. The case concluded that if there is consent given by the husband for A. I.D., then the child born of A.I.D. will be

considered to be legitimate child of the married couple and not of the donor.

2) Doornbos vs Doornbos case: The court concluded that the child conceived through the process of A.I.D in spite of the consent of the husband will be considered as an illegitimate.
3) GURSKY v. GURSKY case, Supreme Court, Special Term, Kings County.: court also coincide with the judgement of Doornbos Vs Doornbos. But it also added that husband has to provide support to the child conceived from A.I.D.[11]

Position in U K:

Legitimacy act 1926 concludes that the child born out of wedlock will be considered an illegitimate until they get married subsequently. As this act was in previous era, there is no mention of child born of A.I.D. But it was incorporated in later in Family law reforms act in 1987 where the sentence act of intercourse resulting in the birth was replaced by act of insemination resulting into birth.

Other countries:

In many countries there is no difference between legitimate and illegitimate children including countries like New Zealand, Jamaica etc. Major religions and several countries have policies or recommendations about sperm donation. Few religions and countries are opposed to ART treatments.[12]

Status of A.I.D. child under Indian law:

- Concept of A.I.D. has not been that common as far as India is concerned. With the birth of the first scientifically well documented test tube baby in 1986 in India, there was escalation of IVF clinics over the country deprived of accreditation, supervisory and regulatory body as well as absence of government's control. This forced the Indian Council of Medical Research (ICMR) to prepare National Guidelines for ART Clinics in India in 2002.
- Subsequently, the Ministry of Health & Family Welfare, Government of India modifies and published the National Guidelines in 2005.
- Then, Indian Council of Medical Research (ICMR) drafted Assisted Reproductive Technology (Regulation) Bill in year 2008 and forwarded to the Ministry of Health & Family Welfare, which was then revised by the Ministry of Law & Justice as Assisted Reproductive Technology (Regulation) Bill-2013. Assisted Reproductive Technology (Regulation) Bill was tabled on multiple occasions.[13]

With advent of ART, multiple medicolegal issues come into picture. One of the issues related to A.I.D. was legitimacy of the child born by A.I.D. In Case of Nirmala of Chandigarh, the court finally gave the judgement that child born of AID be considered as legitimate and as her husband had given consent for AID, it does not amount to adultery.[11] Even the ICMR guidelines specifies that child born of assisted reproductive technology to be considered to have right of parentage, inheritance and support.[14] Currently there are no punishments for not following the guidelines. Only Action may be taken by state medical council or NMC. Solitary act applicable in relation to this is Delhi Artificial insemination act which is applicable in Delhi and no law applicable to the rest of the country.[10]

Current scenario in relation to art legislations.

The Government of India has introduced THE ASSISTED REPRODUCTIVE TECHNOLOGY (REGULATION) BILL 2020 in Loksabha on 14th September 2020.

- It clearly specifies that all ART services to be carried out by ART clinics and ART banks for storing and suppling gametes.
- All the ART clinics and ART banks to be registered in National registry of banks and clinics in India.
- State governments are expected to facilitate the registration process through registration authorities.
- Registrations of ART clinics and ART banks will be done only if they strictly satisfy the prescribed standards, failure of which result in suspension of registration.
- This bill provides multiple provisions which are aimed at curbing commercialization of surrogacy and other ART methods.
- There is provision of the women donating oocyte has to be married and have at least one live child of minimum three years of age.
- The age of the males donating semen has to be between 21 years and 55 years while females donating oocyte has to be between 23 years and 35 years.
- Female can donate oocyte only once in lifetime and not more than 7 oocytes to be recovered from her.

- ART bank cannot supply gamete from one donor to more than one couple.
- This bill also make provision for insurance cover to oocyte donor female in case of damage or death.
- It also restricts the sex determination of the child and gave emphasis for screening of genetic diseases before embryo implantation.
- It also makes provision for National and state board for surrogacy formed under Surrogacy regulation Bill 2019. To act national and state boards for regulation of ART services.
- It also prescribes offences comprising of 1) abuse or desertion of child born of ART 2) commercialization or trading or importing gamete or human embryo 3) using touts or agents for getting donors 4) Abuse of donor, commissioning couple or woman in any way 5) transfer of human embryo in male or animal; as well as punishment in form of imprisonment or fine.

Status of child born of ART

This bill clearly mentions child born of ART will be considered as natural child of commissioning couple and will be having all the privileges and rights of natural child. It also mentions that the donor will not be having any parental right over the child.[1]

3. Conclusion:

The prevailing laws in India does not clearly specifies legal implications of ART. Since ART was very essential for many childless couples for having children, it is destined to escalate over period of time. To circumvent the difficulties and untoward situations, appropriate legislative provisions has to be enacted, else the child born out of AID will experience great hardship which will unfair. The Assisted Reproductive Technology (regulation) bill 2020 if implemented effectively as an act will curb the exploitation of commissioning couple or donor and can be instrumental in providing appropriate rights to the child conceived of ART.

