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Forensic Medicine and Autopsy: Knowledge and Awareness among 2nd Year Medical Students

Mohit Gupta[1], Sanjay Kumar[2], Manish Kumath[3], GV Jain[4]

Abstract

Forensic medicine is being taught to Indian Medical Graduates during 2*nd* to 4*th* semesters as per undergraduate curriculum. *Aim:* To understand whether the 2*nd year* medical students know the basic aspects of forensic medicine, autopsy and if they are interested in choosing forensic medicine as their career. *Materials and Methods:* Study was conducted in Department of Forensic Medicine, 121 students participated. A pre-formulated questionnaire was circulated after taking verbal informed consent. The responses were evaluated. *Results and Conclusion:* Most of the students were aware of the basic principles of forensic medicine and principles of autopsy. Greater number of students did not want to choose forensic medicine as there career.

Keywords: Forensic Medicine; Autopsy; Awareness; Medical Students; Career.

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Introduction

Forensic Medicine/Legal Medicine/State Medicine is the application of Medical knowledge in administration of law and justice.[1–5] Forensic Medicine is presently being taught to the medical graduates of India in 3*rd*, 4*th* and 5*th* semester of their MBBS curriculum. One important part of this subject is performing autopsy.[6] Autopsy is performed to determine the cause of death, time since death, manner of death, identify a person if unidentified, determine the weapon used etc.[7] There is a shortage of Forensic Experts in India.[8,9] After MBBS, these medical graduates are posted in many peripheral areas where they may be required to perform autopsy. Therefore, they are required to know regarding the basic procedures of autopsy. This study was targeted towards medical students who are about to complete the course of Forensic medicine. The study had been undertaken to understand whether these students know the basic aspects of forensic medicine, procedure of autopsy and whether they are interested in choosing Forensic Medicine as their career.

Materials and Methods

The study was done in Department of Forensic Medicine involving students presently studying in 5*th* semester. A verbal informed consent was taken from students. Total 121 students participated in this study. A preformulated standardized questionnaire containing 10 questions was circulated, (**Table 1**). Questions consisted of multiple choice, True-False and Yes/No responses. The data was analysed using SPSS 16 and Microsoft Excel software.

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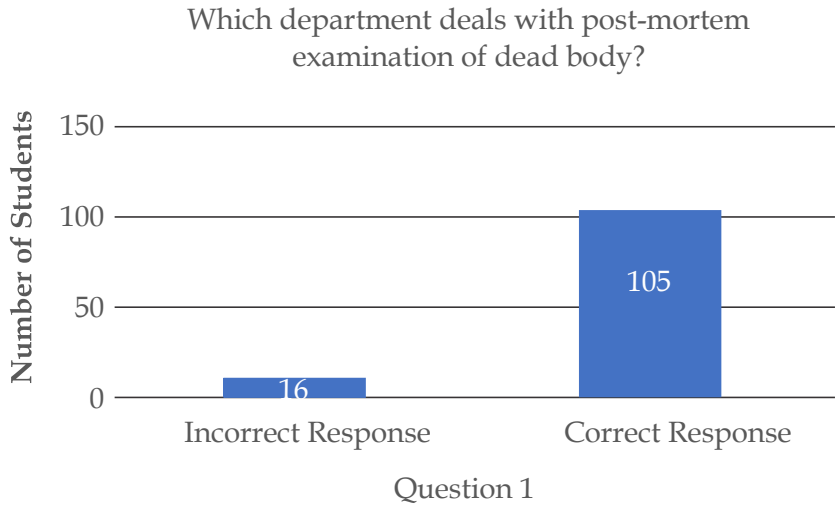
Table 1: Questionnaire used for the present study and students' responses

	Incorrect Response	Correct Response
1. Which department deals with post-mortem examination of dead body? a. Forensic medicine b. Pathology c. Both d. None	16 (13.23%)	105 (86.77%)
2. Which statement is correct: a. Forensic medicine is a part of forensic science b. Forensic science is a part of forensic medicine	4 (3.31%)	117 (96.69%)
3. Forensic medicine is a specialization of pathology. True/False	44 (36.37%)	77 (63.63%)
4. Viscera is preserved in all cases of autopsy. True/False	22 (18.19%)	99 (81.81%)}
5. Consent of relatives is taken before medico-legal autopsy. True/False	48 (39.67%)	73 (60.33%)
6. Autopsy is done mainly to determine the cause of death. True/False	13 (10.75%)	108 (89.25%)
7. Autopsy is done only in Homicide or suspected homicide cases. True/False	4 (3.31%)	117 (96.69%)
8. After medico-legal post-mortem examination, body is handed over to relatives or police. Relative/Police	55 (45.46%)	66 (54.54%)
9. Have you ever seen Hospital autopsy? Yes/no	Yes 0 (0%)	No 121 (100%)
10. Are you interested in pursuing Forensic medicine as your career? Yes/No	Yes 56 (46.28%)	Did not answer 1-(0.83%)
		No 64 (52.89%)

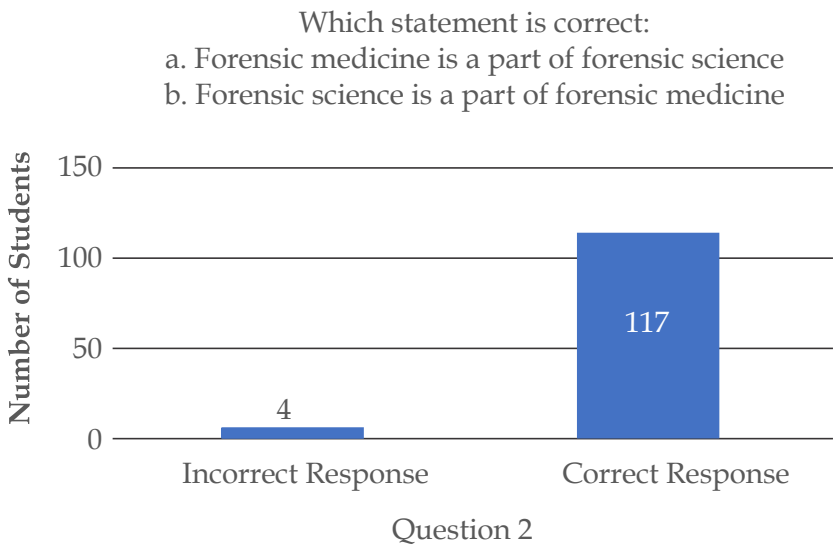
Results and Discussion

Forensic medicine is considered synonymous with post-mortem examination. Indian medical graduates are exposed to medico-legal post-mortem examination when they are posted in Department of Forensic Medicine. As per undergraduate curriculum it is necessary for the undergraduates to observe and document post-mortem examinations in their log book. However, another type of autopsy *i.e.*, hospital/pathological autopsy is also performed under Department of Pathology. In our study, we found that 105 (86.77%) students were aware of the fact that post-mortem examination is done in both departments *i.e.*, Forensic Medicine as well as Pathology (**Graph 1**).



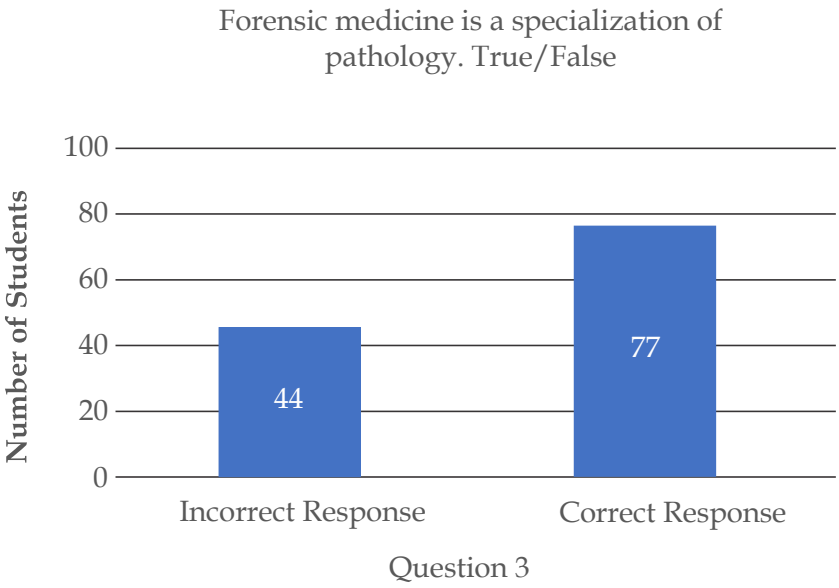
Graph 1: Response to Question 1

Forensic science is a wide discipline that covers many aspects like toxicology, ballistics, criminalistics, anthropometry, medicine etc.[10] 117 (96.69%) students were aware that Forensic Medicine is a part of Forensic Science, (**Chart 2**).



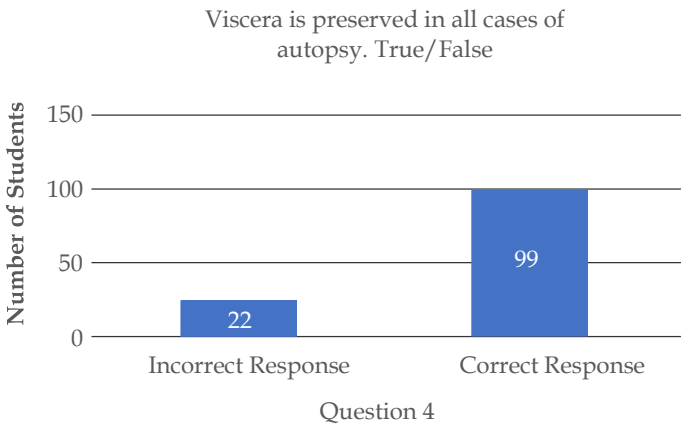
Graph 2: Response to Question 2

In most of the countries, Forensic Medicine is a field pursued after completing degree in pathology.[5,11] In India, however, due to shortage of forensic experts, post-graduation requires only a medical undergraduate degree.[5,9,12] 77 (63.63%) students were aware that Forensic medicine is a specialization of Pathology, (**Graph 3**). This is in stark comparison to the study conducted by Madadin SM, in which only 10.5% students agreed that Forensic medicine is a branch of pathology.[13]



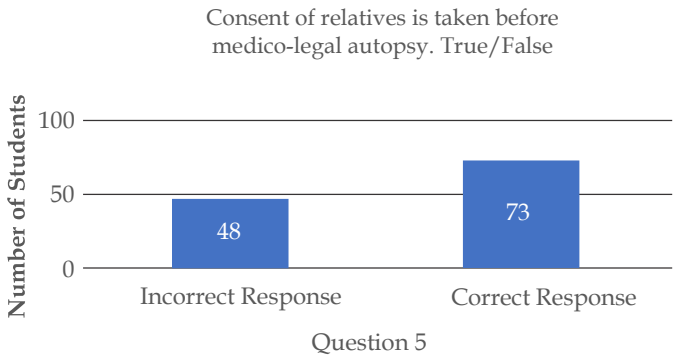
Graph 3: Response to Question 3

Viscera is preserved in cases where poisoning is suspected on post-mortem examination and not routinely. Most of the students 99 (81.81%)[8,9,12] knew that viscera is not preserved in all cases of autopsy, (**Graph 4**).



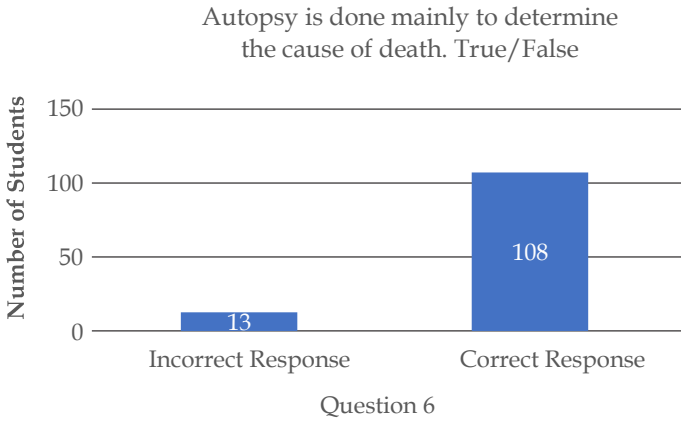
Graph 4: Response to Question 4

Medicolegal autopsy is done at the request of the Investigating officer. No consent is required to be obtained from the relatives for conducting the same.[14] 73 (60.33%) students knew that consent of relatives is not required in medico-legal autopsy, (**Graph 5**).



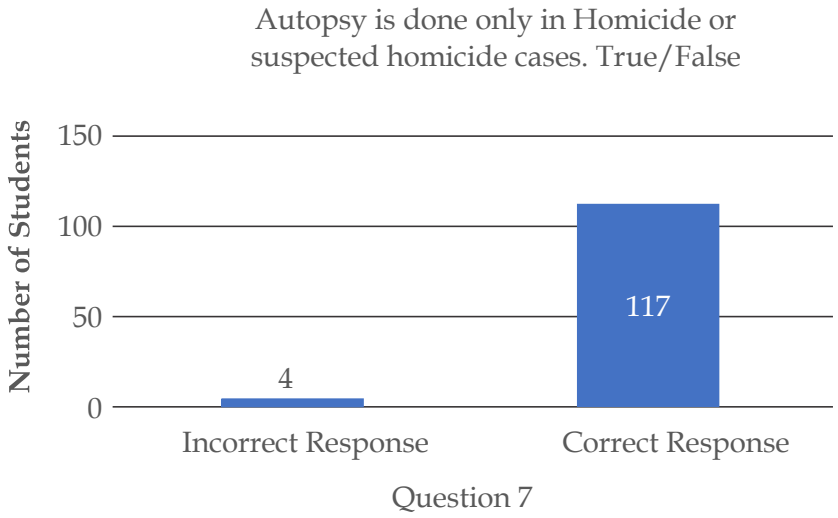
Graph 5: Response to Question 5

Autopsy is done for many reasons, like to determine cause and manner of death, to establish identity of the deceased, to determine time since death, to collect trace evidence, to determine the weapon of offence.[7] 108 (89.25%) students were aware that autopsy is done mainly to determine the cause of death, (**Graph 6**). This percentage is higher that the study done by Madadin SM, where 73.4% students were aware that autopsy is done mainly to determine the time since death.[13]



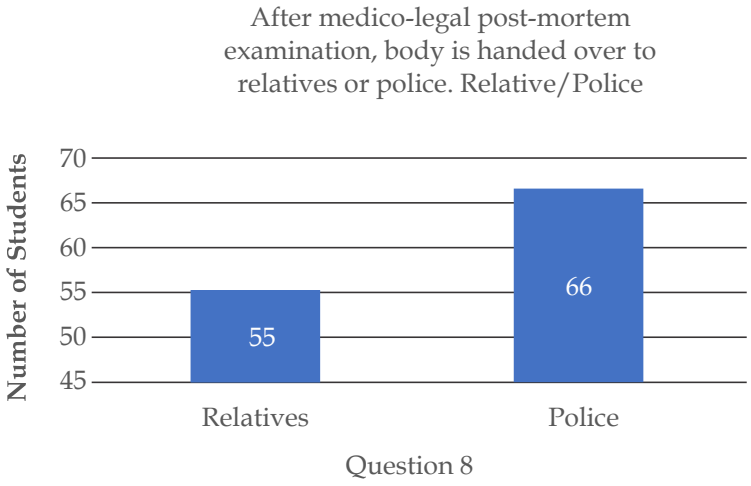
Graph 6: Response to Question 6

Autopsy is done in all cases of unattended, suspicious and unnatural death in India.[1-3] 117 (96.69%) correctly answered that autopsy is not done only in homicide/suspected homicide cases, (**Graph 7**). In the study, conducted by Madadin SM, only 2.1% students had answered it correctly. This may be because of more cases being shown and discussed during post-mortem examination leading to better understanding of the autopsy in Indian system of medical education.



