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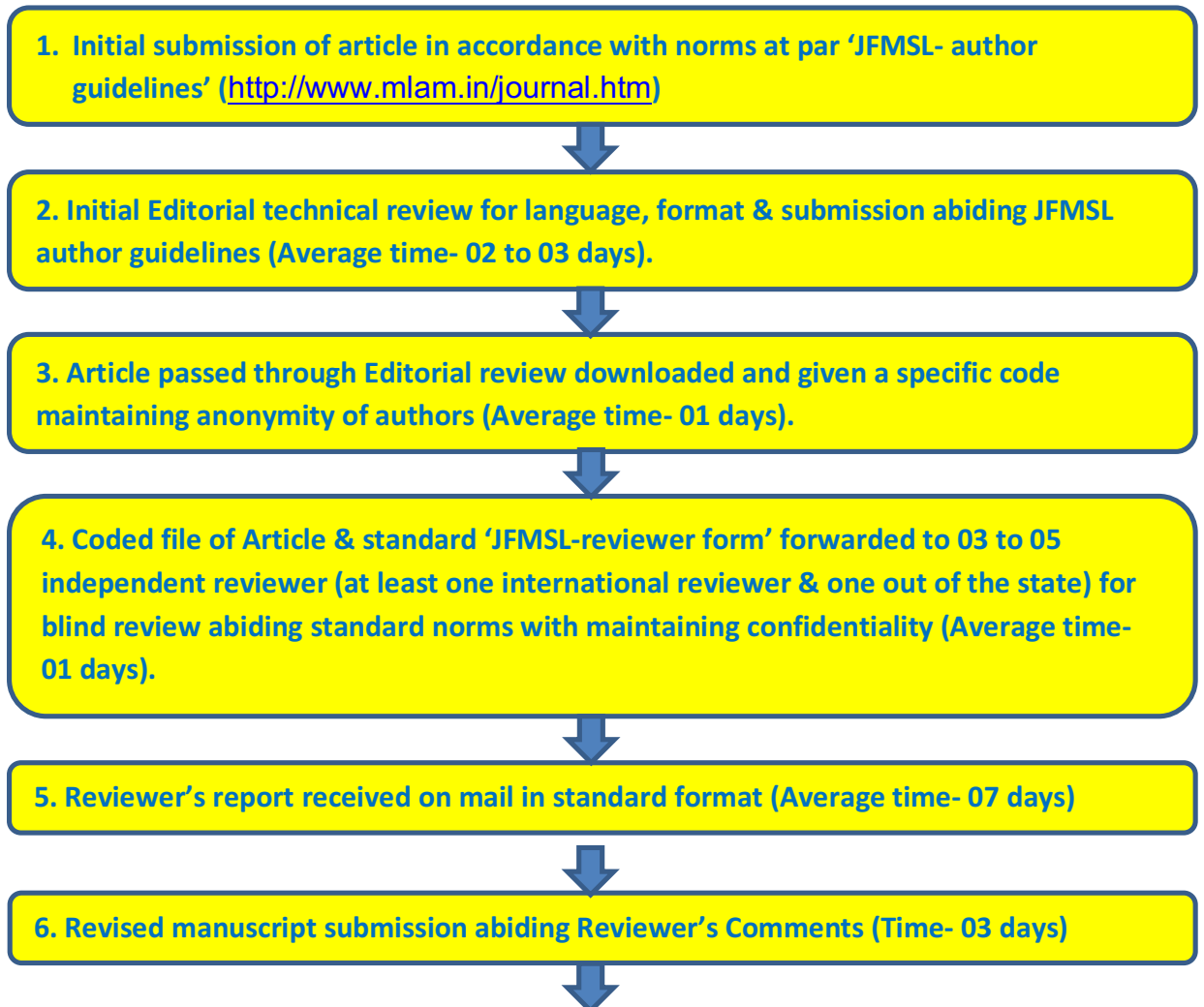
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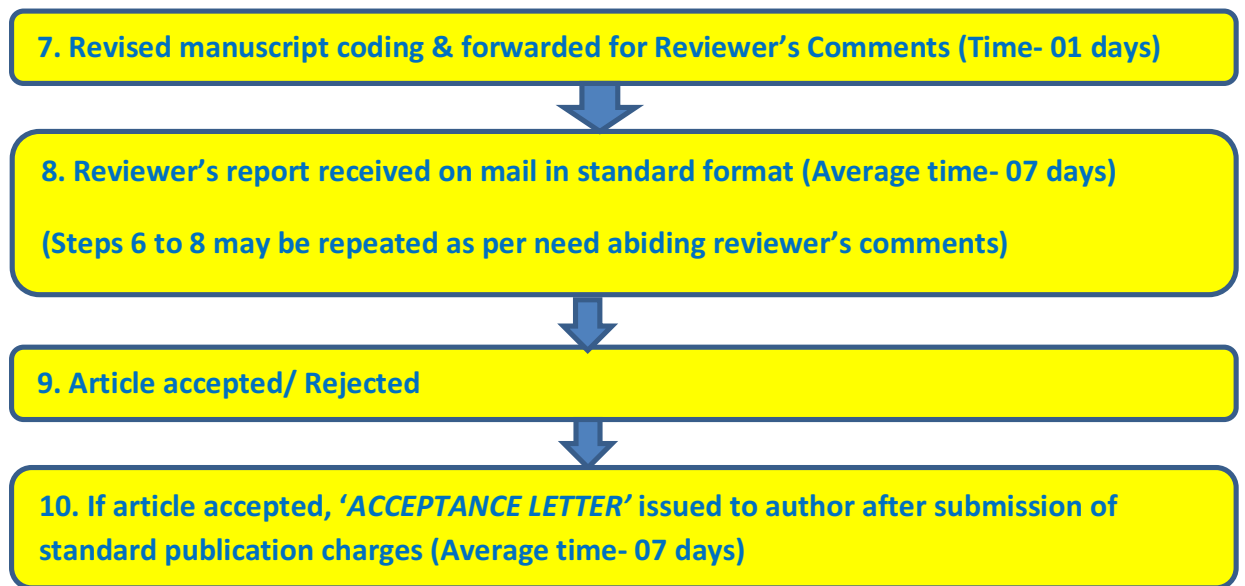
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Editorial

Workplace-based Assessment in Clinical Forensic Medicine

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New competency based curriculum (CBME) for medical education in India is being implemented from year 2019.¹ With the implementation of new competency based curriculum (CBME), there are major changes in undergraduate teaching-learning pattern. The subject teaching Forensic Medicine & Toxicology is spread over period of phase II & Phase III- Part I teaching and the final assessment will be taken at the end Part I of Phase III with subjects such as Community Medicine, Ophthalmology & ENT.² The competency based curriculum teaching in Forensic Medicine will be started in phase II and major attention on Clinical Forensic Medicine (CFM) teaching will be given in phase III with special emphasis on case-based teaching in Clinical Forensic Medicine. Assessment of competence Clinical Forensic Medicine is a challenge.²

A framework for clinical competence assessment given by psychologist George Miller in 1990 who proposed a pyramid with knowledge (knows) at the lowest level, followed by competence (knows how), performance (shows how), and action (does) at highest level.³ He distinguished 'action' from lower levels, which focuses on what happens in real clinical settings rather than artificial test settings. Workplace based assessment tools targets on the highest level of pyramid by collecting direct information on learner's performance at clinical practice. Other traditional methods of assessment include simulation tests, multiple choice questions and objective structured clinical examinations (OSCEs) focuses the lower levels of the pyramid. Traditional clinical assessment has many

shortcomings as it is a snapshot observation. There are artificial settings and lack of opportunity to improve performance to the learners.⁴ Workplace based assessment (WPBA) refers to various tools of assessment which evaluates learner's performance with direct observation of performance at the workplace i.e. during the clinical settings followed by feedback based on that observation by observer. This makes assessment valid & reliable with use of multiple encounters using different assessors in different settings.⁵ It helps to measure performance, as well as promotes improvement in performance. The learners' clinical performance observation at real workplace clinical settings along with relevant feedback by assessor fosters reflective practices and enables improvement in performance. WPBA gives more emphasis on formative assessment i.e. assessment for learning, rather than summative assessment i.e. assessment of learning.⁶

WPBA includes various assessment strategies which help to evaluate learner in clinical settings and provide feedback. Workplace based assessment (WPBA) includes clinical performance observation, clinical cases discussion and feedback from co-workers, peers, patients. The observation of clinical performance assessment can be done using tools like mini-clinical evaluation exercise, direct observation of procedural skills; clinical case discussion assessment. Before the discussion, the trainee used to select 2 (or more) cases and relevant clinical records to the assessor who selects one of them.⁷

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can be done using the tool like Case based discussion and the feedback from peers, coworkers & patients can be collected using Multisource feedback tool.

The different categories of WPBA^{3,5-7} assessing the various facets of learners' performance are given in **Table 1**.

Table 1: Different categories of workplace based assessment and their objectives

S. No.	Activity/Task	Assessment Tools
1	Observation of clinical performance	<ul style="list-style-type: none"> • Mini-clinical evaluation exercise (mCEX) • Direct observation of procedural skills (DOPS)
2	Discussion of clinical cases	<ul style="list-style-type: none"> • Case based discussion (CBD)
3	Feedback from peers, coworkers, and patients	<ul style="list-style-type: none"> • Multisource feedback (360° assessment) • Mini peer assessment tool (mPAT) • Team assessment of behaviors (TAB) • Patient satisfaction questionnaire (PSQ)

The detailed descriptions of various WPBA tools^{6,7} are as follows-

a. Observation of clinical performance

1. Mini-clinical evaluation exercise (mCEX):

In this tool the assessor evaluates the trainee's performance based on the observation of the interaction between trainee & patient at real clinical settings at workplace for specified time period. Usually, it is for 15 minutes' period of observation by assessor in which trainee expected to conduct history taking, physical examination including medico-legal examination in given stipulated time. Trainee used to suggest opinion & management plan at the end. The performance observed by assessors graded on nine-point Likert scale (unsatisfactory to superior performance). Different domain-specific clinical assessments were conducted with ratings by different assessor at each session with a final rating of clinical competence done at the end of year.

It enables evaluation with broader set of patients' problems in real time clinical settings where learner can choose a different assessor for each assessment. The various domains of clinical competence can be covered include history

taking, medico-legal examination including physical examination, efficiency, communication skills, professionalism, judgment. This can be used as assessment tool in different clinical settings such as outpatient clinics, wards, ward rounds, on-call shifts.

2. Direct observation of procedural skills (DOPS)

In DOPS, procedural skills of trainee were assessed in single encounter in real clinical settings on patient. DOPS designed to provide constructive feedback on procedural skills which are essential in the provision of good medico legal & clinical care. An assessor observes a learner performance in practical procedure at real clinical settings and marks the performance on structured checklist. It is scored evaluations by assessor with a face-to-face feedback session based on practical procedures and clinical examinations performed by trainee in a routine practical training with set criteria. It is a valid, feasible and reliable method of assessment in real clinical settings.

The behavioural attributes & procedural skills can be assessed in a DOPS includes the understanding of relevant anatomy, pre-procedure preparations, aseptic precautions, demonstrating the correct technique, communication skills, obtaining written informed consent, technical ability, appropriate sample collections in medicolegal cases, seeking help where needed, overall ability to perform procedure, professionalism, respecting patient's rights.

b. Discussion of clinical cases

1. Case-based discussion (CbD)

The CbD is a structured, in-depth discussion on actual case about decision-making & application of medical knowledge in real clinical settings between the expert and the trainee followed by constructive positive feedback. It enables exploration of professional judgment of trainee. It explores how the case is managed, what was exactly done, why and how such decisions taken with reasons for actions by the trainee. It enables medicolegal & ethical discussion at clinical practice. Assessor can evaluate the quality of record maintenance and case presentation. Knowledge, skills, attitudes and behavioral domains judged based on focused questions relevant to these domains.

Assessment generally completed in 15-20 minutes with an immediate feedback in five minutes. Various context of cases presented keeping balance on overall academic curriculum objectives. CbD is superior to objective structured clinical examination (OSCE), as it assesses the physician performance in real clinical settings rather than hypothetical test conditions. Hence, CbD has more face and content validity. CbD explores holistic, justifiable and balanced decisions in complex situations, deciding appropriate course of action, reasons for such decisions, and reflections on end results.

c. Multisource feedback (360° assessment):

In Multi-source feedback, a feedback from person's subordinates, co-workers, superiors as well as a self-evaluation gathered. It is a questionnaire-based feedback in which the performance is evaluated by peers, coworkers, patients (customers) & educational experts. Multisource feedback objectively assesses key competencies like interpersonal skills, communications skills, professional expertise, collegiality and the ability to progress in the medical practice. It may lead to gradual enhancements in professional competence.

1. Mini-peer assessment tool (mPAT)

mPAT consists of a confidential feedback from different peers on trainee's performance evaluating various aspects of domains such as appropriate diagnosis, application of available investigative tools, medico-legal management, time management, effective communication, stress management and knowledge of self limitations. The data on specific feedback from peers, colleagues and patients can further used to implement modifications in clinical forensic practices.

2. Team assessment of behaviors (TAB)

TAB is a one of the forms of multisource feedback assessment for the new doctors assessing professional behavioral domains such as developing professional relationship, maintaining rapport with the patient, effective verbal communications, team work, timely accessibility & availability, leadership qualities, decision making abilities. TAB can be used for summative & formative assessment. It enables improvement in performance.

3. Patient satisfaction questionnaire (PSQ)

PSQ includes a formative structured feedback from patient and reflecting on such feedback leading to learners' improvement and professional development of doctor.

Conclusion:

WPBA involves assessment of field performance and provide constructive feedback to learner in their routine clinical settings enabling valuable academic insight to learner, assessor with future opportunities to evidence-based interventional and experimental educational models leading significant impact in competency based medical education in Clinical Forensic Medicine.

Faculty needs to be trained in objective evaluations and providing effective constructive feedback for appropriate functionality of this assessment tool creating self directed learning environment in Clinical Forensic Medicine. Institutional or University level introductory seminars, sensitization and training programme on WPBA needed for professional development.

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Original Research Article

Recent Trends of Unnatural Deaths Amongst the Children and Adolescents in Yavatmal Region of Maharashtra

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Key words

Unnatural deaths,
Children, Adolescents,
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Abstract

Introduction: An unnatural death among children and adolescents is a shocking tragedy affecting family, friends and community. It's duty of society to protect them from unnatural tragedies. The present study was carried out to know the various causes of unnatural deaths and to analyse associated factors among 1–19 years. **Material and Methods:** A retrospective observational study by analysing medico-legal autopsy files of unnatural deaths in children and adolescents aged 1–19 years was done in the Department of Forensic Medicine of Shri V. N. Government Medical College situated at Yavatmal district of Maharashtra state (India). **Results:** This retrospective analysis revealed total 144 unnatural deaths in age 1–19 years. Majority were died due to accidents (49.31%) and suicides (42.36%). The most vulnerable age group included among accidents, suicides and homicides was adolescents between 15-19 years. Male preponderance was observed in accidents (61.97%) and homicides (91.67%), whereas females (72.13%) outnumbered the males in suicides. Road accident (38.03%) was the commonest cause of death in accidental deaths, followed by drowning (22.53%). Among suicides, consumption of poison (62.30%) was predominant cause, followed by hanging (24.59%). **Conclusion:** Ruthless driving of two-wheeler by older adolescents and unsupervised swimming in water reservoirs are the important major avoidable reasons for accidental deaths.

1. Introduction

Children and adolescents are the most vulnerable groups of society. Developmentally, childhood refers to the period between infancy and adulthood.¹ While, Adolescence is the transitional phase of

growth and development between childhood and adulthood. It's undoubted fact that, children and adolescents are the future of present society.

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They need good nurture and protection from dangers by their family and the society to achieve healthy adulthood. Unnatural death in these ages is a devastating tragedy which dramatically affects family, friends and community.

An unnatural death is a death caused by external causes (injury or poisoning) which includes death due to intentional injury such as homicide or suicide, and death caused by unintentional injury in an accidental manner.³ Accidental Deaths can be defined as any death that occurs as the result of an accident. An accident is an unplanned event that results in injury, deaths, damage to property or some other losses.⁴ Whereas, suicide is the deliberate act of taking one's own life and homicide is the killing of one person by another. In India all cases of unnatural deaths are subjected to the medico-legal autopsy.

Analysis of autopsy data is useful to know the current trends, different causes and associated reasons for unnatural deaths. All the more that the deaths under 19 years of age are mostly avoidable, analysis of trends in deaths due to possibly modifiable factors enables taking preventive measures at the national and local level and contributes to reducing future mortality.⁵ Therefore, the retrospective analysis of medico-legal autopsy data was carried out to ascertain the unnatural causes of deaths among children and adolescents (1 to 19 years). The study was also aimed to obtain useful information about modifiable circumstances to avoid such deaths in future.

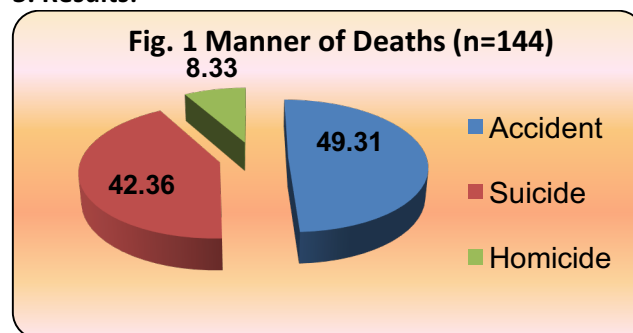
2. Materials and Methods:

The current study was conducted at the Department of Forensic Medicine of Shri V. N. Government Medical College, Yavatmal, Maharashtra state (India). The autopsy files of period January 1, 2016 to December 31, 2018 present in the Department were reviewed retrospectively. We used a pre-formed proforma to extract data from the records to ensure consistency of the whole data sample. The various epidemiological characteristics, details of the circumstances, cause and manner of death, and other relevant information were gathered.

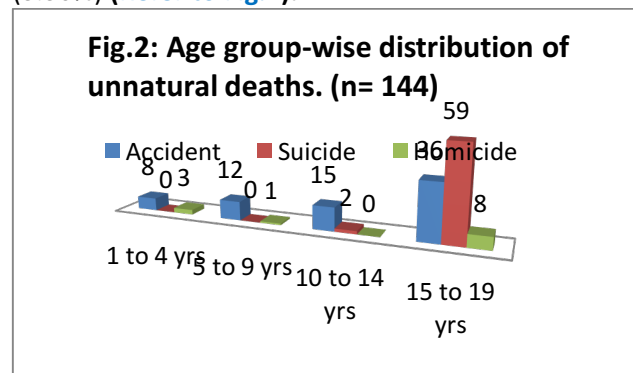
The unnatural death cases among children and adolescents aged 1 to 19 years were considered for present study. Unnatural causes of death were further categorized under accidental, suicidal and

homicidal groups. Factors such as history, information given in inquest papers and autopsy findings were taken into account while categorizing manner of death. The cases in which cause and/ or manner of death could not be ascertained were excluded from the study. Henceforth, a total 144 individuals aged 1-19 years who were definitely died due to accident, suicide or homicide were further studied comprehensively. The data on 144 cases was subsequently compiled, coded into tables and chart and analyzed in detail.

3. Results:

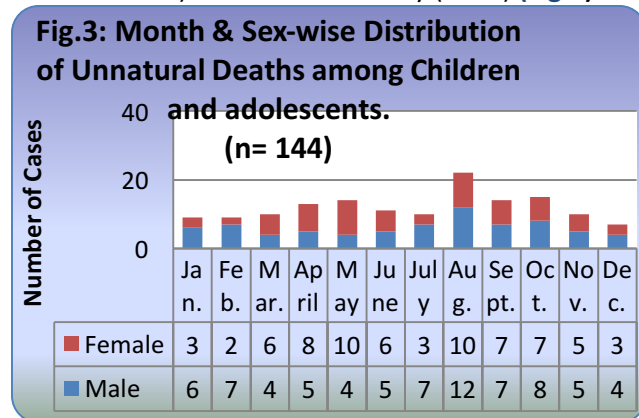


In the present study, accidental deaths were found to be most common manner of death comprising 49.31% cases, followed by suicides (42.36%) (Fig.1). Male preponderance was seen in accidents and homicides, whereas among suicides female predominance was noted. Individuals of 15-19 years were the most common age group involved including suicides (96.70%), homicides (66.66%) and accidents (50.70%). Second most common age group involved in accidents was 10-14 years (21.13%) and in homicides was 1-4 years (25%), whereas other age group contributing to the suicides was 10-14 years (3.30%) (Refer to Fig.2).



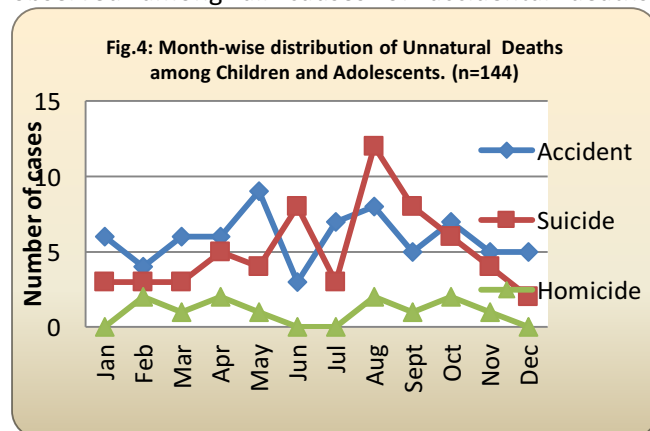
To determine whether there are any noticeable differences in occurrence of unnatural deaths at specific time point across year, month-wise

distribution of cases by sex and manner of death are studied as shown in Fig. 3 and 4. Highest mortality among boys as well as girls was found in month of August with 12 and 10 cases respectively. Males contributed more to unnatural death in month of January, February, July, October and December; whereas, in September both sex have equal number and in remaining months' females outnumbered. Males contribution peaked in month of February (M:F ratio= 1:0.286) and females in May (1:2.5) (Fig.3).



Among suicide mortality, there was a steep rise in August with 19.67% cases of total suicides, followed by a small seasonal peak in month of June (13.11%). Among accidents, highest numbers were observed in May (12.68%), followed by August (11.27%). (Fig.4)

In our study, the most common cause of accidental deaths was road accidents (38.03%), followed by drowning (22.54%). Other significant causes of accidental deaths were snake-bite (10 cases), electrocution (4 cases), burn (4 cases), and poisoning (4 cases). Preponderance of male sex was observed among all causes of accidental deaths



whereas, females outnumbered in accidental burn cases. Most common age group involved among children and adolescents in road accidents was 15-19

years. Individuals travelling on two-wheeler (mostly driver) were found to be most prevalent (62.96%) victims who die in road accidents. The most common cause of death in road accidents was head injury (59.25%). Male was predominant gender involved in accidental drowning (81.25%). Individuals of 15-19 years age group (61.54%) were most common victims of accidental drowning. Boys were mostly drowned while swimming with friends, whereas accidental fall in water reservoir while washing clothes was common reason among girls. Well, river and lake were the water reservoirs of drowning for all age groups except age group 1-4 years. Children of 1-4 years age group were accidentally drowned in a water/ septic tank in premises of their home. (Table 2)

In our study, poisoning (62.30%) contributed the most to suicides, followed by hanging (24.59%). Among all causes of suicide, females predominated except deaths due to drowning in which males outnumbered. Most of the suicides victims were aged 15-19 years (96.72%). Many victims of suicidal poisoning have consumed poisonous compound, mostly insecticides at their home (94.74%). Majority of individuals who consumed poison received treatment at hospital. The most common place of committing suicide by hanging was home (86.67%). Ligation materials most commonly used for hanging in adolescents were Odhani and nylon rope (7 and 4 cases, respectively). (Table 1)

In current study 12 cases of death due to homicide were observed, of which majority were male (11 cases). Sharp force and blunt force injuries jointly comprises maximum number of cases (83.33%). Adolescents aged 15-19 years were most commonly involved (66.66%) who were mostly died due to sharp force injuries inflicted by their rival. Other causes of homicides were ligation strangulation, throttling and poisoning. (Table 2)

4. Discussion:

Death of a child or adolescent is not only a shocking experience to their family but also an important social issue. Survival and morbidity free development of these individuals are always a first priority of their parents. All injury-related deaths which include accidents, suicides and homicides are preventable causes of mortality in this age group. In the present study, total 144 individuals of 1 to 19 years' age group died due to unnatural causes during

Table No. 1: Characteristics of deaths due to accidents among children and adolescents (n= 71).