Conflict of interest: None.

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Case Report

A Rare Case of Biliary Peritonitis Due to Rupture of Common Bile Duct as a Result of Blunt Trauma Abdomen.

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Biliary peritonitis,
Blunt trauma abdomen,
Common bile duct,
Road traffic accident.

Abstract

Background: Injury to the common bile duct and gall bladder due to blunt abdominal trauma is not usually reported. Usually, common injuries to the liver, spleen, bowel, and mesentery were reported due to blunt abdominal trauma in road traffic accidents. Routinely Physician focuses on such types of injuries and misses the injuries to unusual internal organs like common bile duct and gall bladder. We report a rare case of biliary peritonitis due to blunt abdominal trauma in case of a road traffic accident where there was unusual involvement of common bile duct.

Case Report: A 37-year-old man commuting in a bullock cart hit by a lorry and sustained minor abrasions on the back. He was taken to a nearby hospital and referred to our hospital after 18 hours of the incident. However, patient was expired during treatment within 36 hours of admission. The autopsy revealed bile stained fluid in the peritoneum and injury to the common bile duct near the pancreatico-duodenal junction. Histopathology of the gall bladder revealed the chronic inflammatory changes.

Conclusion: Isolated traumatic rupture of the common bile duct due to blunt abdominal trauma without injuries to surrounding organs is very rare. Meticulous autopsy helps to detect such type of internal injuries and to study the mechanism of injury causing the death following trivial trauma.

Background

Trauma to the abdomen could be either open or closed. However, the damage following trauma depends upon the type of force, the site of impact, and the resistance offered by the abdominal wall. It also varies depending on the consistency, mobility, state of distension of organs. Following trauma, the rupture of solid organs such as the liver and spleen occurs more frequently than hollow organs like the stomach and intestines. Intra-abdominal injury following blunt trauma is common but gall bladder injury after blunt trauma is not common. Solitary injury to the extrahepatic common bile duct following non-penetrating blunt abdominal trauma is extremely unusual. But it may occur iatrogenically as a complication of cholecystectomy or during gastrectomy, pancreatectomy, or endoscopic retrograde cholangiopancreatography (ERCP).[1]

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Incidence of cholecystectomy-associated bile duct injury between 0.1% to 0.3% for open cholecystectomy and 0.3% to 0.6% for the laparoscopic approach.[2,3] Biliary peritonitis following blunt abdominal trauma is extremely unusual. The mortality rate of biliary peritonitis is 50-75%.[4] Most common cause of biliary peritonitis following blunt abdominal trauma is gall bladder injury while the extrahepatic biliary injury is a rare entity.

The most commonly injured organs being the gall bladder while the extrahepatic biliary injury is a rare entity. The surrounding liver, kidney, duodenum, costal arch along with vertebral bodies provide bony and visceral cushion to the extrahepatic biliary duct. Due to their infrequent occurrence of non-iatrogenic extrahepatic biliary tract injuries, there is an inadequate index of suspicion and patient evaluation for these injuries. [1] Incidence of bile leak following extrahepatic biliary trauma is reported as 0.5-2.1%.[5] Mortality among these is extremely unusual due to failure to suspect the possibility of such injury and immediate exploratory laparotomy resulting in a fatality.

Usually, biliary injuries are reported due to iatrogenic causes and are repaired successfully. The complexity of bile leaks after blunt abdominal trauma is more, unlike iatrogenic bile duct injuries. However, biliary injuries due to non-iatrogenic causes such as penetrating trauma due to stab injury, gunshots, and non-penetrating blunt trauma abdomen due to a road traffic accident, blows, or kicks, fall from height.[6] Injury to biliary tract following blunt trauma abdomen can be extrahepatic or intrahepatic. We report an unusual case of biliary peritonitis due to traumatic rupture of common bile duct following a road traffic accident with trivial external injuries.

2. Case report:

Thirty-seven-year-old male presented to the hospital with complaints of discomfort and pain left side of neck, left upper limb, numbness of lower limbs for 2 days. Perusal hospital records revealed a history of travelling as a passenger in a bullock-cart and the bullock-cart was struck from behind by a lorry and thrown out of the cart. However, he sustained minor abrasions on the upper back. After two days, he went to a nearby hospital complaining of pain in the neck, numbness, and weakness of the limbs. CT-C Spine revealed fracture of C4 vertebra and he was diagnosed with traumatic quadriparesis, referred to a higher institute for treatment on Day 3 and died within 36 hours after admission on day 5.