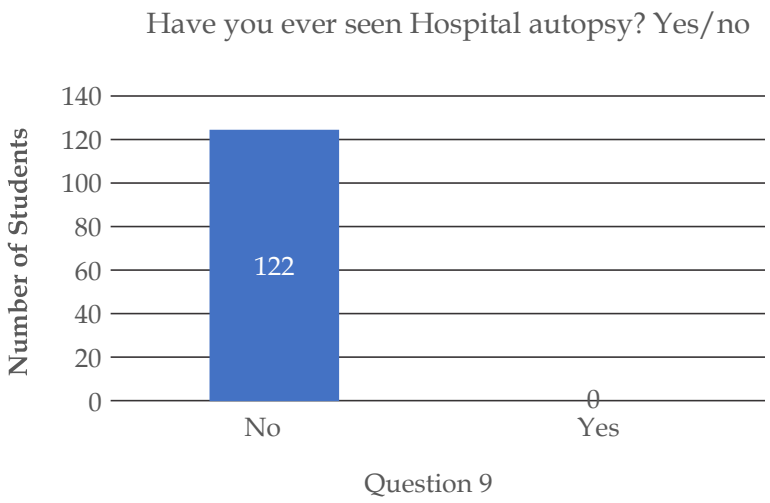
Graph 7: Response to Question 7

In case of medico-legal autopsies, the bodies are handed over to the investigating officers while in hospital autopsy the bodies are handed over to the relatives. Only 66 (54.54%) students knew that after autopsy the body should be handed over to the police and not relatives in medico-legal cases, (**Graph 8**). This may be because the students are shown the procedure of post-mortem examination and the findings therein, but they are not present at the time of handing over of the body.



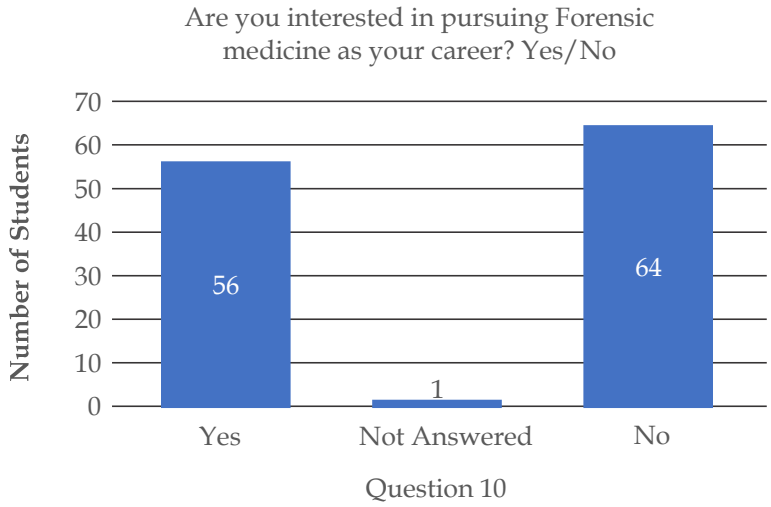
Graph 8: Response to Question 8

There has been a steady decline in hospital autopsy worldwide.[15] In our study, no student {121 (100%)} had seen hospital autopsy, (**Graph 9**). This is probably because the clinicians and pathologists are already overburdened with the clinical and laboratory load. Also, with the advancement in science there is a notion that autopsy will not provide anything new which cannot be determined by performing laboratory investigations leading to increasing trend towards radiological autopsy.[16]



Graph 9: Response to Question 9

Majority of the students (64) did not want to take Forensic Medicine as there career. 56 (46.28%) students were willing to pursue Forensic Medicine as their career and one student did not answer this question, (**Chart 10**). There is already a shortage of forensic medicine specialists in India.[8,9,12] The reason for the students not being interested in taking up the Forensic Medicine as their career can be manifold. The deplorable condition of mortuary, the lack of interest of government in improving the condition of mortuary, the stigma of being with the dead, lack of patient interaction, harassment faced in courts etc.



Graph 10: Response to Question 10

Conclusion

This study was an attempt to understand the knowledge and awareness of Forensic medicine and autopsy in 2nd year medical students. There is a dearth of Forensic Medicine specialists in India. Majority of post-mortem examinations are done by Indian medical graduates posted as medical officers. Forensic Medicine is taught in undergraduate curriculum with the aim that the students should be able to perform independent autopsies. In our study, we found that most of the students were aware regarding the basic principles of forensic medicine and the procedure of autopsy. Also, a greater number of students did not want to take up Forensic Medicine as there career. This highlights the need for immediate action in a field which is already deprived of qualified specialists.

More allocation of resources, favorable salaries, possibility of growth, better career prospects may increase the interest of future doctors in the field of Forensic medicine.

Conflict of interest None.

Ethical approval: Not required.

References

1. Aggrawal A. Textbook of Forensic Medicine and Toxicology, 1st edition. New Delhi: Avichal Publishing Company; 2014.
2. Guharaj P. Forensic Medicine, 1st edition. India: Orient Longman Ltd; 1999.
3. Reddy DKSN. The Essentials of Forensic Medicine and Toxicology, 29th edition. Hyderabad: Om Sai Graphics; 2010.
4. Subramanyam B. Modis Medical Jurisprudence and Toxicology, 22nd edition. Butterworths; 2001.
5. Meilia PDI, Freeman MD, Herkutanto, *et al*. A review of the diversity in taxonomy, definitions, scope, and roles in forensic medicine: Implications for evidence-based practice. Forensic Science, Medicine, and Pathology. 2018;14(4):460–68.
6. Anders S, Fischer-Bruegge D, Fabian M, *et al*. Teaching post-mortem external examination in under-graduate medical education: The formal and the informal curriculum. Forensic Science International. 2011;210(1–3):87–90.
7. Kotabagi RB, Charati SC, Jayachandar D. Clinical Autopsy *vs* Medico-legal Autopsy. Medical Journal, Armed Forces India. 2005;61(3):258–63.
8. Mehta NBS. Shortage of forensic experts in medical colleges puts cops in a fix. The Times of India. 2019.
9. Jagadeesh N. The status of forensic medicine in India. Indian Journal of Medical Ethics. 2008;5(4):154–56.
10. Forensic Science. [cited 2019 18/9/2019]; Available from: https://en.wikipedia.org/wiki/Forensic_science.
11. Hanzlick R, Prahlow JA, Denton S, *et al*. Selecting forensic pathology as a career: A survey of the past with an eye on the future. The American Journal of Forensic Medicine and Pathology. 2008;29(2):114–22.
12. Salgado MS. Forensic medicine in the Indo-Pacific region: History and current practice of forensic medicine. Forensic Science International. 1988;36(1-2):3–10.
13. Madadin MS. Assessment of knowledge about, attitudes toward, and awareness of a forensic medicine course among medical students at the University of Dammam. Journal of Forensic and Legal Medicine. 2013;20(8):1108–111.
14. Lunetta P, Lounamaa A, Sihvonen S. Surveillance of injury-related deaths: Medico-legal autopsy rates and trends in Finland. Injury Prevention: Journal of the International Society for Child and Adolescent Injury Prevention. 2007;13(4):282–84.
15. Turnbull A, Osborn M, Nicholas N. Hospital autopsy: Endangered or extinct? Journal of Clinical Pathology. 2015;68(8):601-04.
16. Julian L Burton, Rutty G. The Hospital Autopsy: A Manual of Fundamental Autopsy Practice. 3rd edition. Italy: Hodder Arnold; 2010.

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Physical and Laboratory Findings Based Analysis of Sexual Assault Victims

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Abstract

Sexual violence is ubiquitous, a global problem and renders a huge negative impact to mind and health of the population. Our study aims to analyse the genital and bodily injury pattern along with laboratory findings in sexual assault cases. A total of 204 cases of sexual assault were studied in a *two years period* among victims ranging from *3* to *70 years* and mean age *17.8 years* which came to our hospital, in which detailed medico-legal examination findings, history from victim, police record, and laboratory findings were analysed. Majority of victims belonged to *16–17 years* age group (27.45%) and *14–15 years* (22.5%), also with maximum genital injury. Mostly occurred in evening between *4–6 pm* in 40.2% cases and inside the house of victim and in only 22.5% occurred outdoor. In 88.2% cases assailant was known to victim producing genital injury in 14.4% cases. In 11.7% assailant was a stranger in which highest (25%) cases of genital injury was seen and all occurred in outdoor settings. In 96% cases which had single assailant showed 13.2% genital and 20.41% bodily injury but in gang rape (3.93%) 75% cases showed genital and bodily injury. 72.5% females had no prior sexual intercourse among them 78.4% had genital injuries and only 27.4% had experienced prior sexual intercourse among them only 8.9% had recent injury. Kidnapping (23.53%) and verbal threats to kill (20.59%) were used as coercion in most cases. Only 32.5% victims were examined within *72 hours* and among them 42.4% evidenced recent genital injury and 30.3% bodily injury. Sites of genital injury evidenced were labia majora (8 cases), labia minora (10 cases), vagina (2 cases), posterior commisure, fourchette, fossa navicularis (10 cases), hymen-redness (16 cases), recent tear (10 cases). Only 11.3% cases revealed spermatozoa in vaginal smear and 0.1% cases were positive for urine pregnancy test/ultrasonography.

Keywords: Sexual assault; Rape; Medico-legal findings; Genital injury; Victims.

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Introduction

Sexual violence occurs in every country of the world and in all levels of the society. It has been seen that one in every five women have experienced rape or attempted rape during her lifetime. Sexual violence has become a global problem, not only in the geographical sense but also in terms of age and sex.

Sexual assault, a form of sexual violence, is a term often used synonymously with rape. However, sexual assault could include anything from touching another person's body in a sexual way without the person's consent to forced sexual intercourse.[1] It takes place in various settings like home, school, work place and community. It has a significant negative impact on the physical as well as mental health of the population, like unwanted pregnancy, sexually transmitted infections, HIV/AIDs, adoption of risky sexual behaviours, depression and post-traumatic stress disorder.

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Victims of sexual assault require comprehensive, gender-sensitive health services to cope with the health consequences of these traumatic events. Hence, encouraging the victims for immediate reporting and the crucial role of the medical examiner in identifying the victims, properly collecting evidence, examining the details and providing necessary treatment is of utmost importance to render justice to them, as well as educating the potential mass against these offences that they may face and how to avoid them. Hence, this study was carried out to analyse the various factors and its impact involved in this heinous crime of sexual violence.

Materials and Methods

All the 204 cases of sexual offence which were presented to the department of Forensic Medicine and Toxicology, Government Medical College and Hospital, Balasore, Odisha during the *2 years* study period were considered as study material.

A prospective study was conducted in all the cases, in which data were collected, analysed considering the different factors like age and sex of victim, date, time and place of occurrence, threats given by the assailant, number of assailants involved and acquaintance of victim with them, bodily injuries and genital injuries sustained, time of reporting and time of examination after the incidence from the police requisition papers, hospital records and history from the victim or accompanying persons.

An informed consent for examination and evidence collection was seeked from victim/ guardian if the victim is a minor. A detailed medical and assault history was taken, which also included previous exposure to sexual intercourse, marital status, earlier child birth, abortion which may alter findings of hymen, menstruation history, history of bathed/urinated/defecated/douched, history of STIs, HIV etc, and if any contraceptive method used.

A top to toe examination was conducted, documenting grossly visible external bodily injury sustained, biological materials of forensic importance such as vaginal swab and smears collected from perineum, posterior fornix of vaginal canal, combed and cut pubic hair collected, blood samples for HIV testing, VDRL and HBsAg, urine for pregnancy test collected and sent to pathology laboratory for examination maintaining the chain of custody, also clothing's having suspicious seminal stains were preserved and sent to SFSL. A detailed genital examination was carried out documenting the different type and site of injury, whether recent or old tear or redness present over hymen, the state of hymen whether intact or Carunculae hymenales, injury to labia majora, labia minora, posterior commisure, fourchette, vaginal canal was examined by using hand held magnifying lens and speculum where required and noted, also 1% toluidine blue is sprayed to visualise micro injuries. Two vulva, vagina, anal opening swabs were collected, air dried and two vaginal smear were made on glass slide, air dried in shade, were examined using standard light microscope for the presence of seminal fluid/ spermatozoa. The observations were tabulated, figures drawn and statistically analysed using chi-square, *p*-value, and results discussed with other authors.

