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Indian Journal of Forensic Medicine and Pathology

Volume 14 Number 4
October–December 2021

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Indian Journal of Forensic Medicine and Pathology
Volume 14 Number 4, October - December 2021
DOI: http://dx.doi.org/10.21088/ijfmp.0974.3383.14421.1

ORIGINAL ARTICLE

Knowledge, Attitude and Practice of COVID-19 Management and Awareness Regarding Doctor's Privilege, Patient's Right and Prevailing Law's during Pandemic

Sanjay D Gaiwale[1], Avinash Jadhav[2], Vijay K Domple[3], Rahul Band[4], Ajay Ghangale[5], Vandana Gundla[6]

ABSTRACT

Introduction: The accelerated spread of the COVID-19 Disease has become a major cause of concern for the medical profession. The objective of this study is to assess the knowledge, attitude and practice of COVID-19 management and awareness regarding doctor's privilege, patient's right, and prevailing laws.

Materials and Methods: A total of 250 respondents from the healthcare Institute completed a questionnaire-based survey. The questionnaire was prepared from the current guidance for medical professionals published by the US Centre for Disease Control and Prevention (CDC) and MOHFW Govt. of India. Suitable sampling method was used for data collection and the distribution. Descriptive statistics were carried out for all groups based on the percentage of correct responses. Individual pairwise comparisons were done using the Median test.

Results: In Present study 94.60% of the participants had knowledge regarding COVID-19 infection but less than 90% of the total participants could correctly defined "close contact."

The responses related to doctor's privilege, patient's right, prevailing laws during pandemic were 83.33%. Out of that, 90.55% of correct responses were from senior faculties. However, awareness regarding recent ordinance and changes in exiting Epidemic Diseases Acts were very low (74.92%) in Junior Faculty. There were 100% correct responses regarding awareness about Transmission and conduction of Medico-Legal Autopsy on COVID-19 Positive Dead Bodies. However, the Knowledge of survival of SARS-CO-2 on Dead body were very low (84.46%). Conclusion: There is a need for regular training programs on Corona Management and Awareness Regarding Doctor's Privilege, Patient's Right, Prevailing Laws.

Keywords: COVID-19 India; COVID-19 PCMC; COVID; WHO; CDC; Medical Professionals.

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Received on: 20.05.2021
Accepted on: 12.02.2022

How to cite this article
Sanjay D Gaiwale, Avinash Jadhav, Vijay K Domple et al./Knowledge, Attitude and Practice of COVID-19 Management and Awareness Regarding Doctor's Privilege, Patient's Right and Prevailing Law's during Pandemic"/ Indian Journal of Forensic Medicine and Pathology/2021;14(4):787-792.

INTRODUCTION

India prepares for the COVID-19 pandemic; healthcare professional on the frontlines is specifically vulnerable to this disease. The virus that causes COVID-19 was initially called as 2019-nCoV and was later named as syndrome coronavirus 2 (SARS-CoV-2) by the International Committee on Taxonomy of Viruses (ICTV).[1] It is a new type of viral strain discovered in 2019 which was previously not found in humans.

Earlier, the severe acute respiratory syndrome-coronavirus (SARS-CoV) and the Middle East respiratory syndrome-coronavirus (MERS-CoV) have been known to have influence on humans. Outbreaks of respiratory disease or diseases relating to breathing caused by these viruses appear to have originated in animals before affecting into other hosts like humans. MERS-CoV was found to be passed on from Arabian camels to humans, however SARS-CoV was transmitted from Civet cats to humans. SARS-CoV-2 appears to have begun from bats and first cases were reported from Wuhan, Hubei Province in China, suggesting an animal-to-person spread from a live animal market. The corona virus then spread outside Hubei and afterwards, to the rest of the world via human transmission. Several countries have now reported the spread of an infectious disease within a group of people who have had no known contact with a person infected with or exposed to the disease. The World Health Organization (WHO) declared coronavirus disease as a pandemic on March 11, 2020 8.

With this mode of transmission, healthcare workers are among the highest risk of being infected. The highly contagious SARS-CoV-2 virus is an added risk for the healthcare professional apart from the overload of extended work hours, physical and psychological stress, burnout, and tiredness.[2] The aim and objective of this study is to assess the awareness of COVID-19 disease and awareness regarding Doctor's Privilege, Patient's Right, Prevailing epidemic Acts and changes made during pandemic among the medical professionals in the Indian healthcare scenario.

Materials and Methods: This research was conducted at a tertiary-care hospital and medical teaching institute in Pimpri-Chinchwad area of Pune. The survey was prepared in the form of an online form and was sent to 544 potential participants who contained Intern, Post-graduate students. Junior and Senior medical staff in medical institutions in the Pimpri-Chinchwad Metropolitan Region in the state of Maharashtra, India. The period of the survey was August 2020 to December 2020, and a total of 250 participants completed the survey with a response rate of 45.95%.

The self-administered questionnaire consisting of Two Sets of Questions, and 10 questions based on knowledge and awareness related to COVID-19 disease and remaining 06 questions were related to Doctor's Privilege, Patient's Right, Prevailing epidemic Acts and changes made in existing acts in the healthcare setting were adapted from the current interim guidance and information for healthcare workers published by the CDC, updated on March 7,2020 and thereafter.[9] The questionnaire also included questions related to Corona infection, its signs and symptoms and doctors' rights, patient privilege and changes made Epidemic disease act.[5] Informed Consent was obtained from all participants in this study. Convenient sampling method was used for data collection, and the distribution of responses was presented as frequency and percentages. Sub-groups were classified based on gender, age (18-30 years, 31-45 years, and >45 years) and profession (undergraduate, Postgraduate students and faculty from medical). Sub-groups were also classified based on the age, gender and experience of respondent. Data were arranged in excel, and descriptive statistics were performed using SPSS 23. Individual pairwise comparisons were done using the Median test for percent correct response.

RESULTS

A total of 250 healthcare professionals from one of the Medical College participated into the survey. Most of the participants were from the age group of 18-30 years (n = 180). Approximately 48% (n = 120) of the responders were females and 52% of the responders were male. Among the various sub-groups, 60% (n = 150) of the Interns, 16% (n =40) of the post graduate students and remaining 24% were (n = 60) the professor, associate professor and Assistant professor who completed the survey.

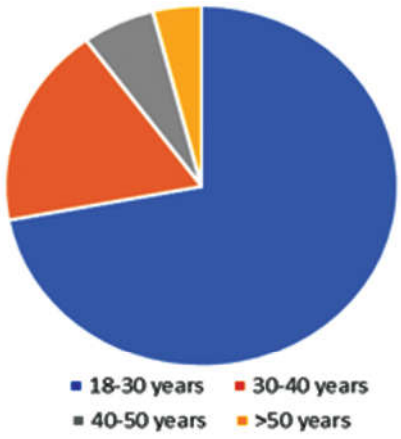
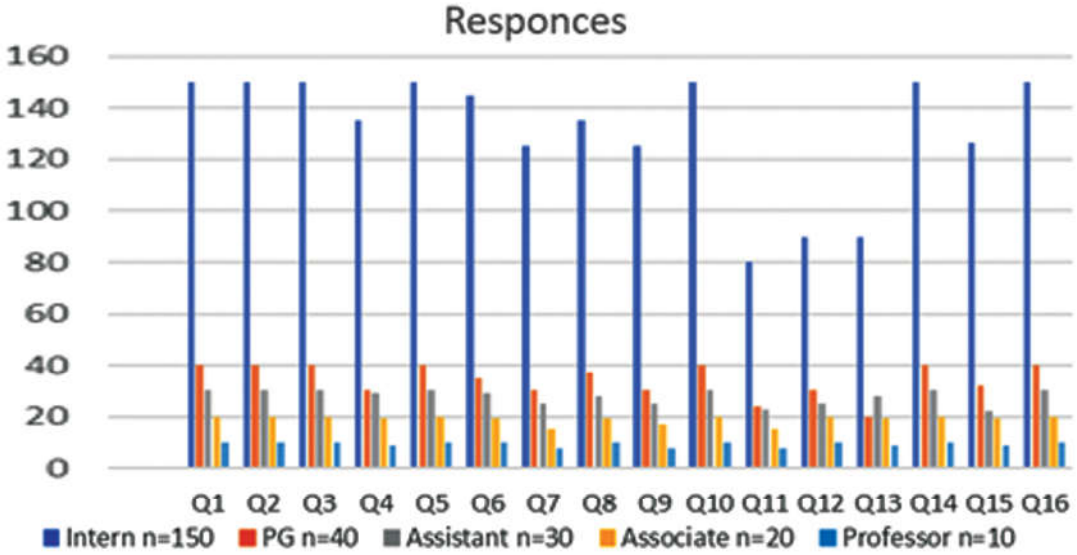
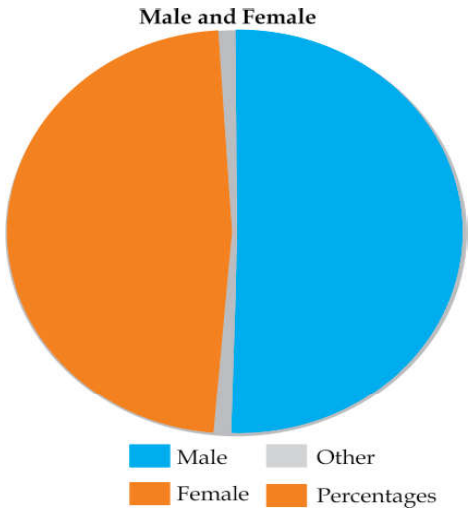


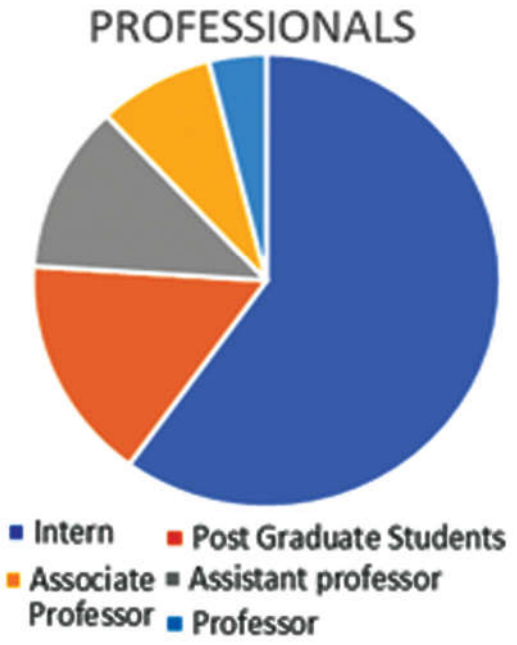
Fig. Age and Subgroups of Ages.

Almost all the responders(100%) were aware that the virus causing COVID-19 was initially called as 2019-nCoV and was later termed as syndrome corona virus 2 (SARS-CoV-2) and the all respondent knows the main symptoms of the Corona virus. The main mode of transmission of the virus is via respiratory droplets which were answered correctly by 100% of the responders. Only 89.4% (n = 222) of the total participants were known the correct definition of "close contact". The maximum number of accurate responses were from the senior medical faculties such as professor, associate professor and Assistant professor and the lowest number was from the Intern subgroup. The majority (100%) of the participants were able to precisely answer the questions related to COVID-19 exposure and appearance of symptoms.





Approximately 95% of the responders aware about the medical questions related to the Covid-19 and Corona virus but, the majority of medical respondent especially junior faculty (Intern and Post-graduate students) took part in the study were less aware about the recent changes of medico-legal or legal provisions related to the Epidemic act or covid-19 or Corona virus.



DISCUSSION

Since its initial outbreak in China in December 2019, the COVID-19 disease has had a cascading effect worldwide. According to the ICMR update on March 23, 2020, there were more than 400 individuals with confirmed positive cases in India and till date it increased to more than 10 million.[2] The tracing the infected person and isolation of a suspected case is the most prime step in curbing the spread of COVID-19. However, in our research, almost all the participants were aware of defining a "close contact." According to the US CDC, a "close contact" is defined as: “being within approximately 6 feet (2 meters) of a COVID-19 case for a prolonged period or having direct contact with infectious secretions of a COVID19 case. Similarly, various other key definitions have been given in Interim U.S. Guidance for Risk Assessment and Public Health Management of Healthcare Personnel with Potential Exposure in a Healthcare Setting to Patients with Corona virus Disease (COVID-19) published by the CDC.[4] Awareness was low among all subgroups with the lowest being the Interns and junior residents.

The overall percentage of correct answers for our study participants was 94.60% with the maximum percentage of accurate responses from professors and associate professors (90.55%) and lowest from the Interns, post graduate junior students (74.92%). A cross-sectional study regarding knowledge and attitudes towards Middle East respiratory syndrome-coronavirus (MERS-CoV) was conducted on healthcare workers in primary healthcare centres and hospitals at Najran in Saudi Arabia which showed a majority of the healthcare workers were aware of MERS-CoV and had sufficient knowledge regarding the same. Physicians and nurses had significantly better knowledge compared with other healthcare workers.[13]

The results of a similar survey carried out in healthcare workers in the Kingdom of Saudi Arabia suggested poor knowledge about emerging infectious diseases among study participants, and self-reported infection control practices were found to be sub-optimal. In South Korea, a survey study of healthcare workers suggested a poor level of knowledge of the modes of transmission of MERS corona virus.[7]

To the best of our knowledge, this is the first type study that access the awareness of COVID-19 infection and Doctor's Privilege, Patient’s Right, Prevailing epidemic Acts and changes made in existing acts among Indian healthcare professionals. During this critical period, the health ministry of government of India has proposed to provisionally use services of medical undergraduates of senior grades to treat COVID-19 patients.[10] This decision could help fulfill the insufficiency of healthcare professionals and potentially dispense treatment to many people.

One of the shortfalls of this study is that most of the participants are from urban location in the Pimpri-Chinchwad Municipal Corporation Metropolitan Region which do not truly constitute the medical professionals of the entire region or state and country.

CONCLUSIONS

Interns and medical professionals from the medical college exhibits sufficient awareness of COVID-19 in the healthcare setting with an

overall percentage of 94.60% correct answers. A higher percentage of accurate responses were from senior faculty (Professors and Associate Professors) and the lowest was from junior faculty (Intern and assistant professor). This study shows that there is a strong need to implement periodic educational interventions and training programs on infection control practices for COVID-19 and new updates in the legal provision of epidemic act across all healthcare professionals. Conducting periodic webinars for educational intervention for all medical professionals including interns,junior faculty and senior faculty could be a useful and safe tool to generate more awareness.

Disclaimer

This article was last updated on 20Dec 2020, and it may not be updated regularly. COVID-19 is a rapidly evolving, and accelerating situation and we recommend medical students and professionals to review the latest updated official information and guidelines from local, state and central governments health organizations.

REFERENCES

1. Cascella M, Rajnik M, Aleem A, Dulebohn SC, Di Napoli R: Features, Evaluation and Treatment of Corona virus (COVID-19): StatPearls (Internet),Treasure Island (FL): 2020 Jan 5.

2. Langade D, Modi PD, Sidhwa YF, Hihikar N et al.: Burnout syndrome among medical practitioners across India: a questionnaire-based survey: Cureus: 2016, 8(9):e771.

3. Modi PD, Kumar P, Solanki R, Modi J, Chandramani S, Gill N: Hand hygiene practices among Indian medical undergraduates: a questionnaire-based survey: Cureus: 2017, 9:e1463. Accessed: March 25, 2020: 10.7759/cureus.1463

4. Feng S, Shen C, Xia N, Song N, Fan M, Cowling BJ: Rational use of face masks in the COVID19 pandemic: Lancet Respir Med: 2020, S2213-2600(20):30134-X. Accessed: Mar 20, 2020.

5. Asaad AM, El-Sokkary R, Mahdi A, Alzamanan, Shafei ME: Knowledge and attitudes towards Middle East respiratory syndrome-coronavirus (MERS-CoV) among health care workers in south-western Saudi Arabia: East Mediterr Health J. 2020, 25(x):xxx- xxx. Accessed: March 21, 2020: 10.26719/emhj.19.079

6. Alsahafi AJ, Cheng AC: Knowledge, attitudes, and behaviours of healthcare workers in the Kingdom of Saudi Arabia to MERS corona virus and other emerging infectious diseases: Int J Environ Res Public Health: 2016, 13:1214. 10.3390/ijerph13121214

7. Mitja O, Clotet B: Use of antiviral drugs to reduce COVID-19 transmission: Lancet Glob Health: 2020, 0:2214-109. Accessed: March 27, 2020: https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(20)30114-5/fulltext. 10.1016/S2214-109X(20)30114-52020 Modi et al. Cureus 12(4): e7514. DOI 10.7759/cureus.7514

8. WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020. (2020). Accessed: Mar 19, 2020.

9. Information for healthcare professionals. (2020). Accessed: March 19, 2020.

10. A step India is taking could make doctor shortage a non-issue in corona virus battle. (2020). Accessed: March 29, 2020.

Indian Journal of Forensic Medicine and Pathology
Volume 14 Number 4, October - December 2021
DOI: http://dx.doi.org/10.21088/ijfmp.0974.3383.14421.2

ORIGINAL ARTICLE

Injury Patterns and Factors Responsible in Fatal Motorcyclist's Road Traffic Accidents: A Forensic Perspective

Gangavarapu Deva Raju[1], Mary Sowjanya Gaddala[2]

ABSTRACT

Road traffic accidents are the major cause of premature death and disability all over the world and motorized two-wheelers accidents account for the majority of such cases particularly in developing countries like India. The aim of the present study is to analyze the pattern of injuries with a focus on head injuries and the environmental factors leading to events.

Methodology: A cross-sectional analytic study was conducted in the Department of Forensic Medicine at Osmania General Hospital, Afzalgunj Hyderabad during the period January 1st, 2018 to December 31st, 2018.

Results: A big majority of victims constitute a working and economically productive age group of 20-40 yrs with male predominance (72.46%). Most accidents (22.6%) occurred during 6-9 pm. Hit by other vehicles (44%) followed by self-skid (32%), and hitting the barriers, or stoppers, sudden interruption by animals and pedestrians, the influence of alcohol all constitute the remaining. About nearly 87% of injuries are multiple and head injuries. Skull fractures were seen in the majority with Subdural Haemorrhage (47.1%) and Sub arachnoid Haemorrhage (43.6%) which lead to death.

Conclusions: The involvement of economically productive males was a major concern. Major responsible factors are nighttime driving, road conditions, barriers, sudden interruption by animals, pedestrians, and the influence of alcohol. Injuries were highly frequent in Head and neck region followed by extremities. There is a need to emphasize on use of helmets and improvement in road conditions and safety measures.

Keywords: Injury Patterns; Fatal Motorcyclist; Forensic Perspective; Analytic study.

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Received on: 07.08.2021
Accepted on: 31.12.2021

How to cite this article
Gangavarapu Deva Raju, Mary Sowjanya Gaddala/Injury Patterns and Factors Responsible in Fatal Motorcyclist's Road Traffic Accidents: A Forensic Perspective /Indian Journal of Forensic Medicine and Pathology/2021;14(4):793-798

INTRODUCTION

The history of the occurrence of road traffic accidents goes before the invention of the motorized vehicle; with the invention of automobiles, the number of road traffic accidents grew exponentially.[1] The first recorded case of road traffic injury was on 30 May 1896 by a cyclist in New York City USA. Road traffic accidents are a major cause of premature death and disability all over the world and motorized two-wheelers account for a majority of such cases particularly in developing countries like India where they are one of the most important means of transportation.[2] Head injuries are a leading cause of death from motorcycle crashes.[3]

Official Indian government statistics report a total of 4,37,396 road accidents in 2019. During 2019, two-wheelers have accounted for maximum fatal road accidents (58,747 deaths), contributing 38.0% of total road accidental deaths.[4,5] Road accident severity measured by the number of persons killed per 100 accidents has seen an increase of 0.6 percentage points in 2018 over the previous year. Road accidents in India kill almost 1.5 lakh people annually. Accordingly, India accounts for almost 11% of the accident-related deaths in the World.[6] Motorcyclist constitute a large segment of the population with head injury associated with other multiple organ injuries. The present study is conducted to analyze the pattern of injuries and causes of death and detailed study of head injuries from a forensic perspective and also the environmental factors of Motorcyclists accused in the event.

MATERIALS AND METHODS

A cross-sectional analytic study was conducted in the Department of Forensic Medicine at Osmania General Hospital, Afzalgunj Hyderabad. The study was carried out from January 1st, 2018 to December 31st, 2018. Data was collected from post mortem examination reports, inquests, hospital records for studying various variables involved in the Motorcyclist's fatalities. Total post mortem examinations carried out during the study period are 3762. Among them death was attributed to Road traffic accidents in 1153, total motorcycle deaths were 314 of which 276 were motorcyclists and 38 were pillion riders.

Inclusion Criteria: All RTA cases where a Motor cyclist's death occurred and referred for autopsy at our Medico-legal centre.