On autopsy, he was moderately built, stature (164cm), weight (60 Kg), teeth (16/16), and rigor mortis were well marked all over the body. Grazed abrasion (brown scab) was present on the back of the left scapular region and back of the left arm. Internal examination revealed bile-stained fluid in the peritoneal cavity (fig.1a) and the viscus on the right side such as the duodenum, hepatic flexure, ascending colon, right kidney was bile-stained (fig.1b) owing to suspicion of the ruptured gall bladder. But the gall bladder remains intact.

Figure 1a: Bile-stained fluid extravasation from peritoneal cavity. Figure 1b: Showing bile-stained hepatic flexure, ascending colon.

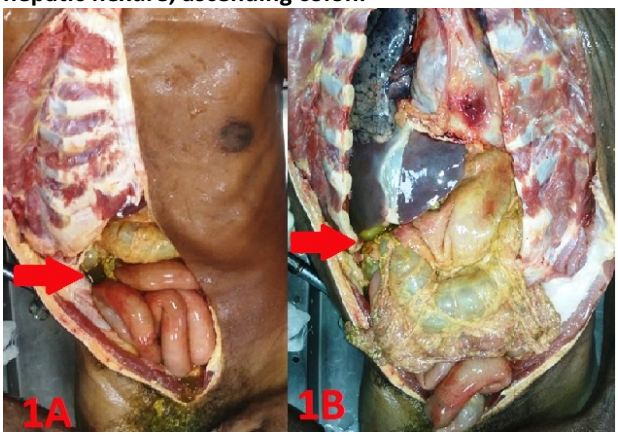
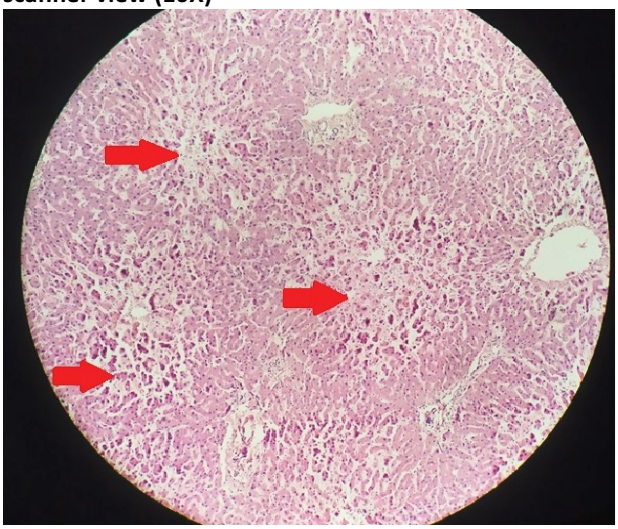


Figure 2: H & E staining of liver showing spotty necrosis scanner view (10X)



On meticulous inspection of the biliary and the extrahepatic biliary tract, we found a 1cm long defect in the common bile duct retro-pancreatically

just before its attachment into the second part of the duodenum. A histopathological examination was done for the site of rupture and bile-stained tissues such as liver, ascending colon, gall bladder. Microscopic sections revealed focal spotty necrosis and degenerative changes of the liver (fig.2); chronic inflammatory changes of the gall bladder (fig.3) and serosal inflammation of the ascending colon (fig.4).

Figure 3: H & E staining of gall bladder showing wall with chronic inflammatory cells (40X)

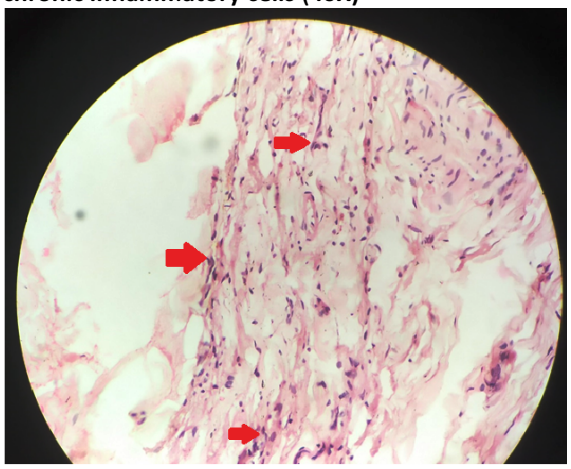
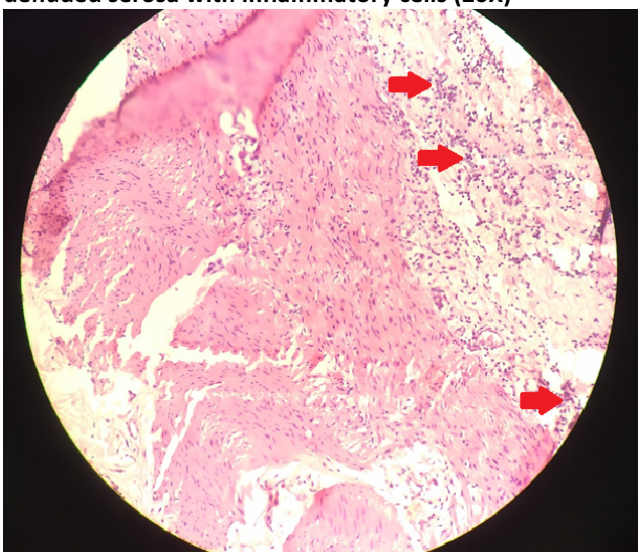