Results

A total of 204 cases of sexual assault were taken for study, all the victims were females, the age of the victim ranges from 3 to 70 years and the mean age is found to be 17.87 years, 79.41% of cases were between *0* and *19 years*. Maximum cases were seen in age group *16* to *17 years i.e.*, 56 (27.45%) cases followed by *14* to *15 year* age group *i.e.,* 46 (22.55%) cases. Also maximum genital injuries 88(43.1%)

Table 1: Distribution of cases according to Age of Victim

Victims Age Group	Number of Cases	Percentages (%)	Genital Injuries		
			Recent	Old	Absent
<10	14	6.86	8	2	4
10–11	4	1.96	0	2	2
12–13	24	11.76	4	10	10
14–15	46	22.55	8	32	6
16-17	56	27.45	4	44	8
18–19	18	8.83	2	14	2
>20	42	20.59	6	36	0
Total	204	100	32	140	32

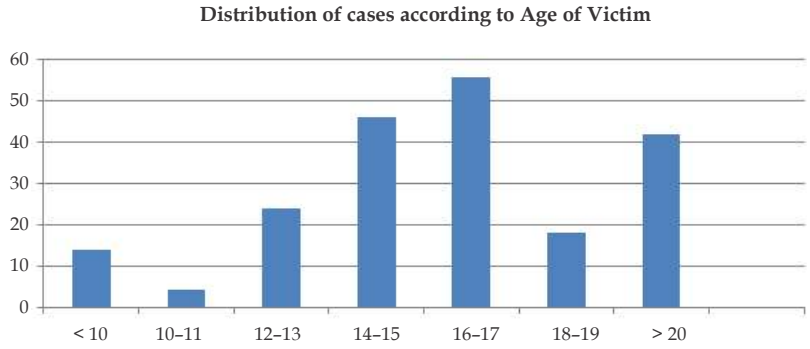

Fig. 1: Distribution of cases according to Age of Victim

cases were present in this age group (14 to 17 years),(Table1)(Fig. 1), regarding time of occurrence of the incidence, maximum cases were found between *4* and *6 pm* and between *7* and *9 pm i.e.,* 82 (40.2%) and 48 (23.57%) cases respectively and least cases *i.e.,* 2 (0.9%) after midnight. In (**Table 3**), taking place of occurrence into account, about 82 (40.2%) cases occurred inside house of victim and 76 (37.25%) cases in accused houses which included school premises, neighbors, relatives, kidnapping cases, friend's house. Rest 46 (22.55%) cases occurred outdoor places like construction areas, ponds, jungle, field, isolated areas. In 180 (88.24%) cases the assailant was known to the victim and in only 24 (11.76%) cases the accused was unknown person. When the accused was unknown the incidence mostly occurred outside (*i.e.,* 18 (75%) cases). Among known accused cases maximum (78 (43.33%)) occurred inside the victims house by close relatives, blood relatives, neighbor, boyfriends. In only 32 (15.69%) cases recent genital injuries were detected. Highest percentage of recent genital injuries (*i.e.*, 6 cases (25%)) was witnessed among unknown accused cases and few cases with

Table 2: Time of occurance of Assault

Time of Occurance	No of Cases	Percentages (%)
7AM–9AM	10	4.9
10AM–12PM	22	10.78
1PM–3PM	26	12.75
4PM–6PM	82	40.2
7PM–9PM	48	23.57
10PM–12AM	14	6.9
1AM–3AM	2	0.9
4AM–6AM	0	0
Total	204	100

Table 3: Place of occurance of Sexual Assault and their acquintance with the accused.

Place of Occurance	Number of Cases	Percentages (%)	Acquintance with accused			
			Yes	%	No	%
Inside house of victim	82	40.2	78	95.1	4	4.9
Inside house of accused	76	37.25	74	97.37	2	2.63
Outside	46	22.55	28	60.87	18	39.12
Total	204	100	180	88.24	24	11.76

p value ≤ 0.05 (under number of cases), *p* value <0.01 (under acquaintance with accused)

Table 4: Acquintance with assailant and Genital Injuries

Acquintance with assailant	Number of cases	Percentages (%)	Genital Injuries	
			No of cases	%
Known	180	88.24	26	14.44
Unknown	24	11.76	6	25
Total	204	100	32	15.69

p value ≤0.05 (under number of cases), *p* value <0.01 (under genital injuries)

known accused revealed genital injuries *i.e.*, 26 cases (14.44%), (**Table 4**).

In (**Table 5**), 196 (96.07%) cases there was single assailant involved and in 8 (3.93%) cases more than one assailant was involved. 75% of cases revealed recent genital injury when more than one assailant is involved also 75% cases evidenced bodily injury.

Table 5: Involvement of one or more assailant in each case and Associated Genital, Bodily Injury

Number of assailants	Number of cases	Percentages (%)	Genital Injuries		Bodily Injuries	
			No of cases	%	No of cases	%
1	196	96.07	26	13.27	40	20.41
> 1	8	3.93	6	75	6	75
Total	204	100	32	15.69	46	22.55

p-value > 0.05 *p*-value < 0.01 *p*-value > 0.05

A total of 46 (22.5%) cases showed bodily injury, and in cases where single assailant is involved only 20.41% cases reported bodily injury.

In 148 (72.55%) cases females had no experience of prior sexual intercourse, among them 116 (78.4%) had genital injuries out of which 26 (22.41%) cases had recent injury and 90 cases had old injury.

Table 6: Genital Injury following Sexual Assault with or without prior Sexual Intercourse Experience

Prior Sexual Intercourse	Number of Cases	Genital Injury		
		Recent	Old	Absent
Without	148 (72.5%)	26	90	32
With	56 (27.5%)	6	50	0
TotaL	204 (100%)	32	140	32

56 (27.4%) cases had experienced prior sexual intercourse out of which 5 (8.9%) cases had recent injury and 50 cases had old injury, (**Table 6**).

Among the different circumstances and threats under which rape was committed, there were 48 (23.53%) cases of kidnap, 42 (20.59%) cases of verbal threats to kill, 18 (8.8%) cases of false promise to marry, 10 (4.90%) cases of physical threats to kill (throttling, smothering, weapon) and 4 (1.96%) cases of sedation were used as coercion, (**Table 7**).

Table 7: Different Circumstances and threats under which RAPE was committted

Circumstances	Number of Cases	Percentages (%)
Verbal threat to kill	42	20.59
Kidnap	48	23.53
False promise to marry	18	8.82
Physical threat to kill	10	4.90
Sedation	4	1.96
No threat	60	29.4
Consensual	22	10.8
Total	204	100

In (**Table 8**), only 66 (32.35%) cases victims came for examination within *72 hours* of the incidence and rest 138 (67.65%) cases came after *72 hours*. Recent genital injury were mostly found in cases where the victim turned out for examination within *72 hours, i.e.,* 28 (42.42%) cases out of which 18 cases were within *24 hours*, 4 cases in between *24* and *48 hours* and 6 cases in between *48* to *72 hours*, no genital injury was present in 10 (15.15%) cases and old injury or previously experienced sexual intercourse in 28 (42.42%) cases. Similarly bodily injuries were present in 20 (30.30%) cases among those who came within *72 hours*. After *72*

Table 8: Time of examination of victims and Genital and Bodily Injury findings

Time of examination of Assault Case	No of Cases	Genital Injuries			Bodily Injury	
		Present		Absent		
		Recent	Old		Present	Absent
< *24 HRS*	34	18	8	8	14	20
24–48 HRS	10	4	4	2	2	8
48– 72 HRS	22	6	16	0	4	18
> *72 HRS*	138	4	112	22	26	112
Total	204	32	140	32	46	158

p-value > 0.05

hours lapse only 4 (2.9%) cases revealed recent genital injury, no injury in 22 (15.94%) cases and old injury in 112 (81.2%) cases. Similarly bodily injury among these cases were found in only 26 (18.84%) cases.

In (**Fig. 2**), among the different sites of genital areas injured, Labia Majora (abrasion, contusion, laceration) in 8 cases, Labia Minora in 10 cases, vagina (laceration) in 2 cases, Posterior Commisure,

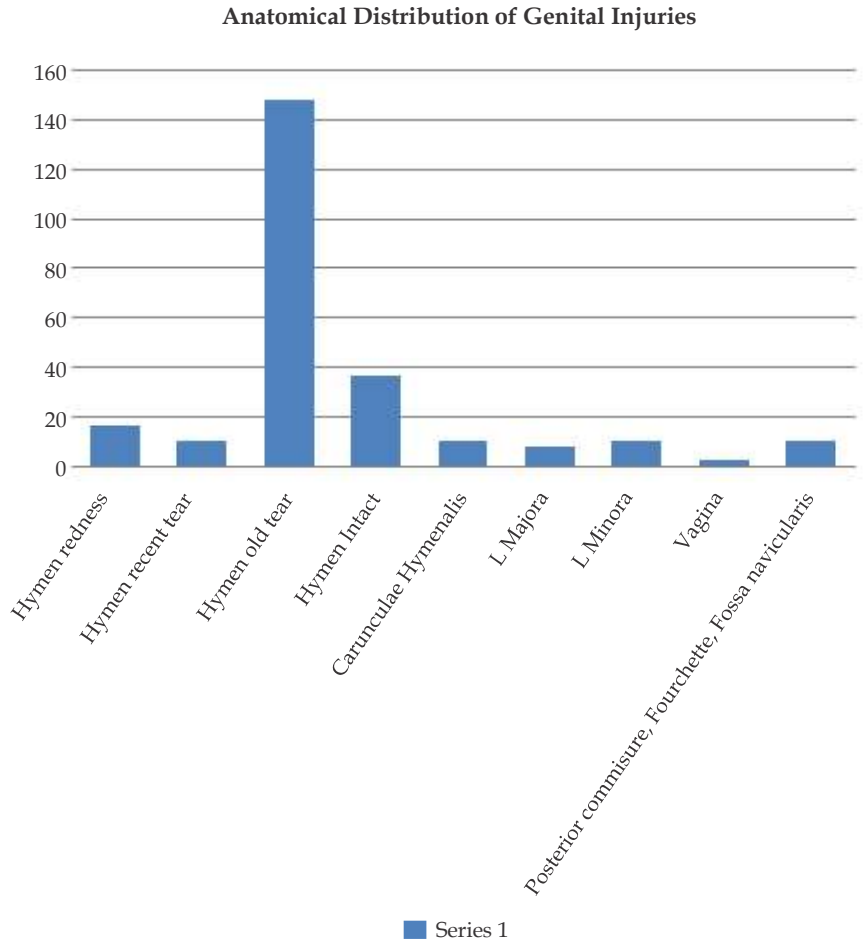

Fig. 2: Anatomical Distribution of Genital Injuries

Fourchette, Fossa Navicularis (tear, redness, contusion) in 10 cases. Hymen shows redness in 16 cases, recent tears in 10 cases, old tear in 148 cases, Carunculae hymenales in 10 cases, intact hymen in 36 cases.

In (**Table 9**), only 22 cases the laboratory report findings showed positive correlation with rape cases, spermatozoa were seen in vaginal smear under microscope in 23 cases and 18 cases were positive for urine pregnancy test or ultrasonography

Table 9: Laboratory report findings

Laboratory findings	No of Cases
Spermatozoa present	23
UPT positive/ USG Finding	18
HIV positive	0
VDRL reactive	0
Total	43

Table 10: Presence of spermatozoa taking in account time of collection of Vaginal Swab

Time of Vaginal Swab sample collection from incidence	No of Cases	Spermatozoa present Cases
< 24 hrs	**34**	**19**
24–48 hrs	**10**	**3**
48–72 hrs	**22**	**1**
> 72 hrs	**138**	**0**
Total	**204**	**23**

of pelvis. Among the 23 cases which showed spermatozoa 19 cases were positive within *24 hours*, 3 cases in between *24* and *48 hours*, 1 case in between *48* and *72 hours* and no spermatozoa found after *72 hours* of incidence, (**Table 10**).

Discussion

A total of 204 cases of sexual assault were evaluated, all the victims were females, the age of the victim ranges from *3* to *70 years* with a mean age of *17.87 years*, 79.41% of cases were between *0* and *19 years*, the findings of the present studies were similar to studies of Santos JC *et al*. with 352 victims between *93 days* and *86 years* and a mean age of *17.5 years* and 61% in age from 0–19 years, Riggs N studied 1076 cases with 96% female victims aging *1–85 years* and mean of *25 years*, Avegno J studied 1172 cases in which 92.6% were women and mean age *27 years*, Grossin C studied 418 cases with 86% females and mean age 22.4 years.[4–7]

Maximum cases were in age group *16* to *17 years i.e.*, 56 (27.45%) cases followed by *14* to *15 year* of age group *i.e.*, 46 (22.55%) cases. Also maximum genital injuries 88 (43.1%) cases were present in this age group (*14* to *17 years*).

Regarding time of occurrence of the incidence, maximum cases were found between *4* and *6 pm* and between *7* and *9 pm i.e.*, 82 (40.2%) and 48 (23.57%) cases respectively and least cases *i.e.,* 2 (0.9%) after midnight.

Taking place of occurrence into account, about 82 (40.2%) of cases occurred inside house of victim and 76 (37.25%) cases in accused houses which included school premises, neighbors, relatives, kidnapping cases, friend's house, because there is least doubt on these perpetrators of rape who are trustworthy people and also they can easily approach and gain confidence of the innocent children. Almost same finding were obtained by Grossin C who found victims house was the most frequent place of sexual assault in 35% cases, also Stermac LE found sexual assault was more likely to occur in home of victim (chi 2 = 36.27, 1 df, $p < 0.001$).[2,6] Rest 46(22.55%) cases occurred at outdoor places like; construction areas, ponds, jungle, field, vehicle, isolated areas.