Exclusion Criteria: Motorcyclist's injuries out of the jurisdiction, four-wheelers, and Pedestrians.

Statistical analysis: Data thus collected was entered in an excel sheet and further descriptive analysis was done using Microsoft Excel spreadsheet 2016. Results were expressed in frequencies, percentages and further tabulated and charted.

RESULTS

A total of 314 autopsy cases in one-year duration due to Motorcycle accidents were analyzed which includes 276 Motorcyclists and 38 Pillion riders.

The majority of victims belong to the age group of 11 to 50 years. Working and economically productive age group of 20-40yrs constitute 72.46%. In all age groups, 80-90% was male population. Percentage of age less than 20yrs accounted for 8.69% who are having inadequate experience in riding two-wheelers. Pillion riders also followed similar distribution except for the age group 51 to 60 years as more cases were involved in RTA (Table 1).

Table 1: Gender and Age distribution Motorcyclists and Pillion riders.

	Motorcyclists		Pillion riders	
	Number	Percentage	Number	Percentage
Gender				
Male	262	95	20	52.6
Female	14	5	18	47.4
Total	276	100	38	100
Age Group				
0 to 10 yrs	0	8.70	6	15.79
11 to 20 yrs	24	41.30	3	7.89
21 to 30 yrs	114	16.67	9	23.68
31 to 40 yrs	46	14.49	4	10.53
41 to 50 yrs	40	11.23	5	13.16
51 to 60 yrs	31	5.07	8	21.05
61 to 70 yrs	14	1.45	1	2.63
71 to 80 yrs	4	1.09	1	2.63
81 to 90 yrs	3	8.70	1	2.63
Total	276	100	38	100.00

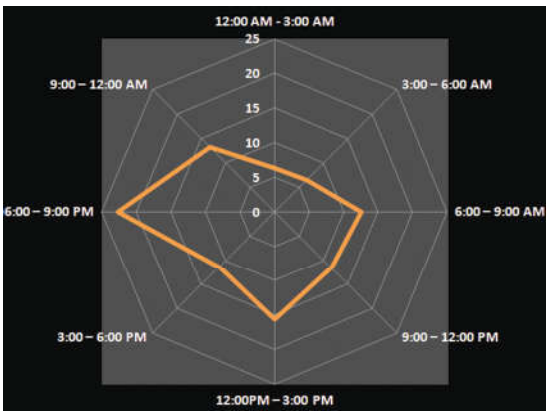

Fig. 1: Time of accident.

The maximum proportion of accidents occur at peak hours of travel i.e. between 6-9 pm where the presence of maximum density of vehicles

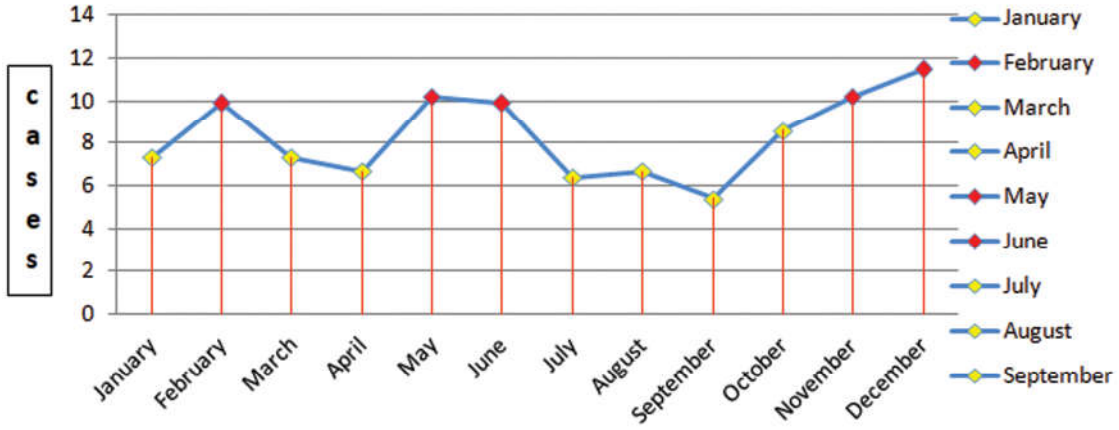

Fig. 2: Month-wise distribution.

in connection with evening fatigue and stress might aggravate the events (Figure 1). Motorcycle accidents are reported more or less uniformly with a dip in July, August and September followed by a gradual rise till December (Figure 2).

Table 2: Circumstances leading to the accident.

Circumstances	No. of Cases	Percentage
Hit by other Vehicles	141	44.90
Self -Skid	99	31.53
Hit the Barriers, Stoppers, etc	28	8.92
Hit other Vehicles	13	4.14
Sudden Interruption [Animal/Pedestrian]	12	3.82
Dim/Absence of light	8	2.55
Triple Riding	5	1.59
Wrong Direction [U-Turn]	4	1.27
On a Mobile Call	1	0.32
Trauma consequent to Natural disease	3	0.96

Hit by other vehicles is the most common type which proves fatal followed by self-skid and fall. Self–Skid due to the poor environment and road conditions is the next common cause of falls from the motorcycle which resulted in deaths. Few others like Hit the Barriers, Stoppers, Sudden interruption by animals and pedestrians are few other circumstances that led to a road traffic accident. 36.9% of drivers and 22.5% were under the influence of alcohol (Table 2). Head injury is one of the most important causes of death among motorcyclists who are involved in the accident. Multiple injuries, blunt, crush, and spinal injuries all types of injuries were noted as the whole body is affected in motorcyclist accidents (Figure 3). 56.5% of drivers, 86.8% of pillion riders didn't wear helmets.

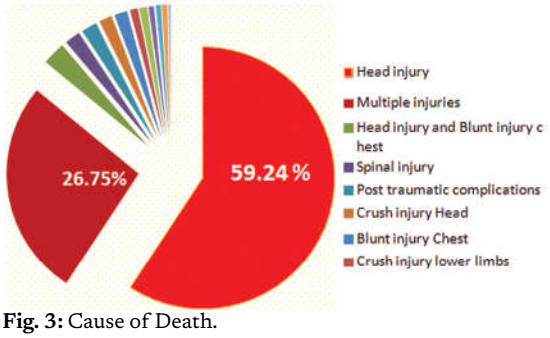

Fig. 3: Cause of Death.

Different types of mechanical injuries are seen. Abrasions and Contusions followed by soft tissue injuries were among the most observed pattern of injuries (Table 3).

Table 3: Pattern of injuries.

Pattern of Injuries*	No. of Cases
Abrasions	314
Contusions	314
Soft tissue injuries	189
Head Injury	186
Lacerations	147
Chest Injuries	92
Hemothorax	34
Hemoperitoneum	32

*Multiple responses

Fractures of ribs were identified as the most common chest wall injuries followed by fractures of the clavicle. Coming to the soft tissue injuries liver and spleen followed by lungs and hearts were observed during the study (Table 4).

Table 4: Chest wall injuries and Soft tissue injuries.

Chest wall injuries*	n	Percentage
Fracture Ribs	61	66.3
Fractured Clavicle	15	16.3
Fractured Sternum	7	7.6
Fracture Thoracic vertebrae	7	7.6
Fracture Acromioclavicular joint	1	1.1
Fracture Sternoclavicular joint	1	1.1
Soft tissue injuries*		
Liver	46	24.3
Spleen	44	23.2
Lungs	41	21.6
Heart	20	10.5
Kidneys	13	6.8
Bowel loops	10	5.2
Bladder	8	4.2
Genitalia	3	1.5
Stomach	2	1
Uterus	2	1

*Multiple responses

Head injury was one of the commonest causes of death. While exploring further, skull fractures were seen in the majority with Sub Dural Hemorrhage and Subarachnoid Hemorrhage. Among skull fractures, temporal bone fractures were seen in the majority followed by frontal and Parietal bones (Table 5).

Table 5: Head Injury.

Injury*	No. of Cases
Skull Fractures	186
Extradural Haemorrhage	21
Subdural Haemorrhage	148
Subarachnoid Haemorrhage	137
Intraventricular Haemorrhage	8
Skullbone fractures*	Total no. of Cases
Temporal	81
Frontal	61
Parietal	58
Occipital	44

* Multiple responses

In the present study, primary impact injuries are most commonly seen in the lower extremities & pelvis followed by upper extremities & shoulder. Secondary impact injuries are mostly seen in the Head & neck and followed by upper and lower extremities. Crush injuries are responsible for more incidences of secondary injuries. Contusions are more common on the scalp.

DISCUSSION

RTA continues to be one of the major causes of morbidity and mortality all over the world. In the present study working and economically productive age group (20-40yrs) constitute 55%. In all the age groups 80-90% was male population as they constitute the largest fraction of those who use the motorized vehicles and earning members of the family. The percentage of study subjects' age less than 20yrs was 8.69% who are having inadequate experience in riding two-wheelers. The factors which explain why this age people are involved include inexperience, risk exposure, risk-taking behavior.

Young riders overestimate their driving capacity to deal in co-coordinating various tasks involved in the art of driving and experience more peer pressure to engage in risky driving. The middle age group is more exposed to road traffics for the following reasons like office visits, dropping kids in homes, attending any functions, etc. Motorized two-wheelers contribute to the major burden of road traffic accidents in the present study which is well established finding in developing countries because of their least stability; thrill-seeking behavior and over the speed of the riders "restless driving". Similar observations were seen in studies conducted by Vishal koulapu et al, Anuj Gupta et al, Dileepkumar R et al, Anuj Gupta et al, Khare N et al.[7-11] Pillion riders constitute 12.11%, as riders are the most frequent travelers of two-wheelers ; they were affected in almost every Road traffic accident. These findings are matching with studies conducted by Badri Narayan Mishra et al, Menon A et al and Jain A et al.[12-14]

The maximum proportion of accidents occur at peak hours of travel i.e. between 6-9 pm; stress, fatigue, and sleeplessness while returning from office contribute more which is supported by many other studies.[15,16] Consuming alcohol in the evening hours, the invisibility of oncoming vehicles, poor quality of roads, etc. are other factors contributing. The accidents are less likely to occur between 3-6 AM due to less traffic movement. Hit by other vehicles is the most common type which proves fatal followed by self-skid and fall.

Deaths due to self-skid and fall are due to various factors like over speed, stress, hurry to the office or home, fatigue, dim light, etc. Studies conducted by Lakshmi Prasad et al and Tiwari et al showed that most of the injuries occurred between 4 pm to 8 pm followed by 8 pm-12 noon and risk factors like high speeding, driving under the influence of alcohol, non-usage of helmets and seat belts were other factors lead to road traffic injury.[17,18]

Multiple body parts were involved in each case. Multiple injuries like Abrasions, Contusions, Lacerations, and Fractures were seen. The majority of fatal two-wheeler accident victims have received multiple external injuries. Head and extremities were the most common areas to suffer. Crush injuries are predominantly seen in lower limbs. Head injuries and multiple injuries are the major causes of death.[19] In the present study abrasions are the most common type of injuries and were common on extremities. In the present study, abrasions are seen more in the extremities i.e. over the upper limbs and lower limbs followed by head & neck region and thoracoabdominal regions.

This correlates with the parachute reflex i.e. when a conscious individual falls there will be a reflex extension of all four limbs to protect the head & torso which contains vital organs. Primary impact injuries are most commonly seen in the lower extremities & pelvis followed by the upper extremities & shoulder. Secondary impact injuries are mostly seen in the Head & neck and followed by upper and lower extremities. Crush injuries are responsible for more incidences of secondary injuries. Contusions are more common on the scalp. Skull fractures and the temporal bone was found to be the most common vault bone to get fractured as it is the thinnest vault bone. Similar findings are observed in studies conducted by Nilambar Jha and Oberoi.[20,21]

The abrasions seen over the body surface are often caused due to friction over the road surface on falling over the ground. Grazed abrasions occur when the victim's body is dragged against a rough surface like roads etc or due to the fall of the motorcycle over them. Elbows & forearms are injured in this study caused either by a handle bar or fall on the ground. Legs often injured when the motorcycle dash with other vehicle or any fixed structures or legs may be trapped in.[22,23]

In the study, Cranio-cerebral injuries are the commonest cause of death. Head injury remains to be the most common killer major cause of death among the non-helmet users which is a similar finding in other studies by Hui Zhao et al, Jain A et al, Cherpitel CJ et al.[14,16,24] Meningeal hemorrhages and cranial fractures are most frequent fatal injuries than the actual injury which damage the underlying Brain tissue and causes death.

CONCLUSION

The majority of the victims were males belong to the age group of 20-30yrs. Most of the accidents occurred around 6-8 pm, the majority being hit by another vehicle. Self–skid, and fall account for a significant proportion of the total burden of two-wheeler accidents. Elbow and forearm suffer most among abrasions on the upper limb. In lower limbs, the knee was abraded most. All types of injuries were highly frequent in the Head and neck region followed by extremities. Meningeal hemorrhages rank first followed by scalp contusions and skull fractures in head injuries. Head injury followed by underlying Brain tissue damage is the cause of death in the majority.

RECOMMENDATIONS

Usage of helmets is a safety measure to protect the head, crash Bars to protect the legs. Transportation law in controlling the speed of vehicles and the amount of alcohol under which an individual is lawfully deemed to be capable of controlling or being in charge of a means. Design road signs and other furnishings so that they are preventive, crash protective, yielding to impacts or cushioning them.

REFERENCES

1. World Report on Road Traffic Injury Prevention – WHO Geneva 2004. https://apps.who.int/iris/bitstream/handle/10665/42925/9241591315.pdf. Accessed on 21 July 2021.

2. Jitender Kumar Jakhar, Tarun Dagar, Naveen Yadav, Piyush Jain. Pattern and Distribution of Injuries in Victims of Fatal Road Traffic Accident Cases of Bikers in Haryana a Retrospective Study.

Medico-legal Update, January-June 2019, Vol.19, No. 1.

3. B.R. Sharma. Motorized two-wheeler crash injuries and the role of helmet use in their prevention: an overview. JIAFM 2008; vol30(4): 244-248.

4. Accidental Deaths & Suicides in India 2019. https://ncrb.gov.in/sites/default/files/Chapter-1A-Traffic-Accidents_2019.pdf. Accessed on 5 Jan 2021.

5. Road Accidents in India – 2018. Ministry of road transport and highways. https://morth.nic.in/sites/default/files/Road_Accidednt.pdf. Accessed on 5 Jan 2021.

6. Global status report on road safety 2018 – WHO. https://www.who.int/violence-injury- prevention/. Accessed on 30/05/2019

7. Vishal koulapur, Anand B Mugadlimath, Kashif Ali, Khaja AzizuddinJunaidi. Epidemiological profile of Road Traffic Fatalities: A Retrospective study of Autopsied cases at Belgavi, Karnataka. J Indian Acad Forensic Med. Jan. – March 2018, Vol. 40, No. 1:52.

8. Anuj Gupta, Alokkumar, Prachi Gupta. Profile of Death due to Road Traffic Accidents(RTA) in Urban Region of Uttar Pradesh, India. J Indian Acad Forensic Med- 2019; 39(3): 229.

9. Dileep Kumar R, Raju. G.M, Vijaynath. V, Shahina.Deaths due to Fatal Road Traffic Accidents A Retrospective study. JIAFM. 2019; 35(3) Page no.235.

10. Ramakantverma, BhaveshBohra, VinodGarg, Narendravaishnawa, Naveen kumarsimatwal, Pc Vyas. Profile of Death due to Road Traffic Accidents brought to Dr.S.N.Medical College & Hospital, Jodhpur. JIAFM.2019; 36(3) Page no.255.

11. Khare N, Gupta SK, Varshney A, Athavale AV. Epidemiological Study of Road Traffic Accident Cases Attending Tertiary Care Hospital, in Bhopal Madhya Pradesh. Natl J Community Med 2012; 3(3):395-9

12. Badrinarayan Mishra, Nidhi D Sinha(Mishra), Sukhla SK, and SinhaAK.EpidemiologicalStudy of Road Traffic Accident Cases from Western Nepal.Indian J Community Med. 2010 January; 35(1): 115–121.

13. Menon A, Pai VK and Rajeev A. Pattern of fatal head injuries due to vehicular accidents in Mangalore. J Forensic Leg Med. 2008; 15(2): 75-7.

14. Jain A, Menezes RG, Kanchan T, Gagan S, Jain R. Two Wheeler accidents on Indian roads—a study from Mangalore, India. J Forensic Leg Med.2009 Apr; 16(3):130-3.Epub 2008 Oct 22.

15. Valent F, Di Bartolomeo S, Marchetti R, Sbrojavacca R, Barbone F. A case – cross-over study of sleep and work hours and the risk of road traffic accidents. Sleep.2010 Mar; 33(3):349-54.

16. Cherpitel CJ. Alcohol and injuries: a review of international Emergency room studies. Addiction 1993; 88:923-37.

17. R.R.Tiwari, G.B. Ganveer. A study on human risk factors in non-fatal road traffic accidents at Nagpur.Indian Journal of Public Health Vol.52 No. 4 October-December, 2008 197-8.

18. Kesava Lakshmi Prasad Kandipudi, Krishna Veni A, Appalanaidu S. In International Journal of Research in Medicine. Titled "Profile of Road traffic accident cases admitted in a tertiary care hospital, Visakhapatnam, Andhra Pradesh. Int J Res Med. 2013; 2(2);166-169.

19. Susan Wells et al "Motorcycle rider conspicuity and crash related injury: a case-control study." BMJ 2004;328:857.

20. Nilambar Jha, DK Srinivasa, Gautam Roy, S Jagdish .Injury Pattern among Road Traffic Accident Cases: A Study from South India.IJCM. 2003; Vol .28(2): 85.

21. Dr.S.S.Oberoi, Dr.K.K.Aggrawal, Dr.D.S.Bhullar, Dr.R.Kumar, Pattern and Distribution of Injuries in Fatal Two Wheeler Accidental Cases. Journal of Punjab Academy of Forensic Medicine & Toxicology 10(2010).

22. Michael Fitzharris, Rakhi Dandona, G.Anilkumar, and Lalit Dandona. Crash Characteristics and patterns of injury among hospitalized motorized two-wheeled vehicle users in urban India. BMC Public Health 2009 9:11.

23. Kortor JN, Yinusa W, Ugbeye ME. Lower limb injuries arising from motorcycle crashes. Niger J Med. 2010 Oct-Dec; 19(4):475-8.

24. Hui Zhao, Rong Chen, Guijing Deng, Zhiyong Yin, Guangyu Yang, Shengxiong Liu, Huipeng Chen, Zhengguo Wang. Comparison of injuries sustained by drivers and pillion passengers in fatal head-on motorcycle collision accidents. Forensic science international. 2011, Vol 207, Num 1-3, pp 188-192.

Indian Journal of Forensic Medicine and Pathology
Volume 14 Number 4, October - December 2021
DOI: http://dx.doi.org/10.21088/ijfmp.0974.3383.14421.3

ORIGINAL ARTICLE

Assessment of Knowledge and attitude about POCSO Act amongst Medical Practitioners

Sandeep Kadu[1], Abhijit Shinde[2], Sunil Natha Mhaske[3]

ABSTRACT

Introduction: Child sexual offences as well as neglect is one of the most prevalent and crucial social issue worldwide. The child sexual abuse is an offence which is commonly under-reported in India. It is found that more than 3 million children become victim of abuse each year.[1] Many more cases among them are unreported. The newly adopted POCSO Act, 2012 deals with all forms of sexual abuse of children and the principles to handle the child in a systematic way and it is the most detailed law regarding this problem. The current study aims to analyze the level of knowledge & attitude and awareness about various practical issues of CSA in context of the POCSO Act, 2012.
Methods: This is a questionnaire-based study conducted amongst the Medical practitioners of Ahmednagar city. A questionnaire was prepared on Google form consisting of 10 questions about POCSO Act 2012. About 157 medical practitioners from Ahmednagar city participated in study. The questionnaire distributed to the doctors & it was focused on knowledge, understanding, their attitude, and practice toward child abuse and POCSO Act 2012. **Result:** Out of total 10 questions average points scored was 6.11/10. Most disappointing observation made is majorly 57% RMP doesn't know about the punishment if he/she fails to report the case under POCSO Act.
Conclusion: The study showed that knowledge & attitude about POCSO Act 2012 amongst medical practitioner in Ahmednagar city was satisfactory. But in addition to strengthening of legislature, more in depth knowledge regarding child sexual abuse among medical professionals will help to eradicate this sensitive childhood social issue.

Keywords | POCSO; Child abuse; Medical practitioners; Knowledge; Attitude.