Figure 4: H & E staining of ascending colon showing denuded serosa with inflammatory cells (20X)



The pathological diagnosis was a traumatic rupture of common bile duct. The opinion as to cause of death was biliary peritonitis due to the rupture of common bile duct as a result of blunt trauma abdomen.

3. Discussion:

Intra-abdominal injuries following blunt trauma abdomen are more common owing to the high incidence of road traffic accidents. The more frequently involved abdominal organs in blunt trauma abdomen are liver, spleen, kidneys when compared to the gall bladder, and extrahepatic bile duct. They are well-guarded beneath the costal margin. Injury to the gall bladder or common bile duct after non-penetrating blunt trauma is less reported. Solheim reported only 3 cases of injured gall bladder out of 291 cases of closed abdominal injury encountered during the twenty years.[7] Traumatic extrahepatic biliary tract injuries represent less than 1 percent of all traumatic injuries.[1] Smith et al. collected twenty-six cases of rupture of the extrahepatic biliary tract in the literature review and added his case report. [8] According to Burchardt, the actual site of perforation cannot be demonstrated as a minute perforation permitted the escape of bile under tension. [9]

Bile duct injuries may be classified by mechanism and type of injury, location of the injury, the effect on biliary continuity, and timing of identification. Concomitant rupture of multiple organs occurs due to anatomical proximity, the sudden force causing compression, sudden flexion of the trunk putting undue strain on the underlying viscera. Traumatic injuries include partial or complete extrahepatic duct transection or duct avulsion, occasionally in near the pancreas.[10] Overall incidence of bile duct injuries in blunt abdominal trauma cases is 3-5%. Out of which 85% are due to penetrating trauma and 15% due to non-penetrating trauma. Among the 15% of non-penetrating gall bladder trauma, 85% have a solitary involvement of gall bladder. In our case, there was a solitary injury to the extrahepatic biliary tract following blunt abdominal trauma without the involvement of adjacent visceral organs. Rupture of the extrahepatic biliary tract following abdominal trauma is unusual. Injury to a biliary tract following trauma can be either extrahepatic or intrahepatic. Extra-hepatic bile duct injury may occur solitarily without the involvement of liver while intra-hepatic bile duct injury is invariably associated with the liver injury.[11] The liver is the most concomitantly injured organ in more than 50% of the cases.[5,7] However, in our case there was no associated liver injury. Wainwright reported the first case of common bile duct injury in 1799. [4] Bourque et al- reported 125

cases since 1806, of which 1/3rd was pediatric group. Dawson et al- reported one case of common bile duct injury out of 10,500 consecutive trauma patients.[12]

Biliary peritonitis carries a mortality rate of 50-75%. The most common cause of non-iatrogenic and non-penetrating traumatic biliary peritonitis is gall bladder injury while extra-hepatic bile duct injury is reported in a few cases.[13,14] Common sites of injury of the common bile duct are usually at the areas of relative fixation of biliary tract i.e., a) origin of left hepatic duct b) bifurcation of hepatic ducts and c) pancreaticoduodenal junction. In the present case, there was localized injury to the common duct at the pancreaticoduodenal junction triggered by the trivial trauma due to blunt force leading to the combination of two mechanisms discussed here. There was an eventual transection of the intrapancreatic bile duct due to the shearing forces on the common bile duct at its fixed point at the edge of its entrance to the pancreas.[12] Mechanism of injury to common bile duct is well explained as horizontal deceleration trauma due to compression of a ductal system against the vertebral column and shearing force causing avulsion of common bile duct at its fixed part or due to sudden rise in intra-luminal pressure of gall bladder owing to the short and permeable cystic duct.[13] In our case, there was horizontal deceleration force and shearing force was acting on the ductal system and the pre-existing chronic inflammatory condition of the gall bladder. This resulted in the perforation of the common bile duct. "Biliary Dew" has been the term coined by Leriche in 1923 for such cases where a minute perforation occurs in the retro-pancreatic portion of the common bile duct from where the extravasated bile leaks into the peritoneal cavity. [11] In our case biliary dew was seen without any blood due to solitary injury to the common bile duct.