In 180 (88.24%) cases the assailants were known to the victim and in only 24 (11.76%) cases accuses were unknown person. At par with the results revealed by Santos JC, where a large majority belonged to the victims social and family circle (85%), Avegno J found 53% knew their assailants and 11.76% unknown person, Riggs N found the assailant was a stranger in 39% cases.[4,5,7.] When the accuses were unknown the incidence mostly occurred outside (*i.e.*, 18 (75%) cases), also found by Stermac LE that sexual assault by a stranger was more likely to occur outdoors or in a vehicle.[2] Among known accused cases maximum (78 (43.33%)) occurred inside the victims house by close relatives, blood relatives, neighbor, boyfriends. A total of only 32 (15.69%) cases had recent genital injuries, which was also observed by Sugar NF in 20% of victims, Santos JC in 31% of cases had traumatic genitalia and/or the anus, Riggs N observed 53% cases of genital trauma.[4,5,8] Highest percentage of recent genital injuries (*i.e.*, 6 cases (25%)) was witnessed among unknown accused cases and few cases with known accused revealed genital injuries *i.e.*, 26 cases (14.44%). Stermac LE also found the mean number of trauma sites was greater among victims assaulted by strangers than among those assaulted

by people they knew ($t = -4.29$, 180df, $p \leq 0.001$).[2]

In 196 (96.07%) cases there was single assailant involved and in 8 (3.93%) cases more than one assailant was involved. Authors like Riggs M, Avegno J found multiple assailants were uncommon *i.e.*, 20% and 18.1% respectively.[5,7.] Three-forth (75%) of cases revealed recent genital injury when more than one assailant is involved. A total of 46 (22.5%) cases showed general bodily injury, which was also found by Santos JC (28%), Grossin C (29%), Avegno (51.7%) and Riggs N (67%).[4–7] In cases where single assailant is involved only 20.41% cases reported bodily injury and 75% cases evidenced bodily injury when multiple assailant were involved.

In 148 (72.55%) cases females had no experience of prior sexual intercourse, among them 116 (78.4%) had genital injuries out of which 26 (22.41%) cases had recent injury and 90 cases had old injury, old injury are due to delay in reporting and examination. 56 (27.4%) cases had experienced prior sexual intercourse out of which 5 (8.9%) had recent injury and 50 had old injury. Similar to the study of Biggs M in 132 women, where 50% (66) had no prior sexual intercourse and significantly more women without than with prior sexual intercourse experience had visible genital injuries (65.2% *v* 25.8%, $p < 0.001$) and 9.1% had hymenal perforation in women without prior sexual intercourse.[3]

Among the different circumstances and threats under which rape was committed, there were 48 (23.53%) cases of kidnap, 42 (20.59%) cases of verbal threats to kill, 18 (8.8%) cases of false promise to marry, 10 (4.90%) cases physical threats to kill (throttling, smothering, weapon) and 4 (1.96%) cases of sedation were used as coercion. Similar findings were obtained by Riggs N that force was used in 80% cases and in 27% of cases a weapon was present, Avegno J found threats of force were common in 72.4% sample.[5,7]

In only 66 (32.35%) cases victims came for examination within *72 hours* of the incidence and rest 138 (67.65%) cases came after *72 hours*. Recent genital injury were mostly found in cases where the victim turned out for examination within *72 hours*, *i.e.*, 28 (42.42%) cases, no genital injury was present in 10 (15.15%) cases and old injury or previously experienced sexual intercourse in 28 (42.42%) cases. Similarly bodily injuries were present in 20 (30.30%) cases among those who came within *72 hours*. After *72 hours* lapse only 4 (2.9%) cases revealed recent genital injury, no genital injury in 22 (15.94%) cases and old injury in 112 (81.2%) cases. Similarly bodily injuries among these cases were found in only 26 (18.84%) cases. Similar study done by Grossin C found genital trauma occurred in 35.7% of the cases in first group (within *72 hours*) and in 19.5% cases in second group (after *72 hours*), general body trauma was found in 39.1% of cases in first group and 6.3% cases in second group.[6]

Among the different anatomical sites of genital injury, Labia Majora (abrasion, contusion, laceration) in 8 cases, Labia Minora in 10 cases, vagina (laceration) in 2 cases, Posterior Commisure, Fourchette, Fossa Navicularis (tear, redness, contusion) in 10 cases. Hymen shows redness in 16 cases, recent tears in 10 cases, old tear in 148 cases, Carunculae hymenales in 10 cases, intact hymen in 36 cases. Hymen injury was seen in 11.3% cases, which was also documented by Grossin C found hymenal, vulvo vaginal and anal lesions were 11%, 20% and 7% respectively.[6]

In only 22 cases the laboratory report findings reflected positive correlation with rape, where spermatozoa were seen in vaginal smear under microscope in 23 (11.3%) cases and 18 cases were positive for urine pregnancy test or ultrasonography of pelvis. Similar findings were obtained by Riggs N, Santos JC and Grossin C *i.e.*, 13%, 34%, 30.3% respectively.[4–6.]

Conclusion

The new laws/amendments have been made pertaining sexual assault and rape. It is a fact and the perception of the society and the court, doctors as a medico legal expert will ventilate the exact scientific knowledge basing on his findings to render justice. At the same thus, it is the duty of the doctors to escalate their skills at par with the changing scenario of the medico-legal examinations in order to not only to protect ourselves from legal complications but also to help the victim from these crimes.

The sexual assault examiner is a specially trained professional needed care, documentation of the details of the assault and to collect evidence timely is a paramount importance. At the same time, the doctors involved in dealing of such cases also required to recommend the physical as well as mental examination of the victim if needed.

The guidelines for the health workers must be prepared with a aim for providing an appropriate understanding of sexual violence and the needs and the rights of survivors/victims of sexual violence, more importantly to highlight the medical and the forensic responsibilities of health professionals.

References

1. Guidelines & Protocols: Medico-legal care for survivors/victims of sexual violence. Ministry of Health & Family Welfare Government of India. 2013.pp.3–30.
2. Stermac LE, Du Mont JA, Kalemba V. Comparision of sexual assaults by strangers and known assailants in an urban population of women. CMAJ. 1995 Oct 15;153(8):1089–094.
3. Biggs M, Stermac LE and Divinsky M. Genital injuries following sexual assault of women with and without prior sexual intercourse experience. Canadian Medical Association Journal. 1998;159(1):33–37.
4. Santos JC, Neves A, Rodrigues M, Ferrao P. Victims of sexual offences: medicolegal examination in emergency settings. J of Clin Forensic Med. 2006;13(6–8):300-3.
5. Riggs N. Analysis of 1,076 cases of sexual assault. Ann Emerg Med. 2000 Apr;35(4):358–62.
6. Grossin C, Sibille I, Grandmaison GL, *et al*. Analysis of 418 cases of sexual assault. Forensic Sci Int. 2003 Jan 28;131(2-3):125–30.
7. Avegno J, Mills TJ, Mills LD. Sexual assault victims in the emergency department: Analysis by demographic and event characteristics. J Emerg Med. 2009 Oct;37(3):328–34.
8. Sugar NF, Fine DN and Eckert LO. Physical injury after sexual assault: Findings of a large case series. Am J Obstet Gynecol. 2004 Jan;190(1):71–6.

Original Article

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A Study on Knowledge and Attitude about Organ Donation among Medical Students in Sikkim

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Abstract

Introduction: Knowledge and attitude of medical students towards organ donation plays a major role in promoting the concept among general population. The study was done with objectives to assess the Medico-legal awareness, knowledge pertaining to organ donation among Undergraduate Medical Students and to determine the willingness and attitude of undergraduate medical students towards organ donation. *Methodology:* A cross sectional descriptive survey conducted over a period of *3 months* under Forensic Medicine department of Sikkim Manipal Institute of Medical Sciences, Gangtok. *Results:* Students in Clinical years were better aware of the existence of the law on human organ donation in India (92%) as compared among pre-clinical students (71%). Exclusion of sperm and oocyte donation from organ donation was known to 78% of the pre-clinical and 87% of the clinical students. Majority of students (87% clinical) and pre-clinical students (85% pre-clinical) were unaware of possibility of organ donation in infectious and lifestyle diseases. Significantly high level of awareness was seen (96.5%) about kidney donation followed by eye donation (95.5%). Our study revealed that a higher percentage of female participants (96.72%) showed a positive attitude for organ donation. 15.57% of the female participants had donor card as compared to male participants (6.41%). *Conclusion:* Awareness and attitude of the medical students are important as they play a major role to motivate the society and spread awareness among community.

Keywords: Organ transplantation; Awareness; Attitude; Medical students.

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Introduction

Organ donation is the process of giving an organ or a part of an organ for the purpose of its transplantation into another person. It can be done by a deceased donor or a living donor.[1]

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In India, almost 500,000 people die every year due to non-availability of organs.[2] Although the "Transplantation of Human Organs Act of 1994" brought a significant change in the conduct of organ donation and transplantation in India but it had not been able to meet the expected outcomes.[3] Ignorance of the common public regarding the procedures and legal issues still creates an unwanted scenario. Knowledge and attitude of medical students towards organ donation plays a major role in promoting the concept among general population. Since, there has been no available literature in the State of Sikkim, it was imperative to carry out a study to identify the gaps among the future health care providers.

Aims and Objectives

1. To assess the Medico-legal awareness and knowledge pertaining to organ donation among Undergraduate Medical Students.
2. To determine the willingness and attitude

of undergraduate medical students towards organ donation.

3. To find out the difference of attitude towards organ and tissue donation between pre-clinical and clinical MBBS students.

Materials and Methods

Study Design

A cross sectional descriptive survey conducted over a period of *3 months* under Forensic Medicine department of Sikkim Manipal Institute of Medical Sciences, Gangtok. A self-administered, pre-designed, pre-tested anonymous questionnaire was distributed after obtaining an informed written consent from each participant. The content validity of the questionnaire was pre-validated by the subject experts after obtaining permission from Institutional ethics committee.

Inclusion Criteria

The subjects of the study included the undergraduate medical students *i.e.,* 100 Pre-clinical (first MBBS) and 100 clinical MBBS students (final MBBS) of the Sikkim Manipal Institute of Medical Sciences, Gangtok.

Data was analysed using SPSS 22 0 version and Microsoft Excel.

Results

Our study included 200 students, out of which 122 (61%) were female and 78 (39%) were male with the mean age of *20.9 years*. 92 % of the students in clinical years were better aware of the existence of the law on human organ donation in India as compared to 71% of pre-clinical students, (**Fig. 1**). 82.5% of the overall study population were aware that sperm and oocyte donation does not come under the purview of Human Organ Transplantation Act with 78% in pre-clinical years and 87% in clinical years respectively, (**Table 1**). 72.5% of the overall students were aware of blood donation being outside the purview of Organ donation, (**Table 1**). Majority of students (87% clinical) and pre-clinical students (85% pre-clinical) were unaware of possibility of organ donation in infectious and lifestyle diseases.

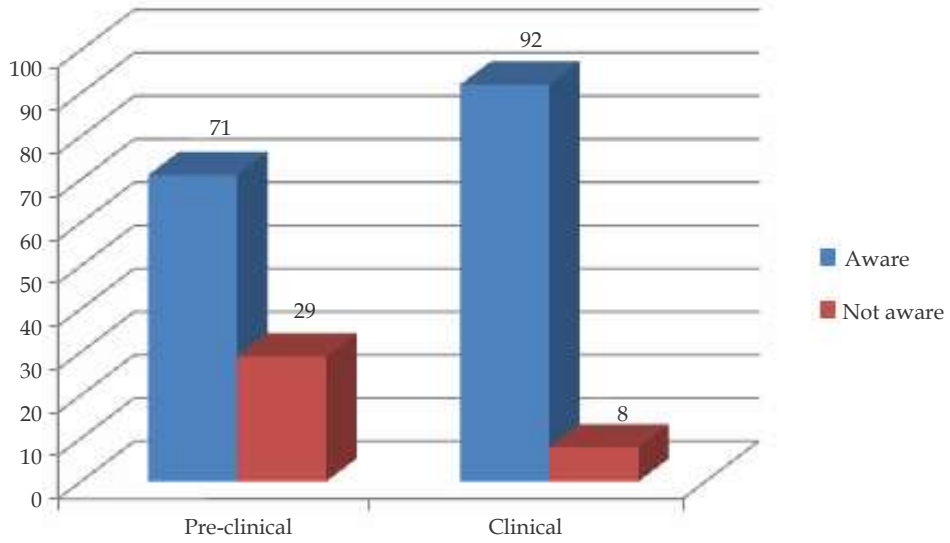

Fig. 1: Awareness about THOA among study population

A significantly high level of awareness was seen (96.5%) about kidney donation followed by eye

Table 1: Awareness about sperm, oocyte and blood from organ donation

Year of study	Exclusion of Sperm and oocyte from organ donation		Exclusion of Blood from organ donation	
	Aware (%)	Not aware (%)	Aware (%)	Not aware (%)
Pre-clinical (*n* = 100)	78	22	71	29
Clinical (*n* = 100	87	13	74	26
Total	82.5	17.5	72.5	27.5

donation (95.5%) when compared to awareness regarding transplant of Skin (43.5%), Pancreas (38%) and Bones (29.5%), (**Table 2**).

It was observed that students in clinical years were more aware about organ donation than the pre-clinical years. The study reflected that the participants had low awareness about organ donation by next of kin, which was only 37% in clinical years followed by 33% in pre-clinical years. With the question pertaining to organ donation in medico-legal cases, only 28% of the pre-clinical students were aware of its possibility compared to 45% in clinical students, (**Table 3**).

Table 2 : Awareness about commonly donated organs among clinical and pre-clinical year

Organs being donated	Pre-clinical Students (*n* = 100)	Clinical Students (*n* = 100)	Total (*n* = 200)
Kidney	94%	99%	96.5%
Heart	87%	97%	92%
Eye	95%	96%	95.5%
Liver	80%	94%	87%
Lung	47%	64%	55.5%
Skin	33%	54%	43.5%
Pancreas	35%	41%	38%
Bones	24%	35%	29.5%

Commercialization of human organs has been curbed long-back in India and a good awareness of the same was seen in the pre-clinical (81%) as well as in clinical students (89%). 43% of pre-clinical and 63% of clinical students still believe that people can accept money and other benefits for donating their organs. Our study pointed out that the participants showed a mixed response while asked about their willingness to donate organs as a living donor in future, (**Fig. 2**). While 42% of the students were of view that they can donate their organ to any unknown person in great need, 68.5% responded that they will donate only to loved ones like family or friends.