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Received on: 28.05.2021
Accepted on: 07.01.2022

How to cite this article
Sandeep Kadu, Abhijit Shinde, Sunil Natha Mhaske/Assessment of Knowledge and attitude about POCSO Act amongst Medical Practitioners/Indian Journal of Forensic Medicine and Pathology/2021;14(4):799-804

INTRODUCTION

Child sexual offences as well as neglect is one of the most prevalent and crucial social issue worldwide. The child sexual abuse is an offence which is commonly under-reported in India. It is found that more than 3 million children become victim of abuse each year.[1] World Health Organization (WHO) defines Child Sexual Abuse as "The involvement of a child in sexual activity that he or she does not fully comprehend, is not able to give informed consent to, or for which the child is not developmentally prepared and cannot give consent, or that violates the laws of society or social taboos".[2]

The World Health Organization has classified the four main types of child abuse and maltreatment including physical abuse, sexual abuse, emotional abuse, and neglect.[3]

- Physical abuse of a child means an action that results in actual or potential physical harm to child. It is in the form of an interaction, which is reasonably within the control of a person in a position of responsibility, power, or trust or parents. It may be of single or repeated events.
- Child sexual abuse is the sexual activity in which child does not fully comprehend, is not able to give informed consent to, or for which the child is developmentally unprepared, or that the laws of the society are violated. Child sexual abuse is an activity between a child and an adult or another older child who is mature by age or development, in a relationship of responsibility, trust, or power; the intention being to gratify or satisfy the needs of other person. This may include but it has no limitation of the inducement or coercion of a child to involve in any unlawful sexual assault, the deceitful use of a child in unlawful sexual practices like prostitution, as well as the unethical, illegal use of children in pornographic performances and materials
- Emotional abuse means a caregiver is unable to provide an appropriate and supportive environment for that child and includes incidents that causes an adverse effect on the emotional health and development of child.
- Neglect means not giving proper attention to development of the child by the parent or care-giver including all aspects such as health, education, emotional development, proper nutrition, shelter, and safe living conditions and has a high frequency of causing harm to the physical, mental, spiritual, moral, or social development of child. This includes the failure to properly supervise and protect children from harm as much as is feasibly possible.
- Exploitation refers to use of child in commercial or other exploitation in work (child labour), or other activities which are beneficial for others, including child trafficking.[4]

Child sexual abuse (CSA), has extreme consequences that interfere with growth and development of child.[5,6] CSA has been associated with numerous maladaptive health behaviours as well as poor social, mental and physical health outcomes throughout the lifespan.[7,8,9] It also estimates that CSA can affect central nervous system of child.[10] Other common sequelae for adult survivors of CSA may include increased risk for, violent behaviours, domestic violence and increased risk of perpetration of CSA as adults'. The potential future psychological impacts are: PTSD, depression, substance abuse, etc. According to NCRB data of 2016, around 20,000 children are sexually assaulted each year in India; many more cases among them are unreported; the statistics which is available is only the tip of the iceberg.[10-14]

However, the medical students and practicing doctors are not properly trained about various views of CSA relevant to the medical field i.e. diagnosis, evidence collection, documentation of injuries and rational treatment of the child. Many are unaware of the subtle physical as well as psychological impact resulting from CSA. Due to lack of knowledge many children undergo repeated victimization. The newly adopted POCSO Act, 2012 deals with all forms of sexual abuse of children and the principles to handle the child in a systematic way, certain protocols should be followed by individuals and hospitals for examination and treatment of the child, the manner in which judicial proceedings are to be carried out and it is the most detailed law regarding this problem. Child friendly procedures for reporting, recording investigation and trial offences are given in this act.[15,16] However, many people including medical practitioner are unaware of provisions of the law. The current study aims to analyze the level of knowledge & attitude and awareness about various practical issues of CSA in context of the POCSO Act, 2012.

METHODS

This is a questionnaire-based study conducted amongst the Medical practitioners of Ahmednagar city. A questionnaire was prepared on Google form consisting of 10 questions about POCSO Act 2012. About 157 medical practitioner from Ahmednagar city participated in study in month of January & February of 2021. All questions were MCQs. All participants attempted all questions. Google forms were sent to various groups of medical practitioners through WhatsApp & emails. The purpose of the study and the procedure to fill

up the questionnaire was explained to the doctors. The questionnaire distributed to the doctors & it was focused on knowledge, understanding, their attitude, and practice toward child abuse and POCSO Act 2012. Three questions had 3 options all other questions had 4 options out of which they have to choose one correct answer. The scores were recorded at scale of 1-10. Only gender & highest qualification were asked to participant at the start & after that real questionnaire were started. It was a study conducted by Forensic Medicine & Paediatric departments, DVVPF'S Medical College & Hospital, Ahmednagar.

RESULTS

- In present study, 157 medical practitioners from Ahmednagar city participated in study & it is found that 47.1 % of male & 52.9 % of female have participated in study.

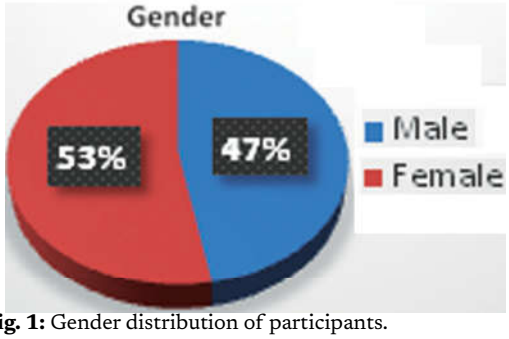

Fig. 1: Gender distribution of participants.

- Out of total 10 questions average points scored was 6.11/10, median was 6/10 points & with a range of 2-10 points.

Results of questionnaire asked are as follows:

1. First question was "What is full form of POCSO?" For this question, 114 (72.6%) of the participants knew the full form of POCSO.
2. This study also reveals that, 107 (68.2%) knew exact age of child as per POCSO Act.
3. It was seen that, 130 (82.8%) of the responses, disagreed that only girls are victim of sexual assault still 18 % believes that only girls are victim.

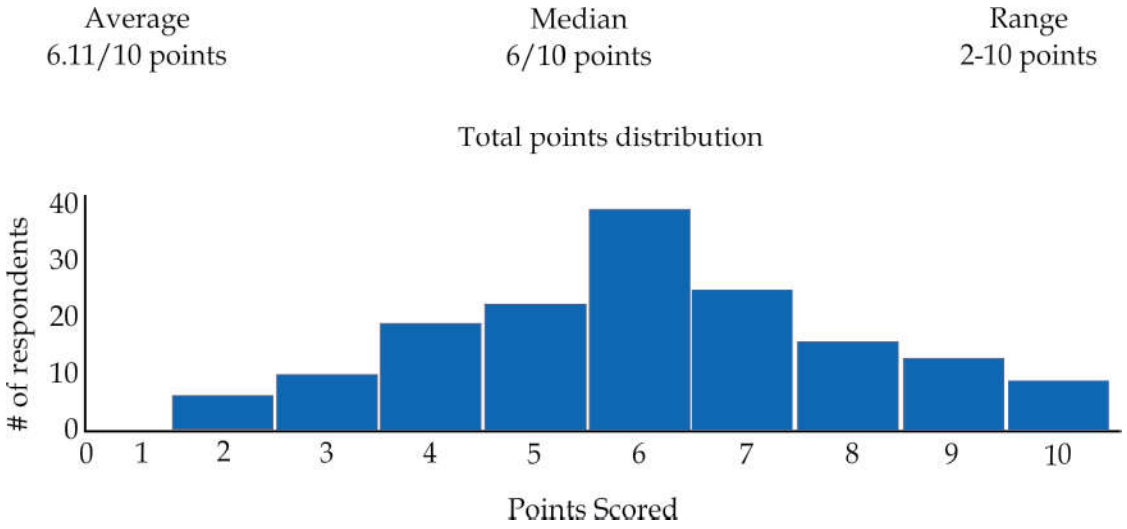

Fig. 2: Total points distribution.

Table 1: Result of question no. 3

Options	No. of Responses
Agree	17 (10.8%)
Disagree	130 (82.8%)
Not Sure	10 (6.4%

4. 88 (56.1%) of the total participants, gave correct answer about maximum punishment under POCSO Act.

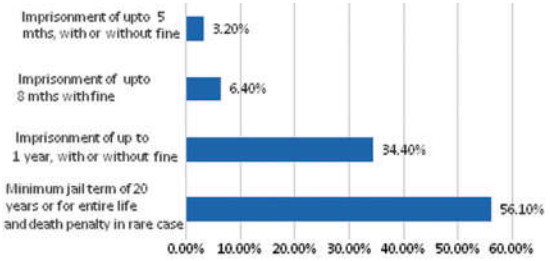

Fig 3: Result of question no 4.

- It was observed that most of practitioners believe that all types of children are sexually abused.

Table 2: Result of question no. 5

Options	No. of Responses
Agree	26 (16.6%)
Disagree	122 (77.7%)
Not Sure	9 (5.7%)

Only 99% participants know the correct child helpline number. Still almost 37% doesn't know about it & its worrying situation.

- Of the total responses, 119 (75.8%), gave correct answer about offences under POCSO Act.

Table 3: Result of question no. 7

Options	No. of Responses
Penetrative sexual response	3(1.9%)
Child pornography	12(7.6%)
Sexual harassment	23 (14.6%)
All of the above	119(75.8%)

- Most disappointing observation is majorly 57% RMP doesn't know about the punishment if he/she fails to report the case under POCSO Act.
- Of the 157 total responses, 65 (41.4%) gave correct answer about presence of parents when medical examination of sexual abuse victim is being conducted.

It is also one of the question that was not correctly answered most of the times (less than 50%).

Table 4: Result of question no. 9

Options	No. of Responses
Yes	65 (41.4%)
No	73 (46.5%)
Cannot Say	19 (12.1%)

It was observed that of the 157 responses, 46 (29.3%) gave correct answer about necessity of medical exam when victim was touched in sexually inappropriate manner a year ago. It is also one of the questions that was not correctly answered most of the times (less than 50%).

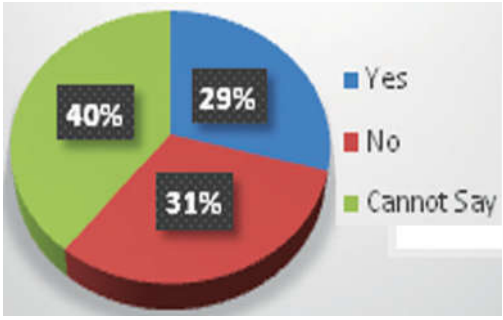

Fig. 4: Result of question no. 10

DISCUSSION

WHO Consultation on Child Abuse Prevention (1999) formulated the definition of child sexual abuse which stated that "Child sexual abuse is the involvement of a child in sexual activity that he or she does not fully comprehend, is unable to give informed consent to, or for which the child is not developmentally prepared and cannot give consent, or that violates the laws or social taboos of society".[17] There has been a gross non-recognition and underreporting of child sexual abuse in India due to several factors such as fear of indignity, guilt, denial from the community, associated socio-cultural stigma, not being able to trust government bodies, and a gap in communication between parents and children about this issue.[18] In our study, we found that 114 (72.6%) knew full form of POCSO & 107 (68.2%) knew exact age of child as per POCSO Act as compared to Yasvanth. S[19] who found that in his study, 44% of the faculty were not aware of the POCSO Act, 2012 and 34% of the study population were aware regarding the age of a child as stated in POCSO Act. The Protection of Children from Sexual Offences Act of 2012 (POCSO) defines a child as any person below eighteen years of age. This Act offers protection for children from sexual violence which includes sexual assault, sexual harassment and child pornography. The lack of awareness amongst some of the medical practitioners entails the necessity to sensitize them. About 44% medical practitioners were not aware of the maximum punishments described under the POCSO Act 2012 as compared to Yasvanth. S[19] who found that in his study, 60% of faculty were not aware of the punishments prescribed for various offence described under the act. Maximum punishment under POCSO Act is Minimum jail term of 20 years or for entire life & death penalty in rare cases.

About 82.8% disagree, that only girls are victims of sexual assault which is a correct answer & 77.7% of them disagree that only at risk children like orphans are sexually abused which is also a correct response. Surveys by UNICEF revealed 12447 children aged between 5 and 18 years and 2324 young adults from 18-24 years were a victim of sexual abuse. Of the children, 53% of the boys and 47% of the girls, are reported being sexually abused.[20]

As per the POSCO act, it is mandatory to report

cases of sexual abuse against children. An easy step which can be taken by a person coming across a case of child sexual abuse in India is calling the 24 hours toll free emergency child helpline at 1098.[21] 63.1% of medical practitioner have given correct answer about child helpline number which is 1098. More awareness of this important initiative is required for remaining medical practitioners who gave wrong answer to this question in order to improve reporting of such crimes and protect children in India.

75.8% of medical practitioner knew various offences under POCSO Act. Few of the punishments listed under POCSO Act of 2012, amended in August 2019.

- Penetrative Sexual Assault (PSA-imprisonment for 10 years or life (PSA in a child Less than 16 years), and fine (section 4).
- The Aggravated Penetrative Sexual Assault - imprisonment for life and fine or with capital punishment (section 6). Sexual assault causing death of a child during a natural calamity or in any situation of violence.
- Sexual Assault i.e. sexual contact without penetration five years and fine (section 8).
- Aggravated Sexual Assault (section 9) by a person in authority seven years and fine (section 10).
- Sexual Harassment of the child (section 11)-three years and fine (section 12).
- Use of child for pornographic purposes (section 13)-five years and fine and in the event of subsequent conviction, seven years and fine (section 14).

Only 43.9% of medical practitioner knew about punishment for failure of reporting of a case of child sexual abuse by a doctor under POCSO Act. 'Imprisonment of up to 6 months, with or without fine' is punishment for not reporting case of child sexual abuse for doctors. This was most disappointing observation. It is really mandatory to know about this punishment for doctors. So more awareness about this issue is needed among medical fraternities. Only 29.3% of medical practitioners knew about necessity of medical examination in a victim who was touched in a sexually inappropriate manner 1 year ago. As per POCSO Act, medical examination can be conducted in this case. Doctors should be made more aware about this question.

Only 41.4% of medical practitioners knew that parents can be present while medical exam of sexual abuse victim is being conducted, according to POCSO ACT 2012. So doctors should get sensitized about this fact also. An average point scored amongst total participants was 6.11/10 which was quite satisfactory.

But in regards to the last three questions, about punishment for failure of reporting of a case of child sexual abuse by a doctor under POCSO Act, necessity of medical examination in a victim who was touched in a sexually inappropriate manner 1 year ago and if parents could be present while medical exam of sexual abuse victim is being conducted, according to POCSO ACT 2012, It was observed that positive responses were reported to be less than 50% thus requiring in depth knowledge about POCSO Act.

A multi centric and an integrated approach for control and prevention of child sexual abuse was suggested by Singh MM et al.,[22] This includes education, awareness, helpline, implementation of laws and policies, self-defence, identification and punishment of perpetrator, support for victims, training of professionals and medicolegal services. Choudhary V et al, conducted a qualitative study on Perspectives of Children, Caregivers, and Professionals on the impact of child sexual abuse and recommended multidimensional impact assessment, culturally sensitive assessment and intervention protocols, incorporation of family focused approach and multidisciplinary team approach to ensure the holistic wellbeing of children.[23]

CONCLUSION

The study showed that knowledge & attitude about POCSO Act 2012 amongst medical practitioner in Ahmednagar city was satisfactory. But in addition to strengthening of legislature, more in depth knowledge regarding child sexual abuse among medical professionals will help to eradicate this sensitive childhood social issue. A safe and confidential space for medical practitioners to report such offenses without fear of being exposed will help in more reporting of such crimes and help to punish the offenders and protect children.

Recommendation

More sensitization programs for medical practitioners, like taking workshops or CME for enhancing knowledge & improving attitude about POCSO Act is needed.

Sameresultsaresuggestedindifferentstudiesdone at different states with large sample size.

REFERENCES

1. Krug EG, Mercy JA, Dahlberg LL, Zwi AB. The world report on violence and health. The lancet. 2002 Oct 5;360(9339):1083-8.

2. Urosevich K. Insights in public health: It takes a Hui to raise a child: A case for peer-to-peer support for child abuse prevention. Hawai'i Journal of Medicine & Public Health. 2013 Oct;72(10):365.

3. Slep AM, Heyman RE, Foran HM. Child maltreatment in DSM-5 and ICD-11. Family Process. 2015 Mar;54(1):17-32.

4. World Health Organization, World Health Organization. Substance Abuse Department, World Health Organization. Department of Mental Health, Substance Abuse. Global status report on alcohol 2004. World Health Organization; 2004.

5. Foster JM, Carson DK. Child sexual abuse in the United States: Perspectives on assessment and intervention. American Journal of Humanities and Social Sciences. 2013 Jul 26;1(3):97-108.

6. Goodman GS, Quas JA, Ogle CM. Child maltreatment and memory. Annual review of psychology. 2010 Jan 10;61:325-51.

7. Putnam FW. Ten-year research update review: child sexual abuse. Journal of the American Academy of Child and Adolescent Psychiatry. 2003; 42(3):269–78.

8. Irish L, Kobayashi I, Delahanty DL. Long-term physical health consequences of childhood sexual abuse: A meta-analytic review. Journal of pediatric psychology. 2010 Jun 1;35(5):450-61.

9. Maniglio R. The impact of child sexual abuse on health: A systematic review of reviews. Clinical psychology review. 2009 Nov 1;29(7):647-57.

10. Shrivastava AK, Karia SB, Sonavane SS, De Sousa AA. Child sexual abuse and the development of psychiatric disorders: a neurobiological trajectory of pathogenesis. Industrial psychiatry journal. 2017 Jan;26(1):4.

11. Davidson G, Shannon C, Mulholland C, Campbell J. A longitudinal study of the effects of childhood trauma on symptoms and functioning of people with severe mental health problems. Journal of Trauma & Dissociation. 2009 Jan 30;10(1):57-68.

12. Sarkar SC, Lalwani S, Rautji R, Bhardwaj DN, Dogra TD. Prospective study of victims and offender of sexual offences. The Malaysian Journal of Forensic Pathology and Science. 2008 Jun;3(2):10-47.

13. Maiti KD. Ministry of Women and Child Development, Government of India. Retrieved from January. 2016.

14. ChildLine India Foundation Children Issues URL http://childlineindia.org.in/pdf/POCSOModelGuidelines accessed on 10-05-2019

15. The Protection of Children from Sexual Offences No. 32 of 2012, Gazette of India, 19, June 2012

16. Ministry of Women and Child Development. Model Guidelines under Section 39 of The Protection of Children from Sexual Offences Act, 2012. Guidelines for the Use of Professionals and Experts under the POCSO Act, 2012 ; September, 2013. p1-76

17. World Health Organization. Report of the consultation on child abuse prevention, 29-31 March 1999, WHO, Geneva. Geneva: World Health Organization; 1999.

18. Choudhry V, Dayal R, Pillai D, Kalokhe AS, Beier K, Patel V. Child sexual abuse in India: a systematic review. PloS One. 2018 Oct 9;13(10):e0205086.

19. Yasvanth, S. A Study of Awareness of POCSO Act 2012 amongst faculty of Private Medical College at Chennai. International Journal of Innovative Science and Research Technology. 2019;4(11): 253-256.

20. Belliappa JL, Ghosh S. Addressing Child Sexual Abuse In India Through Sexuality Education And Teacher Training. AJIL. 2015 ;4(1): 134.

21. Seth R, Srivastava RN. Child Sexual Abuse: Management and prevention, and protection of children from Sexual Offences (POCSO) Act. IndPediatr. 2017 Nov 1;54(11):949-53

22. Singh MM, Parsekar SS, Nair SN. An epidemiological overview of child sexual abuse. J Family Med Primary Care. 2014 Oct;3(4):430.

23. Choudhary V, Satapathy S, Sagar R. Qualitative Study on the Impact of Child Sexual Abuse: Perspectives of Children, Caregivers, and Professionals in Indian Context. J Child Sexual Abuse. 2019 May 19;28(4):489-510.

Indian Journal of Forensic Medicine and Pathology
Volume 14 Number 4, October - December 2021
DOI: http://dx.doi.org/10.21088/ijfmp.0974.3383.14421.4

ORIGINAL ARTICLE

Profile of Child Sexual Assault Cases Reported within 24 Hours of Incidence: Prospective Observational Study at a Tertiary Care Center in Western Maharashtra, with Special Observations Related to Age Groups

HV Vaidya[1], AA Taware[2], HS Tatiya[3], VT Jadhav[4], AL Bandgar[5]

ABSTRACT

Introduction: Cases of child sexual assault are rising day by day and it remains one of the serious offences against children of tender age. However, it's reporting within 24 hours is yet to improve and needs betterment in various aspects.

Material and Methods: This is a prospective observational type of study conducted on alleged cases of sexual assault with ageless than 18 years, during the study period, where valid consent to participate in the study was present after approval from the institutional ethics committee.