Smith and Sherlock emphasized the difficulty of early diagnosis of rupture of the extrahepatic biliary system until 36 hours or more after the accident unless the bile is infected enough to cause symptoms and signs of severe peritonitis.[15] In this case, there was a delay in the recognition of biliary leakage clinically and biliary peritonitis was detected due to meticulous dissection during the time of autopsy. Although localized bile may be tolerated in the peritoneal cavity, generalized choleperitonitis becomes fatal in a short period.[16] Bile in the peritoneal cavity induces toxic manifestations by the irritable nature of the bile acids and bile salts which produce decreased circulatory volume ensuing shock. This case emphasizes the occurrence of trivial trauma to the pre-existing and silent chronic conditions exacerbate the injury to the extrahepatic areas of common bile duct solitarily.

4. Conclusion:

In our case, the site of rupture of the common bile duct is the retro-pancreatic and combined effect of horizontal deceleration trauma leading to rupture which is highly unusual and unexpected causing fatal peritonitis. The meticulous autopsy revealed an undetermined rupture of the common bile duct in the region of its attachment to second part of duodenum retro-pancreatically. This case highlights the importance of autopsy in understanding the mechanism, site, and severity of injury although there are negligible external injuries. Late recognition and delay in diagnosis due to lack of awareness of the mechanism of injury might lead to mortality. Histopathological findings played an important role in relating the extent of damage to viscera.

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Case Report

Death due to Pulmonary and Splenic lymphangiectasia: A Rarely Diagnosed Disorder.

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Key words
Lymphatic dilatation, Developmental disorder, Lymphangioma, Hamartoma.

Abstract

Pulmonary lymphangiectasia is a rare developmental disorder involving the lungs, characterized by pulmonary subpleural, interlobar, perivascular and peribronchial lymphatic dilatation. Splenic lymphangiectasia is characterized by lymphatic dilatation in the spleen with impaired splenic function. The current case is taken for presentation considering the rarity of the disease condition and the mortality arising out of it is still rarest. It also aims to highlight the clinical presentation of disease because most of the times cases are sporadic and aetiology is not completely understood so early suspicion of case, diagnosis and prompt treatment may help to save the precious life.

1. Introduction

Congenital pulmonary lymphangiectasia is a rare developmental disorder involving the lungs, characterized by pulmonary subpleural, interlobar, perivascular and peribronchial lymphatic dilatation. Pulmonary lymphangiectasia presents at birth with severe respiratory distress, tachypnea and cyanosis, with a very high mortality rate at or within a few hours of birth. Most reported cases are sporadic and the etiology is not completely understood.[1] Although there have often debates on the classification and differential diagnosis of the disease, it can usually be divided into primary (congenital) and secondary forms.[2] Normal pulmonary artery wedge pressure and radiographic appearance of increased interstitial markings should lead to suspicion of pulmonary lymphangiectasia. The substernal thickening in three patients is also characteristic of substernal lymphatic collection.[3] Pulmonary lymphangiectasia presents with dilated pulmonary lymphatics as part of a generalized form of lymphangiectasia, i.e., truncal lymphangiectasia, which is usually associated with lymphedema.[1]

Splenic lymphangiectasia is characterized by lymphatic dilatation in the spleen with impaired splenic function. Splenic lymphangioma is a neoplasm or a hamartoma, most researchers support the latter opinion; its formation is proposed to be due to abnormal congenital development of lymphatic vessels. It can also be attributed to bleeding or inflammation in the lymphatic system, which causes obstruction and consequent lymphangiectasia.[4,5] Along with these two forms the other form which is prominently found is Intestinal lymphangiectasia. Which is characterized by dilated lymphatics, protein-losing enteropathy, hypoalbuminaemia and oedema, and patients with this disease lose albumin, immunoglobulins, and lymphocytes into the bowel.

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If the development of splenic atrophy results from prolonged lymphocyte depletion, it is likely that patients with intestinal lymphangiectasia will develop abnormalities of splenic function over the period of time.[6]

As far as global burden of disease is concerned, various Autopsy studies suggest that approximately 0.5–1% of infants who are stillborn or die in the neonatal period have Pulmonary lymphangiectasia.[7] This condition carries a poor prognosis with a mortality rate ranging from 50% to 98%, and the incidence of congenital chylothorax is about 1:10,000–15,000 pregnancies, with a male-female ratio of 2:1.[8]

Recent advances in intensive neonatal care have changed the previously nearly fatal outcome of pulmonary lymphangiectasia at birth. Patients affected by pulmonary lymphangiectasia who survive infancy, present medical problems which are characteristic of chronic lung disease.[1]

The current case is taken for presentation considering the rarity of the disease condition and the mortality arising out of it is still rarest. The aim is also to highlight the clinical presentation of disease, as most reported cases are sporadic and the etiology is not completely understood so early suspicion of case, diagnosis and prompt treatment may help to save the precious life.