Table 3: Awareness regarding organ donation after death and in medico-legal cases

Year of study	Organ donation is possible by next of kin without prior wish of deceased		Organ donation is possible in Medico-legal cases	
	Aware (%)	Not aware (%)	Aware (%)	Not aware (%)
Pre-clinical (*n* = 100)	33%	67%	28%	72%
Clinical (*n* = 100)	37%	63%	45%	55%
Total (*n* = 200)	35%	65%	36.5%	63.5%

Our study revealed a higher percentage of female participants (96.72%) had a positive attitude

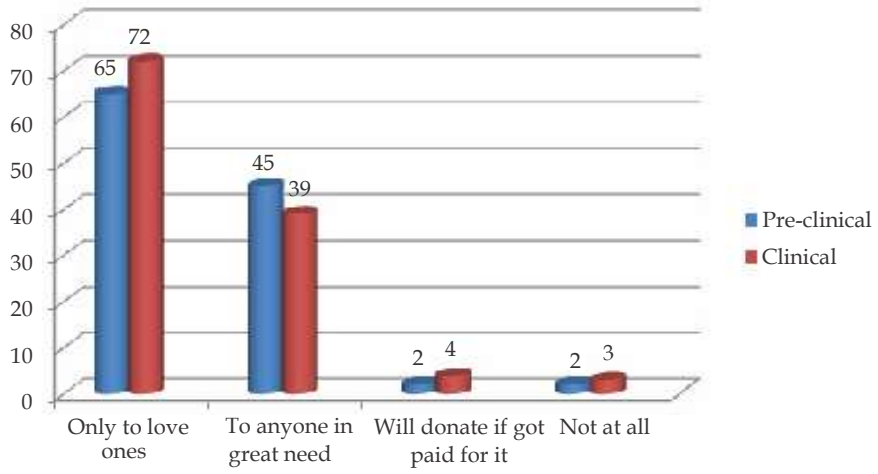

Fig. 2: Reasons of students as future organ donors

regarding motivating their friends, family and community at large for organ donation as compared to 94.87% of male respondents, (**Table 4**). 12% of the total participants were having a donor card with 20% in clinical years and 4% in pre-clinical years respectively. Our study showed, a higher preponderance (15.57%) among female participants who were already registered donors and had a donor card as compared to male participants (6.41%), (**Table 5**).

Table 4: Attitude of students towards motivation for organ donation

Students showing positive attitude regarding motivating others for organ donation	Pre-clinical (*n* = 100)	Clinical (*n* = 100)	Female (*n* = 122)	Male (*n* = 78)
Yes	97%	95%	96.72%	94.87%
No	3%	5%	3.28%	5.13%

Table 5: Registered organ donors according to year of study and gende

Registered organ donors	Pre-clinical (*n* = 100)	Clinical (*n* = 100)	Female (*n* = 122)	Male (*n* = 78)
Students with Donor's Card	4%	20%	15.57%	6.41%

Discussion

In this present study, the participants were better aware of the existence of the law on human organ donation in India as compared to 54% students (no pre-clinical/Clinical group specified) according to study done at Thiruvallur & Chennai.[4] The female participants were more in our study owing to high percentage of female students in our institute as compared to prior studies done at Maharastra (30.2%).[5] The participants in this present study, were aware of the fact that blood, sperm and oocyte donation were outside the purview of Human Organ Transplantation Act. With regard to organ donation in infectious and lifestyle diseases the awareness level of the participants in the present study was quite low as compared to study done at Kerala (54.45%).[6] This could be due to less awareness drive about organ transplantation and limited exposure to such programme. With respect to organ which could be transplanted, a significantly high level of awareness was seen about kidney donation followed by eye donationas compared to awareness regarding other organs which could be transplanted. It was seen that students in clinical years were more aware about organ donation than the pre-clinical years.

A moderate level of awareness was seen in the present study with respect to organ donation by next of kin and organ donation in medico-legal cases in clinical year and lower in pre-clinical year. This could be attributed to the fact organ transplantation covered as didactic lectures had not been able to create the cognition base among the students.

Although the participants in this present were aware of the fact that commercialization of human organs is illegal in India but still a moderate percentage believed that people could accept money and other benefits for donation. These reflect that the participants were aware of existence of the act but were not aware of details of the content. Our study pointed out that the participants showed a mixed response while asked about the reason as a living donor in future. Their preference was mostly towards loved ones followed by unknown person in great need and willingness of the participants was comparable to the studies done at Kerala and Gujrat.[6,7] Findings of our study, were in accordance with study done at Kerala where 36.6% of had strong willingness and 49.5% contemplated of donating their organs during need.[6]

Our study pointed out that only 12% of the participants were already having a donor card with more students in clinical year which was slightly higher than study done at Kerala (7.2%) but similar to a study done at Saudi Arabia (15%).[6,8] It was also similar in that aspect that students in clinical years were more motivated and had a donor card during the study similar to studies done at Saudi Arabia and Turkey.[8,9]

The reasons for the low registration could be due to insufficient awareness drive programs and limited literature exposure by the medical students. Lack of awareness of registration procedures have been stated as a reason for low donor registration

by an earlier study.[5] Our study revealed a high percentage of participants showed a positive attitude regarding motivating their friends, family and community at large for organ donation with female participants slightly more than male. Female participants were more than male participants as registered donors which could be attributed to existence of high emotional aspects in female gender.

Majority of the participants showed willingness in favor of the promotion of donation among their relatives and friends and in community at a large proving the altruistic aspect of the undergraduate students towards this noble cause which was similar to the study done at Saudi Arabia where almost half of the students were considering donation with no significant difference between pre-clinical and clinical students.[8] The authors from an earlier study had stated that health professionals positively influence the opinions and attitudes of patients and their relatives, leading to higher rates of organ procurement.[10] Thus, this attitude of the health professionals would lead to better counselling practice in future.

Conclusion

This study was novice attempt on the part of authors to identify the gaps in relation to the medico-legal knowledge, awareness and willingness to donate. The limitation of this study is its cross sectional design and students representing from one medical college. The medical students being the first contact physicians of the future, their role in informing the general public and driving the organ donation is very essential. Awareness and attitude of the medical students are important as they play a major role to motivate the society and spread awareness among community. Organ donation has to be covered by interactive small group teaching methods rather than didactic lectures.In the community level awareness camps, small group discussion about ethical and legal issues shall be helpful in creating awareness among the students.

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Conflict of Interest: None.

References

1. Ramadurg UY, Gupta A. Impact of an educational intervention on increasing the knowledge and changing the attitude and beliefs towards organ donation among medical students. J Clin Diagnos Res. 2014;8(5):5–7.
2. Need A National Organ Donation Transplantation Programme. The Times of India. 2015 19th August. https://timesofindia.indiatimes.com/city/chandigarh/Need-a-national-organ-donation-transplant-programme/articleshow/48534995.cms assessed on 12th July' 2019.
3. Government of India. Transplantation of Human organ Acts, 1994. Available online at http://mohfw.nic.in/ Accessed on 20th July'2019
4. Sam N, Ganesh R, Indrapriyadarshini V, *et al*. Awareness, knowledge, and attitude regarding organ donation among final year students of medical, Dental, Engineering, and Arts and Science Colleges in Thiruvallur and Chennai City, India. Indian Journal of Transplantation. 2018;12(1):25–29.
5. Sindhu A, Ramakrishnan TS, Khera A, *et al*. A study to assess the knowledge of medical students regarding organ donation in a selected college of Western Maharashtra. Med J DY Patil Univ. 2017;10:349–53.
6. Adithyan GS, Mariappan M, Nayana KB. A study on knowledge and attitude about organ donation among medical students in Kerala. Indian J Transplant. 2017;11:133–37.
7. Kumar A, Patel J, *et al*. Awareness about organ donation in medical and non- medical students in Patan city of Gujarat, India. International Journal of Community Medicine and Public Health. 2019;6(6):2435–439.
8. Saad M AlShareef, Richard M Smith. Saudi medical students knowledge, attitudes, and beliefs with regard to organ donation and transplantation. 2018;29(5):1115–127.
9. Akkas M, Anik RG, Demir MC, *et al*. Changing Attitudes of Medical Students Regarding Organ Donation from a University Medical School in Turkey Med Sci Monit. 2018;24:6918–924.
10. Potenza R, Guermani A, Peluso M, *et al*. Effectiveness of an education program on donation and transplant aimed at students of the nursing degree course. Transplant Proc. 2015;47:2097–101.

Review Article

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Identifying the Crime Using Bite-mark an Effective Method: A Literature Review

Ahila Singaravel Chidambaranathan

Abstract

Retinal pattern, finger prints and DNA are unique and bite marks are often registered at the assault cases of the skin of the victims and effective method which is very helpful in identifying the criminals. Human bites are an alternative. The challenge in forensic dentistry is analysing the bite in human beings because the distortion of the human bite won't give the exact mirror image of the bite, which complicate the investigators to identify the crime. Human bite changes with the time when the measurements taken. Hence, a broad search of published literature was performed electronically using the keyword human bite, identifying crime, human bite analysis technique from *January 1974* to *December 2018*. Medline, Google scholar and text books. This article analyzis the methods of human bite recording and for identifying the criminals in forensic sciences.

Keywords: Distortion; Forensic dentistry; Human bite.

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Introduction

There is a marked raise in assaulted cases in the society and many of them have human bite which has been identified by the forensic dental surgeon. Bite-marks also have seen in the food substance or inanimate objects at the crime location. Bite-marks may be found during assault and abuse of child or adults related with sex related cases.[1] In some criminal cases only the human bite evidence has been seen which may be found in the living or the dead individuals, where the person may be a victim or perpetrator of the crime. Bite-mark may also be defined as all traces left on the victim due to the biting act.[2]

Bite-mark is described as a mark created by the teeth, or combination with other oral parts. Bite-marks can be seen in foodstuffs, flesh and on variety of other materials.[3] Bite-mark investigation started with the inspection of the wound and copying of it, then only it can be used to identify the crime, if it is positively decided as a bite mark. If the wound can be orientated similar to the teeth are positioned in the dental arched to make a firm statement that the wound is a bite-mark. Frequently however, an individual wound will show limited detail and it will be appropriate to identify it only as a possible bite-mark. Advances in forensic sciences have made crime detection scientifically feasible.

Location of bite-marks

Bite marks can be found on any surface of the body (Table 1).[4,5]

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Table 1: Common Sites

Non-sexual	Homo (sexual)	Hetro (sexual)
Arm	Breast	Breast
Leg	Neck	Upper back
Fingers	Cheek	Axilla
Hands	Arm	Arm
Chest	Thigh	Genitalia
Ears	Abdomen	Nose
	Genitalia	Buttocks

Classification of bite-marks

Tooth pressure marks: These markings are caused by the penetration of anterior teeth into the skin. They are stable and subjected to least alteration.

Tongue pressure marks: Sometime **i**mpressions of the palatal surfaces of the anterior teeth, cingulam or the palatal rugae may be created by tongue pressure.

Tooth scrape marks: They are produced by the fracture tooth or filling of the anterior teeth.

Complex marks: They have the impressions of all variety of marks which depends on the amount of tissue pierced into the oral cavity.[6,7]

Classification of bite-mark on food

Type 1 bites are those found in material that fractures readily with limited penetration of tooth. They record the incisal edges of anterior teeth upto *1* to *2 mm*.

Type 2 bites produced by the teeth, and then the bitten piece is removed by cutting it from the material.

Type 3 bites are bite right through and through the material. The dimensions of the bite may be increased because the mark showed the more mesio-distal width and not the incisal edge length.[8]

Nature of human bite-mark

Human bites are usually semi-circular or crescentic in shape which is produced by the imprint of the front teeth with a space at either side due to the separation of maxilla and mandible. The teeth may give a definte, separate marks or form with continuous or intermittently broken line. Bite marks may be in the form of abrasions, contusions or lacerations or a combination of any two or three. Rarely, the bite-mark may be linear in pattern, due to the scraping of the skin causing parallel tracks.[9]

Methods of recording of bite-marks

Photography: For identifying the bite mark, photographis the most commonly used method which does not affect by any other recording like impression on models, and taking swabs etc.

Impression and models: The proper way of recording the details of suspect's dentition is to obtain apositive replica of the teeth and directly compare it with the impression of the bite-mark before it shrings.

Collection of swabs: CDE antigens can be seen in the human saliva during biting. Swabs should be taken from the bitten area, normal area and oral cavity. The bitten area should be sectioned and preserved in 10–20% formalin solution.[10]

UV illumination: Bite-marks which are not seen by naked eye may become visible while examining under UV light in a dark room, because, in a wound, the melanin pigment of the skin shifts to the periphery or margin of the wound, which makes the margins of the teeth bite marks prominent when UV light is focussed on the site of the bite. This technique will demonstrate invisible bite-marks up tosix months after infliction.[11]

Methods of analysis of bite-marks

The American Board of Forensic Odontology has made certain guidelines for analysing the bite-mark.[12]

Odontometric triangle method: It's an objective method of identifying the crime in which triangle is made by tracing of bite-marks by marking two points on the outer most convex point of canines and one in the centre of the upper central incisors. The angles of the triangles are measured and compared with bizygomatic and bigonial width from which the responsible for the mark can also be easily measured.[13,14]

Comparison technique: Model from the suspect canbe directly placed over the photograph of the bite of the human to demonstrate concordant points. Video clip scan be used to show slippage of teeth

producing distorted images of the dynamics of the bite-marks.[15]

Uniqueness: The unique nature of human dentitionis often assumed, but it has not been definitely established.[16]

Overlay method: The overlay had been used to analyze bite-marks in the past. The tooth exemplar was used to produce the biting surface, the data are transferred to a clear acetate sheet. They are usually compared to the hurt on skin or pattern. The perimeter of biting surface of each tooth and the inner aspect will be transparent in hollow volume overlay.[17]

Image perception software procedure

A photograph of a bite-mark is started with the image perception software with the selected region, after such selection different grey colors can be added to the image. The assigning of selected colours to grey values enables the forensic scientist to select regions with similar grey values or to enhance subtle differences of grey values in the picture. The human eye can identify only 40 shades of grey in a monochrome and hundreds of different colours.[16] This will make it easier to determine the pixel intensity and detail image of bite-mark. Now the coloured image of the bite-mark is layered over the original bite-mark photo using Adobe.[18,19] Receiver Operating Characteristic (ROC) analysis provides a graphical representation positive and false positive cut-off points.[20]

Guidelines for the analysis of bite-marks

To standardize the bite-mark analysis the American Board of Forensic Odontostomatology (ABFO)[21] established the following guidelines in 1986:

1. History of any dental treatment subsequent to, or in proximity to, the date of the bite mark.
2. Extraoral photo should show the full face and profiles, intraoral should include frontal views, two lateral views and an occlusal view of each arch and a photograph with maximal mouth opening. If inanimate materials are used for test bites which should be preserved photographically and notify the distance at which photograph was taken. UV light photographs can see the damage into the deeper tissue can capture by the UV light photo includes spacing, size and shape of teeth. A blood group determination is possible in bite marks on the left saliva of the bite-mark.
3. Soft and hard tissue around the mouth may influence biting dynamics. Measurements of maximal opening and any deviations on opening or closing should be made. The presence of facial scars or facial hair and evidence of surgery should benoted.
4. Salivary swabs should be taken and the tongue should be examined to assess size and function. The periodontal status should be noted then prepare a dental chart if possible.
5. Two impressions of each arch and the occlusal relationship should be registered.
6. Sample bites should be made in an appropriate material to simulate the type of bite.
7. Study casts should be prepared using Type II stone and additional casts should be made by duplicating the master casts with silicon rubber, plastic and powders.