Results: Out of total 534 victims, 217 (40.64%) victims registered the complaint within 24 hrs of the incidence and females constituted the majority of the cases (89.40%). The majority of the victims (65.90%) were from urban-dwellings and percentage of case reporting was highest (100%) in the age group of 0-6 years, which declined with an increase in age. Reporting in urban population was higher (42.68%) and mother was the primary complainant in majority cases (41.47%). In majority of cases, the assailant was known to the victim and boyfriend was most common assailant (37.33%) with predominance in 12-18 years age group (88.89%); while known family members were significant assailants (35.08%) for age group 6-12 years.

Conclusion: It seems that, rather than strangers, known members are more often involved in such cases and parents along with children from such vulnerable age groups should be actively made more aware of related facts through education and other means.

Keywords: Child sexual assault; Reporting within 24 hours; Vulnerable age group; Early reporting; Known assailants.

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Received on: 17.06.2021
Accepted on: 07.01.2022

How to cite this article
HV Vaidya, AA Taware, HS Tatiya, VT Jadhav, AL Bandgar/ Profile of child sexual assault cases reported within 24 hours of incidence: Prospective observational study at a tertiary care center in Western Maharashtra, with special observations related to age groups/ Indian Journal of Forensic Medicine and Pathology/2021;14(4):805-810

INTRODUCTION

Child sexual abuse has existed in almost all societies throughout history in one or another form. The Protection of Children from Sexual Offences Act, 2012 defines a child as any person below 18 years age.[1] Even though both sexes are affected, women outnumber men as victims. In a shocking revelation, a government-commissioned survey in the year 2005 has found that more than 53% of Indian children are subjected to sexual assault i.e. four out of every ten persons.[2] Overall crimes against children have increased steeply over six times in the decade over 2008 to 2018, from 22,500 cases in 2008 to 1,41,764 cases in 2018. According to the recently released National Crime Records Bureau (NCRB) data, under the Protection of Children from Sexual Offences Act (POCSO), 32,608 cases were reported in 2017 while 39,827 cases were reported in 2018.[3]

It is stated that most of the cases are reported late or go unreported because victims fear retaliation and humiliation.[4] Barriers to reporting incidents of sexual assault also include poor access to the police by victims, fear of not being believed, fear that confidentiality will not be respected by society, poor treatment by personnel in the criminal justice system, and anticipation that the reporting will not result in conviction of perpetrators.[5,6]

The earlier reporting of cases for examination helps in proper forensic sample collection, as the sperms are mostly found in the vagina or the endo-cervical mucus examination till five days only.[7] The medicolegal evidence taken from a sexually assaulted woman may be used in determining the occurrence of recent sexual activity, identifying the assailant, establishing the use of force or resistance.[8,9] Also the interval between incidence of sexual violence and presentation is crucial for adequate medical assistance and treatment. If the victim presents no earlier than 72 hours after the assault, post-exposure prophylaxis (PEP) against HIV infection, the presumptive treatment for sexually transmitted infections (STIs) and contraceptive against unwanted pregnancy are less effective.[10] This is why victims with delayed presentation of sexual violence incidents do not usually benefit from these prophylaxes.[11] The present study is carried out to analyze the reporting of child sexual assault cases within 24 hours, concerning the age of the victim, region of residence, complainant, and relation with the assailant.

MATERIAL AND METHOD

The present study is a prospective, observational type of study. It was conducted at the Department of Forensic Medicine and Toxicology of B.J.G.M.C and S.G.H. Pune, from November 2015 to September 2017, after obtaining approval from the institutional ethics committee. The study populations consisted of total 534 alleged victims of sexual assault who gave written and informed consent and were of age less than 18 years. A standard pre-designed proforma was filled after obtaining the information from the victim and investigating officer, accompanying relatives, and records which included details regarding the preliminary information such as stated age, sex, educational status, the time of assault, and time of reporting to authority, etc. Out of all this information, cases which were reported within 24 hours of incidence, for medical examination, were further analyzed according to different age groups, region of residence, details of complainant and relation with the assailant.

RESULT

Out of the total 534 victims included under study, 217 (40.64%) victims registered the complaint within 24 hours of the incidence. Of these 217 cases, females constituted the majority of the cases with 194 (89.40%) cases; whereas males were victims in only 23 (10.60%) cases. Out of 217 cases, majority of victims [143; (65.90%)] resided in urban-dwelling, whereas 74 (34.10%) were from the rural population.

Considering age-wise distribution of these cases, it is observed that percentage of case reporting was highest (100%) in age group of 0-6 years as compared to that of 6-12 years (80.28%) and 12–18 years (33.40%). (Chart-1).

Considering all age groups together, distribution of cases shows that reporting in the urban population was slightly higher (42.68%) as compared to that in the rural population (37.18%). However, considering age-wise distribution, among 6-12 years age group, reporting was higher (96.15%) in rural population than that in the same age group of urban population (71.11%). (Table-1).

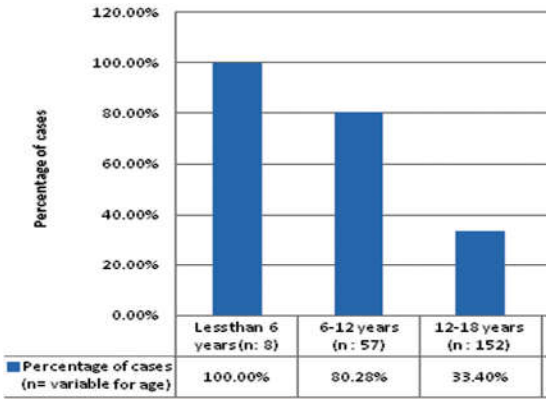

Chart-1: Age wise distribution of the cases who reported within 24 hours.

Table 1: Region wise Distribution of cases who reported within 24 hours.

Age Group	Urban	Within 24 hrs	Rural	Within 24 hrs
<6 years	8	8 (100%)	-	-
6- <12 hrs	45	32(71.11%)	26	25 (96.15%)
12-<18years	282	103 (36.5%)	173	49 (28.32%)
Total	335	143(42.68%)	199	74 (37.18%)

Considering both rural and urban cases, in majority of cases mother was primary complainant (41.47%) followed by father (26.72%); and in 24.42% percent of cases, the victim herself registered the complaint. (Table-2).

Table 2: Distribution of the cases according to complainant.

Region	Mother	Father	Self	Guardian
Urban (n= 143)	57 (39.86%)	40 (27.97%)	32 (22.37%)	14 (9.79%)
Rural (n=74)	33(44.59%)	18 (24.32%)	21 (28.37%)	2 (2.70%)
Total (N= 217)	90(41.47%)	58 (26.72%)	53 (24.42%)	16 (7.37%)

Table 3: Distribution of cases according to complainant.

Relation	<6 years (n=8)	6-12 years (n=57)	12-18 years (n= 152)	Total (N=217)
Mother	4 (50.00%)	38 (66.66%)	48 (31.57%)	90 (41.47%)
Father	4 (50.00%)	13 (22.81%)	41 (26.97 %)	58 (38.15%)
Self	-	-	53 (34.86 %)	53 (34.86%)
Guardian	-	6 (10.52%)	10 (6.57 %)	16(7.37%)
Total (N=217)	8 (3.68%)	57 (26.26%)	152 (70.04%)	

Further grouping of these cases as per age groups reveals that, in age group 6-12 years, the percentage of mothers registering complaint (66.66%) markedly exceeds the complaint registered by fathers (22.81%). (Table-3).

Distribution concerning relation with the assailant, considering all age groups together, shows that in the majority of cases, assailant was known to the victim, while in only 11.52% cases assailant was a stranger. Amongst these known assailants, overall boyfriend was most common assailant (37.33%) with predominance in 12-18 years age group. Whereas in 49 cases (22.58%), accused were known family members (like either of father, maternal relative and paternal relatives).

While the further grouping of cases according to age group reveals that, for age group 6-12 years and 12-18 years, the assailant were known family members in 35.08% and 19.08% cases respectively. (Table-4).

Table 4: Distribution of the cases according to relation of the victim with assailant.

Age Group	Boy Friend	Known Family Member (Maternal relative, paternal relative, father and step father)	Family Friend	Neighbour	Other (Teacher, Watchman, Driver	Stranger	Total
< 6 yrs	-	-	-	5 (62.5 %)	1 (12.5%)	2 (25%)	8
6 - < 12 years	9 (15.78%)	20 (35.08%)	1 (1.75%)	16 (28.07%)	5 (8.77%)	6 (10.52%)	57
12- < 18 years	72 (47.37%)	29 (19.08%)	8 (5.26 %)	18 (11.84%)	8 (5.26%)	17 (11.18%)	152
Total	81 (37.32%)	49 (22.58%)	9 (4.14%)	39 (17.97%)	14 (6.45%)	25 (11.52%)	217
Total	Known Assailants: 192 (88.48%)					25 (11.52%)	

DISCUSSION

In the present study, female child victims (89.40%) have outnumbered their male counterparts (10.60%). This female preponderance is consistent with the previous studies.[12,13,14] however, contradict the study Child Abuse: India, 2007 by Kacker L. et al[15] (52.94% male and 47.06% female). The reason for more incidence of sexual assault in females than males can be attributed to the fact that, women are disproportionately the victims of gender violence, and sexual assault is the most common form of violence against women and has been a part of the culture which leads to a profound violation of woman's bodily integrity.[12]

In the present study, 217 (40.64%) cases were registered within 24 hours of the incidence. The study by Namita G. et al[16] shows comparable results with 40% cases while Shweta Lal et al[7] reported more number of cases (58%). In the background of very few and scattered studies, we cannot comment whether there is a rising trend, in the percentage of reporting of cases within 24 hours of incidence.

It is noted in this study that, the incidence of reporting of child sexual assault cases within 24 hours is more in urban areas (42.68 %) compared to rural areas (37.18%). Studies by other Indian researchers also report similar findings.[17,18] The reason for reporting of more number of cases in urban population can be attributed to distribution of population in the study region. However further division of urban and rural cases according to age group shows that, for age group 6-12 years, reporting in urban population is significantly less (71.11%) than for rural population (96.15%). We could not find any other similar study to compare this data. Reasons behind this lower reporting in the 6-12 years of age group in the urban population need further evaluation with the larger study population.

The overall proportion of assailants shows that, in majority of cases assailants were known (88.48%) while strangers were assailant in very few cases (11.52%). This is consistent with the studies by other authors.[19,20] While some studies mention strangers as most common assailant[21,22] present study disproves this fact. Hence parents need to be aware of this pattern and should be careful while leaving a child with an acquaintance or a relative. In the present study, only 33.40% of cases from the age group 12 years to <18 years have reported within 24 hours of the incidence. The reason for this may be abridged as the assailant in this age group is well known or is in relation to the victim. Barriers to reporting of these incidents can also be summarized as fear of retaliation from the perpetrator, fear of not being believed, fear of ruined reputation if the incident is known, consensual sexual intercourse among adolescents and anticipation that the reporting will not result in conviction of the perpetrators.[5,6,23]

Considering all age groups together, the boyfriend was common est assailant (37.32%). This finding is in agreement with previous studies.[12,19] However, this finding contradicts the observation of statistics of National data of India[24] which reported that in the majority of the cases, assailants were neighbors. In this particular study it is true for victims with age less than 12 years.

We believe that the reason for most common assailants being boyfriend and friend in our study is due to the fact that, in these tender years opposite sex affection and curiosity about relations results into the beginning of the love affairs.

However, when the same observation is further studied concerning age groups, it is visible that, family members (paternal relative, maternal relative, father, and stepfather) if considered together, form a major assailant group with 35.08% in 6-12 years age group. This is much larger when compared to other age groups individually. This may hint toward much lower reporting by fathers in this particular age group (22.81%) compared to that by mothers (66.66%).

Also, in the present study, considering all age groups together, in majority of cases (41.47 %), the mother reported the incidence to the authority within 24 hours. This finding however contradicts to the observation by Tamuli R.P. et al[25] where majority of the cases were registered by victim herself. The reason for more reporting from mothers can be attributed to the fact that the, mother and their children are more closely attached due to compassion and love. In the Indian society, as role of mother is to see all matters of the house and father has to look for finances, the trust, love, and care are more in children and mother.

CONCLUSION

The percentage of reporting of child sexual assault cases within 24 hours is still not acceptable and needs measures to look into causes for the same and demands alternatives to improve this for better Judicial outcomes as well as the health of the victim. Even though reporting seems to be better in the urban population, for reporting of cases from age group 06-12 years more attention is needed.

It is also worth mentioning that with an increase in age, there is a significant decrease in reporting within 24 hours. In the majority of cases mother is still the primary complainant, followed by father, but for cases in the age group 6-12 years, fathers are much reluctant to report cases, the reason may be the involvement of known family members in such incidences. Overall, in the majority of cases, the assailant was known to the victim, and boyfriend was the most common assailant with predominance in 12-18 years age group. The study thus highlights that age group of 6-12 and 12 -18 years are vulnerable age groups and needs more attention.

Conflict of interest: Nil

Source of Funding: self

Ethical clearance: Taken.

REFERENCES

1. The Protection of Children from Sexual Offences Act, 2012, (No 32 of 2012), The Gazette of India, Extraordinary, Part II Section 1, New Delhi, Wednesday, June 20;2012.

2. Incidence Of Cognizable Crimes (IPC) Under Different Crime Heads during 2017 to 2019. Available from: http://ncrb.nic.in/CD-CII2019/cii-2019/2017-2019.pdf. [accessed on 2021/06/05].

3.https://www.hindustantimes.com/india-news/12/06/2020/109-children-sexually-abused-every-day-in-india-in-2018.

4.GovermentofIndia Child violence http://ncrb.nic.in/StatPublications/CII/CII2015/FILES/Tables/Additionaltables.24.11.16.pdf.

5. Kim J. Rape and HIV Post Exposure Prophylaxis: The Relevance and the Reality in South Africa. In discussion Paper presented at the World Health Organization Meeting on Violence Against Women and HIV/AIDS: Setting the Research Agenda. Geneva 2000 Oct 23 (pp. 23-25).

6. Christofides N, Webster N, Jewkes R, Penn-Kekana L, Martin L, Abrahams N, Kim J. The state of sexual assault services: findings from a situation analysis of services in South Africa. Women's Health. 2003 Oct;12:3398582.

7. Lal S, Singh A, Vaid NB, Behera S. Analysis of sexual assault survivors in a tertiary care hospital in Delhi: a retrospective analysis. Journal of clinical and diagnostic research: JCDR. 2014 Sep;8(9):OC09.

8. Du Mont J, Parnis D. An overview of the sexual assault care and treatment centres of Ontario [revised and expanded]. Prepared for L. Kelly for the World Health Organization, Geneva, 2002.

9. Brown AW, Director A. WHO background paper: obstacles to women accessing forensic medical exams in cases of sexual violence. Human Rights Watch, New York. 2001.

10. World Health Organization. Guidelines for medico-legal care for victims of sexual violence. 2003. WHO: Geneva.

11. Collings SJ. Provision of antiretroviral prophylaxis to child rape victims in South Africa: HIV status and delayed reporting. Psychological reports. 2005 Feb;96(1):17-8.

12. Taware AA, Vaidya HV, Tatiya HS, Jadhav VT, Bandgar AL. Profile of Victims in Alleged Cases of Child Sexual Assault. Forensic Medicine and Pathology. 2019 Apr;12(2):59.

13. Vadysighe AN, Senasinghe DP, Attygalle U, Abeysekara AM, Gunasena MD, Ratnayake RM, Banda YI. An analytical study on socio-demographic and medico–legal factors of victims of sexual assault from the Central and Sabaragamuwa Provinces in Sri lanka. Sri Lanka Journal of Forensic Medicine, Science & Law. 2015 Nov 20;6(1).

14. Sarkar SC, Lalwani S, Rautji R, Bhardwaj DN, Dogra TD.A study on victims of sexual offences in South Delhi. J Fam welf 2005;(51):60-6.

15. Kacker L, Mohsin N, Dixit A, Varadan S, Kumar P. Study on child abuse: India, 2007. Ministry of Women and Child Development, Government of India; 2007.

16. Namita G, AmitaSuneja, NB Vaid, Upasana Pandit. Female Sexual Assault: A Study from East Delhi. Indian Internet Journal of Forensic Medicine & Toxicology 2008;6(4).

17. Das I, Chakraborty A, Batabyal S, Sukul B, Dhar G. A study on the Socio-demographic profile of the victims of sex offences attending the department of Forensic Medicine of a Tertiary Care Institute of Kolkata, West Bengal. IOSR-JDMS 2013;(11) 4: 43-47.

18. Bhoi SB, Shirsat KB, Meshram SK, Waghmare SA, Kamle RA. Profile of sexual offences: A 4 year retrospective study at tertiary care hospital of Western Maharashtra. 2016 ;144 (37.99) :379.

19. Punpale SB, Taware AA, Vaidya HV, Tatiya HS. Profile of Accused in Alleged Cases of Sexual Assault in Children–A Prospective Study. Medico Legal Update. 2019 Aug 8;19(2):66-9.

20. Shinge SS, Shrigiriwar MB. Medico-legal examination of accused of alleged rape cases-a prospective study. J Indian Acad Forensic Med. 2013;35(4):332-5.

21. Riggs N, Houry D, Long G, Markovchick V, Feldhaus KM. Analysis of 1,076 cases of sexual assault. Annals of emergency medicine. 2000 Apr 30;35(4):358-62.

22. Okonkwo JE, Ibeh CC. Female sexual assault in Nigeria. International journal of gynecology & obstetrics. 2003 Dec 31;83(3):325-6.

23. Tatiya HS, Taware AA, Vaidya HV, Jadhav VT, Bandgar AL, Punpale SB. Consensual Sexual Intercourse among children Vs Current Legal Provisions under POCSO: A Scientific Review with Prospective Quantitative Analytical Study. Medico Legal Update. 2020 Jul 24;20(3):60-5.

24. Crime in india, National Crime Record Bureau, Ministry of Home Afairs, New Delhi, 2002.

25. Tamuli RP, Paul B, Mahanta P. A statistical analysis of alleged victims of sexual assault -a retrospective study. J Punjab Acad Forensic Med Toxicol 2013;13(1):7-13.

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Indian Journal of Forensic Medicine and Pathology
Volume 14 Number 4, October - December 2021
DOI: http://dx.doi.org/10.21088/ijfmp.0974.3383.14421.5

ORIGINAL ARTICLE

Spectrum of Neural Tube Defects Among the Fetal Autopsies in a Tertiary Care Hospital in Southern India

Rajalakshmi BR[1], Sapna Patel[2]

ABSTRACT

Background: Neural tube defects (NTDs) are congenital disorders with multifactorial etiology that increase the risk of death as well as disability in early neonatal period and infancy.

Objective: The study was conducted in a tertiary care referral hospital to analyse the disease burden of neural tube defects and to study the associated anomalies in the affected fetuses.

Materials and Methods: This study was conducted retrospectively from January 2011 to December 2020 on a total number of 402 fetal autopsies received after abnormal ultrasonographic findings and intrauterine deaths diagnosed prenatally.

Results: Out of the total 402 cases of fetal autopsies, 42 neural tube defects were detected, 33 (79%) were open type and 9 (21%) were closed type neural tube defects. Out of the open type, majority were meningomyeloceles with 18 (43% of NTDs) cases, 11 (26% of NTDs) cases were of anencephaly. Arnold chiari malformation was associated in 4 cases and a rare case of craniorachischisis was encountered. Among the closed type, 6 (14%) were meningoceles and 3 (7%) were encephaloceles. A case of Meckel Gruber syndrome with an associated encephalocele was diagnosed.

Conclusion: The present study would contribute to the prevalent disease burden of neural tube defects in Southern India, proving to be useful in the design and implementation of appropriate comprehensive preventive strategies including nutritional fortification, swift antenatal diagnosis and prompt intervention to reduce the morbidity.

Keywords: Neural tube defect; Rachischisis; Meningocele, Meningomyelocele; Meckel gruber.

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Received on: 29.04.2021
Accepted on: 31.07.2021

How to cite this article
Rajalakshmi BR, Sapna Patel/Spectrum of Neural Tube Defects Among the Fetal Autopsies in a Tertiary Care Hospital in Southern India/Indian Journal of Forensic Medicine and Pathology/2021;14(4):811-818

INTRODUCTION

Neural tube defects (NTDs) are birth defects associated with consequential mortality, morbidity, disability with associated economic and psychological costs. NTDs are known to be preventable with folic acid,[1-4] while the long-term survival and quality of life of the affected children can be improved through access to appropriate clinical care and rehabilitative services.[5,6] However, the formulation of preventive and rehabilitative strategies have been hampered by the lack of studies on the transparent prevalence of these NTDs and hospital based surveys can provide an insight in the respective geographic regions.

Neural tube defects (NTDs) are a heterogeneous and complex group of congenital central nervous system (CNS) anomalies. Anencephaly, spina bifida, encephalocele, meningocoele and meningomyelocoele are included in this group. Neural malformations and anomalies of the other organ systems are frequently associated with NTDs.[7-9] This study was performed retrospectively to study the neural tube defects in a tertiary care centre in South India. The study is of substantial help in understanding the disease burden and help in implementation of the preventive strategies.