Type of Accident	Sex (M:F ratio)	Age group involved	Other information
Road accident (n= 27)	M = 18 F = 9 M:F = 1:0.5	1-4 years= 2 5-9 years=5 10-14 years= 4 15-19 years= 16	Vehicular occupancy: 3- Pedestrian 17- Two-wheeler 4- Four-wheeler driver 2- Three-wheeler 1- Bicycle
Drowning (n= 16)	M= 13 F= 3 M:F = 1:3.63	1-4 years= 2 5-9 years=2 10-14 years= 4 15-19 years= 8	Place of occurrence: 6- Well 4- River 2- Lake 2- Tank
Snake-bite (n= 10)	M = 5 F = 5 M:F = 1:1	1-4 years= 2 5-9 years=2 10-14 years= 3 15-19 years= 3	Place of occurrence: 8- Home 2- Farm
Electrocution (n= 4)	M = 3 F = 1 M:F = 1:0.33	5-9 years=1 10-14 years= 1 15-19 years= 2	Place of occurrence: 1- Home 1- Farm 1- Electric pole 1- Area under construction
Burn (n= 4)	M= 1 F= 3 M:F = 1:3	15- 19 years= 4	History: 3- Stove burst 1- Fall of lamp
Others (n= 4)	M= 4 F= 4 M:F = 1:1	1-4 years= 2 5-9 years=1 10-14 years= 1 15-19 years= 4	Cause of death: 4- Poisoning 3- Head injury 1- Hanging

Table No. 02: Characteristics of deaths due to suicides among children and adolescents (n= 61).

Means of Suicide	Sex (M:F ratio)	Age group involved	Place	Other Information
Poisoning (n= 38)	M= 8 F= 30 M:F = 1:3.63	15-19 years= 38	36- Home 2- Farm	Treatment received:- Yes- 30 No-8
Hanging (n= 15)	M = 5, F = 10 M:F = 1:2	10-14 years= 2, 15-19 years= 13	13- Home 1- Farm 1- Hostel	Ligature material:- i. Odhani- 7, ii. Nylon rope- 4, iii. Saree- 1 iv. Long Handkerchief- 1 v. Not known- 2
Drowning (n= 5)	M = 3 F = 2 M:F = 1:0.66	15-19 years= 5	4- Well 1- River Dam	
Burn (n= 3)	M = 1 F = 2 M:F = 1:2	15-19 years= 3	3- Home	Treatment received:- Yes- 3 No-0

Table No. 3: Characteristics of deaths due to homicides among children and adolescents (n= 12).

Type of assault	Sex (M:F ratio)	Age group involved	Cause of death
Sharp force	M = 5, F = 0	15-19 years= 5	Stab to chest and abdomen- 5
Blunt force	M = 3, F = 0	1-4 years= 1 15-19 years= 2	Head injury- 3
Sharp and blunt force	M = 1, F = 0	15-19 years= 1	Multiple stab with head injury- 1
Others	M = 2, F = 1	1-4 years= 2 5-9 years= 1	Strangulation- 2 Poisoning- 1

period 2016-2018; among these, accidental deaths predominated (49.31%) followed by suicides (42.36%). According to National Crime Record Bureau (NCRB) of India, accidents are leading cause of death with total 4,13,457 individuals have died due to accidents, where as suicide is second most common cause with 1,33,623 individuals committed suicides in year 2015. Maharashtra state ranked first among accidental deaths and suicides in the country.⁴ Accidents and suicides are leading causes of death in India as well as all over the World.

Among suicides, month-wise distribution had shown two peaks: a large one, in month of August followed by significant number in subsequent month of September and second small one, in month of June. Student who committed suicide due to academic problems/ failure was the reason for rise in number of suicides in month of June. In addition to aftermath of academic failure, issues related to adjustment in new environment of college for older adolescents and academic problems might be reason for steep rise among suicides in August and September. Month-wise distribution of accidents had shown a seasonal peak in May month. This is a month of summer holidays in all schools and colleges across the India. There is increase in outside activities for boys such as playing, swimming and increased involvement in household works for girls such as cooking, washing clothes which increases the subsequent risk of accidental death.

Accidental Deaths have been classified as deaths that could be due to forces/factors of the nature which have been termed as 'Natural Accidental Deaths' or could be due to deliberate or negligent conduct of human beings, which is termed as 'Unnatural Accidental Deaths' or due to causes not covered in the above two categories and with no

initial apparent cause of deaths which have been categorized as 'Other Causes of Deaths' like poisoning, sudden death etc.⁴ In the current study, no natural accidental death was observed. Road accidents were the leading cause of unnatural death for children and adolescents, representing 38.03% of accidental deaths and 18.75% of all unnatural deaths. In India, traffic accident was the major cause of unnatural accidental deaths in year 2015 contributing 52.8%. Similar findings were reported by Indian studies from Manipal⁶ and Varanasi⁷ and, International studies from Poland⁵, Japan⁸, United States⁹, Iran¹⁰, and Estonia¹¹. In contrary to our finding, a study from Ghana¹² had reported drowning as most leading for injury-related mortality among adolescents with road traffic accidents being second most common cause. However, they have not further categorized manner of these drowning deaths.

Male gender was predominantly affected in road accidents contributing 66.66% as compared to their female counterparts in the present study. NCRB of India⁴ reported that, contribution of males was 81% among individuals who aged below 18 years and died due to road traffic accidents in 2015. Similar observation of male predominance in road accidents was reported by national¹³ and international studies.^{5,8,10} Male children are frequently affected because they are more involved in outdoor activities.¹³ Maximum number of deaths were observed in 15-19 years age group; majority being boys driving two-wheelers. The finding of major contribution by older adolescents among deaths in road accidents is also reported by other researchers.^{5,7,8,10-13} Combination of risk-taking behavior which includes high speed driving, not using helmet and greater independence compared to children and younger adolescents might be the reason

for these biker's death. Similar finding of more prevalence of death among occupants of motorcycle were reported by studies from Iran and Estonia.^{10,11} Contrary to our finding, a study from Chandigarh¹³ in India and a study from Ghana¹² have reported high proportion of pedestrians in road accidents, whereas in Poland⁵ car users (43.3%) were found to be mainly affected individuals. Making use of helmet compulsory, avoiding intoxicants while driving, strict implementation of traffic rules and educating youth regarding traffic rules are useful measures which can reduce mortality among bike riders. Regarding developing preventive strategies Gradja et al.⁵ have commented that, using the best practices of countries that have the lowest rate of deaths due to accidents seems to be the right approach in taking appropriate preventive measures.

Drowning was the second most leading cause of accidental death in which boys aged 15-19 years predominated. Most of the accidentally drowned boys were swimming with their same aged friends in water reservoirs. Moreover, in an incident two boys aged 9 years were accidentally drowned in a well. In rural areas swimming is learnt in water reservoirs which are actually not meant for this purpose and lacking safety measures. The reduction of the mortality due to accidental drowning among children and adolescents can be achieved by increased parental supervision when they are in the water or by the water, safeguarding water reservoirs, using instruments that facilitate safe movement in water, educating the public regarding the dangers in children near water reservoir and first aid education.^{5,14}

Childhood is the time for children to be in school and at play, to grow strong and confident with the love and encouragement of their family and an extended community of caring adults.¹⁵ Electrocution and snake-bite were the other causes which are undoubtedly accidents whereas, poisoning, burns, head injury resulting from fall were other important causes of accidental deaths which needs investigation to determine its exact manner. Majority of death due to burns categorized as accidents were females who fall in the 15-19 years' age group. Burns is a leading method of suicide among females of India. In the present study, history provided by the parents in female victims of accidental burns was of stove-burst while cooking. In these cases, the investigation did not proceed beyond formal inquiry as there was no

controversy/ allegation regarding manner of burns. There are chances that, the family member's might have hesitated to disclose actual manner due to social stigma attached with suicide in this age group.

Suicide is the final outcome of the complex interaction of biological, genetic, psychological, sociological and environmental factors.¹⁶ A high proportion of suicide victims in our study did so by consumption of poison (62.30%), followed by hanging (24.59%). Incidence of suicide and the methods used vary from country to country due to the variations in cultural, religious and social background.¹⁷ All over India, hanging (45.6%) is leading methods of suicide, followed by consumption of Poison (27.9%). The contribution of poisoning cases among suicide in the present study is well above the national percentage. The method adopted for committing suicide depends on convenience and availability of equipments.^{2,18} Yavatmal is a rural district, also known as cotton-belt in Maharashtra and insecticide compounds are in common use. Insecticides are kept at farm or home before and after spraying crops. In addition, there is no practice of keeping these compounds in lock and key for safety purpose whether at home or farm which leads to it's easy availability for adolescents. The most common ligature material used for committing suicide by hanging was Odhani. The ligature material used by the victim for hanging may be anything available at that moment, which includes any household article or belongings of the victim. Odhani is a part of commonly worn costumes by girls in this region and major contribution of females among suicidal hanging is a self explanatory reason for this finding.

When youth find themselves in the midst of a major life-crisis without any way out, suicide may become an option as a solution to their overwhelming problems.¹⁹ In this study, suicidal deaths were more common in 15-19 years age group, whereas only 2 cases were noted in 10-14 years age group. Similar findings with higher incidence of suicides in 15-19 years of age group among adolescents were reported by various researchers.^{2,5,8,10,20-23} The less incidence of suicide among younger adolescents and children could be associated with many factors such as: lack of cognitive maturation, high extent of parental care, good relation with parents, lack of development of indistinct ideas of nature and definitiveness of death and less exposure to risk factors.¹⁷ Also they receive

more autonomy and less supervision and social support from parents, which may increase the opportunity for disconnection and make recognition of imminent risk less likely.²⁴

Females (72.13%) outnumbered male victims among adolescent suicides. Female predominance in suicide among adolescent was reported by Indian studies^{2,20,25,26} and study from Tunisia²¹. As per NCRB of India⁴, the male preponderance was present among overall suicides (68.5%), but girls aged below 18 years were outnumbered (54.35%) boys among suicides. This could be due to psychological disorders like anxiety and depression occurs more often in girls. Both biological and social factors account for the greater prevalence of depressive disorders in women.²⁷ However, studies from other parts of the world observed male predominance among suicidal deaths.^{5,8,10,22,23}

Two common age groups involved among homicidal deaths were 1-4 years and 15-19 years. Among these, individuals aged 1-4 years were killed by blunt force injuries, strangulation and poisoning. Childhood is a precious time in which they should live free from fear, safe from violence and protected from abuse and exploitation. Victims of homicide in 15-19 years of age were males died mostly due to sharp force injuries. These incidents might be due to their Behavior traits that are associated with increased injury risk include hyperactivity, aggression, and antisocial behavior.²⁶

5. Conclusions:

Road accidents, accidental drowning, suicidal and accidental poisoning are the key areas to reduce unnatural mortality among children and adolescents. Use of Helmet, driving under parental supervision, strict implementation of traffic rules and increasing public awareness are key measures to decrease death in road accidents in this age group. Intensified parental supervision, use of instruments which facilitate movement in water and safeguarding water reservoirs are the steps to reduce deaths due to accidental drowning, whereas counseling, and identification and early psychiatric consultation of high-risk adolescents are possible useful measures for the prevention of deaths due to suicides. Moreover, safeguarding insecticide compounds under lock and key at homes and farm is a key step to prevent deaths due to suicidal poisoning.

Abbreviations:

NCRB - National Crime Record Bureau

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Original Research Article

Study of Profile of Homicidal Deaths at Mortuary Complex of a Tertiary Care Centre in Bhavnagar Region

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Homicide,
Assault,
Murder.

Abstract

The retrospective study is undertaken to analyze the profile of homicidal deaths occurring in Bhavnagar region to understand the relations of murders with demographic and personal data. The knowledge thus gained can be highlighted to reveal magnitude of its impact on the society as well as to attempt solution to assist global efforts to design evidence-based policies to prevent and reduce crime in those areas and population groups where violence is most acute. In our study, autopsy cases received by our hospital morgue registered and /or opined as homicidal deaths in 2018 were analyzed in this retrospective cross-sectional study. 89.47% cases were males. Most of the homicide victims were young men in the age group 21 to 30 years (44.73%). Urban and rural areas found to have same proportions of homicide victims – 50% each. On Wednesday, least number of homicides occurred – only 5.26%. Most homicide incidents occurred between 4 pm to 12 o'clock at night (57.90%). January, September and November have highest & same occurrence of homicide - 14.29%. Season of summer has highest occurrence of homicide – 42.10%.

1. Introduction

Homicidal crime rate data are considered among the most representative and comparable crime indicators. For the same, this study explores and analyses the recent patterns of the homicidal deaths and its demographic, social and medico-legal aspects in one of the major cities of Gujarat state. Murder is the highest level of aggression found in all cultures. ¹ The incidence of such heinous crimes provokes worries in the general population. Explanations for these crimes can be found, among others, in the rapid macroeconomic phenomenon of

internationalization, urbanization, and motorization and their related consequences on people and communities, life styles and practices. ² The retrospective study is undertaken to analyze profile of homicidal deaths occurring in Bhavnagar region to understand the relations of murders with demographic and personal data. The knowledge thus gained can be highlighted to reveal magnitude of its impact on the society as well as to attempt solution to assist global efforts to design evidence-based policies to prevent and reduce crime in those

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areas and population groups where violence is most acute.³ Information about place and time settings is vital as they can help in providing the pertinent information of murder and directs the murder investigation.⁴ Young offenders are becoming increasingly violent and this is a cause for concern, as they are future generation.⁵ Previously similar studies have been done in the same region by Parmar DJ et al.⁶

2. Aims & Objective:

- To analyze various aspects of homicidal autopsy cases according to victim's individual profile like Age, Sex, and Area of living i.e. Rural or Urban.
- To analyze various aspects of homicide cases according to the crime's occurrence like Season, Day, Time and Month wise variation of homicide cases.
- To draw public attention and awareness regarding current patterns of homicidal offences.

3. Methodology:

Approval from Institutional Ethics Committee taken before conducting this study. This is a retrospective cross-sectional study of 12 months duration of year 2018. This is a record-based study of homicidal cases, performed at the mortuary complex of our tertiary care hospital.

Data is collected from police papers, information by relatives of the deceased & from the post mortem examination of the deceased in a pre-designed proforma maintaining confidentiality.

All cases registered by police officials as homicides and all cases in which manner of death is given as homicide after conducting the post mortem examination during the study period of year 2018 were included in this study.

All cases registered by police officials as other than homicides, all cases in which manner of death is given as other than homicide after conducting the post mortem examination during the study period of year 2018 & any cases subjected for post mortem examination with alleged or suspected history of homicide but which were later registered as non-homicidal based on the post mortem examination findings, circumstantial evidence and investigation by the police and any cases where data was incomplete were excluded. Data was analyzed using Microsoft Excel.

4. Results:

Total of 38 (3.63%) Homicidal cases observed out of 1048 total post mortem examinations performed in the year of 2018.

Table 1: Gender-wise Distribution of Homicidal Cases

Sr. No	Gender	Cases (n=38)	%
1	Male	34	89.47
2	Female	4	10.53

Table 2: Age-wise Distribution of Homicidal Cases

Sr. no	Age group (Years)	Cases (n=38)	%
1	0-1	3	7.89
2	1-10	0	0
3	11-20	5	14.29
4	21-30	17	44.73
5	31-40	3	7.89
6	41-50	2	5.26
7	51-60	5	14.29
8	61-70	3	7.89

Rural and urban areas show same proportions of homicide victims – 18 cases each (50% each).

Table 3: Month & Season Wise Distribution of Assault Incidents

Sr. no	Season	Month	Cases (n=38)	%
1	Winter	January	2	5.26
2		February	1	2.63
3	Summer	March	3	7.89
4		April	3	7.89
5		May	5	14.29
6		June	5	14.29
7	Monsoon	July	1	2.63
8		August	1	2.63
9		September	5	14.29
10		October	5	14.29
11	Winter	November	6	15.79
12		December	1	2.63

5. Discussion:

The findings and results of proportions of homicidal deaths according to total post mortem examinations performed in the respective institution in the region are lower than the Global homicide rate i.e. 6.9 and the homicide rate of Asia, Europe and America which is 3, 4 and 16 respectively.³ Male victims constitute 89.47% of which 44.73% with the age group 21 to 30 years (Table 1). Parmar DJ et al⁶,

Rastogi AK et al⁷, Gupta A et al⁸, Dhaval J Patel⁹, Zanzrukiya KM et al¹⁰, Mada P et al¹¹ found similar results (Table 2). Second most proportion of victims observed in 11 to 20 years group which is 14.29%. These findings differ with the findings by Gupta A et al⁸, Dhaval J Patel⁹, G Angam et al¹².

Table 4: Time of Day-wise Distribution of Assault Incidents

Sr. No	Time	Cases (n=38)	%
1	Morning 5 AM to 12 at noon	3	7.89
2	Afternoon 12 at Noon to 4 PM	5	14.29
3	Evening 4 PM to 12 at Midnight	22	57.90
4	Night 12 at Midnight to 5 AM	1	2.63
5	Unknown	7	18.42

Table 5: Day of the Week-wise Distribution of Assault Incidents

Sr. No	Time	Cases (n=38)	%
1	Monday	6	15.79
2	Tuesday	3	7.89
3	Wednesday	2	5.26
4	Thursday	6	15.79
5	Friday	4	10.53
6	Saturday	6	15.79
7	Sunday	6	15.79
8	Unknown	5	14.29

Most homicide incidents occur in Season of Summer from months of March to June having 44.36% cases (refer to Table 3). These findings are similar to Rastogi AK et al⁷ & Dhaval J Patel⁹, Zanzrukiya KM et al¹⁰. Findings differ with the findings by G Angam et al¹². Considering the time of the assault, most homicide incidents fall in between 4 PM to 12 o'clock in Midnight – 57.90% (Table 4). Gupta A et al⁸, Dhaval J Patel⁹, Basappa S. Hugar et al¹³ found similar results. Unfortunately, few criminological studies have acknowledged the importance of time of homicide incidents as part of their study.^{8,9,13,14,15,16,17} Regarding time settings of murder, details about the exact time of murder incidents were not published in many cases.^{6,7,10,11,12} What is known is that the majority of homicides in India occur during late evenings and at night.¹⁴ In Salfati CG, Dupont F.¹⁵ study, 69.0% of the

victims were killed while it was dark outside. However, this observation was in contrast with Sri Lanka, where the majority of homicides took place during the daytime.¹⁶ A Malaysian study done by Kamaluddin M et al¹⁷ based on information from newspaper indicated that the majority of Malaysian murders took place during late evening or night time. Compared to Rastogi AK et al⁷, there is no relation to assault day of the week found with distribution of cases in our study. (Table 5)

6. Conclusion:

The result of age group proportions involved in homicidal incidents in these and many other similar studies is alarming for the nation as the youth are more involved in this type of assaults. Male gender seen more may be due to higher mobility and more socially active status. Males aged 21 to 30 years are more active, violent, and more vulnerable to the fast-changing social trends and culture.

Probably because of the weather in summer, most homicidal incidents observed as people go out regularly and meet other people more during summer because of no rain and much cold.

People tend to go out mostly in evening, hence the more cases falling in 4 PM to 12 O'clock at night time period.

For better results and evaluation of various aspects discussed here, long study time period should be considered. More researches needed indeed, and researchers should include data related to time, day & season of the homicidal incidents in these type of studies for better evaluation in future.

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Declarations of interests:

The authors declare that there is no conflict of interest.

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Original Research Article

Autopsy Profile of Unidentified Bodies: A Two Year Retrospective Study

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Death,
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Abstract

Identification means determination of individuality of a person. Determination of identity of an individual is important for civil and criminal matters. The aim of present study is to obtain a profile of unidentified dead bodies with reference to their age, sex, percentage of bodies that remain unidentified, cause and manner of death and to identify the place from where maximum numbers of dead bodies are brought. A total 1390 autopsies were conducted and amongst them 125 cases (10.93%) were found unidentified. Amongst 125 cases in 31 (24.8%) cases identity was established. Maximum deaths were due to natural disease (61.6%) followed by accidental deaths (20%). There is urgent need to form a separate portal for unidentified death registration at National level and the site should be easily visible, available and user friendly.

1. Introduction

Identification means determination of individuality of a person. Determination of identity of an individual is important for civil and criminal matters. Therefore it is carried out in the living and the dead. In India, determination of identity of a dead individual is primarily done by the Investigating Officer and the role of autopsy surgeon is complimentary. Identity of deceased is achieved through conventional means and scientific methods (1-3). In most of the cases identification is done through conventional means like showing photographs or clothes or ornaments or presence of tattoo or some deformity. In fresh dead bodies the conventional means of identification works and near relatives are able to identify the deceased.

This method is easy and economical. However, problem arises in decomposed or

skeletonised bodies and here scientific means are used. The aim of present study is to obtain a profile of unidentified dead bodies with reference to their age, sex, percentage of bodies that remain unidentified, cause and manner of death and to identify the place from where maximum numbers of dead bodies are brought.

2. Material and methods

This is a postmortem examination based retrospective study conducted at Department of Forensic Medicine, Government Medical College and Hospital, Miraj. We examined all available files of inquest papers, autopsy reports, histopathology reports and toxicological analysis reports into the death of people through 1 January 2017 to 31 December 2018.

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A standard proforma was designed to collect the information to ensure consistency for the whole sample. All bodies that were brought as unidentified were included however; skeletonised bodies were excluded from the study.

3. Results

A total 1390 autopsies were conducted and amongst them 125 cases (10.93%) were found unidentified. The demographic data is presented in **table no. 1**. **Table no. 2** shows age-wise distribution of cases.

Table 1: Showing sex-wise distribution of cases

Year	Male (%)	Female (%)	Total
2017	55 (93.22)	04 (6.77%)	59
2018	60 (90.90)	06 (9.09)	66
Total	115 (92%)	10 (8%)	125

Table 2: Age-wise distribution of cases

Age group	Number of cases	Percentage
11-20 years	02	1.6
21-30 years	08	6.4
31-40 years	26	20.8
41-50 years	38	30.4
51-60 years	31	24.8
61-70 years	19	15.2
71-80 years	01	0.8

Table 3: Month-wise distribution of cases

Month	Number of cases	Percentage
January	07	5.6
February	06	4.8
March	11	8.8
April	13	10.4
May	09	7.2
June	12	9.6
July	16	12.8
August	06	4.8
September	10	8
October	15	12
November	09	7.2
December	11	8.8

Maximum numbers of cases were from age group 41-50 and 51-60 (52.2%). **Table no. 3** shows month-wise distribution of cases. Maximum deaths were noted in rainy season (35.2%) followed by winter season (33.6%). **Table no. 4** shows cause of death.

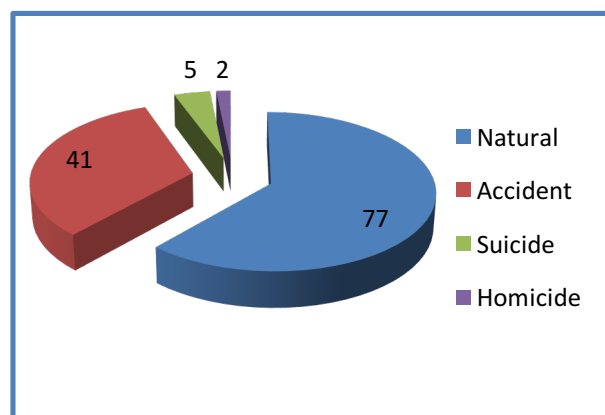
Table 4: Cause of death-wise distribution of cases

Cause of death	Number of cases	%
Natural disease	77	61.6
Poly trauma/ crush injury/injury to chest and /or abdomen/ decapitation	25	20
Head injury	11	8.8
Drowning	05	4
Electrocution	01	0.8
Stab wound over abdomen	01	0.8
Hanging	05	4

Table 5: Showing distribution of identified and unidentified cases

Cases	Male	Female
Identified cases	30	01
Unidentified cases	85	09

Fig 1: Showing manner of death



Maximum deaths were due to natural disease (61.6%) followed by accidental deaths (20%). (**Figure 1**) shows manner of death. Amongst accidental death, 33 deaths (80.48%) were because of railway and road accidents. In 113 cases (90.4%) clothes were handed over to the investigating officer for subsequent identification. In all cases on request of investigating officer, bones were preserved for DNA profiling. In all cases Police had taken photographs of deceased. In 24 cases (19.2%) tattoos were noted and amongst them 22 were male and 02 were females. Maximum number of cases [n = 54 (43.2%)] were brought from railway station, railway line and bus stands. 12 cases (9.6%) cases were hospitalized and admitted by 108 ambulances. Table no. 5 shows status of unidentified individuals. Amongst 125 cases in 31 (24.8%) cases identity was established. In 03 (2.4%) cases identity was

established on the same day while in 28 cases (22.4%) identity was established in subsequent days. The minimum duration to establish identity was 1 day and maximum duration was 273 days with mean duration of 33.42 days. In all these cases identity was established with conventional means.