   Levine[22] suggested Aluwax bites to get impression of the incisal edges and aportion of the labial and lingual surfaces of upper and lower incisors and canines. Subjects are told to bite on apple or to bite on their own flexor surface of forearm. In case of a deceased person, the bite-mark be excised for further forensic bite-mark analysis or the whole body may be taken to a facility where it can be examined.

Distortion of bite-mark

1. *Primary distortion:* The two factors of primary distortions are the dynamics of the biting processes and the detailed featured of the tissue. Dynamic distortion and tissue distortion are complex unpredictable phenomenon which are closely related because of their simultaneous occurrence during the episode of contact between the dentition and skin.

2. *Secondary distortion:* Time related, it also may be due to posture distortion and photographic distortion.

Discussion

Analysis of bite-mark can be difficult for the experienced forensic odontologists whether a bite-mark was produced by a child or adult is dependent upon a number of factors which may include size, shape, size of individual tooth marks and recognition of individual teeth. In the era of common orthodontics interventions, despite of the age of patient, the remark similar to above should be added the incidence of bite-marks expertise's still increase. The comparison of the ability of experts and non-experts to differentiate between adult and child human bite-marks using Receiver Operating Characteristic (ROC) analysis.[23] Bite marks can be analyzed using various techniques which could be either direct or indirect techniques. Direct technique involves the use of a model of the suspect's teeth which is then compared to life sized photographs of the bite-mark, while indirect technique involves the use of transparent overlays, on which the biting edges of the suspect's teeth are recorded.[24]

The success of forensic 3D photogrammetry evaluation of a bite-mark or other patterned injuries, depends primarily on the proficiency in the preparation and subsequent photographic recording of these objects. Patterned injuries can be visually recorded in a short-time using relatively simple camera. FPHG is a no touch or non-invasive 3D documentation and analysis method without distortions. On screen one to one fit and match experiments with objects to be correlated to one another can be performed in virtual space, thus preserving the integrity of the original objects.[25]

Comparison of distortion between male and female showed that men exhibited more distortion in two of the three positions. A definitive conclusion could not be drawn because there was an irregular gender distribution.[26] The distance with its high false positive rates and very low true positive rates, is unreliable individually as well as in association with other parameters in metric method of analysing bite-mark. Hence, forensic experts while analysing bite-marks using metric method.[27]

Conclusion

Bite marks are very important to identify the crime and the bite mark distortion would impact the accuracy and reliability of bite-mark interpretation. So, attempts should be made to establish standards for gathering evidence and interpretation of evidence. However, bite-mark analysis will give opportunity to exclude a suspect from a crime when the data do not correspond.

Conflict of interest: No financial and personal relationship with other people or any organization.

References

1. Dayal PK. Textbook of Forensic Odontology, 1st edition. Hyderabad: Paras Medical Publishers; 1998. pp. 69–80.
2. Mac Donald DG. Bite-mark recognition and interpretation. J Forensic Sci Soc. 1974;14:229–33.
3. Whittaker DK, MacDonald DG. A colour atlas of forensic dentistry. In: Anonymous, A Colour Atlas of Forensic Dentistry. London: Wolfe Medical Publications; 1989. p. 108.
4. Shepherd Simpson's Forensic Medicine, 12th edition. London: Arnold; 2003. p. 67.
5. Vale GL, Noguchi TT. Anatomical distribution of human bite-marks in a series of 67 cases. J Foren Sci. 1983;28:61–69.
6. MacDonald DG. Bite-mark recognition and interpretation. J Foren Sci Soc. 1974;14:229–33.
7. Jacobsen JR, Nielsen SN. Bite-mark lesions in human skin. Foren Sci Int. 1981;18:41–45.
8. Webster G. A suggested classification of bite-mark on foodstuffs in forensic dental analysis. Forensic Science International. 1982;20:45–52.
9. Reddy KSN. The Essentials of Forensic Medicine and Toxicology, 21st edition. Hyderabad: K Suguna Devi; 2002. p. 82.
10. Dogra TD, Rudra A. Lyon's Medical Jurisprudence and Toxicology, 11th edition. Delhi: Delhi Law House; 2005. p. 1018–022.
11. Nandy A. Principles of Forensic Medicine, 2nd edition. Calcutta: New Central Book Agency (P) Ltd; 2003. p. 66.
12. American Board of Forensic Odontology. Inc Guide lines for bite-mark analysis. J Ame Dent Asso. 1986;112:383–86.
13. Chhatpar S, Sabane VS. Role of bite-mark analysis in identification of a person in forensic odontology. J Ind Dent Asso. 1989;60:173–79.
14. Singh M, Das R, Rao KTS. Bite-marks an index for identification in crime: An experimental clinico-anthropological study. J Ind Acad Foren Med. 1988;10:21–25.
15. West MH, Friar J. The use of videotape to demonstrate the dynamics of bite-marks. J Foren Sci. 1989;34:88–95.
16. Dogra TD, Rudra A. Lyon's Medical Jurisprudence and Toxicology, 11th edition. Delhi: Delhi Law House; 2005. p.1018–022.

17. Sweet D, Bowers CM. Accuracy of bite-mark overlays: A comparison of five common methods to produce exemplars from a suspect's dentition. J Forensic Sci. 1998;43:362–67.
18. American Board of Forensic Odontology (ABFO). Inc: Guidelines for bite-mark analysis. J Am Dent Ass. 1986;112:383–386.
19. Bowers CM, Johansen RJ. Digital Analysis of Bite-Mark Evidence using Adobe Photoshop. Santa Barbara: Forensic Imaging Services; 2003.
20. Swets JA. Evaluation of diagnostic systems. New York: Academic Press; 1982.
21. Sorup A. Odontoskopie. Ein Zahnirzhlicher Beitrag Zur Gerichtillichen Medicine. 1924;40:385
22. Levine LJ. Bite mark evidence. In: Standish SM, Stimson PG, editors. Vol. 21. Dental Clinics of North America; 1977.pp.145–58.
23. Whittakera K, Brickleyb MR, Evansb L A comparison of the ability of experts and non-experts to differentiate between adult and child human bite-marks using Receiver Operating Characteristic (ROC) analysis. Forensic Science International. 1998;92:11–20.
24. Kouble RF, Craig GT. A comparison between direct and indirect methods available for human bite-mark analysis. J Forensic Sci. 2004 Jan;49(1):111-8.
25. Thalia MJ, Braunb M, Markwaldera TH, *et al*. Forensic Science International. 2003;135:115–21.
26. Cheri Lewis A, Leonor A. Marroquin Effects of skin elasticity on bite-mark distortion. Forensic Science International. 2015;257:293–96.
27. Tarvadi P, Manipady S, Shetty M. Intercanine distance and bite-marks analysis using metric method. Egyptian Journal of Forensic Sciences. 2016;6:445–48.

Case Report

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Suicide Pact of A Married Couple: Double Hanging with A Single Ligature

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Abstract

In suicide pact, two or more victims mutually agree and execute to end their lives together by predetermined method, preferably by hanging, drowning, gunshot, or poisoning. The victims are usually spouses, lovers, or friends, and the reasons behind such steps are various. In this reported suicide pact, a married couple was found hanging in their bedroom with each end of a single chunni (a cloth worn around the neck by Indian women) tied to the ceiling fan above their bed. Their bodies were found hanging in their bedroom by their neighbours. They were facing sudden financial constraints, and could not handle the stress.

Keywords: Forensic pathology; Suicide pact; Married couple; Partial hanging; Single ligature.

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Introduction

A suicide pact is an agreement between two or more persons, who mutually agree to kill themselves by predetermined methods.[1,2] However, these events are very rare, and amount to less than 1% among all suicides.[3,4] Individuals in suicide pact may be spouses, lovers, or friends: lover pacts seen in Japan; spouse pacts in Florida, USA, and in England; and friend pacts in India.[5] It has been seen that an older, married female of a high social class is more likely to commit suicide in a pact.[6] In the act, one person decides the manner of death, while the other agrees to participate. Methods of suicide are usually less painful and cause immediate death such as by gunshot, hanging, poisoning, jumping from a height and drowning.[7,8] To establish a case of suicide pact, the Forensic Pathologist has to take a multidisciplinary approach with thorough examination of scene of crime and meticulous autopsy examination, including toxicological analysis, to recreate the sequence of events leading to death, thereby determining the cause and manner of death. We report a case of a suicide pact of a married couple, who hanged themselves using a single ligature material.

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Case Details

The husband had a small business, and had taken substantial loan in the recent past. His business suffered a setback and they could not handle the sudden financial crisis, and decided to end their lives together. Their bodies were discovered in their home by their neighbors, when no response was observed from their house for two days. Both husband and wife were found partially hanging by a single ligature from the ceiling fan located above their bed in the bedroom, (**Image 1**). Post-mortem examination was conducted at a Secondary level Hospital.

Fig 1: Couple found hanging partially by a single ligature

Case 1

The body of a moderately built 23-year-old male, with body length *157 cm* and body weight *65 kg*. The body showed early decomposition changes, with bloating of face, external genitalia and abdomen, along with peeling of skin and marbling at different regions of body. A yellow color ligature material (chunni) with a single fixed knot was found around the neck (**Image 2**). The circumference of the loop was *30 cm* and length of free end was *15 cm*. On removing it, an oblique, non-continuous ligature mark of width ranging from *1.5 cm* to *2.5 cm* was present over upper ⅓ of neck, located just below angle of left mandible, *5 cm* below chin, *2.5 cm* below angle of right mandible, *4 cm* below tip of right mastoid process, *5 cm* below external occipital protuberance and there was a gap of *5 cm* on left side of neck below left angle of mandible. The ligature mark was reddish brown in color and showed evidence of parchmentization and drying. Layer dissection of the neck did not reveal any bruising of the neck muscles or fracture of thyro-hyoid complex. All internal body organs were congested with fluidity of blood. No other external injury could be detected on the body. Toxicological blood studies did not reveal any drugs or alcohol. Cause of death was opined as asphyxia as a result of ante-mortem hanging by a ligature.

Fig. 2: Ligature mark in neck of male showing decomposition changes

Case 2

The body of a moderately built 19 years-old female, with body length *150 cm* and body weight *52 kg* showing early decomposition changes with peeling of skin and marbling at different regions of body. A yellow color ligature material (chunni) with a single fixed knot was found around the neck, (**Image 3**). The circumference of the loop was *35 cm* and length of free end was *12 cm*. Face was congested with bluish discoloration of lips and nails. On removing the ligature, a reddish-brown, incomplete ligature mark was noted at the front of the neck above thyroid cartilage, directed upward and backward merging posteriorly with the hairline. On removing it, an oblique, non-continuous ligature mark of width ranging from *1.5 cm* to *2.5 cm* was present over upper ⅓ of neck, located *2 cm* below angle of left mandible, *5 cm* below chin, *3 cm* below angle of right mandible, *4 cm* below tip of right mastoid process, *5 cm* below external occipital protuberance

and there was a gap of *5 cm* on left side of neck below left angle of mandible. The ligature mark was reddish brown in color and showed evidence of parchmentization and drying. Layer dissection of the neck did not show any bruising of neck muscles or fracture of thyro-hyoid complex. There was extravasation of blood Internal examination revealed diffuse congestion of internal organs. Toxicological analysis did not detect any drugs or poison. Cause of death was opined as asphyxia as a result of ante-mortem hanging by a ligature.

Fig 3: Ligature (chunni) in situ on neck of female

Discussion

A suicide pact is a rare phenomenon in forensic practice, which shows a mutual agreement between two people, who determine to end their life together, usually at the same time and almost always in the same place.[9] Suicide pacts occur due to love and association between the participants, but there may be social or financial reasons as well.[10] The pact is most commonly seen between a married couple, between lovers and also friends.[11] The most common reasons include financial problems, marital discord, health issues and a threat of separation from loved one.[12,13] Very few cases of suicide pacts are reported in literature, as their incidence is quite low. In one instance of a suicide pact, a married couple drowned in a river with bound wrist, and the authors explained that the wrists were bound together so that, simultaneous death and consequent simultaneous recovery after death could be ensured.[14] A homicide-suicide pact and a suicide pact can often be differentiated by the suicide note. In the former, the accused kills the victim and then takes his/her own life which may be very similar in presentation with the suicide pact.[15] These cases can be differentiated by the presence of a suicide note, which reveals the manner and motive for pact death.

The case presented here is unique as a common ligature was used by the couple to complete the process of hanging, which is cited rarely in literature. Behera *et al*. described a similar case of a married couple who hanged themselves using a single ligature.[16] Single ligature might be used by the couple so that simultaneous death can be ensured. They were depressed due to severe financial constraint, which might have triggered them to take such an extreme step. The decision might be evenly shared by both partners, or the initiative could come from one of them or it may be a result of two independent decisions: these are difficult to resolve in the absence of suicide notes.[17] However, in the present case, as a single ligature was used, most likely the decision to commit suicide was taken together by both partners. As no suicide note was left behind by the couple in this particular case, it cannot be commented who took the decision, while who participated in the suicide pact.