MATERIALS AND METHODS

- The present study was conducted retrospectively from January 2011 to December 2020 on 402 fetal autopsies received in the department of pathology, out of which 42 fetuses were found to have neural tube defects (NTDs).
- Each fetus was examined according to predetermined protocol which included ultrasound diagnosis, external and internal examination. The autopsy protocol included enbloc evisceration with subsequent dissection into organ blocks. The placenta and fetal membranes were studied wherever possible and umbilical cord was studied in all the cases. Histological sections were taken from all the internal organs, placenta, umbilical cord and stained with Hematoxylin and Eosin. In cases where the antenatal ultrasonography diagnosis were available, findings were compared with the postnatal autopsy.

RESULTS

Among 402 fetal autopsies studied, 42(10.4%) fetuses showed evidence of neural tube defects. Table 1 and Table 2 describe the different neural tube defects and the clinical characteristics respectively. Antenatal ultrasound findings were available only in 28 cases where the findings were correlated with fetal autopsy findings and were found to be consistent.

Table 1: Neural tube defects and associated abnormalities.

Type	Neural tube defects and associated ablnormalities	No. of Cases	%
Open NTDs	Craniorachischisis	1	2.4 %
	Anencephaly	8	26.2 %
	Anencephaly with cystic renal dysplasia	1	
	Anencephaly with bladder exstrophy	1	
	Acrania with anencephay	1	
	Myelomeningocele	16	43 %
	Myelomeningocele with renal ectopia	1	
	Myelomeningocele with b/l club feet	1	
	Arnold chiari malformation II with Meningomyleocoele, and holoprosencephaly (failure of forebrain to divide into lobes).	1	7 %
	Arnold chiari malformation II with kyphosis and Meningomyleocoele,	1	
	Arnold chiari malformation II with Meningomyleocoele,	1	
Closed NTDs	Meningocoele	5	14.3 %
	Meningocoele with Arnold chiari malformation II	1	
	Encephalocoele	2	7 %
	Meckel gruber syndrome (Encephalocoele)	1	

Table 2: Clinical Characteristics.

Characteristics	Distribution
Maternal age in years	Median age -25 Range -19yr-40 yr
Period of Gestation in weeks	< 20 weeks - 11 cases 20–25 weeks - 29 cases > 25 weeks - 02 cases
Order of gestation	Primiparous-11 Multiparous-21 Not known-9 History of previous pregnancy loss-11 cases
Prenatal Ultrasound findings/ diagnosis	Available in 28 cases (67%)

- The case of craniorachischisis (Fig. 1) had bilateral adrenal hypoplasia with associated right cystic renal dysplasia.

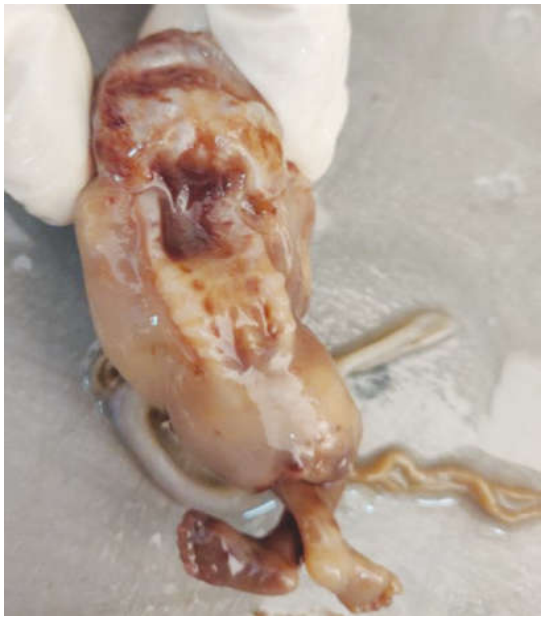

Fig. 1: Craniorachischisis showing a dorsal defect in skull extending through the length of spinal canal.

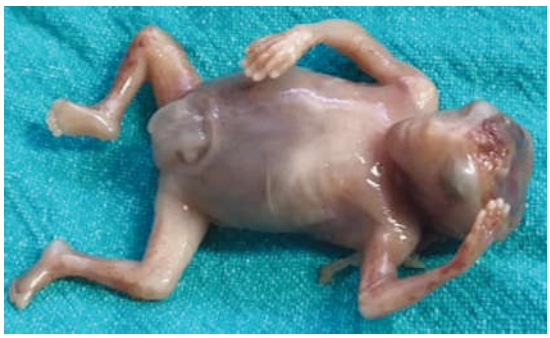

Fig. 2: Anencephaly with urinary bladder exstrophy (protrusion of bladder through the abdominal defect).

- Arareanomalyofbladderexstrophywasseenin a case of anencephaly (Fig. 2).
- Among the meningomyelocoeles described, associated anomalies such as hydrocephalus, bilateralclubfootandectopickidneywerealso noted.
- Arnold chiari malformation II with kyphosis and Meningomyleocoele in a 13 weeks of gestation fetus weighing 85gms (Fig. 3). Internal examination of skull showed ventriculomegaly with herniated cerebellum and brain stem into foramen magnum suggestive of chiari II malformation associated with lumbosacral meningomyelocoele and kyphosis.

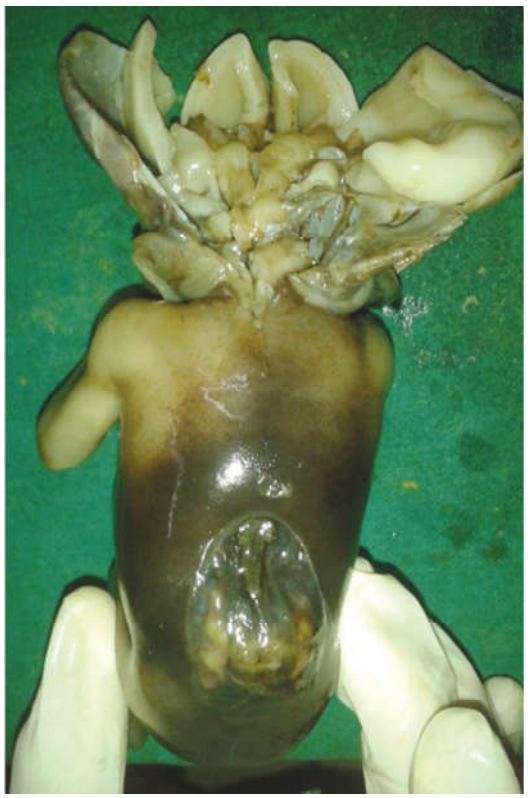

Fig. 3a: Arnold chiari malformation II with kyphosis and meningomyleocoele, displaying cerebral ventriculomegaly.

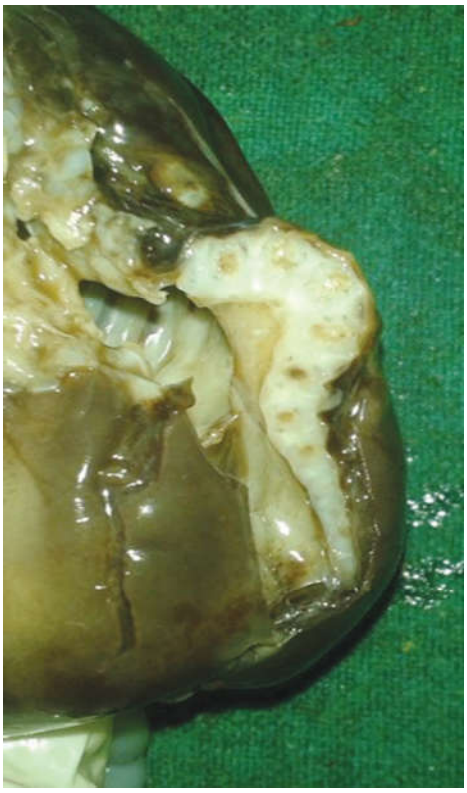

Fig. 3b: Cut opened spinal canal showing kyphosis.

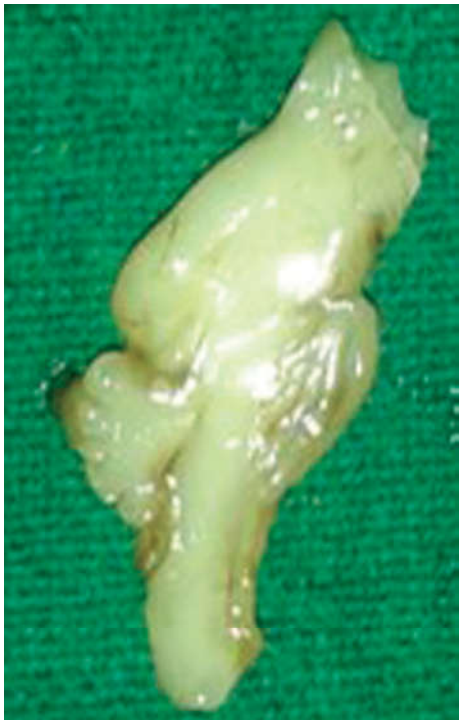

Fig. 3c: Dissected foramen magnum with herniated cerebellum.

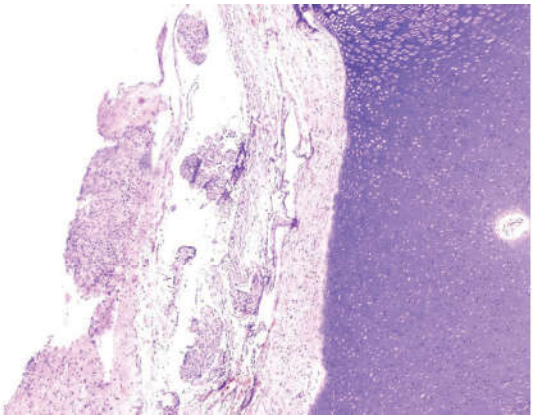

Fig. 4: Microscopy showing thin meningeal lining and neural tissue adjacent to the intervertebral cartilage consistent with meningocoele (Haematolxylin and Eosin, x200).

- All the cases of meningoceles were subjected to histopathology to demonstrate the meningeal lining (Fig. 4).
- Three of the encephalocoele cases displayed occipital swelling with microscopy confirming the thin fibrocollagenous lining and brain parenchyma in the lumen.
- A rare Case of Meckel Gruber syndrome in a male fetus with 16 weeks period of gestation weighing 141gms. Occipital region showed defect m/s 2.5 x 2cms, suggestive of encephalocoele (Fig. 5), abdomen appeared distended with bilateral cystic dysplastic kidneys (Fig. 6).

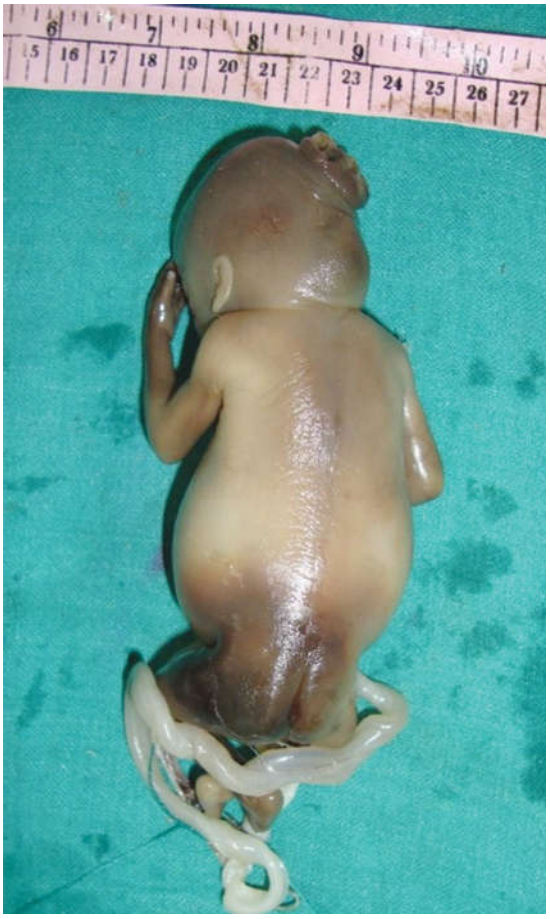

Fig. 5: Fetus with posterior encephalocele–Meckel Gruber Syndrome.

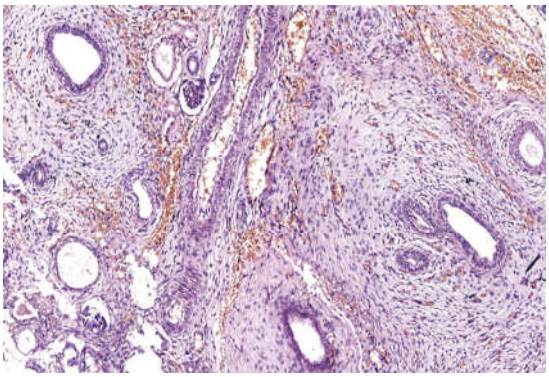

Fig. 6: Microscopy of kidney displaying variable sized cysts lined by cuboidal epithelium with intervening mesenchyme suggestive of renal cystic dysplasia (Haematolxylin and Eosin, x200).

- Sections from umbilical cord were examined in all cases, however all of them showed three vessels (two arteries and a vein).

DISCUSSION

Neural tube defects (NTDs) are congenital structural abnormalities of the central nervous system and vertebral column affecting 4.5 per 1000 total births. Neural tube defects constitute the most common birth defects in India.[1] As there is no national registry to record the birth defects, hospital based studies provide valuable information to record the disease burden.[1,2]

Etiology of NTDs is multifactorial, attributed to genetic and environmental factors such as maternal malnutrition and exposure to alcohol and tobacco.[1,10] Other associated risk factors include micronutrient insufficiency, maternal diabetes, obesity, and the use of certain teratogenic drugs in early gestation. Consangunity has also been implicated as a risk factor with an incidence of NTDs in 11.5/1000 total births born out of consanuinous marriges, in contrast to 4.3/1000 in non consangunous marriages.[1] Consanguinity is suggested to contribute to higher incidence of NTDs in several countries, including Saudi Arabia.[5] The risk of recurrence of NTD for a second affected child is increased by 3-5 folds for couples with one affected infant, requiring early implementation of preventive strategies.[5] In our study, out of 42 cases, 11 mothers had history of previous pregnancy loss, warranting the fetal autopsy study to evaluate the cause and plan the prevention. One study from China reported an estimate of recurrence risk of 6.9% for NTDs, based on a retrospective survey in the early 1990s.

Studies have suggested that genes of folate and methionine metabolism can be involved in the etiology of NTDs. The genotype MTHFR 677C>T was significantly associated with NTDs with synergistic effects in the absence of folate supplementation and also in the presence of gestational diabetes mellitus (GDM), while 5-Methyltetrahydrofolate-homocysteine methyltransferase (MTHM) 501A>G genotype was significantly associated with NTDs in case of gestational diabetes.[5]

The prevalence of neural tube defects has been reported to be 7.7, 1.1, 2.5 and 4.2 per 1000 total births in Northern, Eastern, Western and Southern India respectively.[1] The higher prevalence in Southern India has been attributed to consanguinity, delayed age of marriage and childbirth and dietary factors.[1] The risk of NTDs can be reduced by the use of folic acid supplements in peri-conceptional period and some behavioural modifications such as avoiding tobacco and alcohol in early pregnancy.[1-4,11]

These malformations result from failure of the neural folds to fuse and form the neural tube in the third and the fourth week of development of embryo. This leads to secondary abnormal development of skeletal and muscular structures from mesoderm that cover the underlying neural structures. Cranial dysraphism refers to failure of cranial neural tube closure, comprising anencephaly and encephaloceles, while spinal dysraphism is due to failure of caudal neuropore closure resulting in spina bifida.

They are also known as open when exposed through a skin defect in the skin, or closed if covered by skin. A rare form of NTD is craniorachischisis, resulting from failure of the neural tube closure over the entire body axis.[5] The present case series encountered a case of craniorachischisis with associated bilateral adrenal hypoplasia and right cystic renal dysplasia in a 12 week fetus born to a 23 year old primigravida.

Anencephaly results from failure of the cephalic folds to fuse into a neural tube with absence of a major portion of diencephalon. Failure of bony skull development results from secondary mesodermal defect dorsal to the neural elements. The brainstem, cerebellum, and spinal cord are normally present. Anencephaly is lethal resulting in still birth within a few hours to weeks, and is easily diagnosed antenatally.[5] Among the eleven cases of anencephaly in our study, one case each of associated renal cystic dysplasia and bladder exstrophy have been noted.

Anencephay has been reported to co-exist with feta acrania among one of the cases of our study. The coexistence has been described as a sequence of acrania exencephaly anencephaly.[12] Fetal acrania (exencephaly) is characterized by

the complete or partial absence of skull bones surrounding the fetal brain with abnormal brain tissue development.[13] The lack of cranial bones cause protrusion of the cerebral parenchyma (exencephaly). With the sudden fetal movements and the chemical irritation of the exposed brain parenchyma by the amniotic fluid causes degeneration and destruction of the brain leading to its absence (anencephaly).[12]

Encephalocele is a type of cranial dysraphism resulting from failure of closure of anterior neuropore. Encephaloceles are uncommonly associated with defined syndromes, such as Meckel Gruber syndrome, an autosomal recessive ciliary dysfunction disorder characterized by an occipital encephalocele.[9] Other associated features include holoprosencephaly, polydactyly, polycystic kidneys, hydrocephalus, micrognathia, Chiari malformation and cardiac anomalies. Our case had a triad of posterior encephalocele, polydactyly and cystic renal dysplasia .

Spinal dysraphisms result from aberrant formation of the midline mesenchymal and neural elements.[5] Subtypes of NTDs relate to the stages of closure. Primary neurulation takes place at weeks 3-4 during which the neural ectoderm bends, and folds along the midline to form the neural tube. Defective primary neurulation leads to craniorachischisis, anencephaly and spina bifida. Secondary neurulation occurs during weeks 5-6, when an additional part of the neural tube is produced caudal to the posterior neuropore resulting in the formation of the tip of the conus medullaris and the filum terminale. Malformations resulting from disturbance of secondary neurulation are closed (skin covered) and usually involve tethering of the spinal cord.[5,10]

Myelomeningocele and myelocele constitute the most prevalent NTDs (95%), that appear as sac-like structures with nerve roots covered by a thin membrane, when ruptured, cause a cerebrospinal fluid (CSF) leak.[5] In our study, myelomeningocele and myeloceles together constituted 57% of total cases (24/42). Meningocele and myelomeningoceles represent the two different types of spina bifida, a closed and open defect respectively with different prognosis, although both are macroscopically similar. In open spinal dysraphisms, the neural structures are exposed without a skin covering, including myelomeningocele, myelocele, hemi myelocele, and hemi myelomeningocele.[5,14] The CNS anomalies associated with myelomeningocele include Chiari II malformation and hydrocephalus in upto 90% of cases.[5] Chiari II malformation is a hindbrain anomaly characterized by herniation of the cerebellar vermis, fourth ventricle, and brain stem through the foramen magnum. In our study, four cases of Arnold Chiari malformation type II were found in association with three cases of meningomyeloceles and one case of meningocele.

Closed spinal dysraphisms comprise lipomas with a dural defect (lipomyelomeningocele, lipomyelocele), meningoceles and spina bifida occulta.[5,14] Meningocele is a type of spina bifida resulting from herniation of the meningeal covering through the bony defect without nerve roots into the dural sac.[5] Clinical severity of NTDs varies depending on the extent of defect. Open lesions that affect brain (anencephaly, craniorachischisis) are invariably lethal before or at birth. Encephalocele may also be lethal depending on the extent of brain damage during herniation.

Open spina bifida though compatible with postnatal survival, causes neurological impairment below the level of the lesion leading to features of sensory loss, motor weakness and urinary incontinence. Closed spinal lesions are less severe and may be asymptomatic, as with spina bifida occulta.[6]

Among the studies aimed at prevention of NTDs in 1970s, Smithells and colleagues implicated deficiency of several vitamins such as folate, riboflavin and vitamin C, in the serum of pregnant mothers with fetuses affected by NTD. A meta-analysis of the randomized trials indicated a 69%-87% reduction with use of folic acid for the prevention of NTDs and 85-100% reduction in observational studies. In accordance with the recommendation of the US Center for Disease Control and Prevention (CDC), all women of childbearing potential must receive 0.4mg folic acid per day.[11] The present study in a tertiary care hospital in Southern India has shown a disease burden of 10.4% of neural tube defects among the 402 cases of fetal autopsies.

CONCLUSION

There is a need to systematically record the epidemiological data including the incident cases of NTDs and associated risk factors in different geographic regions. This would help in the design of pertinent preventive strategies to reduce the recurrence, decrease the incidence and to provide supportive health care to already affected neonates with mild disabilities.