2. Case report

A fourteen-year old male child brought to casualty of government medical college and hospital with complaints of severe pain in abdomen and one episode of vomiting in since 3 hours. Patient was apparently alright before this episode. The pain in abdomen is sudden in onset, progressive in nature and confined to epigastric region. Patient is irritable and restless. No history of chest pain, cough, fever, palpitation. The Sleep, appetite, bladder and bowel habits were normal before the episode.

The patient was examined thoroughly and given symptomatic treatment for the same and routine blood investigations and other lab investigations were sent.

On examination

Patient is restless with pain in abdomen; tachypnea was present and prominent cyanosis present, pallor present, profuse sweating seen, Pulse rate was 136 /min.

On systemic examination: cardiovascular system shows S1, S2 was normal, no murmur were auscultated. Respiratory system showed bilateral air entry with tachypnea, cyanosis, and pallor. Per abdominal examination shows tenderness in epigastric region. Central nervous reflexes were within normal limits.

Investigation.

Blood and lab investigation:

Total Serum bilirubin, direct serum bilirubin and indirect serum bilirubin were 0.6 mgs/dl, 0.3mgs/dl, and 0.3 mgs/dl respectively. The indirect serum bilirubin was slightly elevated other two parameters within normal limits. The Serum electrolyte values sodium was 145 mmol/lit and potassium was - 4.4 mmol/lit which are within normal limits. The Serum creatinine was 1 mg/dl, which is within normal limit. Blood urea level was- 15 mg/dl, which is within normal limit. Blood sugar level was- 212 mg/dl, which is elevated. The complete blood count including platelet count was within normal limit no any abnormality seen.

But three hours after admission the patient become restless, tachypnic and was not responding to any stimuli and declared dead. The cause of death remains undiagnosed in spite of meticulous examination and all laboratory investigations and the disease picture is was something different so they referred to Forensic Medicine Department for autopsy to know actual cause of death.

Postmortem examination:

The body was brought to autopsy room in the same hospital for examination along with police inquest and requisition letter.

On external examination the body was male aged 14 years, thin built, Cloths were intact Rigor mortis partially present, postmortem lividity present on back and buttocks and not fixed faint in colour. Nail, tip of nose and lips were cyanosed. No any other external injury or abnormality seen over the body.

On internal examination of thoracic cavity the pleura is pale and loosely attached to lungs with no collection is noted in pleural cavity. Lungs were pale, oedematous, enlarged and heavy with granular appearance, patchy consolidation was present at places. On cut section small cystic spaces were present at places with whitish coloured thin fluid in it. Spleen was enlarged, mushy in appearance. On

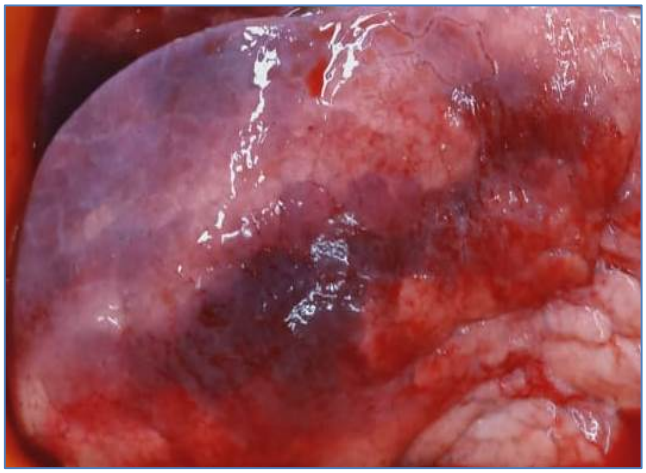
cut section cystic dilated spaces seen. The cranial cavity was unremarkable brain and its coverings were pale. Liver was pale and unremarkable, kidneys were pale and unremarkable, and heart was pale and unremarkable.

Histopathological examination

The lungs show findings of lymphangiectasia, focal granulomatous inflammation, and few thrombi in medium sized pulmonary vessels. Spleen shows evidence of lymphangiectasia.

Figure1: Showing granular appearance of lungs.

Figure 2: Showing areas of patchy consolidation over the lungs.