4. Discussion

Miraj is a small but prosperous town and located in Southern part of Maharashtra. It has major railway junction and hub of hospitals. River Krishna flows throughout the year and therefore has flourishing agriculture, trade, business and industry. People from adjacent districts and Part of Northern Karnataka migrate in search for food, work and livelihood. Many of them may get some sort of shelter but few won't and resides at railway station or bus stand or footpaths. Total 125 unidentified bodies were brought in year 2017 and 2018 at mortuary of Government Medical College Miraj for postmortem examination and subsequent preservation in cold storage. This unidentified group consist of 10.93% of total autopsy workload. This finding is consistent with study conducted at Villupuram, Tamilnadu.⁴ However, studies conducted at New Delhi (16%) and Kolkata (24.5%) showed more number of unidentified deaths.^{3,5} Since both cities are metropolitan cities and therefore the residing population is more. Significantly a study conducted at Chandigarh showed only 3% of unidentified deaths¹ and study conducted at Ahmedabad showed 7.43% unidentified deaths.⁶

In the present study, gender-wise analysis reveals male (92%) outnumbered females (8%) and the findings are consistent with other studies.^{1,3-5}

Natural deaths account for 61.6% of total unidentified deaths in the present study. The findings are consistent with Chattopadhyay et al and Yadav et al.^{3,5} The study conducted at Ahmedabad had 20.19% coronary artery disease as cause of death.⁶ However, Kumar et al and Gitanjali had noted 47.1% and 26.93% death due to trauma respectively.^{1,4} The trauma is attributed to road or railway accidents. In the present study amongst accidental death, 33 deaths (80.48%) were because of railway and road accidents. This is of great concern. Majority of railway deaths are because of

fall from running train or walking along the rail road or not maintaining discipline at railway crossings.

As far as age is considered, in the present study, age group of 41 years to 60 were the most affected one and accounted for 52.2% of total unidentified deaths. The study conducted at New Delhi (31 to 50 years), Chandigarh (21 to 50 years), Kolkata (31 to 45 years), Villupuram, Tamilnadu (51 to 70 years) and Ahmedabad (31.73%) showed somewhat similar findings.^{1,3-6} In the present study, maximum number of deaths were observed during rainy season (35.2%) followed by winter season (33.6%). The study conducted at Chandigarh exhibited more deaths during winter season.¹ In Northern part of India, the temperature during winter may fall considerably and probably may be the reason for more deaths.

About 54 (43.2%) cases were brought from railway station, along railway line and bus stands. Along with this the street footpath is also major abode of homeless people. The lack of proper shelter, food and medical care leads to poor living condition and usually they became the victims of various infections and other diseases causing death.³

5. Conclusion

Unidentified death poses challenge to Investigating Officer as well as the autopsy surgeon. Nowadays the Investigating Officer is requesting to preserve piece of bone for DNA profiling. But unless near relatives are available, there is no use of DNA profiling. It is desirable the Investigating Officer should take appropriate colour photos of deceased and apparels and upload on their district website with description of the deceased.

Now many district Police headquarters are having their website and a portal is provided to register such unidentified death. But most of the websites are restricted to district headquarters and the page is difficult to open. Sometime the page opens but photograph or description is missing. Therefore there is urgent need to form a separate portal for unidentified death registration at National level and the site should be easily visible, available and user friendly. After formation of such portal adequate advertisement should be made and people should be made aware of such initiative. This will reduce the time required to establish the

identity of deceased after postmortem examination and help the relatives to approach appropriate Police Station to obtain the dead body.

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Conflict of Interest: None.

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Original Research Article

A study of Lip Print Pattern Among the South India Population

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Cheiloscopy,
Lip Print Pattern,
Branching pattern,
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Abstract

Cheiloscopy, the study of lip prints is an upcoming tool for the identification of individuals. Lip prints are unique to an individual just like the fingerprints and do not change during the life span of a person. Previous work done on the subject reveals that lip prints show differences according to the sex, race or the ethnic origins of an individual. The study was taken up to determine the predominant lip print pattern in South Indian population. 100 male and 100 female subjects of South Indian origin were included in the study. . The study was conducted during the period from July 2018 to September 2018. The lip print patterns recorded were studied and classified according to Suzuki's classification. The predominant type in each quadrant was noted and the percentage was calculated. It was found that Type II (branched grooves) was the predominant pattern.

1. Introduction

The wrinkles and grooves on labial mucosa, called as sulci labiorum forms a characteristic pattern called as lip prints and the study of which is referred to as cheiloscopy. ^[1] The lip prints are unique and can be identified as early as the 6th week of intrauterine life. Thereafter, lip groove patterns rarely change, resisting many afflictions. ^[2] Fischer was the first anthropologist to describe the furrows on the red part of the human lips. The use of lip prints were first recommended as early as in 1932 by Edmond Locard (1877-1966), one of France's greatest criminologists. Le Moyne Snyder in his book Homicide Investigation, written as early as 1950, mentions the possible use of lip prints in the identification of individuals. ^[3, 4] India is a vast country with 29 states, inhabited by diverse populations of tribes, castes, religions, and migrant groups. Although they share similar physical features,

they show differences in cultural, anthropologic, and genetic traits. ^[5] The aim of this study was to study the most prevalent lip print pattern in South Indian population of India.

2. Materials And Methods:

The study group comprised of both male and female students of South India of age between 18 – 25 years old was chosen. The lip prints of 200 randomly selected students were taken of which 100 are males and 100 females. The study was conducted during the period from July 2018 to September 2018. The whole method and objective of the study was explained to them clearly and informed consent was taken. The ethical clearance for the study was obtained from the institutional ethical committee before commencing the study.

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The materials used were as follows: Skin care cream – NIVEA, A strip of paper, Adhesive tape, Magnifying lens, Brush (Fingerprint brush\squirrel hair brush), Finger print dusting powder (black) and Blower.

In this study, the classification of patterns of the lines on the lips proposed by Suzuki and Tsuchihashi Y was used to analyze the lip prints.

Type I: A Lip with clear-cut groove running vertically across the lip.

Type I¹: Partial length groove of Type I.

Type II: Branched groove.

Type III: Intersected grooves.

Type IV: Reticular pattern

Type V: Undetermined.

3. Results:

The study of lip print patterns from 90 males and 92 female's students of South India were correctly identified and revealed the following observations. Type III was predominant in males followed by Type II and Type V was seen least in males. Females showed predominance of Type II and Type I pattern and Type IV was seen least in females. Most predominant type of lip prints in study population, taking both the upper and lower lips together is Type II which is branched grooves (Y shaped pattern) followed by Type III which is intersecting pattern and Type I (compete straight grooves) and Type I¹ (partial straight grooves). (**Table 1**)

Table 1: Gender wise predominance of Lip Print Pattern among the study Population (M-Male, F-Female)

Type	M L.Q	M R.Q	F L.Q	F R.Q	Male %	Female %
I	32	32	46	46	17.87%	24.86%
I ¹	27	27	48	48	15.08%	25.94%
II	44	44	57	57	24.58%	30.81%
III	58	58	19	19	32.40%	10.29%
IV	11	11	06	06	6.14%	3.24%
V	07	07	09	09	3.93%	4.86%

The least common type of lip print are Type IV and Type V which are reticular grooves and undetermined respectively. Quadrant wise predominance of lip prints. A total of 728 quadrants were studied in 182 individuals. Type III is more predominant in first and second quadrant of males. (**Table 2**) Third and Fourth quadrant shows predominance of Type II pattern in males. Type II is most predominant in first and second quadrant of

females. Type I and Type II is predominant in third and fourth quadrant of females.

Table 2: Percentage distribution of type of Lip Print Pattern among Population

Pattern	Total Quadrants	Percentage
I	156	21.42%
I ¹	150	20.60%
II	202	27.74%
III	154	21.15%
IV	34	4.67%
V	32	4.40%

4. Discussion:

Lip prints are very useful in forensic investigation and personal identification. Lip print is a potential and reliable method which is useful in determining the sex of an individual. In our study Type III (intersected groove pattern, 32.40%) was found to be more common in males followed by Type II (branched grooves, 24.58%). Females showed predominance of Type II (branched grooves, 30.81%) following Type I¹ (Partial length groove of Type I, 25.94%) and Type I (A Lip with clear-cut groove running vertically across the lip, 24.86%). In the present study, the most common lip print pattern found among males was Type III and type II among females which are consistent with the study done by Vahanwalla and Parekh.⁶ Similarly, Gondivkar et al⁷ reported in their study that the most predominant pattern among males was Type III pattern (51.05%) and Type II pattern (37.06%) in females was predominant in the population. While Sivapathasundaram,⁴ Verghese et al.⁸ and Sandhu et al.⁹ reported in their study that Type III, Type II, Type IV, and Type I were the predominant lip print patterns found among males and females, respectively.

In our study Type V (undetermined pattern) was seen least in males (3.93%). Type IV (reticular pattern) was seen least in females (3.24%) which are similar to the other studies.^{10, 11} The most predominant pattern in our study population was Type II (branched grooves, 27.74%) which is in accordance with the studies done by Sivapathasundaram et al., Suzuki and Tsuchihashi.^{4,11} In our study group most which had belong to the South India and Type II/branched grooves was predominant with them which is in

consistent with the studies by Prateek Rastogi et al¹⁰ and Khanapuri et al¹² who found Type II/branched grooves and Type III/Intersected groove pattern as the most predominant pattern in the people of South India where as Patil et al¹³ found Type IV/Reticular pattern as the most predominant pattern in people of North Karnataka. The study conducted in north Indian population by Bindal et al¹⁴ found that most commonly observed pattern was Type II. But studies by Augustine et al (2008)¹⁵ in the Delhi population and, Saraswathi et al (2009)¹⁶ in Kanpur population reported Type III pattern (48% and 38%). The variations in the results of the various studies conducted on different populations suggest that populations have a specific distribution of lip prints patterns and might help in identification of ethnicity.

5. Conclusion:

Cheiloscopy techniques have an equal value in relation to the other types of forensic evidences for personal identification. Thus, the study may help to add certain new aspects to the use of lip prints in forensic practice. Since lip prints behold the potential for individual identification, the study of lip prints needs to be developed further to prove its use as an effective tool for identification, such as finger prints, further studies need to be carried out on a larger sample size, preferably of different races and nations and a database on different lip prints in different population has to be created to be used as an effective tool. Results, if significant, can be of help in establishing nationality or racial origin of an individual, especially, in modern scenarios where international and intercontinental travelling and mixing is common.

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Conflict of Interest: None

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Original Research Article

Estimation of Stature from Footprint Length

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Anthropology,
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Abstract

Height and sex from different parts of the body help in solving crime mysteries related to human identity. Similarly, foot or shoe prints if present at the scene of crime may provide clue regarding the height and the sex of the person that helps in establishing partial identity of the suspect. In the present study, footprints of 100 subjects (50 males and 50 females), ageing 25-40 years. Maximum foot print length and the height of each subject was measured. Predictive equations using linear regression were then derived separately for males, females and for the combined data with the purpose of estimating the height when only the subject's foot print length is known. Thus, in the present study, correlation coefficient (r) of: 0.645666 of left and 0.500692 of right in males, 0.808102 of left and 0.68157 of right in females, And 0.802437992 of left and 0.713979 of right in the combined data was obtained between the height and foot print length of the subjects. The standard error of estimate was: 4.990062 of left and 5.656645 of right in males, 5.110548298 of left and 5.996358 of right in females, And 5.110548298 of left and 5.996359 of right in the combined data. The standard foot print length obtained was: 24.836 cm of left and 24.688 cm of right in male, 23.396 cm of left and 23.256 cm in females. The accuracy of sex determination by this method is reported to be 80%.

1. Introduction

Human height or stature is the distance from the bottom of the feet to the top of the head in a human body, standing erect. It is in centimetres when using the metric system or feet and inches when using the imperial system. Height of an two individuals may vary intra or inter-population. Height is important, because it is closely correlated with other health components, such as life expectancy. Studies show that there is a correlation between small stature and a longer life expectancy.

The development of human height can serve as an indicator of two key welfare components, namely nutritional quality and health. The study of height is known as AUXOLOGY.

Ways in which the height of an individual can be measured are numerous, which can be broadly classified as direct or indirect. **Direct Methods:** 1) Using a metric tape 2) Against a graduated pole.

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Indirect Methods:³

- 1) Distance between two middle fingers of hand with hand extended away from the flanks.
- 2) Length from vertex to symphysis X 2
- 3) Length of one forearm in cm (middle finger to acromion process X2) + 34 cm (clavicle 30 cm + breadth of manubrium 4cm)
- 4) Length from sternal notch to pubis X 3.3
- 5) Length from tip of olecranon process to the tip of middle finger X 3.1cm.

But here I have tried to determine the length of an individual from his or her footprint.

Footprints (fig. 1) are the impressions or images left behind by a person walking or running. Friction ridge skin present on the soles of the feet and toes (plantar surfaces) is as unique in its ridge detail as are the fingers and palms (palmar surfaces). Footprints have been preserved as fossils and provide evidence of prehistoric life. Known as "ichnites".^{4,5}

Fig. No. 1: Footprint of right foot.

**2. Materials and Methodology:**

A descriptive cross-sectional study was conducted among 100 individuals (50 males and 50 females) ranging from age 25 to 40 years of family members of the patients and staff working at the

DVVPF's hospital. This study was done using inkpad, blank sheets, scale and calculator. We conducted this study after Institutional Ethics Committee [IEC] Approval. Data was collected and analyzed using Microsoft excel and Epi info version 7.2.1. Participants who were willing to participate by giving written informed consent were included in the study. Participants having any congenital, acquired foot abnormalities were excluded from the study.

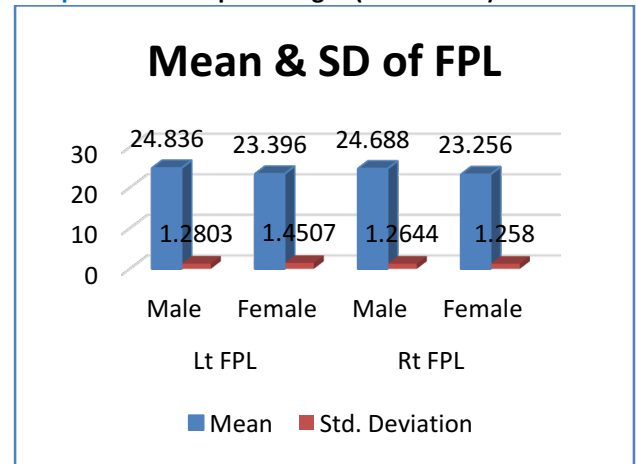
3. Results:

The observations of our study are shown in **table no. 1.** (Min-Minimum, Max-Maximum, SD- Standard Deviation).

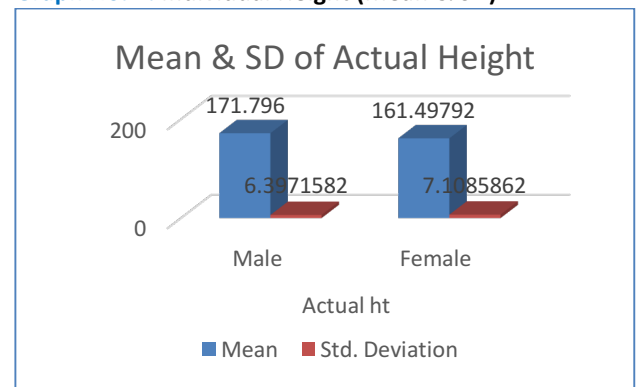
Table no. 1: Combined 50 pairs Foot Print Length

	N	Min	Max	Mean	SD
Lt FPL	50	20.0	27.6	24.116	1.5371
Rt FPL	50	20.0	27.1	23.972	1.4427
Actual height	50	148.50	184.25	166.64 6960	8.4763366

Graph No. 1: Footprint length (Mean & SD)

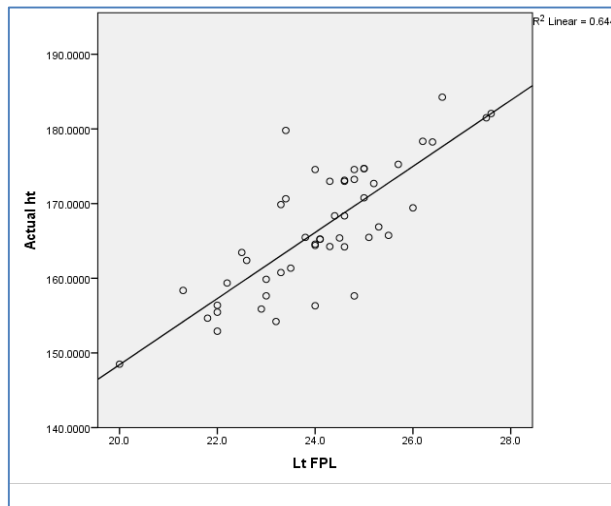


Graph No. 2: Individual Height (Mean & SD)



Mean left foot print length was 24.116 ± 1.5371 cm, range was 20.0 to 27.6 cm. Mean right foot print length was 23.972 ± 1.4427 cm, range was 20.0 to 27.1 cm. Mean actual height was 166.64 ± 8.47 cm, range was 148.5 to 184.2 cm.

Graph No. 3: Linear regression analysis for left footprint length (Lt FPL).



Graph No. 4: Linear regression analysis for Right footprint length (Rt FPL).

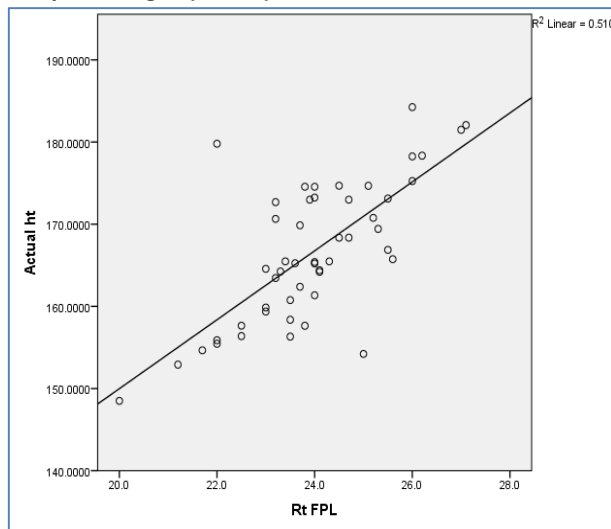


Table no. 2: Combined Left Regression Statistics

Multiple R	0.802437992
R Square	0.64390673
Adjusted R Square	0.636488121
Standard Error	5.110548298
Observations	50

$p < 0.001$; **Regression Formula: $59.93 + 4.425x$**

The regression formula for left foot print from our study was **Regression Formula Left, Stature (Height) = $59.93 + 4.425x$ Left foot length.**

Table no. 3: Combined Right Regression Statistics

Multiple R	0.713979
R Square	0.509766
Adjusted R Square	0.499552
Standard Error	5.996358
Observations	50

$p < 0.001$; **Regression Formula: $66.08 + 4.195x$**

The regression formula for right foot print from our study was **Regression Formula Right, Stature (Height) = $66.08 + 4.195x$ Right foot length**

This was statistically significant ($p < 0.001$).

Table no. 4: Descriptive Statistics for males

	N	Min	Max	Mean	SD
Lt FPL	25	22.6	27.6	24.836	1.2803
Rt FPL	25	22.0	27.1	24.688	1.2644
Actual ht	25	162.3	184.2	171.79	6.3971
Valid N (listwise)	25				

Graph No. 5: Linear regression analysis for left footprint length (Lt FPL) of Male.

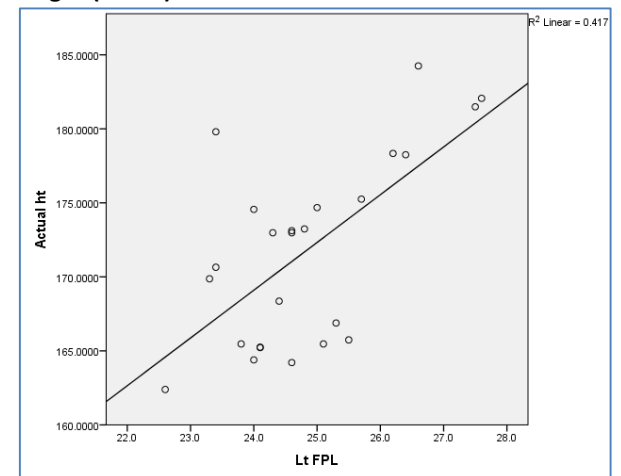


Table no. 5: Regression Statistics for males (Lt FPL)

Males Lt Regression Statistics	
Multiple R	0.645666
R Square	0.416885
Adjusted R Square	0.391532
Standard Error	4.990062
Observations	25

$p < 0.001$; **Regression Formula: $91.67 + 3.226x$**

The regression formula in males for left foot print from our study was **Regression Formula Left, Stature (Height) = $91.67 + 3.226x$ Left foot length**

Graph No. 6: Linear regression analysis for Right footprint length (Rt FPL) of Male.

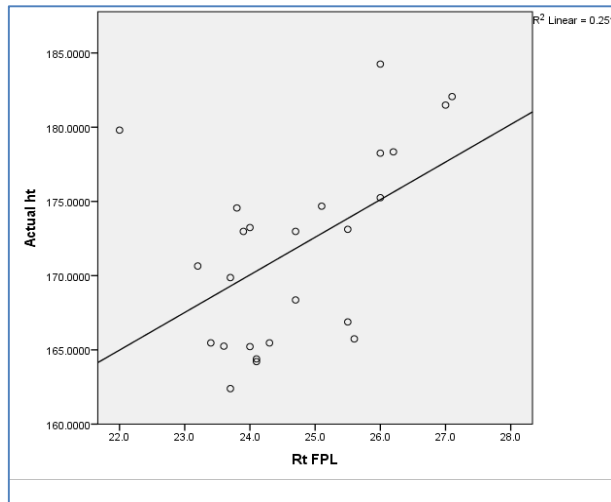


Table no. 6: Regression Statistics for males (Rt FPL)

Multiple R	0.500692
R Square	0.250692
Adjusted R Square	0.218113
Standard Error	5.656645
Observations	25

$p < 0.01$; **Regression Formula: $109+2.53x$**

The regression formula in males for right foot print from our study was **Regression Formula Right, Stature (Height) = $109+2.53x$ Right foot length**

This was statistically significant ($p < 0.01$)

Table no.7: Descriptive Statistics for females

	N	Min	Max	Mean	SD
Left FPL	25	20.0	26.0	23.396	1.4507
Right FPL	25	20.0	25.3	23.256	1.2580
Actual ht	25	148.5000	174.6900	161.497920	7.1085862
Valid N (listwise)	25				

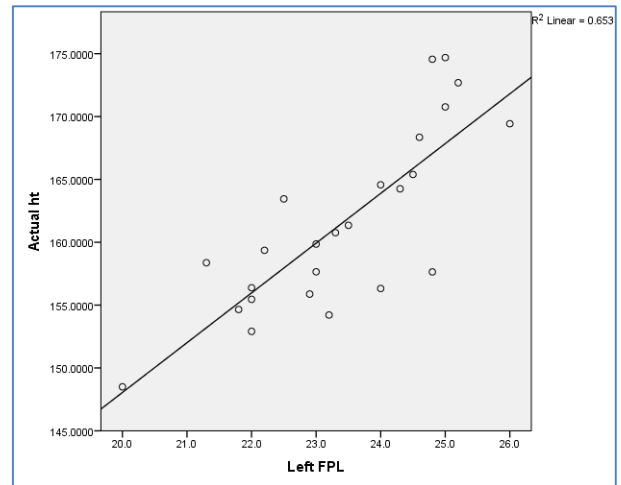
Table no. 7: Regression Statistics for females (Lt FPL)

Multiple R	0.808102
R Square	0.653029
Adjusted R Square	0.637944
Standard Error	4.277316
Observations	25

$p < 0.001$; **Regression Formula: $68.85+3.959x$**

The regression formula in females for left foot print from our study was **Regression Formula Left, Stature (Height) = $68.85+3.959x$ Left foot length**

Graph No. 7: Linear regression analysis for left footprint length (Lt FPL) of Female.



Graph No. 8: Linear regression analysis for Right footprint length (Rt FPL) of Female.