REFERENCES

1. *Allagh KP, Shamanna BR, Murthy GV, Ness AR, Doyle P, Neogi SB, Pant HB. Birth prevalence of neural tube defects and orofacial clefts in India: a systematic review and meta-analysis. PloS one. 2015; 10(3):e0118961.*

2. *Flores AL, Vellozzi C, Valencia D, Sniezek J. Global burden of neural tube defects, risk factors, and prevention. Indian journal of community health. 2014; 26 :3.*

3. *Blencowe H, Kancherla V, Moorthie S, Darlison MW, Modell B. Estimates of global and regional prevalence of neural tube defects for 2015: a systematic analysis. Annals of the New York Academy of Sciences. 2018; 1414(1):31-46.*

4. *Gedefaw A, Teklu S, Tadesse BT. Magnitude of neural tube defects and associated risk factors at three teaching hospitals in Addis Ababa, Ethiopia. BioMed research international. 2018 Mar 11;2018.*

5. *Salih MA, Murshid WR, Seidahmed MZ. Classification, clinical features, and genetics of neural tube defects. Saudi medical journal. 2014;35:S5.*

6. *Copp AJ, Stanier P, Greene ND. Neural tube defects: recent advances, unsolved questions, and controversies. The Lancet Neurology. 2013 Aug 1;12(8):799-810.*

7. *Ganesh D, Sagayaraj BM, Barua RK, Sharma N, Ranga U. Arnold Chiari malformation with spina bifida: a lost opportunity of folic Acid supplementation. Journal of clinical and diagnostic research. 2014;8(12):OD01.*

8. *Turhan AH, Isik S. Neural tube defects: A retrospective study of 69 cases. Asian journal of neurosurgery. 2019;14(2):506.*

9. *Raj M, Dhanuka S, Agarwal P, Reddy SL, Vivekananthan S. Meckel Gruber syndrome–a case report. Surgical and Experimental Pathology. 2020;3:1-4.*

10. *Greene N D E and Copp A J. Neural Tube Defects. Annu Rev Neurosci. 2014; 37: 221–242.*

11. *Gautam B. Neural Tube Defect: A Case Report. JCMS Nepal. 2018;14(4):229-31.*

12. *Samaniego Haro VJ. Sequence Acrania Exencephaly Anencephaly Report of a Case in the San Vicente De Paul Hospital in Ibarra Ecuador. Austin Gynecol Case Rep. 2020; 5(1): 1024.*

13. *Debnath M, Sharma D, Mishra S. Prenatal diagnosis of anencephaly and acrania in pregnant females – Report series of eight cases. Int J Med Sci Public Health 2020;9(5):334-337.*

14. *Salih MA. Neural tube defects: challenging, yet preventable. Saudi medical journal. 2014;35:S3.*

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Indian Journal of Forensic Medicine and Pathology
Volume 14 Number 4, October - December 2021
DOI: http://dx.doi.org/10.21088/ijfmp.0974.3383.14421.6

ORIGINAL ARTICLE

Study of the Impact of Leucocyte Reduction on the Coagulation Factors in Fresh Frozen Plasma

Vijayashree Raghavan[1], Femela Muniraj[2]

ABSTRACT

Introduction: Plasma transfusion is required to arrest or prevent bleeding, for various congenital and acquired cases of coagulopathies such as inherited factor deficiencies, disseminated intravascular coagulation, liver disease, post major trauma, etc. Leukocyte reduced blood components are indicated to prevent the febrile non hemolytic transfusion reactions, Human Leukocyte Antigen (HLA) alloimmunization, transmission of infections such as cytomegalovirus (CMV), and adverse transfusion reactions due to storage lesion. In the present study, the effect of plasma filtration on eight coagulation factors viz. fibrinogen, factors II, V, VII, VIII, IX, X and XI has been studied. **Materials and Methods:** The plasma separated from the whole blood donation from each of 25 donors was separated into two aliquots. Group-1 included unfiltered fresh frozen plasma; group-2 included fresh frozen plasma which was subjected to pre-storage leukocyte reduction by filtration. The levels of the coagulation factors Fibrinogen, II, V, VII, VIII, IX, X, XI were estimated in each sample in both the groups. **Results:** There was no statistically significant difference in the levels of any of the coagulation factors included in this study, between the unfiltered and the leukocyte reduced plasma. Group O positive individuals were found to have higher levels of all the coagulation factors. **Conclusion:** Filtration of plasma has no effect on the coagulation factors. This is the first study where the effect of plasma filtration on eight coagulation factors has been studied. Blood group O positive individuals were found to have higher levels of all the eight coagulation factors.

Keywords: Blood coagulation factor; Blood component transfusion; Filtration, Leukocyte reduction; Fresh frozen plasma.

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Received on: 07.10.2021
Accepted on: 31.12.2021

INTRODUCTION

Plasma is required for transfusion in various congenital and acquired cases of coagulopathies such as inherited factor deficiencies, disseminated intravascular coagulation, liver disease.[1,2] The major cause of death following major trauma, in 10-25% patients is acute traumatic coagulopathy.[3] Among the treatment options for various causes of acute bleeds, factor replacement is considered as the mainstay of treatment.[4]

How to cite this article
Vijayashree Raghavan, Femela Muniraj/Study of the Impact of Leucocyte Reduction on the Coagulation Factors in Fresh Frozen Plasma /Indian Journal of Forensic Medicine and Pathology/2021;14(4):819-824

Among the inherited bleeding disorders in Indian population, Hemophilia A is the commonest comprising 42.4% of cases, followed by platelet function defects comprising 39.2% of cases. Von Willebrand disease is relatively uncommon in Indians, comprising 8.5% of cases. The deficiencies of factors IX, X, XIII, V, VII, XI, XII, afibrinogenemia comprise 5.1%, 1.8%, 0.8%, 0.6%, 0.2%, 0.2%, 0.1%, 0.5% of cases respectively.[2]

Bioactive substances in Fresh frozen plasma (FFP) are considered to be responsible for the transfusion-related adverse events, especially in patients with sepsis and trauma.[5] Leukocyte reduced (LR) blood components are indicated to prevent the febrile nonhemolytic transfusion reactions, Human Leukocyte Antigen (HLA) alloimmunization, transmission of infections such as cytomegalovirus (CMV), and adverse transfusion reactions due to storage lesion.[6]

Transfusion of leucocyte reduced FFP reduces the allogenic immunogenicity induced by residual leucocytes.[7] The leukocytes in the plasma are cleared mainly by filtration.[7] Leukocyte reduction prevents the accumulation of cytokines released by the leukocytes into the storage bag.[6] The activities of coagulation factors were not found to be affected by whole blood filtration before component separation. However, the activation of the coagulation system by the filter material cannot be excluded.[8]

Previous studies have compared the levels of some of the coagulation factors/anticoagulants, between the unfiltered (UF) and leucocyte-reduced (LR) whole blood and plasma, wherein plasma filtration and its effect on the coagulation factors have been studied only by a few researchers. In the present study, the effect of plasma filtration on eight coagulation factors viz. fibrinogen, factors II, V, VII, VIII, IX, X and XI has been studied.

Efficient utilization of blood components with a good knowledge about their quality and maintenance help us improve the management of the blood bank inventory and efficient intervention with strategic transfusion therapy prevents the death in case of major trauma.[1,3]

Abbreviations Used

FFP: Fresh frozen plasma

UF: Unfiltered

LR: Leukocyte reduced/Leukocyte reduction

CI: Confidence interval

Objectives

The objectives of this study are to compare the levels of factors I, II, V, VII, VIII, IX, X, XI between unfiltered FFP and LR FFP, and between different blood groups. This helps us to find out the effect of filtration on the factors and thus its impact on the management of patients with coagulopathies.

MATERIALS AND METHODS

The study was commenced after getting approval from the Institutional Human Ethics Committee. Whole blood collected from 25 healthy donors who consented for participation in the study and fulfilled the eligibility criteria were separated into components. The donors who participated in this study belonged to blood groups A positive, B positive and O positive. The plasma from each donor was separated into two aliquots, so that there are two groups each of 25 plasma aliquots. Group-1 included unfiltered FFP, that is, plasma freshly separated within 6 hours and frozen immediately after separation; group-2 included FFP which was subjected to pre-storage leukocyte reduction by filtration with Terumo Penpol Imugard III polyurethane filter within 6 to 8 hours after blood collection.

The aliquots were frozen at a temperature between -30 and -40°c until analysis. Analysis of coagulation factors was carried out within 24 hours after blood collection. Before analysis, they were thawed and the levels of the coagulation factors Fibrinogen, II, V, VII, VIII, IX, X, XI were estimated in each sample, with the fully automated coagulation analyzer ACL Elite/Elite Pro (Instrumentation Laboratory Co.) in both the groups. The biological reference range for plasma Fibrinogen, Factors II, V, VII, VIII, IX, X, XI are 180-360 mg/dl, 79 to 131%, 62 to 139%, 50 to 129%, 50 to 150%, 65 to 150%, 77 to 131% and 65 to 150% respectively (8–16).

Statistical analysis was done using GraphPad Prism software. Descriptive statistics including mean, standard deviation, range, confidence interval was performed. Comparison between the unfiltered and LR samples was done with multiple t test and Wilcoxon signed rank test. The results were considered to be statistically significant if

Table 1: Comparison of the levels of coagulation factors between unfiltered and leukocyte reduced plasma.

Coagulation factor	Unfiltered			Range		Leukocyte reduced			Range		P value
	Mean	SD	95% C.I.	Min	Max	Mean	SD	95% C.I.	Min	Max	
Fibrinogen	298.2	73.56	30.36	189	447	280.6	51.98	21.45	196	427	0.33
Factor II	94.54	11.93	4.93	68.2	113	95.62	12.8	5.28	66.4	125	0.76
Factor V	86	16.1	6.66	57.1	113	92.07	19.29	7.96	53.3	123	0.24
Factor VII	90.62	22.63	9.33	50.6	129	93.49	21.86	9.02	48.5	129	0.65
Factor VIII	116	34.4	14.19	21.8	150	98.7	29.5	12.18	58.3	150	0.07
Factor IX	115.8	43.69	18.03	35.2	150	119	38.4	15.86	48.2	150	0.78
Factor X	84.9	13.46	5.56	54.4	105	91.6	14.5	6.01	65.3	120	0.10
Factor XI	72.34	37.43	15.45	12.6	147	67.9	37.4	15.44	27.9	171	0.68

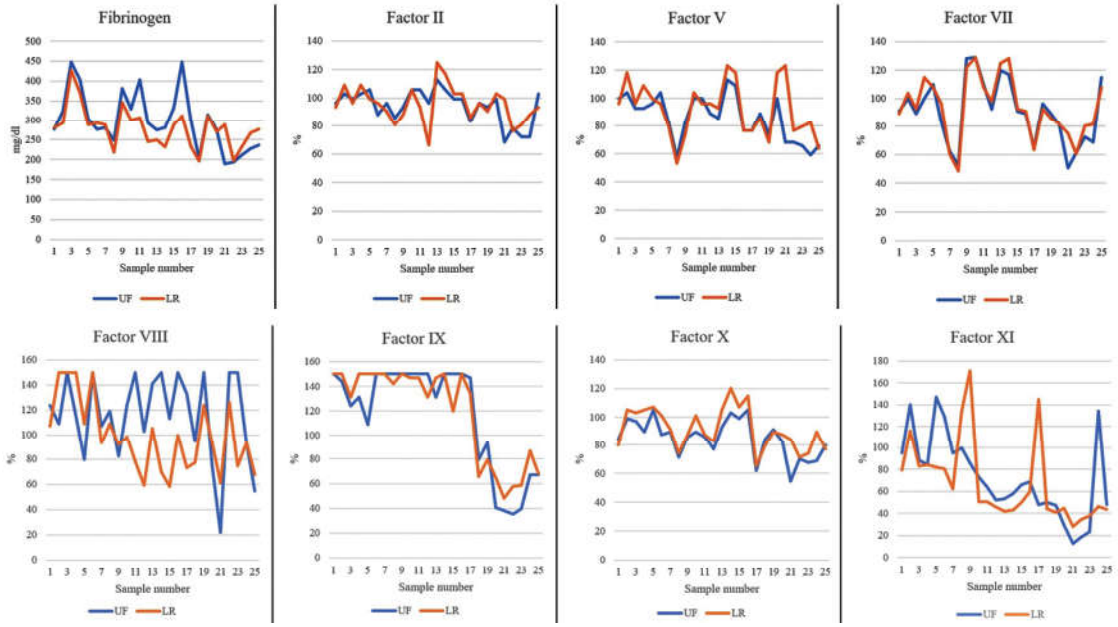

Fig.1: Comparison of the levels of coagulation factors between unfiltered and leukocyte reduced FFP.

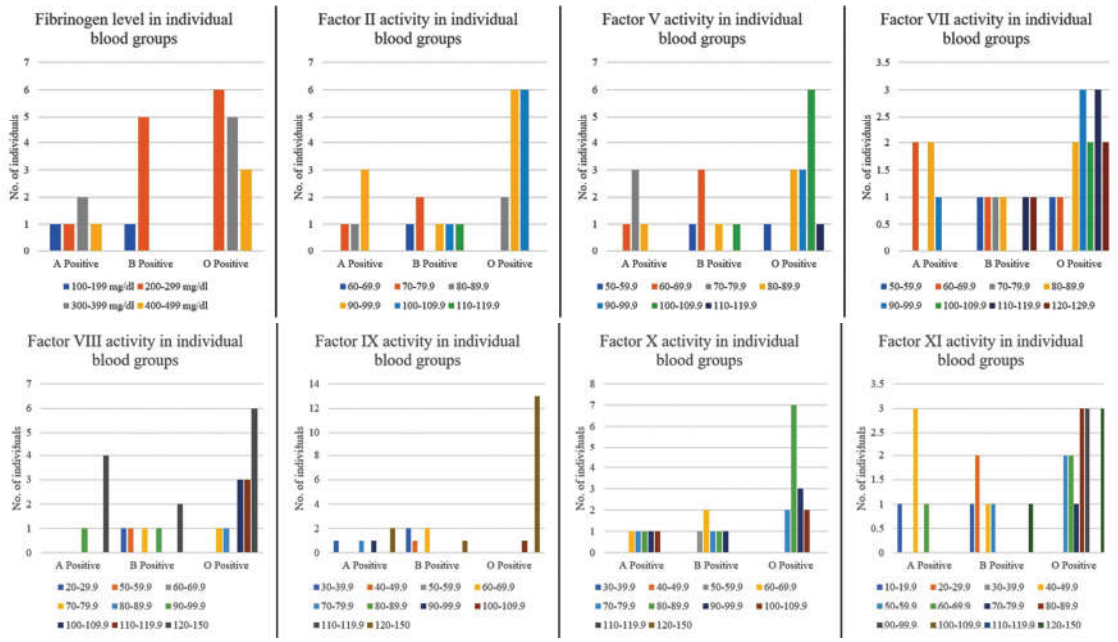

Fig.2: Coagulation factors activities in UF-FFP in individual blood groups.

the 'p' value is <0.05. Quality control was ensured with routine quality assurance methods such as periodic calibration of the equipment, processing of commercial QC samples, participation in EQAS, quality control checking of blood bags.

RESULTS

The results of the analysis are given in Table 1 and Figure 1. In the unfiltered plasma, the level of Fibrinogen ranged from 189 mg/dl to 447 mg/dl and the mean value was 298.2 mg/dl (95% CI = 30.36); the activities of Factor II ranged from 68.2% to 113% with a mean of 94.54% (95% CI = 4.93); Factor V ranged from 57.1% to 113% with a mean of 86% (95% CI = 6.66); Factor VII ranged from 50.6% to 129% with a mean of 90.62% (95% CI = 9.33); Factor VIII ranged from 21.8% to 150% with a mean of 116% (95% CI = 14.19); Factor IX ranged from 35.2% to 150% with a mean of 115.8% (95% CI = 18.03); Factor X ranged from 54.4% to 105% with a mean of 84.9% (95% CI = 5.56); Factor XI ranged from 12.6% to 147% with a mean of 72.34% (95% CI = 15.45).

In the leucocyte reduced plasma, the level of Fibrinogen ranged from 196 mg/dl to 427 mg/dl and the mean value was 280.6 (95% CI = 21.45) mg/dl; the activities of Factor II ranged from 66.4% to 125% with a mean of 95.62% (95% CI = 5.28); Factor V ranged from 53.3% to 123% with a mean of 92.07% (95% CI = 7.96); Factor VII ranged from 48.5% to 129% with a mean of 93.49% (95% CI = 9.02); Factor VIII ranged from 58.3% to 150% with a mean of 98.7% (95% CI = 12.18); Factor IX ranged from 48.2% to 150% with a mean of 119% (95% CI = 15.86); Factor X ranged from 65.3% to 120% with a mean of 91.6% (95% CI = 6.01); Factor XI ranged from 27.9% to 171% with a mean of 67.9% (95% CI = 15.44).

There was statistically significant difference in the levels of coagulation factors Fibrinogen, FV, FVIII, FX between the unfiltered and leukocyte reduced plasma. The difference in the levels of FII, FVII, FIX, FXI were not significant.

The individuals included in the study belonged to blood groups A positive, B positive and O positive. When the individual blood groups were compared for the activities/levels of coagulation factors, in blood group 'A positive', most of the individuals had Fibrinogen levels in the range of 300 – 399 mg/dl; Factor II activity in the range of 90 – 99.9%; Factor V in the range of 70 – 79.9%; Factor VII in the range of either 60 – 69.9% or 80 – 89.9%; Factor VIII in the range of 120 – 150%; Factor IX in the range of 120 – 150%; Factor XI in the range of 40 – 49.9%. All ranges of Factor X activity were equally distributed among the A positive individuals.

In blood group 'B positive', most of the individuals had Fibrinogen levels in the range of 200 – 299 mg/dl; Factor II activity in the range of 70 – 79.9%; Factor V in the range of 60 – 69.9%; Factor VIII in the range of 120 – 150%; Factor IX in the range of either 30 – 39.9% or 60 – 69.9%; Factor X in the range of 60 – 69.9%; Factor XI in the range of 20–29.9%. All ranges of Factor VII activity were equally distributed among the B positive individuals.

In blood group 'O positive', most of the individuals had Fibrinogen levels in the range of 200–299 mg/dl; Factor II activity in the range of 90 – 109.9%; Factor V in the range of 100 – 109.9%; Factor VII in the range of either 90 – 99.9% or 110 – 119.9%; Factor VIII in the range of 120 – 150%; Factor IX in the range of 120 – 150%; Factor X in the range of 80 – 89.9%; Factor XI in the range of either 80 – 99.9% or 120 – 150%. (Figure 2).

DISCUSSION

In July 1998, UK Transfusion services implemented universal leucodepletion, that is, leucodepletion of all blood units, to prevent the risk of transmission of variant Creutzfeldt-Jakob disease via blood transfusion. Though filtration of red cells has already been in practice in the UK, this new guideline initiated the process of filtration of FFP.[9]

The incidence of congenital bleeding disorders may vary depending on the ethnic origin.[2] While Von Willebrand disease is the most common inherited bleeding disorder in the industrialized world, Hemophilia A is found to be the most common and qualitative platelet defect is the second most common inherited bleeding disorder in India.[2] In the study by Gupta M et al, platelet function defects were more prevalent among females,

whereas the coagulation defects were rare.[2] The incidence of VWD is lower in India, as compared to the west, because of the fact that only symptomatic patients presented to the outpatient department.[2] Factor X deficiency is a very rare hereditary bleeding disorder and it is found to be more common in communities accepting consanguineous marriages.[10]

Leukocyte reduction prevents the release of cytokines by the leukocytes into the storage bag.[6] The concentrations of bioactive substances such as Histamine, Myeloperoxidase, Eosinophil cationic protein were found to be higher in unfiltered FFP thawed after storage, compared to FFP samples which are filtered before storage, and FFP samples which are unfiltered and tested before freezing and storage.[5] LR filters have a variable effect on the activities of coagulation factors which may be attributed to the possibility of adherence of the coagulation factors to the surface of the filter which is made of either polyester or polyurethane.[11,12]

Management of coagulopathy in patients post major trauma is difficult and FFP transfusion should be started during the primary survey phase of resuscitation, instead of considering as a product for volume replacement, during massive transfusion.[3]

In our study, none of the coagulation factors showed any significant difference between the unfiltered and leukocyte reduced plasma. Various studies have analyzed the effect of filtration over the coagulation factors. In the study by Alhumaidan et al, PT, APTT, activities of factors V, VII, VIII, X, XI, fibrinogen, antithrombin III, protein C and free protein S were compared between filtered and unfiltered plasma.[11]

The paired plasma aliquots were stored at -18°c until assessment. Then the aliquots were thawed and the coagulation assays were performed. They were stored at 1 to 6°c until further analysis on days 5 and 7. Factors VII, VIII, IX showed decrease whereas factors V, X, fibrinogen showed no difference between the filtered and unfiltered plasma.[11] Shooshtari et al studied sixty units of plasma separated from whole blood for the activities of coagulation factors V, VII, VIII, IX, XI, Fibrinogen, Antithrombin, Antitrypsin. The filtration had been done between 4 and 20 hours of blood donation. Except for the negligible change in the activity of factor VII, there was no significant difference in the activities of the coagulation factors and inhibitors involved in this study, between the filtered and unfiltered plasma.[12] Williamson et al studied the effect of whole blood filtration on the coagulation factors in plasma separated from the whole blood. There was decrease in factor VIII, increase in factor V, and no changes in factors IX, X, fibrinogen during 12 months of storage, but without statistical significance.[13] In the study by Cardigan et al, the coagulation factors in filtered FFP were evaluated, employing either whole blood or plasma filters. Significant reduction in factors V, VIII, IX, XI, XII was observed after filtration.[9]

In the study by Heiden M et al, there were no significant differences between the coagulation factor activities of unfiltered FFP and FFP obtained from whole blood filtration.[14] In the study by Solheim et al, pre-storage leukocyte filtration had been done with whole blood filter and the levels of coagulation factors were found to be improved with it.[15] In the study by Chabanel et al, the levels of coagulation factors had been maintained within the normal reference range in the plasmas stored at -30°c for 6 months.[16]

In our study, the filtration of plasma was done within 6 to 8 hours after blood collection, immediately after separation into components, that is, before storage. Separation by centrifugation was done within 6 hours after blood collection. In the study by Cardigan et al, whole blood or plasma were filtered within 8 hours of blood collection.[9] Neutrophils get activated and elastase is released if whole blood is filtered after storage at room temperature.[12] Hence pre-storage leukocyte reduction is preferable.