3. Discussion

Noonan et al. classified the pulmonary lymphangiectasis into three groups. Group 1 is a generalized form of lymphagiectasis (lymphedema with intestinal lymphangiectasis), group 2 is due to pulmonary venous hypertension or obstruction associated with cardiovascular anomalies, and group 3 includes patients compromised by a primary developmental defect of the pulmonary lymphatics.[9] New classification divides the lymphangiectasis into the primary (congenital) and secondary forms to differentiate it from the lymphangiomatosis, and they noted that the primary form presents in neonates and is usually fatal. The secondary form of lymphangiectasis results from a variety of processes that impair lymphatic drainage and increase lymph production. They proposed that primary and secondary lymphangiectasis can be distinguished by the age of the patients and their clinical courses.[10]

Pulmonary lymphangiectasia may present at birth as a stillbirth or with severe respiratory distress, tachypnea, and cyanosis, with a very high mortality rate at or within a few hours of birth.[11] The etiology of PL is not known. Although no consensus has yet been reached on whether splenic lymphangioma is a neoplasm or a hamartoma, most researchers support the latter opinion; its formation is proposed to be due to abnormal congenital development of lymphatic vessels.[5] It can also be attributed to bleeding or inflammation in the lymphatic system, which causes obstruction and consequent lymphangiectasia.[12,13]

It has been suggested that Pulmonary lymphangiectasia, lymphatic channels of the fetal lung do not undergo the normal regression process at 20 weeks of gestation, and thus there is a persistence of the large lymphatic vessels that are normal form of the maturation developmental process at 9–16 weeks of gestation.[1] Obstruction of pulmonary lymphatics or veins, or the actions of infectious agents have also been taken into consideration.[11]

The lymphatics of the lungs have valves that direct the flow of lymph toward the hilum.[14] From the hila, the lymph is carried by the broncho mediastinal trunks to the subclavian veins. There are right and left broncho mediastinal trunks with many anastomotic channels between them. Most of the lymph of the lungs goes to the right broncho mediastinal trunk, except the left upper lobe which is drained mainly by the left broncho mediastinal trunk.[15] Pulmonary lymphangiectasis may be the result of dilatation and ectasia of the pulmonary lymphatics due to incompetent valves or agenesis, or interruption of the thoracic duct with establishment of collateral pathways through the diaphragm and parietal pleura to the internal mammary chain.[3]

Hennekam Lymphangiectasia syndrome is a rare disorder characterized by presence of intestinal and renal lymphangiectasia, dysmorphic facial appearance and mental retardation. The syndrome is familial and was first reported in two male and two female children of consanguineous parents. The pattern of transmission was autosomal recessive.[16] Eom M. et al reported two cases of primary CPL in a 13-day-old male neonate and a one-day-old male neonate, showing prominent lymphatic dilatation in the septal, subpleural, and peri-bronchial tissue throughout both lungs. The latter case was associated with congenital cardiac anomaly including single ventricle. These are unique cases of CPL in Korea of which the diagnosis was established through post-mortem examination.[10]

Foster et al described a patient with intestinal lymphangiectasia who developed hyposplenism and speculate that it resulted from chronic loss of lymphocytes into the gut. This patient was saved with meticulous investigations and prompt, vigorous treatment.[6] Lahiri et al described the duodenal and splenic lymphangiectasia can exist in a scenario of chylous ascites without any obvious obstruction of lymphatic channels and in the absence of yellow nail syndrome. They describe the case of a 54-year-old man presenting with chylous ascites, lymphangiectasia and nephrotic syndrome with focal segmental glomerulosclerotic lesion in his kidney.[17]

4. Conclusion: Pulmonary lymphangiectasia is a rare developmental disorder involving the lungs, characterized by pulmonary subpleural, interlobar, perivascular and peribronchial lymphatic dilatation. Splenic lymphangiectasia is characterized by lymphatic dilatation in the spleen with impaired splenic function. Recent advances in intensive neonatal care have changed the previously nearly fatal outcome of pulmonary lymphangiectasia at birth. Patients affected by pulmonary lymphangiectasia who survive infancy, present medical problems which are characteristic of chronic lung disease. As far as forensic aspect of the disease is concerned the autopsy surgeon must look for the findings of this particular condition to reach the appropriate cause of death and also the associated organ involvement, which will help the clinicians in early diagnosis and prompt treatment may help to save the precious life.

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Letter to Editor

Pesticide Use and Health Hazards in India

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1. Introduction

India's economy is mainly dependent on agriculture. Green Revolution in India has led huge use of pesticides. Traditionally, pesticides were acknowledged as economic poisons. Pesticides can be classified into insecticides, fungicides, herbicides (weedicides) etc. Pesticides kill the pest by inhibiting or blocking enzymes, neurotransmitters and hormones in the different organs. It kills adult pests or prevents growth and development in young ones. Pesticides kill not only the pests, but also other animals and human beings through air, food and water. Various pesticides also linked to environmental pollution, and shocking effects on non-target species such as honeybees and earthworms.