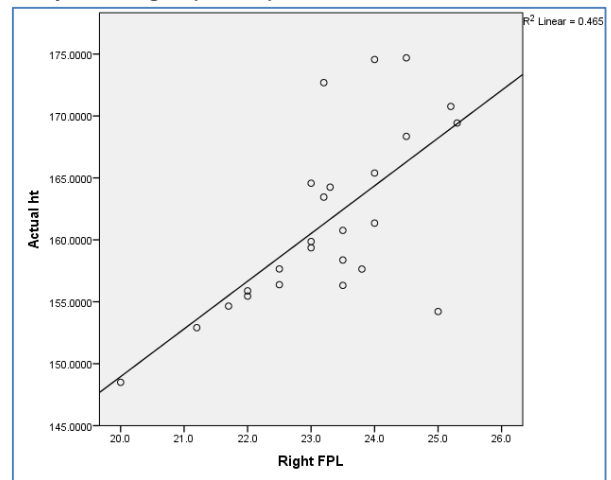


Table no. 8: Regression Statistics for females (Rt FPL)

Multiple R	0.68157
R Square	0.464538
Adjusted R Square	0.441257
Standard Error	5.313607
Observations	25

$p < 0.001$; **Regression Formula: $71.93+3.851x$**

The regression formula in females for right foot print from our study was **Regression Formula Right, Stature (Height) = $71.93+3.851x$ Right foot length**

This was statistically significant ($p < 0.01$).

4. Discussion:

No two individuals are exactly alike in all their measurable traits, even genetically identical twins (monozygotic) differ in some respects. These traits tend to undergo change in varying degrees

from birth to death, in health and disease, and since skeletal development is influenced by a number of factors producing differences in skeletal proportions between different regions.

Anthropometry constitutes that means, as it is the technique of expressing quantitatively the form of the human body. In other words, anthropometry means the measurement of human beings, whether living or dead or on skeletal material.^{6,7}

In the present study, males show higher mean values in each anthropometric dimension than among females. These statistically significant differences may be attributed to the early maturity of girls than boys; consequently, the boys have two more years of physical growth. In the present study height is estimated using simple and multiple linear regression models. Our study observes a statistically significant sex difference ($p < 0.001$) in the footprint length measurements between males and females in both right and left feet. A positive and strong correlation exists between various length measurements of the footprint and stature in both the sexes. Males show relatively higher values of correlation coefficients than females. Bilateral differences (right – left differences) were also observed in some of the footprint length measurements among males and females. Linear and multiple regression models are derived for estimation of stature from various footprint length measurements in males, females and for the pooled sample. Many previous studies have elaborated the stature estimation from foot print length and concluded similar findings as in our study.⁶⁻⁹

This study helps for easy determination of height through footprints in area of war or medicolegal cases.

5. Conclusion:

The results obtained are found to show less error in predicting stature as compared to other conventional methods used earlier. The percentage accuracy of establishing sex by the standard footprint by rational method is reported to be 80% which is quite significant for use. We advise multicentre study with large number of participants for further research.

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Conflict of Interest: None.

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Original Research Article

A Prospective Study of Organ Transplant in Mumbai Region

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Key words

Donor, recipient,
Swapping,
Liver,
Kidney.

Abstract

The Human Organ & Transplantation Act provides for the regulation of removal, storage and transplantation of human organs and tissues for the therapeutic purposes and for the prevention of commercial dealings in human organs and tissues. Organ transplantation is the only option to save lives in patients affected by terminal organ failures and improve their quality of life. However, there is a disparity exists between the supply and demand of donated organs, leads to a loss of many lives. The number of organ transplantation have gradually increased in the last two decades and provide excellent results in children and young adults, and are challenging by the growing proportion of elderly transplant patients with co morbidity. This Study was conducted at a tertiary care centre in Mumbai region. Total 209 live transplant cases were studied prospectively which are referred for authorization committee for approval at the tertiary care hospital Mumbai. we have observed that Among the total transplants which were conducted 80% Kidney transplants were conducted and 20 % Liver transplants were conducted. Maximum age group distribution among recipients lies between the age group of 21 to 40 years of age,(48.3%). Maximum age group distribution among donors lies between age group of 41 to 60years of age.(63.6%)

1. Introduction

Organ transplantation is the therapeutic use of human organs involving the substitution of a non-functional organ for another one coming from a donor. Clinical organ transplantation began in the mid 1950s with kidney transplantation procedures between twins¹. Simultaneously with kidney transplantation, the first heart (1967) and liver (1979)

transplantation were performed². The use of human organs for transplantation has steadily increased during the past decades. Organ transplantation is now the most cost-effective treatment for end-stage renal failure, and for end-stage failure of organs such liver, lung and heart, it is the only available treatment.² Transplant procedures continue to develop and in the

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future may offer practical treatment for other unmet medical needs such as diabetes mellitus and some forms of malignant and metabolic diseases.^{3,4} Total 209 live transplant cases were studied prospectively in this study which are referred for authorization committee for approval at the tertiary care hospital Mumbai. Among all these cases 17% females and 83% males were recipients and 67% were females and 33% males were donors. Maximum age group distribution among recipients lies between the age group of 21 to 40 years of age (48.3%). Maximum age group distribution among donors lies between age group of 41 to 60 years of age (63.6%).

2. Aims & Objectives:

1. Evaluation of gender related variation among donors and recipients in living organ transplant cases.
2. Evaluation of regional variation among donors and recipients in living organ transplant cases.
3. Evaluation of age related variation among donors and recipients in living organ transplant cases.
4. Evaluation of time period required for the patients to receive donation.
5. Evaluation of complications following the transplant cases.
6. Evaluation of practical problems faced by the patients for delayed transplants or rejected transplants.

3. Material & Methods:

The study was performed on 209 cases referred to the regional authorization committee at tertiary care hospital in Mumbai within the period from 1st January 2016 to 31st May 2017. Various identification data of the recipients and donors like age, sex, religion, along with address were noted from individual interview as per rules of organ transplant act. Analysis was done using HPSS software.

4. Results & Discussion:

Among the total transplants which were conducted 80% Kidney transplants were conducted and 20 % Liver transplants were conducted. Kidney being the major organ donated and demanded. 2 - 2.5 lakhs were the demand for kidneys, of which, only 7500 live donor transplants were conducted in year 2016 indicating the yawning gap between

demand and supply. 52.6% cases of End stage renal disease and 15.8% cases were reported of chronic kidney disease who required renal transplants. Ailments like diabetes and hypertension are major lifestyle diseases leading to a rise in kidney diseases.

Table 1: Recipients' Age group frequency distribution

Age group recipients	Frequency	Percent
<20	13	6.2
21-40	101	48.3
41-60	84	40.2
61-80	10	4.8
>80	1	0.5
Total	209	100

Maximum age group distribution among recipients lies between the age group of 21 to 40 years of age, (48.3%). Maximum age group distribution among donors lies between age group of 41 to 60 years of age (63.6%) as shown in **Table no - 1 and 2**. Indicative of increased need for life style changes. Maximum distribution of donors lies among female population and Maximum distribution of recipients lie among male population. Most transplants were between Sister to Sister followed by Mother to son and then Wife to Husband.

Table No. 2: Donors' Age group frequency distribution

Age Group of Donors	Frequency	Percent
<20	3	1.4
21-40	46	22.0
41-60	133	63.6
61-80	27	12.9
Total	209	100.0

Table No. 3: Related/ non-related transplant frequency distribution

Related/ non-related transplant	Frequency	Percent
Related	155	74.2
Unrelated	54	25.8
Total	209	100.0

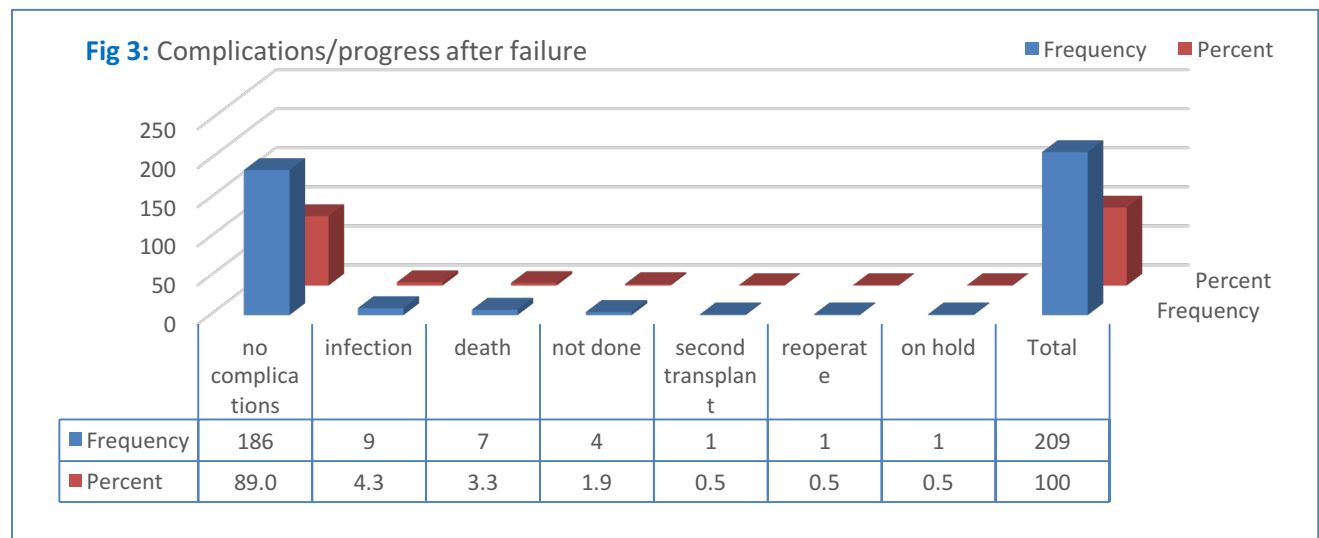
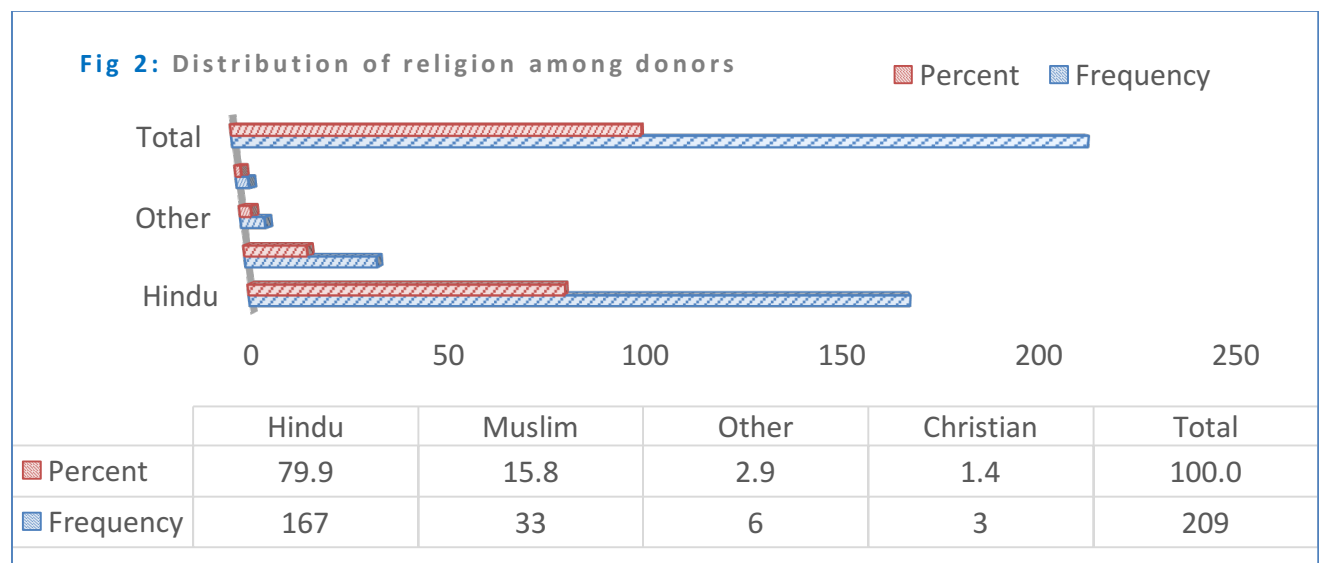
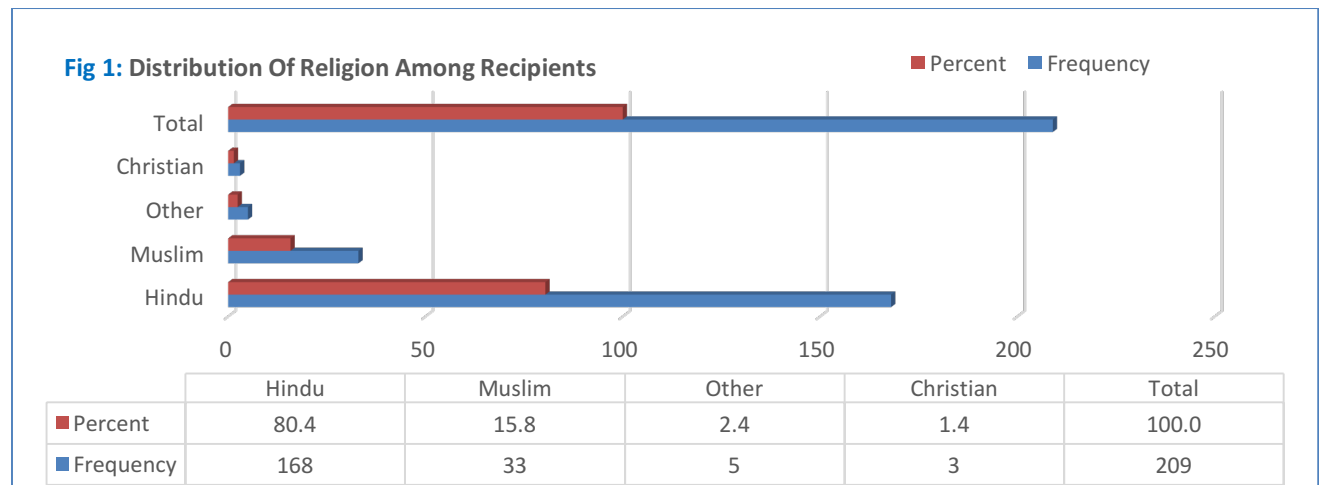
Table No. 4: Recipient- donor relationship

Relationship	Frequency	Percent
Sister to Sister	41	19.6
Mother to son	38	18.2
Wife to Husband	19	9.1

Maximum transplant cases among related recipients and donors (74.2%) as shown in **Table no- 3**. In this related transplant most common was found between sister to sister followed by mother to

son and wife to Husband (Table no-4). Maximum transplant cases occur among private hospitals.

Among all transplants 8 transplants of 209 were conducted at government hospital.



This indicates increasing need for promoting live transplants at government hospitals. Increased live transplant cases at government hospitals will also help cap down the expenses required for transplant. 24.4% of Chronic liver disease required Liver transplants. 1% cases were complicated of chronic Liver disease with Spontaneous bacterial peritonitis and renal failure.

In 3.8% cases of Swapping were reported. For unmatched cases, Swapping is an important option. This will help reduce the numbers on waiting list. Waiting period extended from 4 months to 4 years. Government initiatives are required for easier and faster transplant services to deal with the waiting period. If we see distribution of religion among recipients and donors, it is commonly seen in Hindus (Fig 1 & 2). 4.3% cases experienced infection after transplant and 3.3% cases experienced death after transplants (Fig-3). In post transplant communicating sessions with the patients having complications like infections, drop outs of immunosuppressive drugs were noted(Fig-3). Reason for post-transplant drop outs in medication was increased financial burden in most cases. Of the total 209 cases approached, 2 cases were rejected by the State transplant committee for objectionable causes suspicious of authenticity of documents(Fig-4).

Maximum live transplant cases which were referred to State Authorization committee are from Maharashtra followed by Gujarat, Jharkhand, Uttar Pradesh and seven foreign national cases noted from Tanzania, Iraq and Yemen. Post-transplant scrutiny revealed that around 60% population were comfortable in communicating about health problems after transplant. 70% population were satisfied by the transplants and service establishing the dignified goal of the very initiation of the Act.

Conclusions:

While interviewing, donors should be interviewed separately to exclude possibilities of victimization of donors. Donors being maximum female population detailed scrutiny should be done if altruistic approach was the reason for transplant. All the transplants should be scrutinized by State Authorization committee. There should be uniform

State Authorization rules among all the States. While interviewing, donors should be interviewed separately to exclude possibilities of victimization of donors. Donors being maximum female population detailed scrutiny should be done if altruistic approach was the reason for transplant. All the transplants should be scrutinized by State Authorization Committee Uniform State Authorization rules are required among all the States.

Information is the key to catalyze change-

- ▶ Increased awareness among population about cadaveric transplant.
- ▶ Every brainstem death should be notified in all the hospitals.
- ▶ Brain-death cases among pediatric population should be also considered as kids are most hit in waiting scenarios.
- ▶ Since 2008, around 50 children are waiting for various organs.

In case of Dead Body Organ Donation -There should be one team in each hospital for organ retrieval along with other team for post-mortem. Green traffic corridors which are established in Tamil Nadu, Kerala and Karnataka should be done everywhere whenever required. Policy decisions which are done in Madhya Pradesh that is 5 lakhs medical cover is extended to 2 Adults and 2 minors among donors, should be done all over country. Foreign delegate's relationship status confirmation should be done strictly by the Embassy. Language related problems while dealing with foreign nationals should be solved by language translators. Socioeconomic status should be scrutinized in detail in all cases. Detailed scrutiny by State Authorization committee of relationship status and socio-economic status with the help of police officials will help decrease mal-practices.

Community Impact:

- ▶ This study helped analyze the age, gender and regional variation among transplant cases.
- ▶ Post-transplant scrutiny and communication helped to analyze the satisfaction of the health service provided to the patients.
- ▶ Post-Transplant communication helped to analyze patient's problems for non-compliance in medications.

- ▶ This will help evaluate and formulate further checklist during transplant cases.
- ▶ Such continuous assessment will help render improved service to the society.

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Original Research Article

Indian Constitution: Awareness Among Medical Students

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Key words

Health law,
Health sector,
Constitution education.

Abstract

Constitution of India is the fundamental law of the land and is a set of rules, principles and procedures to which the people want the country to be governed. Hence it is ideal for every citizen to have a basic awareness on constitution. A programme was conducted at Jubilee Mission Medical College and Research Institute, Thrissur, Kerala to create awareness among the students about the constitution. Along with the programme a pre-test was conducted to assess the knowledge the students already have through a pre structured questionnaire. An evaluation of the programme was also conducted in the form of a post test. A total of 496 students participated in the class on introduction to Constitution of India and attended the pre-test. The post test was attended by 480 students. A substantial improvement of knowledge was noticed among the students who have attended the programme. Considering the significance of constitution as the health law the country, it is suggested that the basic concepts of constitution has to be incorporated in the medical curriculum. It is not just for passing information but sensitizing the future health care providers to take part in the development of country with a special attention to health sector.

1. Introduction

The Constitution of India:

The first major achievement of independent India was framing of a new constitution, a constitution based on the ideals of justice, liberty, equality and fraternity. The final form of the constitution was passed and adopted by the constituent assembly on November 26, 1949. However the constitution was inaugurated only on January 26, 1950. A careful study of the constitution will show that there are at least eight basic principles. These are popular sovereignty, fundamental rights, directive principles

of state policy, secularism, judicial independence federalism and cabinet government.¹

Constitution of India and health:

The most important source of health related legal provisions in India is the constitution. Even though right to health is not directly included as a fundamental right in Indian constitution, there are many provisions which direct the state to ensure health care of the citizens. Right to health is considered as an inevitable part of right to life by various interpretations of article 21.

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In addition, many provisions of Constitution of India which includes the preamble, legislative powers of union and state governments, fundamental rights and directive principles of state policy can be considered as health related laws of the country. Thus Constitution of India may be regarded as the most important health law of the country. Hence government has a constitutional obligation to provide health facilities.²

Constitution education among students:

Constitution education among students is nothing but exposing them to the constitution, teaching them its salient features, enlightening them about their fundamental rights, enabling them to critically evaluate the relevance of various articles, shaping their mind to develop a positive attitude towards it and helping them appreciate the wisdom found in it. As it protects the rights of all citizens and serves as the frame work for good governance, it functions as a social contract between the government and the people governed. Since Constitution of India may be regarded as the most important health law of the country, it is essential for the medical students of our country to have a basic awareness about the constitution.

To fulfil this requirement, Jubilee Mission Medical College and Research Institute, Thrissur, Kerala has initiated an awareness programme on constitution of India among the undergraduate and post graduate Medical students of the institution. In view of the Constitution day celebration on November 26 and Constitution literacy week celebration by Government of Kerala, Jubilee Mission Medical College and Research Institute, Thrissur has conducted classes on Introduction to Indian Constitution to the students spreading over a period of one week. The class was preceded by a pre-test which tests some basic knowledge on the constitution among the students. An interactive session between the students and resource persons were also arranged after the talk. Evaluation to assess the constitution knowledge after the orientation programme was conducted in the form of a post-test during the week after that.

Objective of the programme:

To create awareness among the future health care givers of the country about the constitution of India.

Objective of the study:

1. To ascertain the views and extent of awareness about the constitution of India among medical students.
2. To assess the evaluation of the programme conducted through a pre structured questionnaire.
3. Suggesting measures for conduct of constitutional awareness programme.

2. Materials and methods:

In connection with celebrations of constitution day an introduction in to Constitution of India was arranged to the undergraduate and postgraduate students of Jubilee Mission Medical College and Research Institute, Thrissur. The class was preceded by a pre-test which tests some basic knowledge on the constitution of India. (Appendix-1). The class was conducted by Legal and medico legal experts. This was followed by an interactive session where the students have actively participated in the discussion. A post-test with the same questionnaire was conducted during the next week to all participants of orientation programme to evaluate the knowledge acquired after the orientation programme.

3. Results:

A total of 496 students participated in the class on introduction to Constitution of India and attended the pre-test. The post test was attended by 480 students. Eleven questions were asked based on the Indian constitution which is general in nature. The number of correct responses and incorrect responses (both pre-test and post-test) are given in [Table 1](#). A question to mention any four fundamental rights as guaranteed by the constitution of India was also asked. The number of students who have responded in the pre-test and post-test are given in [Table-2](#).

4. Discussion:

The constitution is considered as the fundamental law of any country. All laws which are implemented later if they are in contravention to the provisions of constitution are null and void. Hence constitution is considered as the supreme law of the land. This concept was known to most of the medical students even before the orientation given to them. This suggests that as a citizen, even the medical

students know that constitution is the highest norm established for proper and regular functioning of the society. Indian constitution is the lengthiest and most detailed written constitution in the world. Even though the provisions are more indigenous, the legal system has a great influence on British model. But the great irony is that U.K does not have a written constitution. Hence the question “Country

not having a written constitution” is relevant. Most of the students’ do not know this aspect. Even after the orientation given to them they did not give important to this concept of written and unwritten constitution. This was reflected in response of students in the post test. The introductory statement of the constitution is called the preamble and is an essential part of the constitution.⁴

Table No 1: Number of Correct and incorrect responses

Questions included	Answer	Pre-test(496)		Post-test(480)	
		Correct response	Incorrect response	Correct response	Incorrect response
Constitution is the supreme law of the land	True	418 (84.27%)	78 (15.73%)	480 (100%)	0 (0%)
Chairman of the Drafting committee of Constitution	Dr.B. R Ambedkar	380 (76.61%)	116 (23.39%)	480 (100%)	0 (0%)
Country not having a written constitution	UK	142 (28.63%)	354 (71.37%)	242 (50.42%)	238 (49.58%)
Preamble-Sentence(first few words)		0 (0%)	496 (100%)	365 (76.04%)	115 (23.96%)
Concept of Emergency borrowed from	Germany	152 (30.65%)	344 (69.35%)	296 (61.67%)	184 (38.33%)
Mind & Ideas of framers of constitution are reflected in	Preamble	196 (39.52%)	300 (60.48%)	319 (66.46%)	161 (33.54%)
Indian constitution is	Quasi federal	147 (29.64%)	349 (70.36%)	278 (57.92%)	202 (42.08%)
Constitution of India came in to force in	26-01-1950	275 (55.44%)	221 (44.56%)	452 (94.17%)	28 (05.83%)
Type of democracy followed in India	Representative	356 (71.77%)	140 (28.23%)	422 (87.92%)	58 (12.08%)
Three types of emergencies	National, State & Financial	117 (23.59%)	379 (76.41%)	311 (64.79%)	169 (35.21%)
Meaning of concurrent list		8 (01.61%)	488 (98.39%)	121 (25.21%)	359 (74.79%)

Table NO. 2: Questions related to fundamental rights

Fundamental Rights	Answer	Pre Test(496)		Post-test(480)	
		Correct response	Incorrect/No response	Correct response	incorrect /No response
Right to Equality		169 (34.07%)	327 (65.93%)	365 (76.04%)	115 (23.96%)
Right to Freedom		135 (27.22%)	361 (72.78%)	344 (71.67%)	136 (28.33%)
Right against Exploitation		0 (0%)	496 (100%)	18 (03.75%)	462 (96.25%)
Right to Freedom of religion		36 (07.26%)	460 (92.74%)	184 (38.33%)	296 (61.67%)
Cultural and educational rights		12 (02.42%)	484 (97.58%)	26 (05.42%)	454 (94.58%)
Right to Constitutional Remedies		0 (0%)	496 (100%)	4 (0.83%)	476 (99.17%)

The preamble of the constitution declares India to be a Sovereign, Socialist, Secular, Democratic, Republic. Thus preamble requires provision for ensuring social and economic justice also. Improving the quality of life and ensuring healthy life are the important goals of Social justice. Thus preamble is an important part of health law of the country. The ignorance on the part of medical students regarding preamble has changed after the orientation given to them and 76.04% students have answered the question regarding the preamble. This preamble is considered as the heart and soul of the Indian constitution according Dr. B. R. Ambedkar and a question "Mind and Ideas of framers of constitution are reflected in" is also relevant. A substantial improvement in number of students giving correct answer to this question after orientation was a good sign.