Conclusion

This case report presents a unique case of suicide pact in which husband-wife duo hanged themselves from the ceiling fan above their bed in bedroom by a single ligature. A state of grief and shock may be experienced due to sudden financial stress, but committing suicide in such situation with a clear conscience and in a simultaneous act is relatively rare.

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Funding: None.

References

1. Marcikic M, Vuksic Z, Dumencic B. Double suicide. Am J Forensic Med Pathol 2011;32:200–201.
2. Hocaoglu C. Double suicide attempt. Singapore Med J. 2009;50:e81–84.
3. Cohen J. A study of suicide pacts. Medico-legal J. 1961;29:144–51.
4. Schwartz AC, Spitalnick JS, Short DK. Suicide pact by mutual simultaneous arm amputation. Psychosomatics. 2009;50:633–37.

5. Fishbain DA, Aldrich TE. Suicide pacts: International comparisons. J Clin Psychiatry. 1985;46(1):11–15.
6. Brown M, Barraclough B. Epidemiology of suicide pacts in England and Wales, 1988–92. Brit Med J. 1997;315(7103):286–87.
7. Prat S, Rerolle C, Saint-Martin P. Suicide pacts: Six cases and literature review. J Forensic Sci. 2013;58:1092–98.
8. Sikary AK, Swain R, Dhaka S, *et al*. Jumping together: A fatal suicide pact. J Forensic Sci. 2016;61(6):1686–88.
9. Salih MA. Suicide pact in a setting of foliea deux. Brit J Psychiat. 1981;139:62–67.
10. Sarkar S, Srinivas B, Grover S. Quadruple pact suicide attempt involving a man and three adolescents. Indian J Psychol Med. 2014;36(4):422–24.
11. Latha KS. Suicide pact survivors: some observations. Med Sci Law. 1996;36(4):295–98.
12. Noyes R Jr, Frye SJ, Hartford CE. Single case study. Conjugal suicide pact. J Nerv Ment Dis. 1977;165(1):72–75.
13. Vijayakumar L, Thilothammal N. Suicide pacts. Crisis. 1993;14(1):43–46.
14. Behera C, Karthik K, Singh H, *et al*. Suicide pact by drowning with bound wrists: A case of medico-legal importance. Med Leg J. 2014;82(1):29–31.
15. Behera C, Rautji R, Sikary AK, *et al*. Triple hanging in filicide-suicide: An unusual case report. Med Sci Law. 2015;55(1):50–53.
16. Behera C, Rautji R, Kumar R, *et al*. Double hanging with single ligature: An unusual method in suicide pact. J Forensic Sci. 2016;62(1):265–66.
17. Norton A. Double suicide. Br Med J Clin Res. 1984;288(4):346–47.

Case Report

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Medico-legal Opinion in Case of Assault by Bear: A Case Report

Sachin Kumar Meena[1], Vishal B Surwade[2], Indarjeet Khandekar[3]

Abstract

Bear bite injuries have become a common occurrence as the forest covers and natural habitats are diminishing.[1] Patients injured in bear attack present with different patterns of injuries. A common protocol about the medico-legal cases of animal bite its opinion is not present in the system. These animals usually attack in remote areas where composite trauma centers do not exist and urgent referrals of these patients is essential. Final outcome influences the medico-legal opinion and compensation.[2] The goal of the present case to document the injuries suffered in bear bite and provides the required medico-legal opinion.

Keywords: Bear bite; Medico-legal opinion; Compensation; Forest; Degloving injuries.

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Introduction

The chance of a human encountering a bear is on the rise as the remote bear territory is diminishing.[3] Bear bite injuries to the head and neck region can result in facial disfigurement with physical and psychological consequences. Bear bite wounds usually range from minor scratches to major trauma that involves fractured bone, joint damage, skin and deep tissue injuries. Facial defects caused from such bite injuries not only create functional problems but also serious psychological problems, which can cause the individual to avoid social contact. Medicolegal issue are often raised regarding such injuries Depending on the seriousness of injuries resulting from an animal attack, victims are entitled to compensation for the loss or damages he has suffered. Medico-legal opinion is often indispensable to ascertain the magnitude of compensation that the person is entitled to.

Case report

A 60 years old male reported to the Casualty of Kasturba Hospital, Mahatma Gandhi Institute of Medical sciences, Sewagram, Wardha with multiple injuries over chest and degloving injury at scalp. A detailed history taken from the patient revealed an episode of: Attack by a Bear on *6/9/2012* at about *7.30 AM* in the morning. The victim was attacked while on the way to his farm, sustaining multiple injuries over the head and chest. He was immediately taken to Kasturba Hospital, Sewagram

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with multiple abrasions and a degloving injury over the scalp. Following injuries were noted by the forensic physician, showing are as in (Images 1–4):

1. A lacerated wound of length *19 cm*, with varying width from *4 cm* to *8 cm* and depth up to the skull bone, present over the left fronto-parieto-occipital region. It is degloving in nature with a flap of the scalp, of size *11 cm* × *8 cm* avulsed from the underlying bone. No foreign body appreciated. Margins of the wound are irregular.
2. A red colored abrasion of size *3 m* × *2 cm* present over the left shoulder *3 cm* below the acromion process, no foreign body is seen.
3. At armpit fold two parallel contused abrasions are appreciated both are about *3 cm* in length, breadth of *2 cm*, red in color.
4. Multiple red colored abrasions of varying sizes ranging from *1* × *1 cm* to *2* × *2 cm* over the middle of the chest.
5. A red colored contused abrasion of size *2* × *1 cm* over the tip of right thumb.

Fig. 1: Showing degloving

Fig. 2: Showing degloving

Fig. 3: Showing exposure of scalp with loss of tissue

Fig. 4: Showing multiple injuries over chest armpit and left shoulder

General examination revealed nothing important. This case was reported to Sewagram police station but not as a medico-legal case. The provisional medical report with medico-legal opinion were provided as under:

Opinion as to gravity of injury: Injuries no 2, 3, 4, 5 was simple in nature and opinion for injury no 1 was reserve.

X-ray skull A/P advised & the opinion regarding Injury no 1 would be issued after perusal of the *X*-ray report, treatment records up to the time of discharge from the hospital and re-examination of the patient on a later date. The patient was discharge on 12/9/2012, after a treatment period of nearly *6 days*.

Opinion as to age of injury: All injuries were fresh.

A request was submitted by forest department to provide the final opinion on 10/10/2012, accompanied by the patient. Material received from forest department:

1. Request letter;
2. Xerox copy of MLR;
3. *X*-ray opinion report from Radiology Dept of MGIMS;
4. Treatment records.

Material taking into consideration: All above mentioned material.

Details observed:

X-ray revealed no bony injury Treatment records revealed no profuse blood loss, nor any surgical interventions. There was no history of vomiting, unconsciousness;

Re-examination of Patient/victim was done:

All wounds except injury no 1 healed out but injury no 1 shows scar mark; Taking into consideration all the above mentioned details, injury no 1 is opined as grievous in nature, due to the permanent scar on the face.'

Discussion

In victims of bear attack, these injuries are commonly due to the powerful 'slap' inflicted by the front paw of the bear. Bear is declared threatened animal and rarely comes in human contact. Recent decrease in forest area has, however, increased the chances of bear-human interaction, hence, causing injuries to humans. The two major types of bear attacks are defensive and predatory. Defensive, attacks are the result of abrupt, unexpected encounters that follow in response to a perceived threat to cubs, individual space or food supply, and often involve activities such as hiking and hunting.[4] Predacious attacks are far less common and occur when humans are perceived as a source of food. In these instances, the bear more often invades human territory, *e.g.*, camping or picnicking sites. Predacious attacks result in the majority of fatal encounters. Bear bite injuries with tissue loss may result in severe disfigurement with significant functional and aesthetic concern.

In the present case, since, the victim was attacked by the bear while on the way to his farm, it could be considered as a defensive measure exhibited by the animal. 'More often, animal attacks are not included as medico-legal cases as the police cannot file a case against an animal.' But in this medico-legal issue arises because the Forest Department wants to record the nature of the injury; whether it was simple or grievous.' As per their rules compensation will be provided on the basis of severity.

Conclusion

It can be said at the conclusion that wild-animal attacks, though rare, remind us that humans can still be food or prey. Awareness, education, knowledge, and prevention, rather than the elimination of animal populations, may be the best way to control wild-animal attacks on humans in the future. It is important to decide whether the injury was simple or grievous 'It is true to say that the final opinion in every medico-legal report should be based on all aspects concerning the case.

Ethical clearance: Taken from ethical committee MGIMS.

Source of funding: There was no need due to case study.

Conflict of Interest: None declared.

References

1. Dieter RA, Dieter DL, Diete III RA, *et al.* Bear mauling: A descriptive review. International Journal of Circumpolar Health, 2001;60(4):696–704, View at Scopus.

2. Garshelis DL, Joshi AR, Smith JLD, *et al*. Sloth bear conservation action plan. In Bears: Status Survey and Conservation Action Plan, Servheen C and Peyton B, Eds., Gland, Switzerland: IUCN/SSC Bear and Polar Bear Specialist Groups; 1999. p. 309.
3. Yoganand K and Rice CG. Evaluating Panna National Park with Special Reference to Ecology of Sloth Bear (Melursus ursinus). Final Project Report, Dehradun, India: Wildlife Institute of India; 2005.
4. Bargali HS, Akhtar N, and Chauhan NPS. Characteristics of sloth bear attacks and human casualties in North Bilaspur Forest Division, Chhattisgarh, India. Ursus. 2005;16(2);263–67.

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Malignant Mixed Tumor of Soft Tissue: A Case Report

V Rajalakshmi[1], A Sajitha Begum[2], Hemalatha Ganapathi[3], Mary Lilly[4]

Abstract

Mixed Tumor of soft tissue are not so rare but mostly under recognised Tumors. The mixed Tumor and myoepithelioma of soft tissue are ends of a spectrum. There are only less than two hundred cases reported in literature. We report a case of Malignant mixed Tumor of soft tissue in a *47 years* old male. The excised specimen revealed a heterogenous neoplasm with rounded, plasmacytoid to spindle shaped cells, with areas of tubular differentiation in a chondromyxoid, hyalinised stroma with metaplastic bone. Cytological criteria of atypia, nuclear pleomorphism and Tumor giant cells favoured malignancy. Immuno Histochemistry confirmed the diagnosis. We report a case of Malignant mixed Tumor of soft tissue.

Keywords: Mixed Tumors; Malignant; Myoepithelioma; Soft tissue.

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Introduction

Mixed Tumors of Soft Tissue (MXT-ST) and Myoepitheliomas of SoftT (ME–ST) are often under recognised. Both are similar to their counterparts in salivary glands and skin showing heterogenous microscopic appearance with round to spindle cells, plasmacytoid cells, eosinophilic to clear cytoplasm, chondromyxoid stroma with metaplastic bone. MXT–ST differs from ME–ST by ductular differentiation in the former.[1,2] Unlike their salivary gland counterparts where infiltration predicts malignancy infiltrative margins in MXT–ST and ME–ST do not correlate with malignancy.[3] Cytological atypia only is the predictor of malignancy.[3]

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Case History

A *47-years*-old male presented with a gradually progressive swelling in the right gluteal region of *ten years* duration, with sudden increase in size with pain since one month. On examination, circumscribed, smooth swelling, firm to hard in consistency in the right gluteal region near the cleft measuring *6×6 cm* with skin stretched over the swelling, (**Fig. 1**).

Fig. 1: Swelling *6x6 cms*-right gluteal region

MRI showed–A lobulated T2 hyperintense solid mass *6×3.5 cm* with eccentric hemosiderin deposit and surrounding soft tissue edema in the

subcutaneous plane of right medial gluteal region, (**Fig. 2**). FNAC of the lesion showed features consistent with a round cell neoplasm with a provisional clinical diagnosis of sebaceous cyst wide local excision was done.

Gross

Skin covered soft tissue mass measuring *5x4 cms*, *5x3.5 cms*. c/s was yellowish white with glistening areas, foci of hemorrhage and cystic areas with gritty foci, (**Fig. 3**).

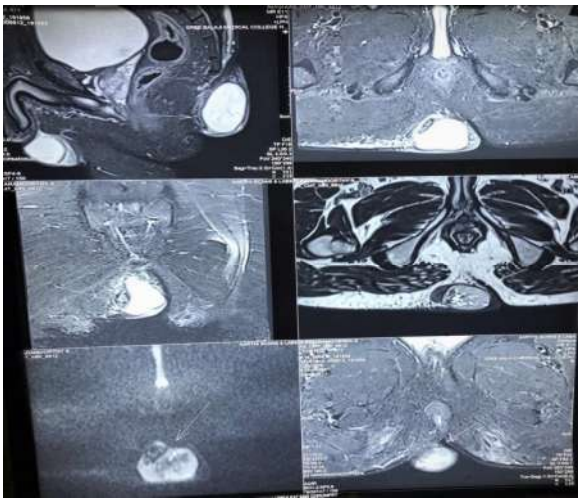

Fig. 2: MRI T2 hyperintense solid mass in gluteal region

Fig. 3: Skin attached soft tissue mass

Microscopy

Structure of skin with subcutis and deeper tissue showing a poorly circumscribed neoplasm arranged in lobules, nests and fascicles, occasional foci showing ductular differentiation with chondromyxoid, hyalinised stroma and metaplastic bone, (**Fig. 4**) & (**Fig. 5**). The cells are spindle to round, plasmacytoid with eosinophilic to clear cytoplasm. (**Fig. 6**) & (**Fig. 7**). There were nuclear atypia, pleomorpism and Tumor giant cells, (**Fig. 7**) & (**Fig. 8**). Only occasional mitosis seen. With the above features in view of the ductular differentiation and atypia the diagnosis of Malignant MXT-ST (MMXT-ST) was made. IHC P63, Vimentin and S100 were strongly positive, (**Fig. 9**) & (**Fig. 10**) CK focally positive, (**Fig. 11**) Ki 67 high index. GFAP negative. The above IHC confirming the diagnosis of MMXT-ST.