Pesticides are hazardous to human health and wellbeing. Pesticide traces in food and water are causative agents for chronic health diseases such as immune suppression, hormonal disturbances, reproductive defects, and cancers. Children are at higher health risk of pesticide exposure by dietary intake as they consume more food per unit body weight as compared to adults. Maximum permissible limits is exceeded in many food samples in India. The routine use of pesticide is an occupational hazard.

Pesticides are commonly used poison for Suicidal purpose in India. Agricultural poisoning stands second amongst various methods used for suicide in India. Authentic record revealed that self-poisoning deaths are 23,172 per year. Several studies showed that the real number could be three times higher. Suicidal and accidental poisoning deaths add up to80,000 deaths every year .It is due to easy availability of toxic pesticides.

Hazardous pesticides use in India is lower than some developed countries such as the United States of America. In USA only two percent of the population is directly employed in agriculture and ninety-five percent of agriculture is mechanized which causes less contact between farm workers and pesticides. In contrast to this, in India seventy percent of Indian rural households are dependent on agriculture and farm mechanization levels being less than forty-five percent. This leads Indian farming communities in direct contact with pesticides. The toxicological pesticide effects caused malnutrition in these Indian communities. Indian farmers also rarely use safety measures due to lack of education, reasonably priced protective equipment, user regulation and enforcement. Therefore, it results acute toxicity in India.

2. Pesticide use in India

The pesticide business has effectively produced a myth that pesticides are an unavoidable prerequisite in modern agricultural production, even if food production happened for centuries without use of pesticides. Most of the farmers are unaware of the hazardous effects of pesticides.

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Thus, farmers started using them carelessly, and continue to uses till today. Various studies had shown that farmers in India do not use the requisite protecting measures as suggested, affecting their health.

3. Problem of pesticide residue

Various studies have revealed that in India food, environment and biological systems including blood samples and breast milk are polluted with pesticides. A recent report published by All India Network Project on Pesticide Residues reveals that pesticide residues were detected in 18.7% of samples, un approved pesticides were found in 12.5% of samples, and residues above the maximum residue level (MRL) recommended by FSSAI were noted in 2.6% of samples.

4. Health implications

Exposure to pesticides and poisoning is a major problem among farmers' in India. Exposure of pesticides are also hazardous to agricultural workers, women, children, and consumers as well. Pregnant women and children are the most susceptible groups. They get traces from food and drinks contaminated with pesticide residues. Pesticides get into the body via oral route, nasal passage, eyes and skin. Persistent exposure to multiple pesticides and cocktails can have much complicated health implications. It causes acute health effects such as headache, itching, burning sensation, nausea, vomiting, and weakness; unconsciousness and death in severe poisoning as well. Lipophilic pesticides get accumulated in organs with more fatty content and cause long-term degenerative effects. Pesticides mimic critical hormones in the body and cause unintended results. DDT and its metabolic product DDE behave like estrogenic hormones affecting sexual development.

Some pesticides cause long-term health effects including damage and dysfunction in the nervous system, immune system, hormone system, reproductive system, etc. Such impacts can result in diseases and disorders such as behavioral changes, learning disorders, attention deficit hyper activity disorder (ADHD),autism; incidence of allergies, infectious diseases; impaired body growth, hormone-related diseases and disorders, sexual development and reproduction, reduced sperm counts, infertility, miscarriages, endometriosis; early puberty, abnormal menstrual cycle, early child birth, birth defects; various types of cancers such as brain tumor, blood cancers, lung cancer, breast cancer, ovarian, uterine and cervical cancer.

5. Precautionary measures

A global campaign is demanding progressive ban on highly hazardous pesticides and phase out all other pesticides at the earliest. Non-chemical methods of food production and household pest management have to be promoted. We should encourage farming communities to opt for sustainable agriculture. To protect children, PAN India has urged Central and State Governments to impose a buffer zone (where use of pesticides should not be allowed) of at least a kilometer for schools, anganwadis, hospitals, human settlement areas, etc.

- Eat fresh, organic foods to avoid food-related exposure.
- Encourage non-chemical farming and support farmer-led local markets- know your food producers.
- Avoid pesticide use near to human settlements, residential areas, schools, anganwadies, health centres, public spaces, water resources, etc.
- Avoid use of toxic household pest management products, cleaning liquids, etc.
- At regulatory level, ban highly hazardous pesticides immediately and phase out all chemical pesticides and adopt agro-ecological practices.

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