Questions like 1. Chairman of the Drafting committee of Constitution, 2. Concept of Emergency borrowed from, 3. Types of emergencies, 4. Constitution of India came in to force on and 5. Type of democracy followed in India are of general in nature, which every individual is expected to know. Even though many were not aware of such general aspects, the orientation programme conducted improved their basic knowledge to a great extent. This was reflected in the post test conducted.

A question on Meaning and examples of concurrent list was asked which was answered by only by 01.61% students prior to orientation and only 25.21% students after the orientation. The constitution of India distributes powers between Union and state by distributing them in three lists. They are Union list, State list and concurrent list. Items to which the Parliament is vested with law making powers is called Union list while the items where state government is empowered to make law is termed as state list. Items on which both Parliament and state legislature has the power to make laws are called concurrent list. The item public health, sanitation, hospitals and dispensaries are listed in the state list. Medical education, medical profession, mental health and welfare of labour are included in the concurrent list.

International health, port health research and technical and scientific education comes in Union list. The various aspects of health care administration are distributed under the purview of

union and state legislature. Awareness on distribution of such powers and their categorization is essential for a health care provider of our country, to facilitate better health governance.

Certain rights are guaranteed by the constitution which are fundamentally essential for life and guaranteed by law. There are six fundamental rights which every individual is entitled to enjoy. They are Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of religion, Cultural and educational rights and Right to Constitutional Remedies. None of the students under study were aware about two rights namely Right against Exploitation and Right to Constitutional Remedies. Even after orientation to the topic on constitution only 03.75% and 0.83% students mentioned these two rights respectively. Every individual shall aware of their rights. These rights are justiciable and the individual can approach high court or Supreme Court if their rights are denied.

A medical student shall aware of the right to equality which is interpreted as constitution guarantees equality in terms of treatment and access to health care. 34.07% students in presented study were aware of the right to equality prior to the orientation given to them and this percentage has increased to 76.04% after the class on constitution. Health and equality are linked and it is said that unequal societies are associated with low life expectancy, high infant mortality, lower birth weight and increased depressive illness.⁵

Article 19 to 22 deal with the different aspects of the basic right -Right to freedom or personal liberty. In the present study right to freedom as a fundamental right was mentioned by 27.22% students in the pre-test and 71.67% in the post test. Article 21 guarantees right to life which includes factors that are essential to lead a meaningful and dignified life including health. There are many case laws where the court held that right to health as a part of right to life.^{2,6,7}

A total awareness on fundamental rights is essential for every individual and those who are in the health care field shall aware of right to equality (articles 14-18) and right to freedom (articles 19 to 22) enshrined in the constitution. Because today the right to health is not a charity work of the government but it is an entitlement.

5. Conclusion:

Indian constitution is not only a politico legal document but it's a socio economic document also. In addition to achieving a political stability it aims at social and economic equality. The social equality shall ensure improvement of quality of life which includes healthy life. Thus health of an individual is a right ensured by the constitution of India. Hence Constitution itself is the most important source of health related legal provision in the country. Every individual in the health care system shall aware of the constitution as it is regarded as the most important health of India. The ideal time to impart this constitutional knowledge to health care providers is by introducing in the curriculum. A brief study on Constitution of India can be included as a part of foundation course during medical and paramedical undergraduate studies.

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Original Research Article

Introducing a Clinical Forensic Medicine Module in a Tertiary Care Medical Institution

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Abstract

Clinical Forensic Medicine sometimes referred as antemortem forensics relates to medical examination, documentation, material evidence collection and assessment of medicolegal cases in living persons. Well trained registered medical practitioner may provide competent medical services to victims of assault in medicolegal cases, but, ignorant towards its appropriate medicolegal management. Overlooking of evidence or errors in documentation due to ignorance by physician may weaken the case in court of law for the innocent victim and offers easy escape for the culprits. Hence, it is need of hour that medical practitioner must have an adequate knowledge of documentation, policies and dealing of such medicolegal cases through a formal adequate training towards medicolegal management of such medicolegal cases. Solution to this essential lacuna would be imparting routine academic training of medical undergraduates by Clinical Forensic Medicine Module through active, student centric learning for clinical forensic medicine topics that requires them to have good knowledge and skills in handling medico-legal cases. In this study, a clinical forensic medicine module applied to a group of students imparting hands on training to undergraduates towards handling medicolegal cases in real settings. Undergraduates showed positive inclination towards implementing such educational module on Clinical Forensic Medicine as an effective teaching/learning method. It facilitated them to learn basics of Medico-legal issues and protocols in handling medicolegal cases in real scenario at bedside clinics in wards.

1. Introduction

Clinical Forensic Medicine (CFM) is refer to the branch of Forensic Medicine involving an interaction

among various agencies such as judiciary, police, law. It usually concerned with living people.

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It is application of forensic techniques to living person.¹ The field of CFM is continued to be flourished and progressing very rapidly. The expertise in this field is essential for providing appropriate and prompt quality care to victims and suspects. Further it facilitates the securing the material evidence towards justice to such survivor's in court of law. Hence, the role of healthcare professionals is very important and it must be courteous, professional, competent, independent, well-trained, non-judgemental and well informed.^{2,3}

The traditional practice of teaching Forensic Medicine to students in India is not able to deliver effective clinical skills towards handling medico-legal cases. It is a matter of great concern towards creating efficient graduates for handling medicolegal cases in accordance with need of society towards justice to the victims of crime.^{3,4} As per section 39 of Criminal Procedure Code of India, person who is aware of the commission of any offense by any person in relation to the human body, he/she is bound to report such information to the police or the magistrate.⁴

In absence of clear medical sub-speciality of clinical forensic medicine, the concerned work is mostly done by casualty medical officers or forensic experts. Sometimes, in accordance with their appointments they may termed as police surgeons, forensic physician, forensic medical officer, forensic medical examiner.⁵ Due to violence, there may be loss of human life or functions. Annually, millions of people affected by this and used to receive medical care services and expects justice in addition to medical relief. Society demands in depth investigations into criminal activity associated with trauma. In consideration with the examination of such victims, basic forensic education, skills, knowledge and experience needed to handle such medicolegal cases. The forensic medicine expert expected to be work as clinical investigator providing a vital link between the investigation agencies and judiciary towards justice to survivor.⁶⁻⁸

In India, a medical practitioner is constantly exposed to medicolegal cases at practice and receives the information about the commission of a crime during the healthcare services to the patients who are injured due to crime committed against him/her. The concerned doctor is duty bound to convey this information to the police/magistrates at

the earliest. In addition, a doctor is also legally bound to collect all the necessary evidence material from the body of patients.⁹ This may further help to investigating authorities in the investigation of the crime. In accordance with the training of doctor, he must be enough efficient and well trained to judge a medical case and to assess whether there is a possibility of any crime or not. With advancement of the rate of trauma cases, the recognition of these cases with its medicolegal value requires new knowledge and appropriate training.¹⁰⁻¹⁵

Sometimes, judiciary refers or send some cases for medical examination and expert opinion to the medical doctor. E.g. Identification of criminal, age estimation of survivor or assailant, medical termination of pregnancy cases, etc.¹² The registered medical practitioner is well trained and confident to provide efficient medical treatment, but feel less confident, uncomfortable, or unwilling to provide the patient with an equally competent medicolegal evaluation.¹³ In consideration with these un-met forensic needs of survivors of violent crimes and trauma, the examination of victims of violence by a specially trained person in medicolegal matters is need of hour.¹³⁻¹⁵

Usually in traditional curriculum, the training of handling of such medico-legal and clinical forensic medicine cases to a medical student is given during the second year of their undergraduate courses.¹⁴⁻¹⁶ Due to lack of appropriate exposure to emergency cases in second MBBS, it is argued that these phase students are lacking awareness about the importance of learning to handle medico-legal cases. Hence, a dedicated module to teach clinical forensic and medico-legal cases to these phase students along with practical hands-on training knowledge may be imparted to them with skills required to deal in such cases. In this study, the students opinion were taken on the implementation of this module, as they are the main stakeholders of this educational module. Further the usefulness and impact of this module was assessed.

2. Aims & Objectives:

This study was undertaken with following objectives:

- i. To assess II MBBS students' perception on this Clinical Forensic Medicine module.

- ii. To study the impact of the hands on training to undergraduate students towards handling antemortem medico legal cases.

3. Material & Methods:

This is an educational interventional study undertaken using 81 second MBBS students of our Medical Institution as the subjects of the study. The study protocol was submitted to Institutional Ethics Committee (IEC) & IEC Permission was taken. The second MBBS undergraduate students, who had given voluntary consent to participate in this project were included in this project. The written informed consent of participants was taken. First, third year and Exam going second MBBS students were not excluded from this study. A prevalidated questionnaire with Five point Likert scale used for assessment of students' perception and impact of this module at the end of the module. The departmental Faculty were trained specifically for this module to conduct practical demonstration-cum-training sessions on clinical forensic medicine cases.

Training sessions: This course introduced the systematic instruction to undergraduate students in the principles and practice of Clinical Forensic Medicine. The basic principles and practices in handling medico legal cases of age & injury imparted by way of lectures, practical demonstrations on subjects. In addition, video graphic demonstration of examination of survivor of sexual assault were conducted. Victim assessment and collection of forensic samples were demonstrated by showing sample videos. The broad goal towards teaching undergraduates in CFM is to impart the basic knowledge, skills and behavioural attributes in Clinical Forensic Medicine towards handling medicolegal cases effectively as the first contact Medico-legal experts.

In this project, 81 undergraduate students of our institute were participated with voluntary will. Besides lectures, video demonstrations, they were subjected to hands on training in small groups towards handling medicolegal cases such as age & Injury and training given towards preparation of medicolegal reports & expert opinions to investigating agencies. The students' responses towards educational project on Clinical Forensic Medicine were collected in the form of a pre-

validated questionnaire template at the end of this project. The responses were 1-strongly disagree, 2-Disagree, 3- Uncertain, 4- Agree, 5-Strongly agree. The data collected was analyzed.

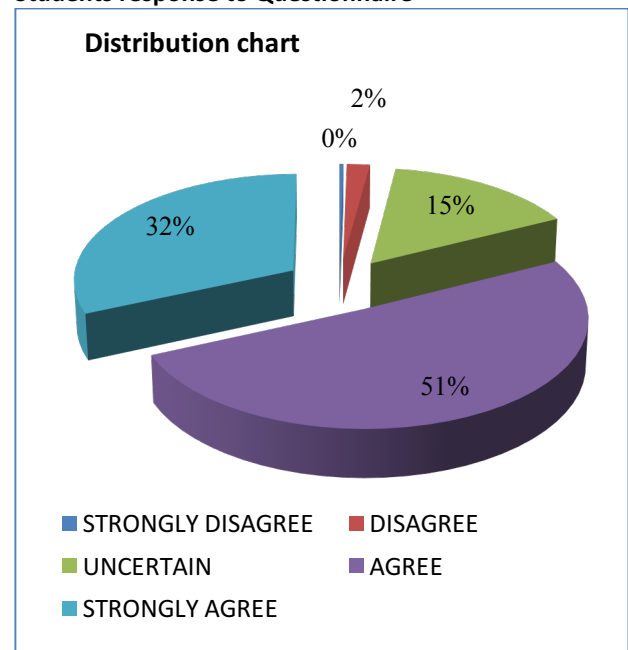
4. Results

About 51 % students responded as agreed and 32 % strongly agreed with the questionnaires of this module. There were 15 % students who were not able to decide whether this module is going to improve their medico-legal knowledge and its use in clinical practices (**Table 1 & Fig. No. 1**).

Table No. 1: Overall Students response to Questionnaire

Overall Response		Score	%
1- SD	STRONGLY DISAGREE	5	0.309
2-D	DISAGREE	30	1.852
3-U	UNCERTAIN	250	15.43
4-A	AGREE	823	50.80
5-SA	STRONGLY AGREE	512	31.60
		1620	100

Figure No. 1: Graphical Representation of overall Students response to Questionnaire



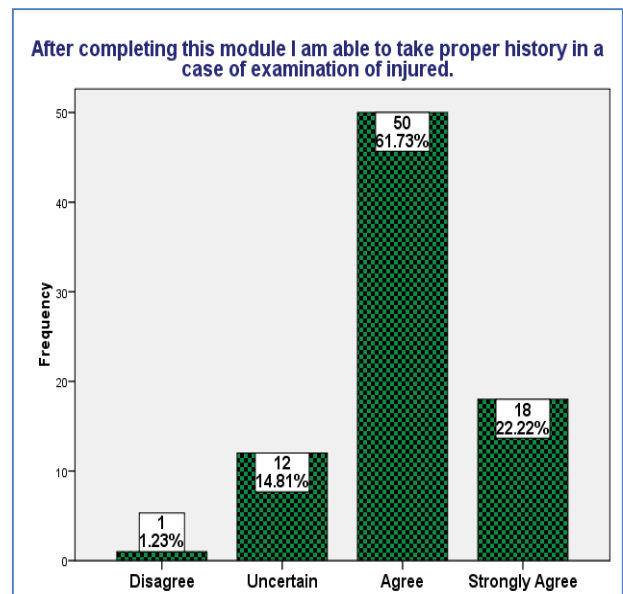
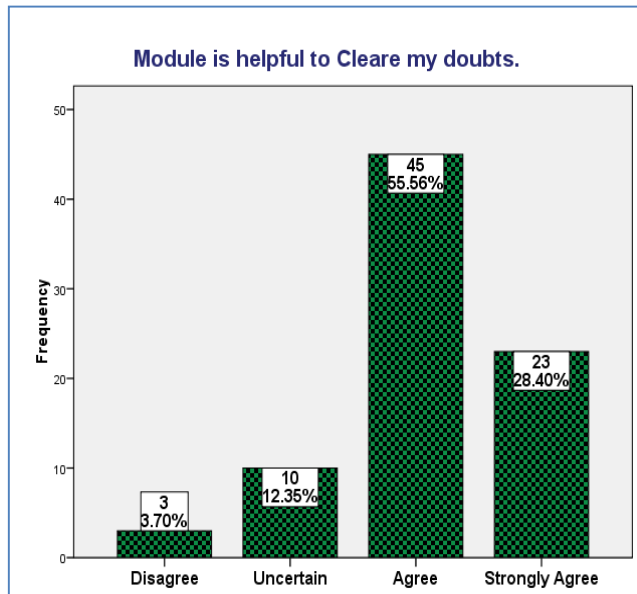
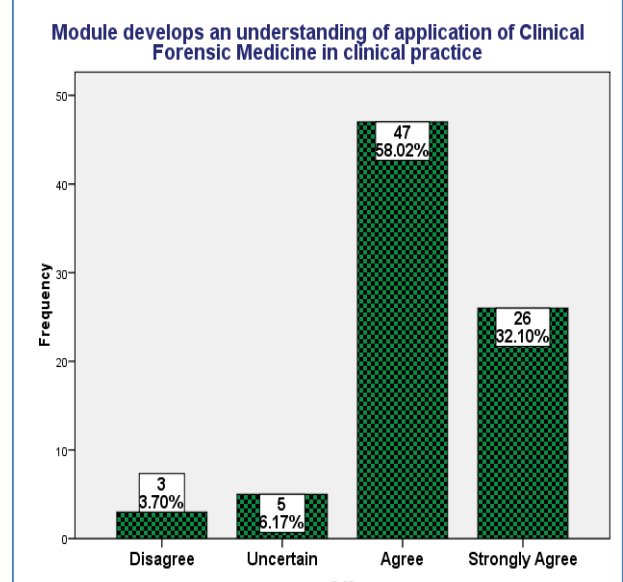
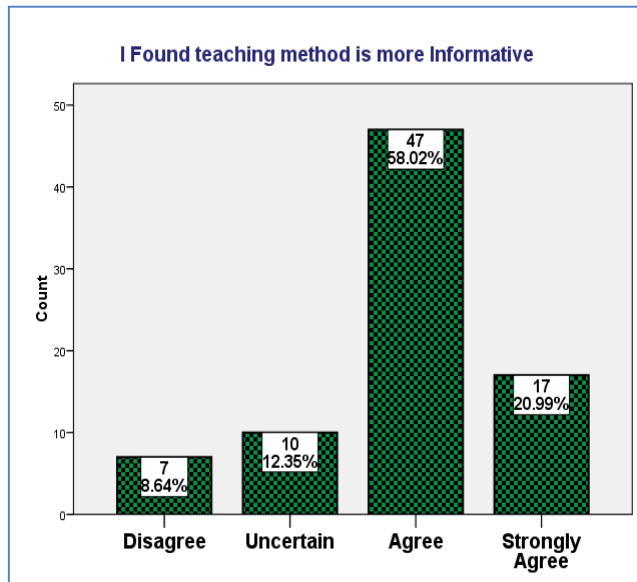
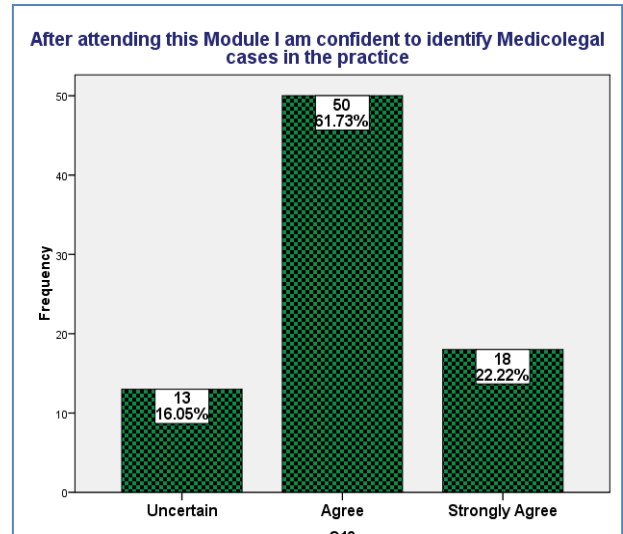
The overall or combined response to this module (table no. 2):

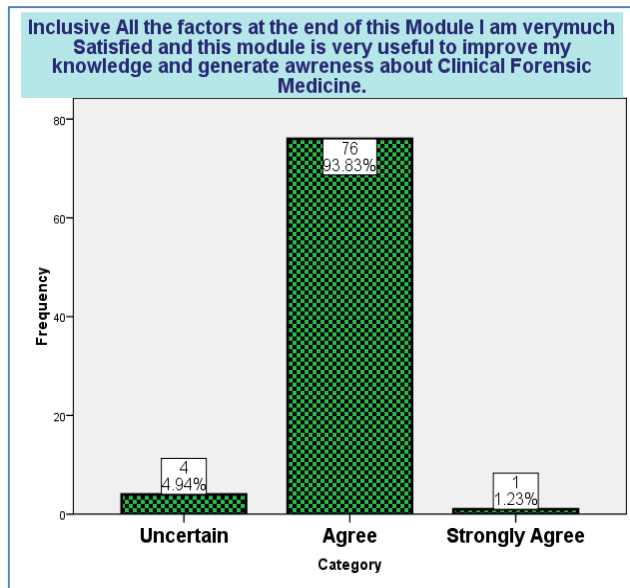
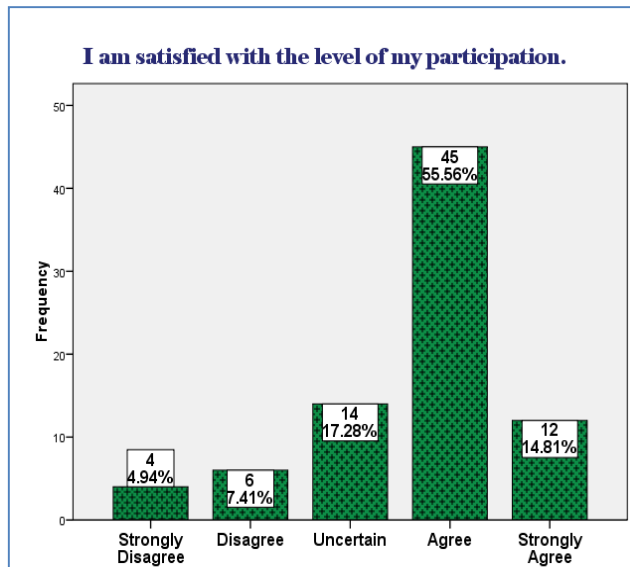
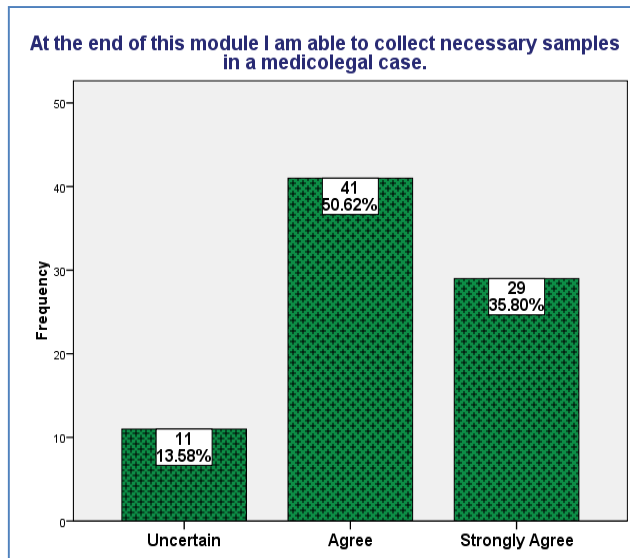
- ✓ 93.8 % students are agreed and 1.2% strongly agreed with the objectives of this module.
- ✓ 4.9 % students are not able to decide whether this module is going to improve their medico-legal knowledge and its use in clinical practices.

Table No. 2: Cumulative frequency table of overall positive Students response to Questionnaire

OVERALL RESPONSE		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Uncertain	4	4.9	4.9	4.9
	Agree	76	93.8	93.8	98.8
	Strongly Agree	1	1.2	1.2	100.0
	Total	81	100.0	100.0	

Figure No. 2-9: Graphical representation of relevant questionnaire perception.





Discussion

Recently, there is exponential growth of the field of Clinical Forensic Medicine and it is emerging as separate entity which deals with practice of physically examining and assessing a living persons such as victim of assault or culprits of the alleged crime. It collaborative efforts from various other departments such as medicine, surgery, pediatrics, pediatric surgery, obstetrics and gynecology and criminology.¹⁻³

A new competency based medical education curriculum is being implemented by Medical Council of India in all medical colleges in India from August 2019 with an aim to train graduates by developing their essential competencies to cater the health care to public as per the need of the society.⁴ As per Medical Council of India, the most important core competencies of an Indian Medical graduate is that the graduates should know to describe the importance of documentation in medical practice and should competent to prepare Medical Certificates and medico-legal reports. They should document the medico-legal cases appropriately by performing the medicolegal examinations.^{3,7} In accordance with the tradition curriculum, the graduates are not able to deal medicolegal cases competently, efficiently as they were not given any sufficient training in handling medicolegal cases in practical scenario. Hence, appropriate teaching module imparting hands on training in clinical forensic medicine is need of hour.