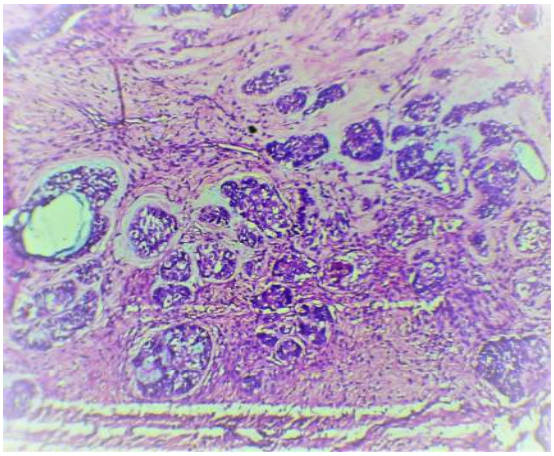

Fig. 4: H & E X100 Tubular differentiation of the epithelial cell

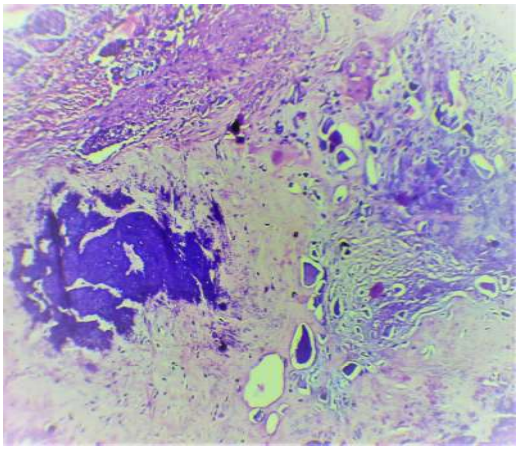

Fig. 5: H & E X100 metaplastic bone with calcification

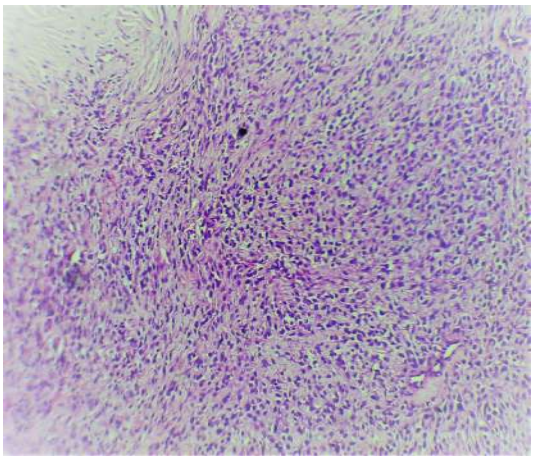

Fig. 6: H & E X100 Fasicles of spindle shaped cells

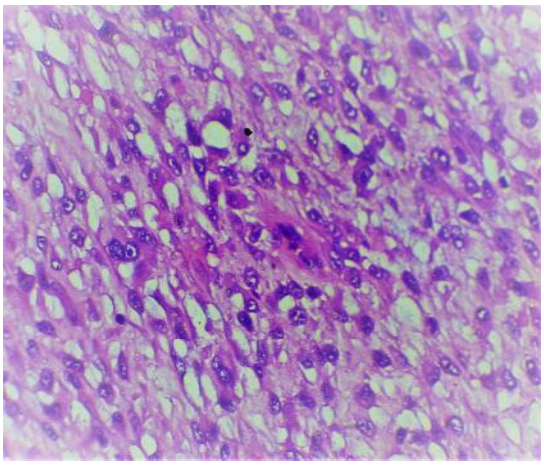

Fig. 7: H & E X400 Round to plasmacytoid cells with eosinophilic to clear cytoplasm

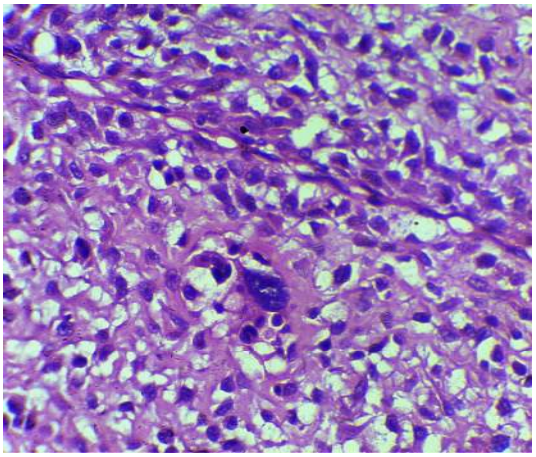

Fig. 8: H & E 400 Round cells with clear cytoplasm with atypia

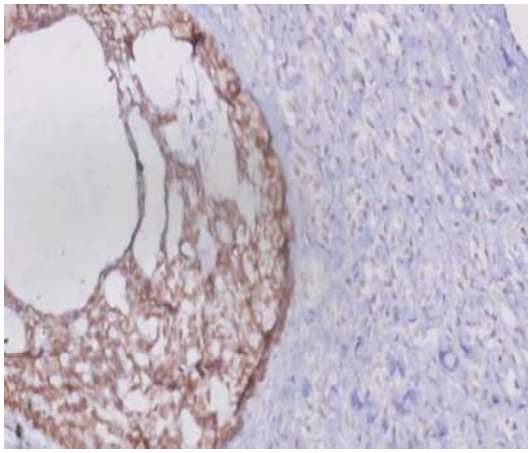

Fig. 9: IHC X400 P63 Positive

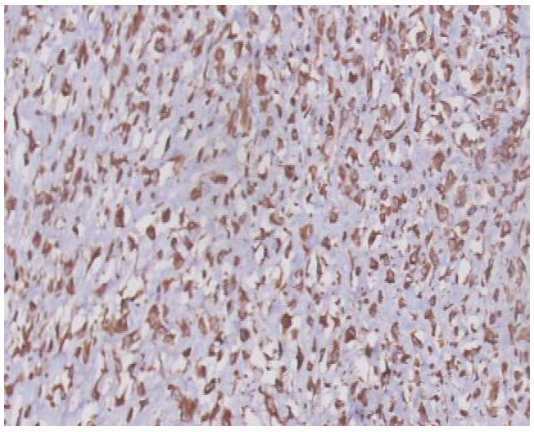

Fig. 10: IHC X400 imaging S100 Positive

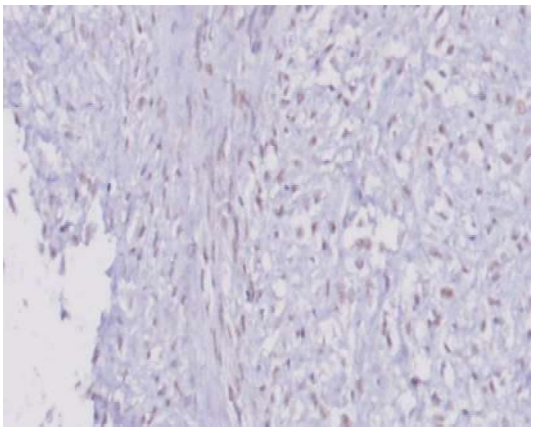

Fig. 11: IHC X400 CK focal Positivity

Discussion

MXT–ST and ME–ST are more often under recognized and there are only less than 150 cases reported in literature.[1,2] Awareness and Immuno histochemical studies have resulted in the increased diagnosis of these Tumors. Hornic *et al*.[1] in their paper have reviewed 101 cases of ME–ST ansd MXT–ST and evaluated the criteria for diagnosis and malignancy. The mean age of

occurrence of ME–ST and MXT–ST *38 years* with a range of *3–83 years* with equal gender predilection.[2] Tumor size ranged from *0.7* to *20 cms*. The most common sites being limb girdle, head and neck and trunk in descending order.[1,2] In the present case, age is *47 years*, the size of the Tumor is also with in the range of other cases reported and the site also is in the gluteal region.[4] MXT–ST and ME–ST have heterogenous histology with epithelial and myoepithelial cells with round, plamacytoid to spindle shaped cells and chondromyxoid, mucoid and hyalinised stroma with osseous metaplasia. Ductal differentiation is the hallmark of MXT–ST to differentiate MXT–ST from ME–ST.

The biological behavior of both MXT–ST and ME–ST is benign. However, 20% of these Tumor recur and metastasize. The cytological criteria for malignancy in both MXT–ST and ME–ST are atypia, nuclear pleomorphism.[1,2] Unlike in their salivary gland counterparts where infiltration is a predictor of recurrence and metastasis nearly in most of the ME–ST and MXT–ST the infiltration do not correlate with their clinical behavior.[3] Tumors with benign cytomorphology with mild cytologic atypia are ME–ST/MXT–ST. Tumors with moderate to severe atypia are classified as MMXT-ST Myoepithilial carcinoma of soft tissue (MEC–ST).[3,5]

ME–ST and MXT-STare positive for S100, Calponin and cytokeratin. 50% show positivity for GFAP. In our case P63, S100, Vimentin are strongly positive. Cytokeratin focally positive. Ki 67 high index. MXT–ST has to be differentiated from Extra Skeletal Mesenchymal Chondrosarcoma (ESMCS) and Ossifying Fibromyxoid Tumor (OFMT). ESMCS has a nodular growth pattern with interlacing fascicles of spindle shaped cells lacking intratumoral heterogeneity in contrast to MXT–ST and ME-ST which has reticular and solid areas.[5] ESMCS show only rare positivity for epithelial and myogenic markers. In our case, epithelial and myoepithelial markers are positive.[4]

OFMT is a lobulated proliferation of pale staining ovoid to round cells in cords and nests set in a variably myxoid or hyalinised stroma with rare metaplastic bone with S100 and desmin positivity. GFAP and Keratin are rarely positive. Our case is positive for cytokeratin.The mainstay of treatment for both benign and malignant ME–ST and MXT–ST is complete surgical excision with clear margins.

Conclusion

MXT–ST and ME–ST are not rare and awareness will increase their recognition. Most ME–ST and MT-ST are benign but 20% of them have unpredictable risk for recurrence and metastasis. MXT–ST and ME–ST with cytological atypia are clinically malignant. This case is reported to highlight the diagnostic criteria of the presence of ductular differentiation in MXT–ST differentiating from ME–ST and to emphasise that cytological atypia is the predictor of malignancy.

References

1. Hornick JL, Fletcher CD. Myoepithelial tumors of soft tissue: A clinicopathologic and immunohistochemical study of 101 cases with evaluation of prognostic parameters. Am J Surg Pathol. 2003;27:1183–96.
2. Kilpatrick SE, Hitchkock MG, Kraus MD, *et al*. Mixed tumors and myoepitheliomas of soft tissue. Am J Surg Pathol. 1997;21:13–22.
3. Ting F, Smith R, Davidson T, *et al*. Low grade myoepithelial carcinoma: A mini case series analysis including a case with sacral disease and a case with forearm disease. MOJ Clin Med Case Rep. 2015;2(1):18–22.
4. Pai MR, Naik R, Kamath R, *et al*. Myoepithelioma of soft tissue. Indian J Pathol Microbiol. 2009;52:100–02
5. Gleason BC, Fletcher CD. Myoepithelial carcinoma of soft tissue in children: An aggressive neoplasm analysed in a series of 29 cases. Am J Surg Pathol. 2007;31(12):1813–24.

Subject Index

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The second page should carry the full title of the manuscript and an abstract (of no more than 150 words for case reports, brief reports and 250 words for original articles). The abstract should be structured and state the Context (Background), Aims, Settings and Design, Methods and Materials, Statistical analysis used, Results and Conclusions. Below the abstract should provide 3 to 10 keywords.

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State the background of the study and purpose of the study and summarize the rationale for the study or observation.

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Include summary of key findings (primary outcome measures, secondary outcome measures, results as they relate to a prior hypothesis); Strengths and limitations of the study (study question, study design, data collection, analysis and interpretation); Interpretation and implications in the context of the totality of evidence (is there a systematic review to refer to, if not, could one be reasonably done here and now?, What this study adds to the available evidence, effects on patient care and health policy, possible mechanisms)? Controversies raised by this study; and Future research directions (for this particular research collaboration, underlying mechanisms, clinical research). Do not repeat in detail data or other material given in the Introduction or the Results section.

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List references in alphabetical order. Each listed reference should be cited in text (not in alphabetic order), and each text citation should be listed in the References section. Identify references in text, tables, and legends by Arabic numerals in square bracket (e.g. [10]). Please refer to ICMJE Guidelines (http://www.nlm.nih.gov/bsd/uniform_ requirements.html) for more examples.

Standard journal article

[1] Flink H, Tegelberg Å, Thörn M, Lagerlöf F. Effect of oral iron supplementation on unstimulated salivary flow rate: A randomized, double-blind, placebo-controlled trial. J Oral Pathol Med 2006; 35: 540-7.

[2] Twetman S, Axelsson S, Dahlgren H, Holm AK, Källestål C, Lagerlöf F, et al. Caries-preventive effect of fluoride toothpaste: A systematic review. Acta Odontol Scand 2003; 61: 347-55.

Article in supplement or special issue

[3] Fleischer W, Reimer K. Povidone iodine antisepsis. State of the art. Dermatology 1997; 195 Suppl 2: 3-9.

Corporate (collective) author

[4] American Academy of Periodontology. Sonic and ultrasonic scalers in periodontics. J Periodontol 2000; 71: 1792-801.

Unpublished article

[5] Garoushi S, Lassila LV, Tezvergil A, Vallittu PK. Static and fatigue compression test for particulate filler composite resin with fiber-reinforced composite substructure. Dent Mater 2006.

Personal author(s)

[6] Hosmer D, Lemeshow S. Applied logistic regression, 2nd edn. New York: Wiley-Interscience; 2000.

Chapter in book

[7] Nauntofte B, Tenovuo J, Lagerlöf F. Secretion and composition of saliva. In: Fejerskov O,

Kidd EAM, editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. p. 7-27.

No author given

[8] World Health Organization. Oral health surveys - basic methods, 4th edn. Geneva: World Health Organization; 1997.

Reference from electronic media

[9] National Statistics Online—Trends in suicide by method in England and Wales, 1979-2001. www.statistics.gov.uk/downloads/theme_health/HSQ20.pdf (accessed Jan 24, 2005): 7-18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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