Factor VIII is affected by ABO blood group.[17] Blood from group A individual contains higher amounts of factor VIII activity and antigen than that from a group O individual.[18] But in our study, higher levels of all the coagulation factors were found in group O positive individuals.

CONCLUSION

Filtration of plasma does not have any effect on the coagulation factors. Hence leucocyte reduction can be done in the plasma for patients

who need it. This is the first study where the effect of plasma filtration on eight coagulation factors has been studied. Blood group O positive individuals were found to have higher levels of all the eight coagulation factors.

Funding

The authors have funded themselves to undertake this research. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflicts of Interest: None

REFERENCES

1. Dogra M, Sidhu M, Vasudev R, Dogra A. Comparative analysis of activity of coagulation Factors V and VIII and level of fibrinogen in fresh frozen plasma and frozen plasma. Asian J Transfus Sci. 2015;9(1):6.

2. Gupta M, Bhattacharyya M, Choudhry VP, Saxena R. Spectrum of Inherited Bleeding Disorders in Indians. Clin ApplThromb. 2005 Jul;11(3):325–30.

3. Mitra B, Cameron P, Mori A, Fitzgerald M. Acute coagulopathy and early deaths post major trauma. Injury. 2012;43:22–5.

4. 'Consensus in Diagnosis and Management of Hemophilia' Committee, Indian Academy of Pediatrics, Sachdeva A, Gunasekaran V, Ramya HN, Dass J, Kotwal J, et al. Consensus Statement of the Indian Academy of Pediatrics in Diagnosis and Management of Hemophilia. Indian Pediatr. 2018 Jul;55(7):582–90.

5. Nielsen HJ, Reimert C, Pedersen AN, Dybkjoer E, Brünner N, Alsbjørn B, et al. Leucocyte-derived bioactive substances in fresh frozen plasma. Br J Anaesth. 1997 May;78(5):548–52.

6. Quinley ED, editor. Immunohematology: principles and practice. 3rd ed. Baltimore, MD: Lippincott Williams & Wilkins; 2011. 411 p.

7. Hiruma K, Okuyama Y. Effect of leucocyte reduction on the potential alloimmunogenicity of leucocytes in fresh-frozen plasma products. Vox Sang. 2001;80(1):51–6.

8. Li D-Y, Zhang H-W, Feng Q-Z, Zhao H. Impacts of leukocyte filtration and irradiation on coagulation factors in fresh frozen plasma. Exp Ther Med. 2015 Feb;9(2):598–602.

9. Cardigan R, Sutherland J, Garwood M, Krailadsiri P, Seghatchian J, Beard M, et al. The effect of leucocyte depletion on the quality of fresh-frozen plasma: Effect of Leucodepletion on FFP. Br J Haematol. 2001 Jul;114(1):233–40.

10. Annual report 2019. Hemophilia Federation India. 2019;

11. Alhumaidan HS, Cheves TA, Holme S, Sweeney JD. The Effect of Filtration on Residual Levels of Coagulation Factors in Plasma. Am J Clin Pathol. 2013 Jan 1;139(1):110–6.

12. MahmoodianShooshtari M, Mousavi Hosseini K. Evaluation of the plasma quality after filtration. DARU. 2010;18(2):114–7.

13. Williamson, Rider, Swann, Winter, Ali, Pamphilon. Evaluation of plasma and red cells obtained after leucocyte depletion of whole blood. Transfus Med. 1999 Jan;9(1):51–61.

14. Heiden M, Salge U, Henschler R, Pfeiffer H-U, Volkers P, Hesse J, et al. Plasma quality after whole-blood filtration depends on storage temperature and filter type. Transfus Med. 2004 Aug;14(4):297–304.

15. Solheim BG, Flesland O, Brosstad F, Mollnes TE, Seghatchian J. Improved preservation of coagulation factors after pre-storage leukocyte depletion of whole blood. TransfusApher Sci. 2003 Oct;29(2):133–9.

16. Chabanel A, Sensebé I, Masse M, Maurel JP, Plante J, Hivet D, et al. Quality BlackwellPublishingLtd. assessment of seven types of fresh-frozen plasma leucoreduced by specific plasma filtration. Vox Sang. 2003;10.

17. Downes K, Wilson E, Yomtovian R, Sarode R. Serial measurement of clotting factors in thawed plasma stored for 5 days. Transfusion (Paris). 2001;41:570.

18. Alakech B, Miller B, Berry TH, Ambruso DR. Coagulation Profile for Cryoprecipitate Produced From 24-Hour Stored Whole Blood. Lab Med. 2009 Sep;40(9):540–3.

Indian Journal of Forensic Medicine and Pathology
Volume 14 Number 4, October - December 2021
DOI: http://dx.doi.org/10.21088/ijfmp.0974.3383.14421.7

ORIGINAL ARTICLE

Effect of formalin fixation on DNA: A Time-Based Approach

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ABSTRACT

Introduction: Tissue preservation is important. From it forensic scientist may extract sufficient DNA for profiling. The most commonly used preservative found in the literature is formalin. However, it causes severe side-effects on its users as well as the environment; we need to find its replacement.

Method: This study examined whether formalin could preserve soft tissues (fresh) stored at 4°C for 100 days and how DNA can be extracted from it. Qualification and Quantification of the presevred samples were done.

Result: The results revealed that tissues preserved in formalin failed to generate sufficient quantity of DNA for profiling whereas tissues preserved in normal saline did so.

Conclusion: The study concluded that there is a need to find an alternative to formalin which can preserve the tissue samples well and enable DNA profiling.

Keywords: DNA quantification; Formalin; Fixation; Normal saline; Preservative; Tissue Preservation.

INTRODUCTION

Tissue fixation is an initial and important step for processing of a specimen for histological and DNA examination and requires that the tissue is kept in a safe medium that prevents it from degradation for a long period of time.[1,2] Well preserved tissue is crucial in biological sciences studies. It plays an important role in the Court of Law where decisions are made based on the facts and the evidence.[3] There is a wide range of nucleic acid extraction methods available from home made procedures to commercially-available kits. Various commercial kits have their own efficiency of recovery of nucleic acids. Some kits recover quantifiable DNA yield, while others recover lesser DNA concentration. Literature shows that the method used for extraction of nucleic acids affects DNA yield.[4,5]

The literature reveals a number of preservatives, out of which formalin is the most common. It is generally used in the concentration of 10%. Though, various

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Received on: 23.10.2021
Accepted on: 31.12.2021

How to cite this article
Jyoti Gullaiya, Naresh Kumar, Neeharika Srivastava/Effect of formalin fixation on DNA: A Time-Based Approach/Indian Journal of Forensic Medicine and Pathology/2021;14(4):825-830

concentration of formalin has been debated upon in the past.[6,7] Due to its low price, good application effect and easy availability, it is among the most commonly used fixative worldwide. However, cross-linking of proteins and nucleic acids by formalin resulted in hampered analysis and also restricted the study of proteomics to frozen tissues. It also hampers the study of rare disease subtypes.[8]

The OSHA regulation standard has declared it as "hazardous" because of its carcinogenic nature and ill-effects on the environment and its users.[9] Additionally, it has been observed that formalin denatures the DNA and mRNA and does not allow full profile to get generated during DNA profiling.[10] This has raised the quest for some less toxic or formaldehyde-free preservative which has fixative properties comparable to that of formalin.[9,11]

Nucleic acid extraction is an important step in evaluation of tissue for their source and integrity. DNA can be extracted from a wide range of sources which include human as a biological source in the form of hairs, nails, whole blood, buccal cells etc. It has also been reported that archival unstained bone marrow slides resulted in good DNA yield. A properly preserved tissue enables appropriate extraction of nucleic acids from them.[12]

Nucleic acid isolation has some standard protocols which require specific reagents. These reagents are now being commercially available in the form of DNA extraction kits.[13] Carlsson in his study reported different extraction kits to evaluate the quantity and quality of DNA and RNA which can be extracted from FFPE prostate cancer biopsies.[4] Additionally, the Organic Extraction is amongst the most widely used method of DNA Isolation.[14]

METHOD

This study has been approved by Institutional Ethics Committee, Civil Hospital, Gurugram. The informed consent from the legally acceptable representative of the deceased has been obtained in written. In the study, twenty-five soft tissues from five different organs were obtained from a deceased individual. The deceased were admitted into the Mortuary 24 hours after death and the tissue samples were then collected during post-mortem. Those organs were heart, lung, liver, kidney and brain. Tissues were further cut into small segments (n=50) using laboratory protocols. Twenty-five samples were placed immediately into containers having 10% neutral buffered formalin (NBF) and rest twenty-five different tissue samples were placed in containers having solution of normal saline. The weight of each sample has been decided to be approximately 1-2 gram as the tissues taken in this study are particularly soft tissues. The tissues were preserved at 4ºC for 100 days in NBF and normal saline to assess how efficiently DNA quantification can be done in such a condition.

Autosomal STRs were amplified using Power Plex 21 TM PCR amplification kit. PCR Amplified products were subjected to electrophoresis in ABI 3500 XL genetic analyzer. The Gene Mapper ID-X 1.4 software was used for STR analysis.

DNA Isolation

Tissues preserved in the NBF solution and normal saline solution were taken out from the refrigerator and an appropriate size was cut from it for analysis. They were placed in a 50 ml tube and firstly washed with tap water and then washed with Milli Q water three-four times in order to completely remove the formalin. Cut piece was taken out from the tube with the help of forceps and placed in a Petri dish. Piece was finely chopped using a surgical blade. Finely chopped pieces of tissue were transferred to aliquots where Phenol Chloroform Extraction Method has been applied to the tissues. Forensic buffer, protease K and Sodium dodecylsulphate (SDS) were then added to the aliquots and kept at 56ºC in water bath overnight. Multiple number of times centrifugation was done after adding required reagents and in the end, intense washing was done. Last step was to add Tris EDTA to the sample and then placed in thermo mixer at 56ºC for 30 minutes.

Quantitation

After isolation, all the samples were quantified by Quantifier Trio kit. The PowerPlex 21 System is a multiplex STR system for human identification applications including forensic analysis and relationship testing. The system allows co-amplification and fluorescent detection of 21 loci (20 STR loci and Amelogenin).

Table 1: RT-PCR Findings of tissues preserved in Formalin.

Tissue Type	RT-PCR Value
Heart	0/0.06/0.00
Lung	0/2.24/-
Liver	-/0.28/-
Kidney	0/0/0
Brain	0/0.47/0
Heart	0/0.08/0.00
Lung	0/2.21/-
Liver	0/0.30/-
Kidney	0/0.01/0
Brain	0/0.78/0
Heart	0/0.09/0.01
Lung	0.1/2.20/-
Liver	0/0.29/-
Kidney	0/0.01/0
Brain	0/0.52/00
Heart	0/0/0
Lung	0/2.1/-
Liver	-/0.27/-
Kidney	0/0/0
Brain	0/0.48/0
Heart	0/0.06/0.01
Lung	0.1/2.1/-
Liver	-/0.27/-
Kidney	0/0.01/0
Brain	0/0.42/0

Table 2: RT-PCR Findings of tissues preserved in Normal Saline.

Tissue Types	RT-PCR Values
Heart	1.35/1.69/0.0
Lung	0.22/0.61/0.0
Liver	0.49/1.17/0
Kidney	0/0.01/0
Brain	1.45/3.07/0
Heart	1.21/1.63/0.1
Lung	0.24/0.66/0.2
Liver	0.69/1.21/0
Kidney	0/0.02/0.01
Brain	1.56/2.07/0
Heart	1.22/1.57/0.0
Lung	0.32/0.61/0
Liver	0.66/1.31/0
Kidney	0/0.04/0.0
Brain	1.76/2.57/0
Heart	1.34/1.78/0
Lung	0.24/0.76/0
Liver	0.98/1.89/0.0
Kidney	0/0.01/0
Brain	1.56/3.07/0.1
Heart	1.89/1.96/0
Lung	0.15/0.67/0.0
Liver	0.59/1.31/0
Kidney	0/0.02/0
Brain	1.87/1.57/0.0

RESULT AND DISCUSSION

F. Blum in the year 1893 accidentally discovered fixation by formalin. Protein-protein cross links along with intermolecular cross linking of proteins with DNA and RNA takes place in formalin preserved tissues. However, as per chemical testing, on coming in contact with uncharged amino acid groups, formaldehyde makes extremely reactive methylols.[15] Due to this, it is said that the tissues get rigid for histological and immunohistochemical studies.

Results in this study revealed that the tissues preserved in formalin at 4ºC for 100 days were not able to generate complete profile due to binding or inhibition. The values obtained in RT-PCR has been mentioned in Table 1 and 2. On the other hand, the reference samples kept in normal saline at 4ºC showed good yield even after 100 days.

The failure of amplification in formalin-fixed tissue could be due to inhibitions and quantity of the DNA amplified was found to be poor. The most affected area of DNA was large size marker more than 300 base pairs. In case of formalin, it is also observed that some of small sized markers were able to generate partial profile which are markers ranging from 80 base pairs to 160 base pairs. However, large size markers above 240 base pairs could not produce the profiling of the deceased individual as they could not be amplified.

Moreover, samples preserved in normal saline yielded sufficient quantity of DNA which has been represented by almost all the genetic markers of different sizes. In fact, larger markers above 210 base pairs also showed better amplification in normal saline under the preservation conditions. (Figure 1) Whereas, in case of formalin, they could not produce any result. Though, as few reported studies, it is essential to add methylene bridges between proteins

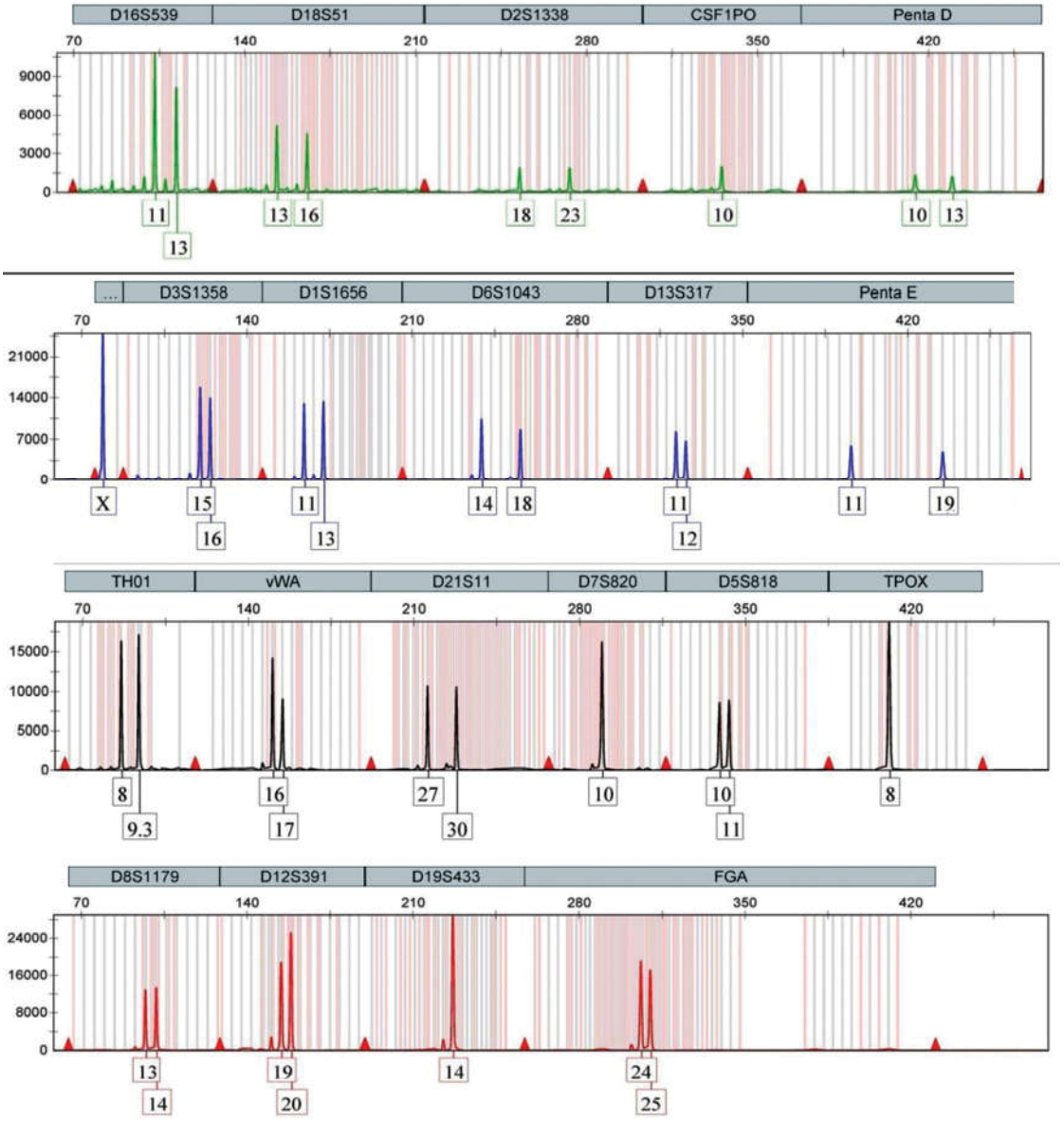

Fig. 1: DNA profile obtained from tissues preserved in normal saline.

and nucleic contents and CH_2OH to bases of nucleic acid for easy nucleic acids extraction, especially in case of RNA. Otherwise, fixation in formalin yields in poor quality RNA due to degradation. Moreover, high yield of RNA can only be extracted from fresh tissues.[16-18]

Some researchers believe that by washing and dehydration, formaldehyde can be completely removed from the formalin-fixed tissue. Actually, when washed multiple times, only loosely bound formaldehyde gets removed. Remaining formaldehyde cannot be removed merely by washing, though if a tissue is kept in water for a prolonged time, formaldehyde slowly starts to get removed. However, such intense washing is not a good idea for the purpose of histochemistry and histology.[15] However, it is interesting to know that a study revealed that the quantity and quality of extracted products gets affected by the type of kit used for the extraction method and the nucleic acids amount is also dependent on formalin fixed paraffin embedded tissue age and origin.[4,5]

Sodium chloride being an inexpensive and readily available substance have found place in fixation of tissue, even in field conditions in tropical countries which lack cooling and freezing facilities and

hospitalslackingserviceofpathology.Preservation ofmolecularstructureoftissuesbysodiumchloride hasnotbeenexplainedinthepast.Itcanbeasodium specific, chloride anion and hyperosmolarity effect.N-formyl-methionyl-leucylphenylalanine gets stopped in hypertonic saline which raises intracellularcalciumion.Additionally,dehydration ofcellsinosmoticmediumandintercellularmatrix canalsobeconsidered.[19] Saraj's research suggests that saturated sodium chloride solution can be used as an alternative to formalin as it gives same histologicalfeaturesasformalinintissuefixation.[20] Tissuepreservedinnormalsalinehasbeenproven to yield RNA better than formalin-fixed tissues. Since tissues fixed in formalin severely affect the RNA so normal saline can be considered as a safer alternative which protect the histomorphology as well as the RNA of the tissue. The integrity of membraneofcellisguardedbynormalsalinewhich results into inhibiting the release of intracellular RNase. However, some unexplored facts may also be responsible for avoiding RNA degradation in normal saline preserved tissues.[21]

In this study, formalin preserved tissues were found unable to generate sufficient or complete profileintheabove-mentionedcondition.Though some of the small sized markers can be identified butlargesizedmarkersshowednopeak.Ithappened becauseofalterationsandcross-linkingofnucleic acidswithproteinswhichchangesthebondingof DNA and RNA. It even led to complete breakage of the DNA. The sample size taken in this study is relatively small to conclude a definite result so it is suggestive that more number of samples can be consideredtocometoaconclusiveresult.Moreover, thetypeofDNAkitusedforextractionalsoaffects itsoverallanalysis.Differentcommercialkitscanbe usedtoseeifvarianceoccursinthedata.Thefactors i.e.temperatureanddurationofpreservationcan alsolimittheresearchdata.Thesetwoparameters can be explored to obtain varied results.[4,15]

CONCLUSION

In our study, the reference sample yielded good quantity of DNA which shows that normal saline can be used to preserve tissue under the defined conditions. Normal saline is an easily available, handy and cheap alternative to formalin. So, it can be safely considered to be used in the laboratories for nucleic acid extractions.[21] Some of the tissues were found to be dissolved in normal saline hence it is suggested that the tissue preserved in normal saline should be clean prior to preserve in normal saline to avoid contamination. Furthermore, more studies are needed to determine the actual reliability and safety of using normal saline for genetic analyzes.