This teaching would include making the graduates competent in taking appropriate history in medicolegal cases, carry out observations, conduct proper physical examination (Medico-legal) a living person. They should able to document findings appropriately as per prescribed and accepted format while dealing with medicolegal cases.

He should be enough competent in preserving the relevant biological samples in medicolegal cases and able to interpret its results towards giving expert advice to investigation agencies. He need to deal with Age estimation cases for age verification/certification to aid administration of justice. Currently in India, such

program on Clinical Forensic Medicine, where evaluation of a living victim is carried out by trained medico legal person with team approach has not been so evolved and also not implemented everywhere.⁴⁻⁷

However, till date as per the traditional curriculum, this essential information was delivered in Forensic Medicine through theoretical lectures and demonstrations only. A shift in teaching system towards competency-based medical education has been initiated world-wide including India with transition towards student-centric, an active learning format for delivering such information to the medical undergraduates.

Hence, this Clinical Forensic Modules is a way forward to enlighten students on the in depth clinical forensic medicolegal aspects by using small group discussion methods and hands on training in practical scenario including case based teaching at bed side clinics, a case scenario or video clipping or clinical rounds.

The trauma care physicians involved in assessment and treatment of victims of violence or accidents may not have appropriate training in forensic aspects of trauma and forensic material evidence collection. This may result in loss of evidence as due attention is given to medical management of wound only and the material evidence collection may be overlooked or discarded.⁸⁻¹² Also, the appropriate, timely medicolegal documentation of evidence which may be important in future for Pathologists, police and legal authorities in consideration with judging/interpreting findings and investigation results for forensic and judicial purposes may be neglected by such on duty physician.¹³⁻¹⁶

In traditional curriculum, it was expected from a graduates performing physical examination to learn the basic forensic skills to handle medico legal cases. Hence, this study was undertaken to apply principles of active, student-centric learning to assess student's satisfaction on their teaching-learning experience with this Clinical forensic medicine module.

In the present study (**fig no. 2-9**), most of the students (98.5%) had a good learning experience with this module with reference to enjoyable experience, stimulation to learning, and aroused curiosity about topic. The participants of this module

found that the delivery of method useful to understand the topic better. In addition, Students opined that this module ensures their active participation and helped them towards clearing of doubts. It helped to memorise the steps of examination clearly. They found that the learning was relevant to them in routine clinical medical practice. It ensures the future application of knowledge in their private professional practice. It improves their understanding of application of Clinical Forensic Medicine expertise in clinical practice.

Students felt that they may perform better in university examination after their training using this module. An acceptance to this module by students encourages implementing this Clinical module. By implementing this module students understanding would improve and will make them competent in Clinical application of Forensic Medicine in medico-legal cases. More than 80% students (either agreed or strongly agreed) that forensic practicals need to be covered by this method using bedside clinics and case based teaching in real scenario. Case based training in Clinical Forensic medicine is need of hour. May give undergraduates the confidence to handle medico legal cases in practice.

Similar comparable results were revealed by Mohite et al. Authors concluded in their study that introduction of Clinical posting in Clinical Forensic Medicine is need of hour for enabling medical graduate competent with skills of handling medico legal cases.¹⁷

Ingole et al in studied the effect of early Clinical exposure on documentation of medico-legal cases. The authors revealed that implementation of this critically designed module of early clinical exposure definitely improved knowledge and skills of students. Authors recommend undergraduates early Clinical Posting in casualty and compulsory posting of Interns under forensic Medicine, as this is currently optional in India.¹⁸

It is hoped that implementation of Clinical Forensic Medicine module may avail an opportunity to the forensic expert faculty to teach students all clinical medico-legal aspect in an efficient way at wards or in clinical settings. This will definitely towards improving the medico-legal examination

and medico-legal report writing which will further aids in administration of justice.

Limitations:

Long term effects such as students' actual performance in their professional examinations were not assessed. The actual improvement in knowledge & skills not assessed as it is not included in the study protocol due to time constraint.

Conclusion

The approach and tool used in this Module for teaching principles and practice of Clinical Forensic Medicine, including medico legal cases of age & injury were well accepted by students as one of the good teaching-learning method. The study was demonstrated the students' active learning involvement at study sessions showing their acceptance towards this method for better understanding of medico-legal issues. The introduction of this module shows increased confidence amongst the undergraduates towards handling the medicolegal cases with systemic standard protocol. Also, it improves their confidence towards their Professional examination assessment.

Undergraduates showed positive inclination towards implementing such educational module on Clinical Forensic Medicine as an effective teaching/learning method. It facilitated them to learn basics of Medico-legal issues and protocols in handling medicolegal cases in real scenario at bedside clinics in wards. It showed increase in their confidence towards handling medicolegal cases as first contact person efficiently in their clinical practice. Implementation of this module will help to produce medical graduates with a sound and broad applied knowledge of medico-legal principles in Clinical Forensic Medicine.

Recommendations:

Authors of this study recommends the bedside clinical forensic medicine teaching in real settings at ward for undergraduates with the new competency-based medical education curriculum.

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Ethical Clearance: Yes.

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Original Review Article

Long Term Reversible Contraception Use in Comparison to Tubal Ligation

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Abstract

There are multiple different types of contraceptive methods are available. Unplanned, unwanted pregnancy is one of the most important social, economic and national problem. Preferences in couple is in consideration with its lower failure rates. We present a review article with comparison of different methods of long term contraception and their effectiveness. Tubal ligation is an operative intervention which can have complications, in comparison with long term reversible methods such as intrauterine contraceptive device can be more feasible and less invasive. Failure rates of long-acting reversible contraceptive (LARC) are comparable, in fact lower than that of female tubal ligation, and should be considered as a more feasible option.

1. Introduction

Many different types of contraceptives methods are available. Permanent methods such as tubal ligation, male and female; long term reversible methods such as intrauterine contraceptive devices, injectables, implants; and short term methods such hormonal pills and barrier methods. There is still no perfect method. The most preferred method for a couple is one which has the least risk of failure. Unwanted pregnancy can be catastrophic for a couple especially in resource limited countries.

2. The National Scenario:

Unplanned, unwanted pregnancy is a social, economic and national problem. An estimated 15.6 million

abortions (14.1 million–17.3 million) occurred in India in 2015. Abortions accounted for one third of all pregnancies, and nearly half of pregnancies were unintended.¹ They form a significant number of pregnancies and could be a major factor of population increase. For many decades the National Family Planning Program in India is encouraging various methods of contraception, more so permanent methods of female sterilization and also male sterilization. Though very effective and most often irreversible, these methods can have complications and in fact are major surgeries. We need to look for more cost effective and reversible options with minimal failure rates (**Refer table no. 1**)

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Table 1: Women experiencing an unintended pregnancy within the first year of use (%).

Method	Typical use	Perfect use ²
Copper T intra-uterine devices	0.8	0.6
Progesterone intra-uterine system	0.2	0.2
3-year implant	0.05	0.05
Female sterilization	0.5	0.5
Male sterilization	0.15	0.10

3. Discussion

LARC (long-acting reversible contraceptive) methods are easy to administer to the well motivated couple. They are most commonly done in the outpatient setting by a qualified health care provider. This is very easy for the patient in comparison to tubal ligation which requires admission and operation theatre facilities. Tubal ligation involves trained gynecologist and anesthetist where as long-acting reversible contraceptive LARC can be inserted by a family physician as well.

LARC (long-acting reversible contraceptive methods) are long term, Norplant implants are effective for 5 years, intrauterine contraceptive device (IUCD) which contains copper has a range from 5 to 8 years of effectiveness. Mirena intrauterine system (IUS) has contraceptive effectiveness of 5 years.^{2,3} Biggest advantages they are all completely reversible with simple removal. This is important as many a time women may change their mind and if there is a change of partner or life circumstances may desire future fertility. This option would not be possible in tubal ligation.

Although with advent of artificial reproductive technology it is possible to have children with IVF (in vitro fertilization) after female sterilization, albeit, it's a costly option. But, fertility following male sterilization is rarely if at all possible. However, women have a lot of misconceptions about intrauterine device insertion use. They attribute a lot health issues to it. Multiple studies have proven that they do not cause any long term side effects like menorrhagia, dysmenorrhea, but women post intrauterine contraceptive device (IUCD) insertion associate these symptoms to

intrauterine contraceptive device (IUCD) and ask for its removal. This is where proper and detailed counseling would help. The side effects post insertion is limited to first few months and usually subside on their own. The detailed counseling of women prior to insertion is essential.

Intrauterine devices have very low failure rates as low as 1 in 1000 women.^{2,3} Moreover, typical use and perfect use failure rates are almost similar. This is unlike oral contraceptive pills or barrier methods when there is vast difference between typical use and perfect use and efficacy is totally dependent on the user.

Tubal ligation techniques and timings have an effect on its failure rates. Failure rate after female tubal sterilization is 1 in 200. Failure rate after male sterilization is close to 1 in 1000, after 72 days of the procedure and confirmed with a semen analysis.^{2,3}

When female tubal ligation is considered, timing is important. Failure rates are higher if done along with cesarean delivery or immediately post partum. Effectiveness is said to be better when done at least 6 months after child birth. This could be attributed to edematous post partum tissue, which can form re-anastomosis of the tubes.

There are various techniques; both open surgery and laparoscopy can be considered. Specific techniques for tubal ligation are also numerous. Pomeroy's method, salpingectomy, Parkland method, Madlenar's method, Irving method, Uchida method, Aldridge method, coagulation of fimbrial ends can be done. Method is chosen as per surgeon discretion, failure rates though almost similar are lowest for fimbriectomy. The type of method used would also determine if reversal would be possible or not. Reversal is usually most successful with Pomeroy's method especially if done post partum. In comparison, long acting reversible contraceptive are very effective in terms of failure rates.⁴ They have the ease of insertion and removal if required. They do not have associated risks of major surgery or anesthesia. Moreover if the women change her mind and wants to conceive these LARC can be easily reversed without long term effects.

The non hormonal copper containing are easily available under the national family planning programme. Mirena intrauterine progesterone system is a more costlier option. Their failure rates are almost similar but there are no symptoms of

dysmenorrhea or menorrhagia with Mirena (intrauterine progesterone system) as it can also be used to treat such conditions.

The most common complication that is associated with both tubal ligation and Long acting reversible contraceptive (LARC) intrauterine device (IUD) is the chances of ectopic pregnancy. Women have to be counseled that if she misses her period she should be seen by a health care provider to rule out pregnancy and ectopic pregnancy.

Women who opt for Long acting reversible contraceptive (LARC) should get it removed after its recommended duration, which is usually of 5 years, as the effectiveness may be a concern. This information should be given to every women opting for Long acting reversible contraceptive (LARC).

Long-acting reversible contraceptive (LARC) methods which include the copper containing intrauterine devices (IUCD), progestogen-releasing intrauterine system (MIRENA) and injectable and implantable contraceptives are widely available. They offer a safe and effective contraceptive option for many women who do not want to have any further children.

Conclusion:

Long-acting reversible contraceptive (LARC) methods which include the coppercontaining intrauterinedevices (IUCD), progestogen-releasing intrauterine system (MIRENA) and injectable and implantable contraceptives are widely available. They offer a safe and effective contraceptive option for many women who do not want to have any further children.They are very effective but still lot of women do not opt for them and go for permanent operative methods.

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Original Review Article

Access and Rights to Healthcare of LGBTQ Patients: A Systemic Review

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HIV & Health rights,
Health Accessibility.

Abstract

The article deals with the clinical care and accessibility of the LGBTQ community. LGBTQ people faces a lot of challenges in social, political and cultural life — the primary reason being the absence of legal recognition. It is one of the most comprehensible hindrances that often restrict them to employ their rights associated with marrying the person of their preferred gender to child adoption to employment to access of healthcare facilities and health insurance schemes. A varying degree of healthcare discrepancy is encountered by the LGBTQ community on a daily basis in accessing and utilizing of healthcare services. There are multiple manifestations of discrimination that these minority people face to meet their basic healthcare requirements. The article also talks about the LGBTQ Health rights and demonstrates some effective approaches to protect healthcare rights of the LGBTQ individuals. The study aimed to understand the challenges faced by the LGBTQ population, its psychological consequences, their healthcare needs & rights to avail healthcare services. The study based on secondary data, which is collected from books, research papers, newspaper articles, international journals concerned with the atrocities and discrimination committed against the LGBTQ population in regards to attain basic standardized healthcare needs. There is dire need to make these populations meet the basic amenities of healthcare.

1. Introduction

LGBTQ people faces a lot of challenges in social, political and cultural life — the primary reason being the absence of legal recognition. It is one of the most comprehensible hindrances that often restrict them

to employ their rights associated with marrying the person of their preferred gender to child adoption to employment to access of healthcare facilities and health insurance schemes.

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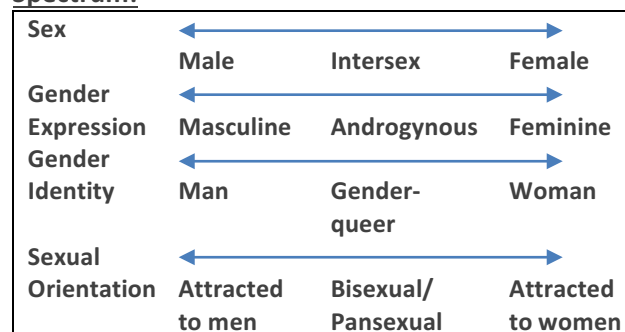
The stigma of being a member of LGBTQ culture is so high that people, especially youth, often fear to reveal their sexual identity. Thus, it becomes difficult to identify the actual number of LGBTQ people in a community. However, in 1994 Laumann and associates, used “the national probability Health and Social Life Survey combined with data collected in the General Social Survey”, ascertained that “2.8% of men and 1.45% of women” recognize themselves as “gay or lesbian, while 7.7% of men and 7.5% of women” have same sex desires. Perhaps the most misinterpreted population inside the spectrum of **LGBTQ community are the bisexual individuals** — because for some people the recognition of their bisexuality in continuous and lifelong, while for some the sexual orientation is fluid in nature and shifts from being heterosexual to gay or lesbian or vice versa. Thus, mistaken beliefs about bisexuality is often noticed and unfortunately sometimes the healthcare service providers also embrace some of those myths and perceive bisexual people to have emotional and psychological damage. Transgender, on the other hand, is a broad terminology that circumscribes within itself a range of individuals varying from “transsexuals” to transvestites to bigender to androgynous people and they demonstrate the entire radius of “sexual orientations” (from homosexual to bisexual and heterosexual individual).¹ LGBTQ individuals confront almost all the same issues that a regular person faces as they progress through life. In fact, it is noticeable that an LGBTQ individual witnesses apparently more difficult life cycle issues — like “coming out” of the mainstream sexual orientation and disclosing about the choice of “being different” involves the risk of rejection and ostracism.

Terminology and Conceptual Understanding:

The notion of “**sexual orientation**” constitutes “a complex, multidimensional construct that reflects an individual’s sexual behavior, attraction and identity that respond to environmental context and may change across the life course.” People whose sexual desires is towards individuals of the alternate sex are “**heterosexual**” and those people whose “orientation” is towards the individuals of the same sex are “**homosexual**”, with women who primarily desire other women are described as “**lesbian**” and men who are oriented to

other men are called “**gay**”. **Gender**, on the other hand, is defined as a psychological, social and cultural construction of factors that classifies individuals as “male, female, both or neither, with individuals traditionally assigned a gender role at birth based on one’s sex, the anatomy and physiology that determines whether one is biologically male, female or intersex.”² The people who specify not to acknowledge to any particular mainstream social norms are regarded as “**gender variant**”. This amount of diversity thus demands the necessity of healthcare service providers to approach the LGBTQ individuals (patients) with few or no prior assumptions about them and to have a broadened outlook to the needs of these patients within their cultural milieu.³

Spectrum:

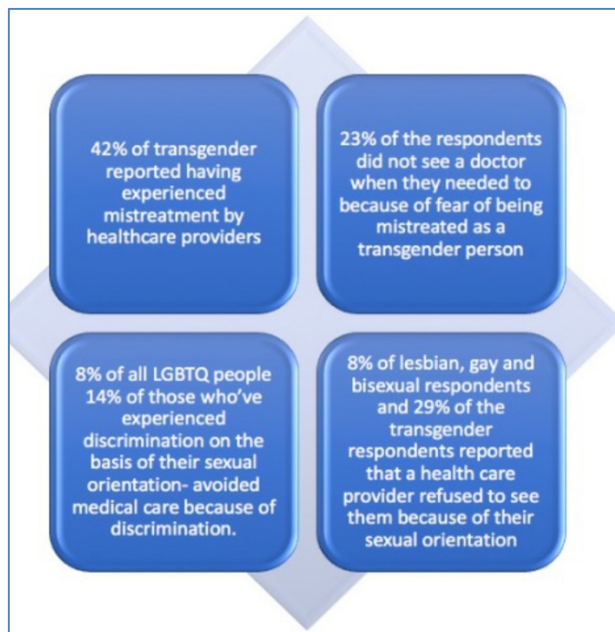


2. Fear of Stigmatization and Access of Healthcare:

There exists a varying degree of health discrepancy within the LGBTQ community which includes “access and utilization of programs and services”.¹ For instance, in a study of “Women’s Health Initiative” (with a sample size of 96000 older women from US), it was demonstrated that heterosexual women are comparatively more insured than lesbian and bisexual women.¹ According to the Gay and Lesbian Medical Association the highest uninsured people belong from the transgender spectrum as most healthcare services associated to transgender concerns are not enclosed by any insurance, resulting their healthcare costs way too expensive.

The social stigmatization associated with the LGBTQ community creates a huge amount of mental health outcome that results in the “feeling of shame, self-hatred” which in turn give rise to low self-respect, depression, alcohol and drug dependence, anxiety, substance use disorders, panic attack among other things.³⁻⁵ Many LGBTQ

individuals often witness homophobia or denial of service from healthcare professionals, or sometimes they often isolate themselves from care because of agitation of ill-treatment or perceived homophobia.^{4,5} A Healthy people 2020 report found that “LGBTQ youth are 2 to 3 times more likely to attempt suicide, more likely to be homeless, and have a higher risk of HIV and other sexually transmitted diseases (STDs).”⁶ According to Ryan Thoreson, an LGBTQ rights researcher at Human Rights Watch “Discrimination puts LGBT people at heightened risk for a range of health issues, from depression and addiction to cancer and chronic conditions.” Despite healthcare being a right, when require care LGBTQ individuals often witness higher number of obstacles to assess and avail the services. Also, at times within the healthcare premises, transgender people often face inappropriate and unprofessional remarks and questions about their sexual preferences and genitalia which results in distrust and apprehension for the healthcare service institution.



Access or availing the healthcare refers to the methods in which healthcare facilities are (or aren't) addressable to the LGBTQ community. Even before addressing healthcare service providers, LGBTQ individuals can witness complexity in looking for the particular care they need. If they encounter bias or prejudice, they often do not have an alternative provider accessible. “Data collected by

the Center for American Progress” indicate that 18% of LGBT people is of the belief that if they were denied treatment at a healthcare setting, it would be “very difficult” or “not possible” to get referred to an alternate service-provider. Although LGBTQ individual in general have similar basic health requirements as do other persons, but adding to it they also have health issues related to being LGBTQ. For instance, a young adult LGBTQ individual should be routinely immunized for hepatitis A, hepatitis B, and influenza. In a study it was found that in the “United States men who have sex with men continue to be disproportionately affected by HIV/AIDS, accounting for 49% of all HIV/AIDS cases diagnosed in 2005 (CDC, 2006), with depression occurring among 20–37% of infected individuals.”³ However, it is noted that only a few LGBTQ healthcare customers or establishments have openly declared the specific requirements and issues of this diverse group. LGBTQ individuals, particularly “non-white”, remain “hidden”. They lack the potential for being legitimized and a criticality to take part in designing of resources that may empower their approach and availability to a standardized healthcare.³

Leidolf and colleagues, in an article titled “Intersex Mental Health and Social Support Options in Pediatric Endocrinology Training Programs,” wanted to analyze the degree to which the mental supportive services available among those “providers most likely to evaluate and treat intersex children and their parents.” The resulted report documented that “69% of programs offered psychological support and 58% had a dedicated mental health specialist on staff”.⁷ In spite of these, it was reported that only “19% of patients or families reportedly received psychological support during diagnosis and 15% after diagnosis.” The anecdotes of the respondents advocate that the services were not adequate and were addressed on an “as-needed” basis. However, the specificity of these disparities in accessibility and utilization of psychological health care among these people and their families prevail to remain obscure and demand additional scrutinization.⁷

However, in some of the recent studies it is noted that LGBTQ consumers, patients and advocates of health services are coming out of their long silence on care-taking and care-giving. For

instance, the “American Public Health Association” had acknowledged the health issues of LGBT populations with a “policy statement” on the requirement for research on “gender identity and sexual orientation” and a subsequent journal issue wholly dedicated to the topic in 2001 and the inclusion of homosexual people in Healthy People 2010.^{8,9}

The passion and constant effort of advocates of Los Angeles, Santa Clara, Alameda, and Humboldt Counties made the quest for safe and accessible healthcare for LGBTQ population practicable. With their perseverance, they have made it possible to successfully implement transgender health care services.¹⁰ For instance, Danielle Castro, a transgender Latina woman often faced difficulty in availing healthcare services. She believed that she alone was not facing this kind of situation but many other LGBTQ individuals are also dealing with similar sets of issues.¹¹ She was referred to “Transpowerment” (a county health program housed at Community Health Partnership created to reduce HIV infection and transmission among transgender people and their partners). She chose to work in that organization as a health trainer (hired by the Pacific AIDS Education and Training Center (PAETC) through their Minority AIDS Initiative funds).¹² As she belonged from the transgender community, she was able to connect Transpowerment to the economically weaker transgender crowd and started a multicultural support group. Danielle realized the need for healthcare services within this minority population and performed hard to set off as an extraordinary trainer with the guidance of JoAnne Keatley, PAETC Minority AIDS Initiative Program Manager. Shortly after the support, Transpowerment also focused on training to provide services to gay people and other sexual minorities — which help to create an ensuring place where LGBTQ people could get healthcare support and services.

Availability of standard healthcare services for LGBTQ population in rural area are more challenging than urban setting.¹³ There are huge number of testimonies of people being refused health treatment and are subject to “verbal abuse” and “public humiliation”, “psychiatric evaluation”, a number of “forced procedures such as sterilization,

State-sponsored forcible anal examinations for the prosecution of suspected homosexual activities, and invasive virginity examinations” done by healthcare staffs, hormone therapy and genital normalizing surgeries under the false colours of “reparative therapies”.¹⁴ Isolation from healthcare services is very common in rural areas. To further worsen the situation, if an individual belongs from the “other” identity based-groups, then the isolation adds on another layer which creates unruly concoction of healthcare barriers for LGBTQ individuals. The professor of Health behavior Doctor Rob Stephenson has conducted a study on rural LGBTQ people and learnt that failing to “come out” and reveal sexual orientation and gender identity results in decreased healthcare utilization: “Not age or education or income. Nothing else mattered. All that mattered was whether or not your doctor knew you were gay,” Thus the rural LGBTQ individuals carry a burden of anxiety and negative stereotypes within themselves and distance themselves from availing healthcare services.

Providing healthcare to all is the ultimate Public Health Goal and the accomplishment of this goal explicitly demands elimination of different level of discrepancies that exist in healthcare delivery system among minority population. However, it becomes extremely difficult and complicated for especially sexual minority population (gay, lesbian, bisexual individuals, transgenders).⁵ Thus it becomes imperative to conduct population based surveys to understand the priorities for mental health intervention efforts within these communities, however there are limitations that exist in regard of the inferences that are deduced like the sample size of the individuals who open up about their sexual preferences (within this community) is very small (less than 5% in each study) and again some respondents do not feel comfortable enough to reveal their personal information.

Availability of healthcare services and economic status are closely knitted. In the year 2008, “Transgender Law Center” carried out a survey within the “transgender Californians”, enquiring about their “employment”, “housing” and “healthcare status”. The resulting report which was found disclosed these statistics: “among 648 respondents: 30% postponed care due to disrespect

or discrimination from health care clinicians; 42% postponed care because they could not afford the medical care they needed; and 26% of those who postponed care reported that their conditions worsened as a result.”¹⁰ The condition further exacerbates as the transition related care such as hormone therapy and gender reassignment surgery are often explicitly excluded from the health insurance plans — which seriously affects both the physical and mental health and economic stability of these minority individuals. As a result, it is often seen that these people have to pay out-of-pocket for the cost of hormones or transition related surgeries or mental health therapy — for which they often avail less expensive care from unlicensed practitioners. Such incomprehension and discrimination by the insurance companies and healthcare service providers lead LGBTQ people fight each day to fill the gap for their primary health requirements.

“...[T]here is nothing new or special about the right to life and security of the person, the right to freedom from discrimination. These and other rights are universal ... enshrined in international law but denied to many of our fellow human beings simply because of their sexual orientation or gender identity”

—United Nations High Commissioner for Human Rights Navi Pillay, 2012.

3. LGBTQ HEALTHCARE RIGHTS:

The human right with the association to LGBTQ health is the right to enjoy the highest “accessible standard of physical and mental health (Refer table no. 1).” The Yogyakarta Principles on the Application of Human Rights Law in Relation to Sexual Orientation and Gender Identity (the Yogyakarta Principles, signed by 29 international human rights expert) were set to motion on March 26th, 2007 who elaborately work on the rights of all people irrespective of their sexual orientation and gender identity.⁹ The 17 and 18 of the Yogyakarta Principles convey “the right to highest attainable standard of health and protection from medical abuses.” The principle states “Everyone has the right to the highest attainable standard of physical and mental health, without discrimination on the basis of sexual orientation or gender identity. Sexual and reproductive health is a fundamental aspect of this right.” However, LGBTQ individuals witness multiple

manifestations of discrimination stemming from heterosexism and traditional views regarding sexuality. Homophobia, ignorance and the stigma associated with it act not only as an impediment to avail healthcare, but also operate as a hinderance in the way of research which in turn perpetuates within the cycle of mistreatment. For instance, on 7th August 1995, a 24-year transgender woman named Tyra Hunter was severely injured in a car accident. The paramedical staffs arrived at the scene and started treating Tyra, but when they discovered that she had a penis, they stopped providing treatment and began to mock her. Horrified bystanders did nothing but witnessed the incident silently until someone came on the scene and resumed treatment. Tyra however lost her life. Another incident where an LGBTQ individual named Robert Eads (who was diagnosed with ovarian cancer) was refused treatment for one year as more than dozens of doctors did not want to treat him.¹³

Accessibility of standard healthcare for LGBTQ people is not a privilege, it’s a RIGHT

Some Effective Approaches to Protect Health Rights of LGBTQ Individuals:

Enable LGBTQ individual to proclaim their gender identity: To attain the highest achievable quality of health it is essential to allow people to proclaim their “gender identity” in state documents and other administrative procedures.⁸ According to a report of Harvard school of public health “upholding a right to privacy in relation to past and present gender identity, and the ability to change legal identity to protect this privacy, helps to ensure that LGBTI persons are less likely to be subjected to unlawful discrimination, harassment, and psychological harm.”

The right to avail proper Gender affirming Healthcare Services: The freedom to define one’s own gender identity is “one of the most basic essentials of self-determination.” Thus, availing appropriate gender affirming healthcare which includes the freedom to change one’s gender through medical intervention is one of the basic healthcare rights that can impact the LGBTQ community. A patient who has undergone partial gender reassignment surgery alleged that: “[H]is continuing inability to complete gender-reassignment surgery left him with a permanent

feeling of personal inadequacy and an inability to accept his body, leading to great anguish and frustration. Furthermore, due to the lack of recognition of his perceived, albeit pre-operative, identity, the applicant constantly faced anxiety, fear, embarrassment and humiliation in his daily life. He has had to submit to severe hostility and taunts in the light of the general public's strong opposition, rooted in traditional Catholicism, to gender

disorders. Consequently, he has had to follow an almost underground life-style, avoiding situations in which he might have to disclose his original identity, particularly when having to provide his personal code. This has left him in a permanent state of depression with suicidal tendencies." So, it becomes imperative to facilitate the self-determination of gender identity along with the provision of funding of relevant healthcare procedures.

Table no. 1: Healthcare as a basic right¹⁵

Who is to be protected?	What is the law?	What is the situation?	What should be done?
<ul style="list-style-type: none"> LGB People 	Everyone has the right to the highest attainable standard of physical and mental health, without discrimination on the basis of sexual orientation or gender identity. Sexual and reproductive health is a fundamental aspect of this right	Despite healthcare being a right, when require care LGBTQ individuals often witness higher number of obstacles to assess and avail the services. Also, at times within the healthcare premises, transgender people often face inappropriate and unprofessional remarks and questions about their sexual preferences and genitalia which results in distrust and apprehension for the healthcare service institution.	<ul style="list-style-type: none"> The right to avail proper Gender affirming Healthcare Services
<ul style="list-style-type: none"> Transgenders 			<ul style="list-style-type: none"> No healthcare caregivers should treat the identity of the individual rather they should treat the unique needs of the patient
<ul style="list-style-type: none"> Gender Non-conforming People 			<ul style="list-style-type: none"> Effective communication between these multicultural groups and the service providers should be ensured
<ul style="list-style-type: none"> Intersex individuals 			
<ul style="list-style-type: none"> Non binary people 			

LGBTQ Individuals in Health Policy Setting: Another way in which the health of the LGBTQ people can be facilitated is through the training the healthcare professionals and service providers to be sensitive enough to the concerns of these people.⁸ No healthcare caregivers should treat the identity of the individual rather they should treat the unique needs of the patient. The LGBTQ population should not feel "overlooked or undeserved" when it comes to their healthcare needs and in this regard the health policy makers should prioritize the LGBTQ population group along with the heterosexual consumers.

Health Education for LGBTQ Population: Another aspect of LGBTI health is the right to educate. "Health education is an important aspect of the right to health for LGBTQ individuals. In many countries around the world the hetero-norm is reinforced through withholding education about sexual and gender diversity,⁷⁰ and risking the health of young LGBTQ people in the process.

4. Discussion & Conclusion:

The review highlights the prejudice and discrimination suffered by the LGBT population in

accessing good quality health services. The LGBT population experience difficulties communicating with health professionals, apart from the fear of assumptions about their sexual orientation, and of embarrassing situations when expressing their homosexuality/bisexuality, due to the homophobia present in professionals' conduct. The exclusion and marginalization in health services imply a reduction in attendance and the subsequent search for assistance, contributing to the deviation of this clientele, in view of their own body care, and reducing the chance of developing educational and preventive health work.

It becomes necessary, therefore, to ensure that, apart from the provision of qualified and equipped health services, there are trained professionals stripped of discriminatory attitudes in that area. These should be able to analyze the health status of their clients, taking into consideration the health, social, and cultural context in which they are placed. To that, the accomplishment of new research on the theme may provide a broader discussion and generate

favorable changes in the health care of the LGBT public.

Thus, we can understand how clinical settings and research training opportunities in LGBTQ medicine, epidemiology and public health are of dire need to make these populations meet the basic amenities of healthcare. Proper and meaningful interaction and engagement with the local, national and global LGBTQ communities will facilitate to create an environment that provide medical treatment and counseling that support LGBT people in adopting healthy lifestyles.

Effective communication between these multicultural groups and the service providers are of paramount importance to ensure and augment the trust between the caretaker and the caregiver. By working together and developing productive relationships with the amalgamation of various range of politics, medicine, and social service organizations, one can move towards progress. It takes patience, determination, and effort– may be often years, but it can be achieved. Such interventional efforts will be maximally responsive if they attend to the multiple health care needs of the LGBTQ people.

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Case Report

Unusual Case of Suicidal High-voltage Electrocutation

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Key words

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Burns.

Abstract

High-voltage electrocutation is usually accidental seen at the workplace. These are always associated with electrical entry wounds because of direct contact or arching of the current. Twenty-two-year-old male admitted with history of homicidal thermal burns in emergency department. He survived for two days of treatment. During the dying declaration deceased revealed the same history. On autopsy, the death was due to flash burns and Joule burns caused by high-voltage electrocutation. After a meticulous autopsy, crime scene investigation, histological examination, laboratory investigation and Police inquiry helped to conclude the manner of death as suicidal in nature.

1. Introduction

Electrocutation is defined as “the passage of substantial electric current through tissue produces the skin lesion, organ damage, and death”.¹ The death in electrocutation mainly depends upon the high-voltage currents are more than 1000 volts and low voltage currents are less than 1000 volts.² High-voltage electrocutation is caused either by direct contact or arching through the air.³ High-voltage electric current will jump an arc through the air. Air is the bad conductor of electric current and the high-voltage is needed to the arc for some distance. For example, the electric current of 100 kilovolts can jump for 35 cm distance. This will leads to a heat production of about 4000 degree Celsius.⁴ The most commonly involving the fatality of high-voltage electrocutation is arching or

flashing through the air. In flash burns, intense heat may be produced from flashover resembling thermal burns (exogenous burns). Brief contact may not produce burns.

High-voltage burns may be severe with charring of the body. Multiple, small, distinct, pitted burns may be caused by arcing from conductor to the body without direct contact in case of high tension electrical current.⁵ An enormous amount of heat may be generated during the arching that causes crocodile flash burns and also the ignition of clothes may possible that leads to secondary burns.⁶ High-voltage electrocutation is usually accidental as compared to suicidal nature. Suicidal high-voltage electrocutation is very rarely reported in the literature.⁷

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Hence we are reporting a case with unusual history of homicidal burns. In this case, how meticulous autopsy, crime scene investigation, histopathological examination and investigation by Police were helpful for detection of cause and manner of death has been discussed.

2. Case report

A twenty-two-year-old male was admitted to emergency medical services with an alleged history of fastened to the electric post and inflicted thermal burns by pouring kerosene by an unknown person. He was died on after two days of treatment. During the dying declaration deceased revealed the same history. After all the legal formalities body was subjected to postmortem examination. A body was naked, moderately build and brown complexion. Rigor mortis passed off in the upper limb and neck. Livor mortis is present and fixed over the back except over an area of contact and burns.

Superficial burns involving the head and neck (5%), right upper limb (7%), left upper limb (8%), front of trunk (12%), back of trunk (16%), right lower limb (10%), left lower limb(7%) and genital region (1%). Base and margins are reddish. Crocodile flash burns (skin appearance) noted over the left side of the lower half of face, left arm, left shoulder, and bilateral inguinal region (Fig.1A, 1B& 1C). A total of 66% of total body surface area burns was involved. These were evidence of flash burns.

Figure 1A: Crocodile flash burns noted over the left side of lower half of face, left shoulder and arm; **Figure 1B:** Crocodile flash burns noted over the bilateral inguinal region; **Figure 1C:** Superficial burns present over the back.



A circular electrical entry wound of size 1.5cm diameter present on the hypothenar eminence of the left palm. Another electrical entry wound of size 8cm x 4cm present over the distal part of the thenar eminence and proximal fingers of left palm except for the thumb. The bases of craters were greyish pale present in two electrical entry wound. These injuries were suggestive of Joule burns (Fig.2). Multiple reddish-brown abrasions were seen on the posterior and medial aspect of both thighs (Fig.3A). Multiple abrasions present on the antero-lateral aspects of the left thigh (Fig.3B). These graze abrasions were suggestive of climbing the electric post. The chemical analysis report was negative for toxicological substances.

Figure 2: A arrow showed a circular electrical entry wound of size 1.5cm diameter present on the hypothenar eminence of left palm. B arrow showed electrical entry wound of size 8 cm x 4 cm present over the distal part of thenar eminence and proximal fingers of left palm except for the thumb.



Figure 3A: Multiple reddish brown abrasions were seen on posterior and medial aspect of both thighs. **Figure 3B:** Multiple abrasions present on the anterolateral aspect of the left thigh.



Histopathological examination of electrical entry wound site revealed that electric current induced changes in the skin are disruption and necrotic epidermal layer and presence of neutrophil infiltrations (Fig.4). These findings were suggestive of Joule burns. Crime investigation showed the evidence of torn thin metallic wire (it holds high tension wire with pole) and partially burnt shirt recovered from the crime scene (Fig.5).

Figure 4: Histopathological examination of electrical entry wound site revealed that electric current induced changes in the skin (H & E 10x). Arrow A showed disruption and necrotic epidermal layer. Arrow B & C showed presence of neutrophil infiltration.

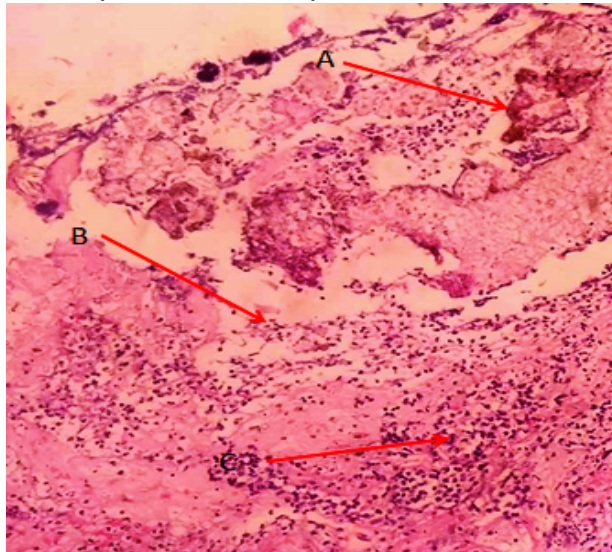


Figure 5A. Crime scene investigation showed the evidence of torn electric wire which was previously connected with high-voltage wire. **Figure 5B.** A partially burnt shirt recovered from the crime scene.



There was no evidence of kerosene or petrol. But evidence of burnt clothe and burns of the left half and the upper half of the body due to the flash burns due to high-voltage. We ruled out any other injuries due to assault. The cause of death

opined based upon the autopsy features and histopathological examination was 66% of burns following high-voltage electrocution. There was evidence of both flash burns and Joule burns. After analysis of autopsy, histopathology, crime scene, chemical analysis report and Police inquiry, we concluded manner of death as suicidal.

Discussion:

In India, about 9986 deaths in 2015 related to the accidental and suicidal death of electrocution as per the National crime bureau record investigation. It contributes to 3 % of death compare to all unnatural cause of death.⁸ Suicide by using electric current is a very rare phenomenon and about 90% was successful. In which mostly the individuals are using the low voltage electric current for committing suicide and more common in males.^{7,9} High-voltage electrocutions are usually accidental at the workplace and always associated with electrical entry wounds because of direct contact or arching of the current¹⁰.

The individuals who have committed suicide by electrocution may be linked to psychiatric illness and the electrical profession. Based upon this it can be divided into two groups. In the first group person who has related to electrical works like electrician, electrical engineers, and electrical appliances repairing. They are often dealing with complicated electrical circuits with time and switches. In the second group the person with a psychiatric illness who have more prone to deal with an electric current to terminate the life of an individual like person sits in the bathtub by dropping the hairdryer and lamps into the water.^{9,11}

According to Somogyi E et al and Manfredi M suicide by electrocution is again classified into four groups based upon the type of method of commission. **Group 1:** climbing a pylon grasping the wire carrying high-voltage electric current. **Group 2:** fastened the one end of a wire to one of the limbs and throw the other end of wire tied with the heavy object to transmission lines. **Group 3:** winds the electrical wires to a wrist or the waist and switching the current. **Group 4:** placing the electric wire on the mouth passing the current over the head.^{7,12}

Fernando R and Liyanage S reported a case of the thirty-four-year-old male laborer of electricity board found dead inside the locked room. He had two-loop of electric wire encircles the left index

finger. He was a known case of depressive disorders. They came to a conclusion based upon autopsy findings and circumstantial evidence cause of death was ventricular fibrillation due to low voltage electrocution.¹¹ Bligh-Glover WZ et al reported two cases of suicidal electrocution case one was by using the bare copper wires encircles both wrists with switch control present over the chest and found suicide note revealed warning about the live electrical circuit for the rescuers not to touch his body and another was holding the lamp by the deceased in the bathtub. Both cases are known case of psychiatric disorders. Cause of death arrived as ventricular fibrillation as consequent of low voltage electrocution.¹⁰

Gupta BD et al reported a case of suicide by electrocution using 'black' and 'red' wires tied on the wrist with un-insulated copper wire. He was an electrician by occupation. They concluded the case died due to electrocution.¹³ Chan P et al conducted a study for 10 years in Sydney regarding suicidal electrocution. They found 25 cases in that 20 cases are the direct contact and 5 cases are immersed in the water bathtub with electrical devices. In this majority of the cases are direct contact with electricity and most of the cases are related electrical professions. They found that the high number of bodies in the scene of investigation presences of the active electrical wire. They were investigated with proper electrical professional.¹⁴

Das S et al reported a case of suicidal electrocution of the thirty-two-year-old men climbing the electric post and grasped the electric wire and having multiple exit electrical wounds over both feet. He was known the case of psychiatric disorder. The cause of death was high-voltage electrocution.¹⁵ Eren B et al and some of a few case reports showed the electrical profession was usually involved in suicide electrocution.^{16,17} Lucas J conducted a study for 22 years in North Ireland. They found a total of 9 suicidal electrocutions among these eight were associated with severe depressive disorder.¹⁸ In the present case, the person involved was free of psychiatric disorder and nonelectrical profession who had committed suicide by high-voltage electrocution method.

We observed crocodile flash burns. Heat produced by flash over in high tension wire and arcing resulted in the ignition of clothes responsible

for the thermal burns. It was evident by burnt clothes present in the crime scene. The linear and circular electrical entry wounds were typical of a Joule burns with shallow crater due to direct contact with an un-insulated live metallic wire connected with high tension electric wire. This was confirmed with crime scene investigation where torn connecting wire with high tension electric wire in the electric pole and along with the histopathological examination. Joule burns are caused by low-voltage electrocution. But in our case, Joule burns were produced by high-voltage electrocution. In present case combination of flash burns and Joule burns was seen due to suicidal high-voltage electrocution.

Conclusion

As autopsy surgeons, we should not believe the history given by deceased himself in the form of dying declaration or allegation of relatives. We want to the highlight importance of autopsy and ancillary investigation in the form of histopathology. It helped in forming an opinion to cause of death. Further use of crime scene visit and Police inquiry were very much helpful to differentiate homicidal versus suicidal death.

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Case Report

Burn: A Tool for Concealing Homicide by Strangulation

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Homicide,
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Abstract

Homicide is a killing of one person by another. It may be caused by mingle of factors at the individual, relationship, and community. Societies with pronounced gender inequality tend to be characterized by higher levels of interpersonal violence against women, including homicide which is increasing at an alarming rate in India. Homicide in the form of strangulation (manual and ligature) with 'hands-on' kill feeling occurs where the sexual fantasy acts paired with domination, degradation, and violence resulting in death. Attempts to conceal homicide to the accidental ones are not rare, which neither the science, and nor the law has been completely successful in unearthing most of these incidents. Burns are frequently used by perpetrators to hide homicide. We present one such case where the female deceased was strangled and burnt. Later an attempt was made to conceal the homicide. Medico-legal autopsy revealed homicide and the arrestee was taken into custody.

1. Introduction

In the age group of 15 to 29 years, homicide held the top position in the causes of death in some countries, and leads to death in millions annually. About 464,000 people globally loss their precious life as a result of homicide as per the article released by U.N Office on Drugs and Crime (UNODC).¹

The largest number (20,000) of all women killed worldwide by intimate partners or other family members in 2017 was in Asia.² Women are at a lower risk compared to male population for homicide, but their age profile especially adolescent groups are at risk in women category. In India, female continue to bear the heaviest burden of lethal victimization of homicide as a result of inequality and gender

stereotypes. Homicides involving female tend to be determined by long-term, less volatile and more stable issues such as gender roles, social norms, and status of women in society, discrimination and gender equality.

Ligature strangulation is one of the common methods used in homicidal practice.³ In cases of female homicide, the perpetrator may attempt to delay or avoid discovery of the body by disposing it in hidden or remote places. At the same time steps may be taken by offender to prevent the identity of the victim and destroy forensic evidence. The perpetrator may also try to minimize his contact with the victim's body.

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Death associated with burns or bodies recovered from burned down places are always a challenge to the police officer as well as autopsy personal. In this rare case, thermal burns were used to dispose the body. The deceased was strangled first, and then burnt at a lonely place for concealment of crime. Meticulous autopsy and relevant investigations by the team of autopsy surgeons helped the police in solving the case and punishing the perpetrator under the law of land.

2. Case History

An unknown female's body of approximate age between 20 to 25 years was found in burned condition around outer zone of an urban area as local people informed police about the incidence of burning victim's body by the offender. Accidental death report was made by police of the area and body was sent for postmortem examination. During the postmortem external and internal examination was done for identification and to rule out injuries other than burns. A horizontal ligature mark as spared area over anterior aspect of neck was noted. On internal examination hanging was ruled out. Cause of death given was strangulation with burns. Viscera were preserved for chemical analysis and skin tissue was preserved for histopathological examination to differentiate between antemortem and postmortem burns. Samples were preserved for chemical analysis.

Observation

a. External findings-

Burnt clothes were seen over the body at places. Body was unidentified because of burns. Teeth were intact. Body was moderately nourished and cold. Heat stiffness was not able to break. No signs of decomposition were present. Lividity was present at unburned back region and fixed. Face was burnt, eyes were closed and tongue was protruded with mouth open. Superficial to deep burn seen at places with reddish-yellowish pale floor and at places were present (Fig. no. 1). Blood was oozing from nostrils. External genitalia were burnt. Pugilistic attitude was present.

Deep burns were present on head, face, and neck with some part of neck spared (8% of burnt surface). Chest (9%), abdomen (9%), back (12%), both the upper limbs (9 % each), both the lower limbs up to knee joint(12 % each) and perineum (1%) were burnt. Total burnt surface area was 81 %.

Total neck circumference was 28 cm. Over neck a horizontal spared, grooved band with reddish strips in between, of size 18x 2.5 cm was present over anterior aspect above the level of thyroid cartilage (Fig. No. 2). The spared band was 8 cm anterior to left mastoid, 8.5 cm anterior to right mastoid, 8 cm below the level of chin and 6 cm above the suprasternal notch. Deficient superficial groove present over both legs above the level of ankle of size 12 x 1 cm, pale in color. Singing of hair was present over the body.

Figure 1: Showing reddish yellow discoloration of burnt area over face



Figure 2. Showing horizontal ligature mark over neck



b. Internal findings-

Diffuse contusion over strap muscle of neck corresponding to ligature mark. Sub capsular & interstitial thyroid hemorrhages were present. Hemorrhagic infiltration over pharynx, epiglottis, larynx and lymphoid follicle at the base of tongue were present. Palatine tonsils were congested. Singing all body hairs was present. Deficient superficial groove present over both legs at the level of ankle of size 12x01 cm pale yellowish in colour which was postmortem injury.

No evidence of skull fracture. Meninges and brain were intact. On cut section, petechial hemorrhagic spots in white matter of brain were

present. Thoracic cavity was intact. Petechial hemorrhagic spots present over the surface of both the lungs, on cut section congested. Multiple echymotic lesions present over surface of heart. Blood was in fluid form, dark reddish in colour. All other organs were congested. Organs of generations were unremarkable.

c. Investigations

Bone for DNA analysis, hairs, skin and burnt cloth for detection of accelerant, swabs for seminal analysis and blood clot for grouping were preserved. Routine viscera were sent for chemical analysis. Identification was confirmed by DNA analysis. Petroleum was detected in hair, skin and burnt cloth on chemical analysis. Chemical analysis report of viscera was negative. On histopathological examination epidermis and dermis were completely charred suggestive of postmortem burns.

3. Discussion

Homicide is one of the most serious consequences of interpersonal violence in every part of the world. The incidence of homicide has been increasing at an alarming rate in India too.⁴ The reasons are rapid increasing population with decreasing morale and frustration in day-to-day life in our society. Circumstantial evidences and evidences at the scene of crime play a major role in drawing conclusion about homicidal deaths. However, a body is concealed, the disposal site and means are many and various.

Bodies are usually dumped in secluded places like jungle, canals or outskirts of city, or may be dismembered and kept in small boxes, briefcases and are disposed or buried in the ground. Cases have been reported where the corpse will be dissolved in containers filled with acid, and the remains will be dumped or transferred in small convenient transport mediums. Some may be submerged in large water bodies with weight being attached to the body, which are often disfigured due to sea living organism's attacks; hence identification is quite a challenge as well as to study the injury patterns and thus deciding the manner of death. Some will try to dispose of the body by dry heat (e.g. fire), electrocution, mutilation etc. Arson is one of the most commonly practiced way of concealing the crimes especially following gagging, ligature or manual strangulation and head injury by assault.⁵ Burning wipes out majority of the essential

crime evidence and hence by of weakening its strength in the trials.

Majority of (70%) fire-related deaths are determined to be accidental occurring in the home environment and 10% are reported to result from deliberately started fires.⁶ In the present case, identity of victim was established through police investigation as face of deceased was not completely burnt. Through investigating officers, we came to know the details crime. The offender was in extramarital affair with the victim that is the deceased female. She was requesting the offender for marriage and he was denying of it. They were had repeated quarrels. When they meet last time, in the heat of argument, offender strangled the survivor with rope. The body was taken to a lonely place for annihilation by burning to conceal the crime.

During the postmortem examination we also got ligature mark over neck which was suggestive of ante mortem ligature strangulation. Ligature marks were also observed over both the legs above the level of ankle. In our opinion these marks were produced due to tying of legs for easy transport of deceased's body which was confronted by offender later on. Circumstantial evidences suggested of homicidal act followed by burns. On autopsy antemortem ligature mark over neck and postmortem ligature marks over lower limbs were observed. Histopathological report was suggestive of postmortem burns as no evidence of any congestion, cell infiltration and hemorrhage was observed. Charring was seen at few locations on external examination. Petroleum was detected on chemical analysis of hair, skin and burnt cloth. Poisoning was ruled out as chemical analysis report was negative for viscera. So opinion regarding final cause of death was given as "ligature strangulation".

4. Conclusion

The present case is an unfamiliar case of homicide, where the antemortem ligature strangulation marks over neck along with postmortem ligature marks over legs for transport of body were seen. This was followed by postmortem burn for concealment of crime. Circumstances of the case, the crime scene, a clear motive and most importantly the presence of post-mortem thermal burns on the body helped us to conclude that the case was one of homicidal ligature

strangulation with postmortem burn. This case points towards changing trend of homicides. In such cases, from identification till knowing the cause, manner of death and collecting vital evidence, necessitate meticulous approach.

Conflict of Interest: None.

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Case Report

Gender Differentiation: The Difficult Task in Unusual cases

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Key words

Transsexualism,
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Abstract

The word "transsexualism" has been coined by American physician, Harry Benjamin. A transsexual is a person who belongs to a particular sex anatomically but is psychologically obsessed with a desire to change to other sex which, according to him, is his rightful gender. A 19 years old female was joining as female constable sent for medical examination specifically for sex determination. After examination she was found to be of different gender. This paper is regarding this case, laws and Medico-Legal issues related to this.

1. Introduction

The word "transsexualism" has been coined by American physician, Harry Benjamin.¹ A transsexual is a person who belongs to a particular sex anatomically but is psychologically obsessed with a desire to change to other sex which, according to him, is his rightful gender. A transsexual finds it extremely difficult to adapt himself to the society. He is ashamed of and embarrassed with, his features. sometimes such a person may even develop suicidal tendencies. these peoples often face problems in their identity, marriage, employment, property matter, and many other legal issues. This paper is regarding one of such case came for opinion to our department.

Literature -

In 1932, Lili Elbe was first known patient of male to female sex reassignment surgery in Germany.² In 1945, First female to male surgery done by Sir Harold Delf Gillies (Father of modern plastic surgery) in UK.³

In 1952, Christine Jorgensen, man, 24 years, Denmark, underwent sex change got legal problems and successfully fought to have transgender people recognized in their new sex.⁴ In India, in 1979, a girl, 19 yrs, was refused admission in Junior College at Karimganj, Bihar unless she had produced medical certificate of her sex confirmation. She was as athlete. Later developed masculine features like moustache. She was denied admission in "Kabaddi" tournament. Later done sex change surgery.³

Legality of Transsexualism in different countries⁵⁻⁷:

Argentina - It is Permissible if physical abnormalities are there with patient's consent.

Belgium- Patients consent with pre-operative medical evaluation

Canada- Sec. 45 of Canadian Criminal code 1970

Great Britain- It is permissible if undertaken for genuine therapeutic purpose.

London- Patient are required to live in the new sex role for at least six months prior to surgery.

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USA- Patient is evaluated by psychologist, psychiatrist and a surgeon. When it is found to be true transsexual & physically and mentally fit then it is as allowed.

2. Case Report:

A 19 years old female was joining as female constable sent for medical examination specifically for sex determination. Consent for examination, sample collection and photographs was taken.

Psychiatric examination- General mental condition including orientation as regards to time, place, person was normal and feminine type.

Local examination- breast examination - Tanners stage 1 features look like male breast (**Figure 1**).

Figure 1: Front & Lateral view local examination



Axillary and pubic hairs were present. In Genital region, Labia Majora, Labia Minora with Vaginal orifice was present with Penile like tissue 1-2 cm was also present.

USG Abdomen- Absent uterus and ovaries & prostate like structure at the base of bladder.

MRI- Undescended morphologically normal left testis at deep inguinal ring. hypoplastic prostate. No female gonads, uterus and fallopian tubes.

Hormonal assay- Testosterone- 8.17 Normal value - F: 0.2 to 0.8 ng/ml M: 4 to 11 ng/ml

Karyotyping- No of cells score:20, karyotype-46XY, Cytogenetic evaluation of G banded metaphases revealed male karyotype.

Final opinion- It was given that the examined person is genetically male.

3. Discussion -

In India, though no legal case has come to notice so far but instances are not waiting where an individual has changed his or her biological sex. It is legally allowed in U.K. since 1967¹ in America since 1972, in Japan in 1998. But, till now there is no law governing this transsexualism and its related legal issues in India.⁵

Legal Problems in India³:

An Indian surgeon dealing with transsexual patients faces number of issues like consent for procedure, safe guarding surgeon or gender team from future litigations.

a) The Indian Penal code 1860-

1. Sec 375 and 376 IPC - Definition and punishments of rape may require a change.
2. Sec 497, 498, and 498A - Definition of wife, Husband And adultery require a change.
3. Sec 125 Cr P C - Definition of wife and laws regarding maintenance require a change.

b) Personal Laws-

1. Hindu Marriage act and all personal laws relating to marriage. These are not adequate in questions of maintenance, grounds for divorce and custody of children's.
2. Hindu adoption and maintenance act 1956.
3. Hindu succession act especially Sec. 1, 14 and 23 Labour and Industrial laws especially Workmen's compensation act 1923, Factories act 1948 and reservation of jobs.

c) Taxing status- Various beneficial provisions like tax exemptions available only to women under IT Act.

International issues: In 1968 International Olympic committee first time started to test the chromosomes of athletes to prevent transsexuals from competing.

In present case patient has not told of any operation done in past it may be due to fear of losing the job. On external examination female genitalia are there but on hormonal, USG MRI and genetic examination it was proved as male. He might face

problems like identity, marriage, Occupation, adoptions and maintenance.

transsexuals. *British Journal of Psychiatry* 1993;162:681-85.

4. Conclusion -

1. Consent for procedure and safeguarding the surgeons or gender team from future litigation.
2. At completion of GAS, a Gender Certificate should be issued to the patient by the gender team consisting of the operating surgeon, psychiatrist and endocrinologist.
3. There is also the issue of postoperative sexual and legal status of the patient. Change in all Laws mentioned in discussion should be there.
4. Postoperatively, the patient faces issues of change in name, birth certificates, school and college certificates and identity cards.

This situation can be amended by new legislation. There can be a nodal authority for dealing with transsexual patient. On presentation of Gender Certificate by the individual, this authority can then retain previous certificates and issue new certificates to the individual.

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Case Report

Blue Death: A Case Report

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Abstract

Nitrobenzene poisoning very uncommon in India. Very few cases have been reported of Nitrobenzene poisoning. Nitrobenzene is used as a paint solvent in printing industries. Occupational hazards or Accidental exposure is a major cause of premature mortality globally. It is capable of causing serious toxicity, whether ingested or inhaled. When hydrocarbons are aspirated into the lung, they cause chemical pneumonitis, acute respiratory distress syndrome (ARDS). We are reporting a case of ingestion of reducer (Nitrobenzene) by a 21 year old female. She was brought to to Dr. Ram Manohar Lohia Hospital, New Delhi, where she was admitted and expired during the course of treatment. A detail post mortem finding of case was discussed in this case report.

1. Introduction

Nitrobenzene which is of bitter almond odour is a pale yellow or transparent oily liquid. Nitrobenzene also known as Nitrobenzol or oil of Mirbane is used in dyes, paints, printing, lubricating oil and synthetic rubber. Occupational hazards or Accidental exposures are a major cause of premature mortality globally. In India, 20% Nitrobenzene emulsion is widely used as pesticides. and marketed under the brand name Synflower offered by Mandar agrotech.¹⁻³ The lethal dose is reported to 2-4 gm, ranges from 1 to 10 gm by different studies. Nitrobenzene ingestion leads to formation of methemoglobinemia. The toxic dose resulting in methemoglobinemia was estimated in one case study at 4.3 to 11gm based on urinary p-nitrophenol Level.⁴

2. Case History:

A 21 year old female was brought to Dr. Ram Manohar Lohia Hospital, New Delhi with a history of accidental consumption of transparent liquid reducer (**Fig. No-7B**) lying in the fridge. She was admitted and expired during the course of treatment. Body was shifted to Mortuary of Maulana Azad Medical college to conduct the medicolegal autopsy.

3. Autopsy Findings

The dead body was of an adult female of average built with height of 158 cm. Eyes: both the eyelids were closed and bluish discolouration of both eyes and face present (**Fig. No-1A**), bluish discolouration of both upper and lower lips were present (Photograph No-1A). Conjunctiva and sclera were bluish in colour (**Fig. No-1B**).

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Natural orifices: Bluish discoloration were present on lips, tongue, gums (**Fig. No. 1A**) and female genitalia (**Fig. No. 8**). Bluish discoloration of veins of right hand were present (**Fig. No-1C**).

Fig. No 1: 1A: Bluish face of deceased; 1B: Bluish discoloration of sclera and cornea; 1C: Bluish discolorations of veins of Right hand



Fig No-2: 2A: Bluish discoloration of scalp; 2B: Scalp hairs were easily removable



Hypostasis could not be appreciated due to diffuse bluish discoloration of the body. Rigor Mortis was developed and could be elicited at all the major

joints of body. Bluish discoloration of scalp seen and scalp hairs were easily removable (**Fig. No. 2A & 2B**). No changes of decomposition were present. On internal examination bluish discoloration was present in the layers of scalp, skull sutures, meninges and brain parenchyma (**Fig. No. 3A,3B,3C,6A,6B & 6C**).

Fig No-3: 3A: Bluish discoloration of left temporalis muscle; 3B: Bluish discoloration underscap & skull vault; 3C: Bluish discolorations of dura matter of brain



Bluish discoloration of all internal organs like Heart, lungs were present (**Fig. No-4A & 4B**). Pharynx, Larynx and Trachea showed bluish discoloration of mucosa, oesophagus showed bluish discoloration of mucosa along the whole length. Pleural cavity showed diffuse bluish discoloration and contained about 150 ml of bluish coloured fluid was present in plural cavity on both sides. Both lungs were of bluish colour (**Photograph No-5A & 5B**). Oozing of bluish frothy fluid was seen on compression of the cut surface of both lungs. Pericardial sac contained about 20 ml of bluish coloured fluid and outer surface of heart was bluish coloured (**Fig. No-4B**). Peritoneum & Peritoneal Cavity showed bluish discoloration of outer surface of all abdominal viscera (**Fig. No-4A**) and contained about 300 ml of bluish coloured fluid. Kerosene like smell was present on opening of stomach and contained about 100 ml of mucoid material.

Stomach walls were congested and bluish discoloration of mucosa of stomach were present (Fig. No-7A).

Fig No-4: 4A: Bluish discoloration of internal organs; 4B: Bluish discoloration of Heart

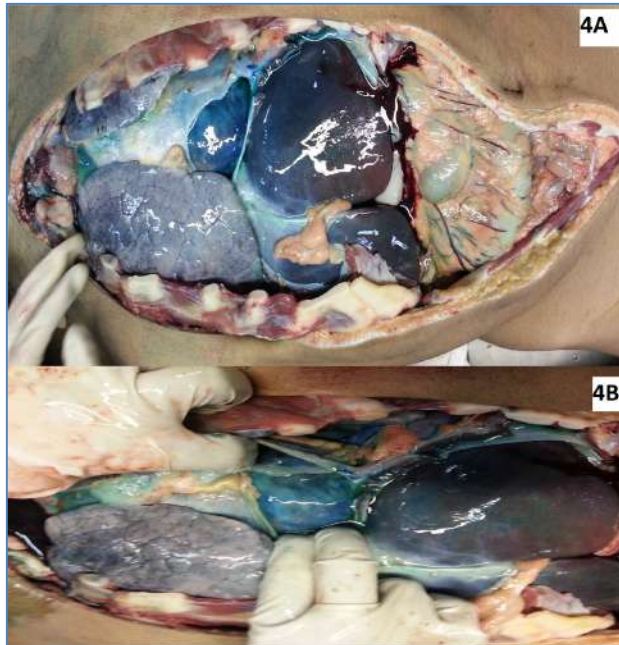


Fig No-5: 5A: Bluish discoloration of internal surface of lung; 5B: Bluish discoloration of external surface of lung



Fig No-6: 6A,6B, 6C: Bluish discoloration of Brain

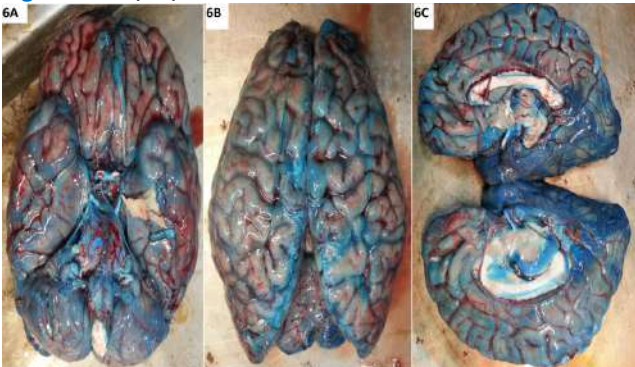


Fig No-7: 7A: Bluish discoloration of stomach mucosa; 7B: Poison bottle consumed by decease



Fig No-8: Bluish discoloration of female genitalia.



Small intestine and Large intestines showed bluish discoloration of outer surface. Kidneys showed bluish discoloration was present on outer surface and cut surface of both kidneys. Uterus, Fallopian Tubes and appendages showed bluish discoloration. Opinion about cause of death was kept pending and viscera was preserved. On receipt of viscera report shows presence of Nitrobenzene in **Exhibit 1A** i.e. (Stomach with its contents and loop intestine with its contents) and in **Exhibits 1B, 1C and 1D** no poisons nitrobenzene were detected.

4. Discussion

Nitrobenzene is pale yellow oily liquid, with an odour of bitter almonds is used as an intermediate in the synthesis of solvents, like paint remover. The first report of nitrobenzene poisoning came in 1886⁵ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2900745/> - CIT1 and subsequent fatality reports followed⁵ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2900745/> - CIT1⁶. Toxicity of nitrobenzene can be accidental or suicidal. Accidental toxicity are generally seen in those people who are dependent on well water which are having dangerously high

levels of nitrites and nitrates^{7,8}. The fatal dose ranges from 1 g to 10 g, by different authors^{4,5}. The ill effects after consumption are due to the rapid formation of methaemoglobinaemia, a condition in which the iron within the haemoglobin is oxidized from the ferrous (Fe^{2+}) state to the ferric (Fe^{3+}) state, resulting in the inability to transport oxygen and causes a brownish discolouration of the blood. Once formed, methemoglobin can be reduced enzymatically either via an Adenine dinucleotide (NADH)-dependent reaction, catalysed by cytochrome b5 reductase, or an alternative pathway utilizing the nicotine adenine dinucleotide phosphate (NADPH)-dependent methemoglobin reductase system.^{3,7}

Normal level of methemoglobin is 0 to 2% and level of methemoglobin in blood up to 10 to 15% patient remains asymptomatic or sometimes present in hospital with only cyanosis.^{3,9} Above 20%, headache, dyspnea, chest pain, tachypnea, and tachycardia develop and beyond 40–50%, confusion, lethargy, and metabolic acidosis occur leading to coma, seizures, bradycardia, ventricular dysrhythmia, and hypertension. Fractions around 70% are fatal. G6PD-deficient or anaemic patients developed more severe symptoms^{3,6,8} in some patient Leukocytosis has been reported, with relative lymphopenia¹⁰. Sometime patient develops Heinz body haemolytic anaemia, hepatosplenomegaly and deranged liver functions.^{3,6,9} Nitrobenzene metabolites are p-nitrophenol and aminophenol and after five days of ingestion they got excreted in urine up to 65% and in stools up to 15%.

Diagnosis can be established with help of brief history of chemical ingestion, peculiar smell of bitter almonds, and persistent cyanosis even after the continuous hyperbaric oxygen therapy without any pre-existing cardiopulmonary disease, minimal arterial oxygen saturation, and atypical arterial blood gas (ABG) analysis. Blood colour turns to dark brown which fails to turn bright red on shaking, which suggests methaemoglobinaemia and this is supported by the chocolate red colour of dried blood. Presence of nitrobenzene compounds may be confirmed spectrophotometrical methods.^{3,9}

Patient can be cured on the principles of decontamination and symptomatic and supportive management. Methylene blue is the antidote of

choice in cases of methaemoglobinaemia due to poisoning which accelerates the NADPH-dependant methemoglobin reductase system and is indicated when the blood methemoglobin levels are more than 30%^{3,9}. Route of administration is intravenously at 1–2 mg/kg (up to 50 mg dose in adults,) as a 1% solution over five minutes; with a repeat in one hour, if necessary. Methylene blue is an oxidant at levels of more than 7 mg/kg, and therefore, may cause methaemoglobinaemia in susceptible patients. It is contraindicated in patients with G6PD deficiency, because it can lead to severe haemolysis. Ascorbic acid is an antioxidant that may also be administered in patients with methemoglobin levels of more than 30%^{3,9}. In recent studies, N-acetylcysteine has been shown to reduce methemoglobin, but it is not yet an approved treatment for methaemoglobinaemia.¹¹

Conclusion

The treatment of acute methemoglobinemia due to poisoning is usually associated with high mortality so early prompt management of poisoning should be attempted. Methylene blue and ascorbic acid are the treatment of choice, while RBC exchange transfusion and hyperbaric oxygen therapy are usually reserved for patients who are resistant to standard treatment.

Prevention is always better than cure so be aware of substance around you which can lead to ill effect and also keep these type toxic material out of reach your children and also educate them about the dangers of substances that contain poison. They should not be kept with eatable or store in food container. They should be properly stored and labelled.

Consent: While publishing this case report due care were taken so that identity of deceased was not disclosed at anytime during publication of this case report. Further this case report was sent to only this Journal.

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Conflicts of interests: None.

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Letter to Editor

The Scope of Toxicology Services in the Health Care Facilities

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1. Introduction

How often do we hear a case of drug overdose in the country? An unresponsive patient presented with respiratory failure, slow breathing, small pupils, and cyanosis; how many of the clinicians would doubt a chance of Heroin overdose, although it is one of the most common abused drugs in India. In developed countries the diagnosis of such is suspected in all comatose patients, especially in the presence of respiratory depression and small pupils. Although most of the over dose cases are treated with supportive care, in some cases of Methyl Alcohol, Barbiturate, Opioid poisoning etc, requires specific approach in treatment. Since the old times, the role of clinical toxicology in aiding the management of poisoned patient is less spoken. Clinicians often, especially in emergency services would highly agree to the need of toxicology services which would come handy for speedy diagnosis. Toxicology laboratory service for emergency purposes is never set as a priority in the hospital establishments in our country.

2. Toxicology Profession and Career

Clinical and Medical Toxicology are one of the two main disciplines within toxicology. Clinical toxicologists are people who are expert with detailed knowledge and experience of toxicology in dealing with the investigation, diagnosis and management of people exposed to harmful chemicals and toxins¹. People interested in the field should have a bachelor degree in any science branch which is the minimum requirement. A handful of

institutions in the country provide the course of Master of Science in Toxicology. Although there are qualified toxicology professional in the country due to lack of placement, the career received less reputation. After MSC Toxicology interesting candidates pursue PhD and are attracted to Western countries as of lucrative positions and better facilities. Depending on their area of work, toxicologists can be divided into eight distinct groups: industrial, pharmaceutical, academic, clinical, forensic, regulatory, occupational and ecotoxicology.

3. Medical toxicology

It has wide implications in a developing country like India, but the scope and opportunities are less explored. It focuses on diagnosis, treatment and other adverse health effects due to drugs and other biological agents. Only a medical professional can become a Medical Toxicologist. In western countries like USA, it is a recognized specialty. They must complete a fellowship in medical toxicology. Fellowships consist of 02 years of training, and after that candidates must pass the Medical Toxicology Board exam required for certification. Generally residents of Emergency medicine, Pediatrics and Internal medicine are interested in the field. They are involved in the assessment and treatment of a wide variety of problems, including acute or chronic poisoning, adverse drug reactions, drug overdoses, envenomations, substance abuse, industrial accidents and other chemical exposures.

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As can be seen, the knowledge and skills required by the toxicologist are extensive. The range of expertise they may be required to provide can be very variable.

4. Scope of Medical Toxicology in the Country.

Medical toxicology establishments can provide services in the following areas.

- Emergency departments and in-patient units where they directly treat cases of acute poisoning.
- Occupational health settings to investigate the exposure to toxic substances in the home or workplace environment.
- National and regional poison control centers where they provide medical direction for health professionals, personal responders and the general public.
- Industry and commerce where they contribute to pharmaceutical research and development, product safety, occupational health services, and regulatory compliance.
- Clinical and forensic laboratories where they aid in the design, conduction and interpretation of diagnostic tests and forensic studies.
- In government agencies, such as the Centers for Disease Control and Prevention and the Food and Drug Administration, medical toxicologists help with health policy.
- Medical toxicologists are employed to help other physicians prepare for dealing with the aftermath of crimes such as chemical warfare and biological warfare.³

As of now not much of the Public health care facilities are equipped with toxicology services. Many public funded toxicological laboratories, including a number of forensic toxicology laboratories, are under the administrative control of law enforcement agencies or under the home department of government. They only accept cases from parent agencies, and due to burden of case loads it takes months to get the results. In sensational cases the law enforcement agencies have to wait longer period, hence charging or acquitting of persons by the judicial system also get shelved, this in turn is a waste of man power and public fund.

Apart from the analytical problems, the legal aspect of the work demands a meticulous attention to detail. Any toxicology test in a clinical laboratory

has the potential to become medical evidence. Failure to make full descriptive notes on the items received a simple error in the date the analysis was performed or break in chain of custody can be presented as evidence of careless work by an experienced lawyer. This makes the job of a toxicologist an exceedingly challenging one but also a very rewarding one. Developed nations have various schemes in regards to Environmental Protection hence the importance of Environmental toxicology is very well appreciated, which assures that all governmental and public sector activities such as industrial, agriculture, etc give proper consideration to the environment prior to undertaking any major federal actions that significantly affect the environment.

5. Conclusion

Poisoning is one of the leading causes of morbidity and mortality in the country and also a major health problem worldwide. It accounts for 30% of suicides in India². Medical professionals as well as the police personal should be made aware of the facilities available through seminars, workshops etc. With the development of society and life style changes new designer drugs are on the market and in order to tackle that it became necessary to develop new test methods with state-of-the-art instruments, qualified technologists to conduct the testing, and experienced and qualified forensic toxicologists to manage the laboratory and to interpret the results. For pharmacological interventions such as invent of new medications, dedicated research facilities should be established as it requires measuring drug levels in body fluids and establishing therapeutic windows for effective treatment.

Better information on prevalent recreational drugs associated with clinical toxicity would also be obtained, which helps in the drug enforcement agencies. Failure in establishment of improved clinical research in clinical toxicology is underscored by the weakness of the evidence base to the management of many poisons. Medical health professionals from Emergency Care, Forensic Medicine, Internal Medicine, Psychiatry and Occupational Health which are in call of Toxicology services should actively push forward the exigency of such to the Policy makers without postponement. Government should approve more courses related

to toxicology and also to increase man power in the field by creating new vacancies.

6. Recommendations

More research should be encouraged in the field of toxicology. Each district should have a toxicological lab where samples are accepted from peripheral locations and if attached with institutions they can serve as a referral centre for poison related cases. Public health care facilities should provide clinical toxicology services at affordable rates. The Government as by opening new labs it offers exciting and varied career opportunities in the field of toxicology. More efficient labs mean more accuracy in the test results and speedy court/legal proceedings, and also Police and other can submit the required samples within the golden period, which is required in most of the cases. Additionally, spoiling of samples can be avoided. Analytical reports and opinions shall be accepted by the legal system. To wind up, failure in establishment with respect to the needs of patient care and health is a distress to the system. Protocol should be formed by the State or National bodies for conducting proficiency surveys, to assess the performance and there by accreditation of such labs. There is a need for higher quality surveillance of the clinical effects of poisoning with newly introduced agents, including therapeutic medications.

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