Acknowledgments

The authors would like to thank those who generously donated their body tissue samples for education and research whom without their contribution, we wouldn't have been able to conduct this study. We would like to thank Dr. Deepak Mathur, Incharge, Mortuary, Civil Hospital and Kamal Sharma, Kalpatru Scientific for their constant support and encouragement.

Conflicts of interest: The authors declares there is no conflicts of interest.

Ethical Approval

The ethical approval for conducting this research study has been obtained from Institutional Ethics Committee, Civil Hospital, Gurugram, Haryana, India.

REFERENCES

1. Howat WJ, Wilson BA. Tissue fixation and the effect of molecular fixatives on downstream staining procedures. Methods (San Diego, Calif.) 2014;70(1):12–19.

2. Brenner E. Human body preservation – old and new techniques. J. Anat. 2014;224:316-44.

3. Kumar N, Maitray A, Gupta R, Shukla SK. Effects of preservative on foetus tissues and DNA profiling in forensic cases. International Journal of Molecular Biology. 2018; 3(4):165-67.

4. Carlsson J, Davidsson S, Fridfeldt J, Giunchi F, Fiano V, Grasso C et al. Quantity and quality of nucleic acids extracted from archival formalin fixed paraffin embedded prostate biopsies. BMC Med Res Methodology 2018; 18(1), 161.

5. Ludyga N, Grünwald B, Azimzadeh O, Englert S, Höfler H, Tapio S et al. Nucleic acids from long-term preserved FFPE tissues are suitable for downstream analyses. Virchows Arch. 2012 Feb; 460(2):131-40.

6. Buesa RJ. Histology safety: now and then. Ann Diag Pathol. 2007;11(5): 334-9.

7. Buesa RJ, Peshkov MV. How much formalin is enough to fix tissues? Annals of Diagnostic Pathology. 2012; 16:202-209.

8. Thompson SM, Craven RA, Nirmalan NJ, Harnden P, Selby PJ, Banks RE. Impact of pre-analytical factors on the proteomic

analysis of formalin-fixed paraffin-embedded tissue. Proteomics Clin Appl. 2013 Apr;7(3-4):241-51.

9. Chhabra N. Long term preservation of cadavers:Substitution of formalin with Phenoxyethanol:Need of the hour. International Journal of Anatomy and Research 2020;8(2.3):7557-63.

10. Buesa RJ. Histology without formalin. Annals of Diagnostic Pathology2008;12(6):387-96.

11. Udonkang MI, Ubi KA, Inyang IJ. Honey as fixative and safer substitute for formalin in histology. International Journal of Medical Laboratory Research 2018;3(3):11-17.

12. Fey MF, Pilkington SP, Summers C, Wainscoat JC. Molecular diagnosis of haematological disorders using DNA from stored bone marrow sides. Br. J. Haematol. 1987; 67:489-492.

13. W. John Kress and David L. Erickson (eds.) DNA Barcodes: Methods and Protocols, Methods in Molecular Biology, vol. 858, DOI 10.1007/978-1-61779-591-6_14, © Springer Science Business Media, LLC 2012.

14. McKiernan HE and Danielson PB. Molecular Diagnostic Applications in Forensic Science. Molecular Diagnostics 3rd ed., 2017.

15. Thavarajah R, Mudimbaimannar VK, Elizabeth J, Rao UK, Ranganathan K. Chemical and physical basics of routine formaldehyde fixation. J oral and Maxillofac Pathol 2012;16(3),400–405.

16. Chung JY, Braunschweig T, Williams R, Guerrero N, Hoffmann KM, Kwon M, et al. Factors in tissue handling and processing that impact RNA obtained from formalin-fixed, paraffin-embedded tissue. J Histochem Cytochem. 2008 Nov;56(11):1033-42.

17. Dotti I, Bonin S, Basili G, Nardon E, Balani A, Siracusano S, et al. Effects of formalin, methacarn, and fineFIX fixatives on RNA preservation. Diagn Mol Pathol. 2010 Jun;19(2):112-22.

18. Masuda N, Ohnishi T, Kawamoto S, Monden M, Okubo K. Analysis of chemical modification of RNA from formalin-fixed samples and optimization of molecular biology applications for such samples. Nucleic Acids Res. 1999;27(22):4436–43.

19. Olszewski WL, Zolich D, Manokaran, G, Tripathi MF. Sodium chloride fixation of tissues under field conditions in tropical countries. Journal of immunological methods 2004;284(1-2):39–44.

20. Al-Saraj A. Use of saturated sodium chloride solution as a tissue fixative. Iraqi Journal of Veterinary Sciences 2010;24(1):53-58.

21. Vincek V, Nassiri M, Knowles J, Nadji M, Morales AR. Preservation of Tissue RNA in Normal Saline. Laboratory Investigations; a journal of technical methods and pathology 2003;83(1)1,137-138.

Indian Journal of Forensic Medicine and Pathology
Volume 14 Number 4, October - December 2021
DOI: http://dx.doi.org/10.21088/ijfmp.0974.3383.14421.8

ORIGINAL ARTICLE

Perceptions about the Virtual Learning amongst Medical students: A Cross Sectional Study

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ABSTRACT

Background: Covid-19 pandemic has forced the medical education to switch from traditional learning to virtual learning. Many different platforms are available for virtual learning. And like any other teaching-learning method, this new method also has its pros and cons. But the important thing is how the medical students perceive this technique. Hence, the study was planned to understand the student's perception regarding Virtual learning.

Methods: A cross-sectional study was conducted among under-graduate medical students across various medical colleges in India, via a Google form. Total 824 medical students participated in the study.

Results: Out of 824 participants, 36.2% feel that students do not listen to the virtual class attentively from start to end. 79.2% agree that there is more distraction during virtual learning and 77.1% students feel that virtual learning is boring because of lack of interaction between teacher and students. Also 47.3% students don't think that it is easy to clear doubts during virtual learning. 77.5% agree that there are more chances of scrolling the social media during virtual learning. According to 67.7% students, only the knowledge aspect is better learnt during the virtual learning. But the 50.1% students agree that virtual learning is cost-effective and time-saving. Still, 90.9% students prefer traditional learning considering all aspects of medical education

Conclusion: Despite having certain advantages, medical students still prefer conventional method of learning to acquire different competencies, while the virtual learning remains supportive method. Many issues need to be addressed for wide acceptance of virtual learning.

Keywords: Virtual learning, traditional learning, medical students, medical education

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Received on: 03.06.2021
Accepted on: 12.02.2022

How to cite this article
Sandeep S Kadu, Pritish K Raut, Shamkumar U Burungale/ Perceptions about the Virtual Learning amongst medical students-A Cross Sectional study/ IndianJournalofForensicMedicine andPathology/2021;14(4):831-834

INTRODUCTION

Curriculum designing and its implementation is an integral part of all education systems. Curriculum has broad aspects and it includes various parameters such as its goal and objectives, content (syllabus), teaching and learning methods, organisation and scheduling the course, assessment and feedback from all stakeholders.[1] Teaching learning methods (T-L methods) are one of the most important parameters of curriculum. It can be classified according to listener's size, different domains and either student centered or teacher centered.

Covid-19 pandemic has caused havoc and fear in everyone's mind. Till date no curative treatment is available, only way to prevent is to take proper precautions. Social distancing is one of the most important precautionary measures to be taken during this pandemic era. Government has released the SOP's to higher educational institutions regarding the curricular implementation. As per government guidelines traditional learning is not possible during Covid-19 pandemic. Virtual T-L methods are performing an important role in the global Covid-19 pandemic era. It is not only helping in continuation of education but also supporting to break the chain of disease transmission.

Virtual learning is a learning experience that is enhanced through utilizing computers and/or the internet both outside and inside the educational organization.[2] The instruction most commonly takes place in an online environment. Virtual learning is known by various names such as digital learning, e-learning, web based learning, Online learning, Distributed learning, Computer-assisted instruction and Internet-based learning.[3]

There are many virtual platforms available such as learning management system (LMS), Modular Object-Oriented Dynamic Learning Environment (MOODLE) blackboard etc. Virtual learning is technology based T-L method, so it requires installation of softwares, training and technical support.[3] We all medical teachers are now well conversant and routinely using Virtual T-L methods since last one year. But, as each T-L method is having its own pros and cons and virtual T-L method is no exception. Being a new technique, many questions including the advantages and disadvantages regarding the virtual T-L methods remains unanswered. One of the question is what are the students perceptions regarding different aspects of this method? Are they really learning with this T-L method? Which type of learning domain they learnt better? Hence, the study was planned to understand these various aspects of student's perception regarding Virtual learning.

MATERIAL

A cross-sectional study was conducted among the under-graduate medical students (MBBS) across India in the month of April and May-2021. The questionnaire regarding student's perception about virtual and traditional teaching-learning methods was first designed and then validated by peers. Ethical clearance was taken from Institutional Ethical Committee (IEC). Google form containing the consent and questionnaire was constructed. The survey link is https://forms.gle/yrt9KqV56czNGrEo8. Link was then sent to the MBBS students all over India via WhatsApp groups. Those students attending the online classes and give an informed consent were included in the study. In our study, a total of 824 students from different medical colleges from all over India submitted their response. These responses were converted into Excel spreadsheet and analysed.

RESULTS

Results show that 299 (36.2%) participants feel that students do not listen to the virtual class attentively from start to end and large proportion of students 513 (62.3%) disagree that the virtual learning is more convenient than that of traditional learning. Majority of the students 653 (79.2%) agree that there is more distraction during virtual learning than traditional learning and 635 (77.1%) students feel that virtual learning is boring than traditional learning because there is no face to face communication between teacher and students. Almost the equal number of students 639 (77.5%) agree that there is more chances of scrolling the social media during virtual learning than traditional learning. Also 390 (47.3%) students don't think that it is easy to clear doubts during virtual learning. But the 413 (50.1%) students agree that virtual learning is cost-effective and time-saving. According to 558 (67.7%) students, only the knowledge aspect is better learnt during the virtual learning (Table 2). Hence 749 (90.9%) students prefer traditional

learning over virtual learning considering all aspects of medical education (Graph 1). Students feel that convenience and time-saver as the main advantages of virtual learning; while distraction, no interaction between students and teachers and lack of gaining practical knowledge are considered as important disadvantages of virtual learning methods.

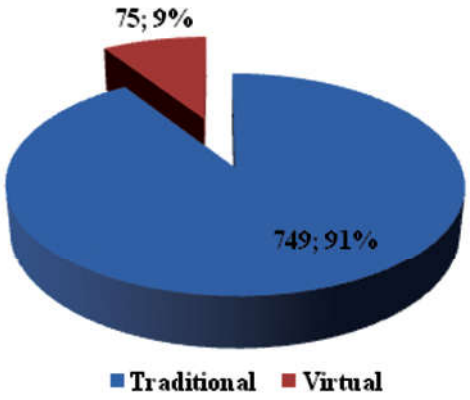
Table 2: As per your opinion, which of the aspects is better learnt during virtual learning?

Knowledge (%)	Behavioural aspects (%)	Practical aspects (%)	All (%)	Total (%)
558 (67.7)	121 (14.7)	38 (4.6)	107 (13)	824 (100)

Table 1: Perception of students about virtual and traditional TL methods.

Question	Strongly agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)
Students listen the virtual class attentively from start to end	41 (5.0)	219 (26.6)	265 (32.2)	208 (25.2)	91 (11.0)
Virtual learning is more convenient than traditional learning	44 (5.3)	121 (14.7)	146 (17.7)	314 (38.1)	199 (24.2)
Distraction is more during virtual learning than traditional learning	286 (34.7)	367 (44.5)	106 (12.9)	49 (5.9)	16 (1.9)
Virtual learning is boring than traditional learning because there is no face to face communication between teacher and students	304 (36.9)	331 (40.2)	113 (13.7)	62 (7.5)	14 (1.7)
It is easy to clear doubts during virtual learning	35 (4.2)	154 (18.7)	245 (29.7)	263 (31.9)	127 (15.4)
Virtual learning is more time saving and cost-effective than traditional learning	102 (12.4)	311 (37.7)	181 (22.0)	152 (18.4)	78 (9.5)
There is more chances of scrolling the social media during virtual learning than traditional learning	300 (36.4)	339 (41.1)	125 (15.2)	52 (6.3)	8 (1.0)

Graph 1: According to you, which learning method will you prefer considering all aspects of Medical Education?



DISCUSSION

In this cross-sectional study to find out the perceptions of medical students about virtual learning; 824 medical students across various medical colleges in India participated. More than one-third of the students do not listen to the virtual class attentively from start to end. Similarly the students reported to have limited attention span during online learning.[4] Also the study conducted by Adchitre SA, et al[5] found out that 52.2% students disagreed that their attention and focus stayed longer during online learning supporting the findings of our study. Almost 80% students agree that there is more distraction during virtual learning than traditional learning and it is boring than traditional learning because there is no face to face communication between teacher and students; these were considered as major disadvantages by many participants. And similar kind of findings was reported by many previous researchers. Ekarini Daroedono et al[6] in their study titled "The impact of COVID-19 on medical education: our students perception on the practice of long distance learning" mentioned that 77.6% students agree that there is lack of concentration and 62.9% students mentioned lack of interaction as an inhibitory factor during the virtual learning. Similar views were stated by Shashikant Dhir et al[3] that lack of face to face interaction was one of the hurdles in preventing the widespread use of e-learning. Adchitre SA, et al[5] also mentioned that 71.1% students get distracted during online classes and 64.5% students feel that online classes are less engaging and boring because of lack of face to face interaction between teacher and students. Stuty Jayara[7], a medical student in her article underlined the role of offline classes in building up strong teacher-student relationship because

of direct interaction. But the Kuldeep Singh et al[8] had a contrasting finding that 54.8% students believed that interaction with teacher was better than or as good as physical classroom. Also there are more chances of scrolling the social media during virtual learning than traditional learning; which was reiterated by Stuty Jayara[7] that it is difficult for students to resist the temptation to use social media. In our study 47.3% students don't think that it is easy to clear doubts during virtual learning. This was exactly the same as study by Adchitre SA, et al[5] where 48.2% students disagreed that it was easier to clear doubts through online discussion.

In spite of these disadvantages; 50% students agree that virtual learning is cost-effective and time-saving; and convenience being the biggest advantage of virtual learning. This observation was similar to many other studies like Rehana Khalil et al[9], Shashikant Dhir et al[3], Adchitre SA, et al[5] and Stuty Jayara.[7]

Majority of the students feel that only the knowledge aspect is better learnt during the virtual learning and therefore prefer traditional learning over virtual learning considering all aspects of medical education. But Mohammad Rajab et al[10] found that 62.5% students prefer combined method and 25.5% prefer traditional method of learning. Similarly mixed responses were there in the study done by Rehana Khalil et al[9], whereas the feedback received by Kuldeep Singh et al[8] showed that the percentage in favour of physical classroom was 50%.

Findings suggest that the convenience, time-saver and cost-effectiveness are the major advantages of the virtual learning. But the medical students will still prefer the conventional mode of learning the medicine as acquiring competencies and developing certain skills are vital while practicing medicine and those cannot be learnt in virtual learning. Still virtual learning has its importance, but there are certain barriers as identified by Diane O'Doherty et al[11] as time constraints, poor technical skills, inadequate infrastructure, absence of institutional strategies and support and negative attitudes of all involved which needs to be addressed for wide acceptance of virtual learning.

Limitations

In this study, participants were only medical students and their perceptions regarding virtual learning were recorded. In order to have an comprehensive data and find out the other issues involved in virtual learning, a separate study which will include all the stakeholders such as teachers, parents, institution or university curriculum committee members, etc. should be conducted.

REFERENCES

1. Bhuyian PS, Rege NN, Supe A. The Art of Teaching Medical Students. 3rd ed. Elsevier Publication; 2015.

2. Racheva V. What is Virtual Learning? [Online] 2017 November 29; [Cited 2021 may 21] Available from: https://www.vedamo.com/knowledge/what-is-virtual-learning/#:~:text=Virtual%20learning%20is%20a%20learning,facilities%20of%20the%20educational%20organization.&text=The%20teaching%-20activities%20are%20carried,%2C%20time%2C%20or%20both).

3. Dhir SK, Verma D, Batta M, Mishra D. E-Learning in Medical Education in India. Indian Pediatr. 2017 Oct 15;54(10):871-877. doi: 10.1007/s13312-017-1152-9. PMID: 29120336.

4. Valentina A, Nelly A. The role of e-learning, the advantages and disadvantages of its adoption in higher education. IJERN 2004;2:397-410.

5. Adchitre SA, Adchitre PA, Dase RK. Conventional V/S Online Teaching During The Covid-19 Pandemic: Perception Of Undergraduate Medical Students Of India. International Journal of Advanced Research. 2020 September; 8(9);794-801

6. Daroedono E, Siagian FE, Alfarabi M, Cing JM, Arodes ES, Sirait RH, et al. The impact of COVID-19 on medical education: our students perception on the practice of long distance learning. Int J Community Med Public Health 2020;7:2790-6.

7. Jayara S. The advantages and disadvantages of online teaching in medical education. J Med Evid 2020;1:144-6.

8. Singh K, Srivastav S, Bhardwaj A, Dixit A, Misra S. Medical Education During the COVID-19 Pandemic: A Single Institution Experience. Indian Pediatr. 2020 Jul 15;57(7):678-679. doi: 10.1007/s13312-020-1899-2. Epub 2020 May 4. PMID: 32366728; PMCID: PMC7387263.

9. Khalil, R., Mansour, A.E., Fadda, W.A. et al. The sudden transition to synchronized online learning during the COVID-19 pandemic in Saudi Arabia: a qualitative study exploring medical students' perspectives. BMC Med Educ 20, 285 (2020). https://doi.org/10.1186/s12909-020-02208-z.

10. Rajab M H, Gazal A M, Alkattan K (July 02, 2020) Challenges to Online Medical Education During the COVID-19 Pandemic. Cureus 12(7): e8966. DOI 10.7759/cureus.8966.

11. O'Doherty, D., Dromey, M., Lougheed, J. et al. Barriers and solutions to online learning in medical education – an integrative review. BMC Med Educ 18, 130 (2018). https://doi.org/10.1186/s12909-018-1240-0.

Indian Journal of Forensic Medicine and Pathology
Volume 14 Number 4, October - December 2021
DOI: http://dx.doi.org/10.21088/ijfmp.0974.3383.14421.9

ORIGINAL ARTICLE

Histomorphological Study of Atherosclerotic Lesions of Coronary Artery and Aorta: An Autopsy Study

Sunita Nyamagoudar[1], Ramesh BH[2], Radhika C Sasturkar[3]

ABSTRACT

Background: Cardiovascular diseases leading to atherosclerosis are rapidly increasing in Indian population. This study was formulated to assess histomorphological atherosclerotic changes in aorta and coronary arteries and grading of lesions according to American Heart Association Classification (AHA).

Materials and Methods: 57 heart specimens received for autopsy study were included in the study. Hearts were fixed in 10% formalin and dissected. They were examined grossly for atherosclerotic lesions in aorta and coronary arteries and subsequent microscopic sections were studied and graded according to AHA classification.

Results: 44(77%) cases belonged to male and 13(23%) cases belonged to female. 16(28%) cases were seen in third decade followed by 14(24.6%) and 9(15.8%) in second and fourth decades respectively. Majority of atherosclerotic lesions were noted in aorta (25) followed by LAD (10). Maximum number of lesions were in grade II with 15(26.3%) cases followed by grade IV and grade III with 13(22.8%) and 10(17.5%) cases each respectively.

Conclusion: Atherosclerotic lesions are rapidly increasing among younger population. Screening programs and preventive measures if implemented early can prevent these lesions and it's complications.

Keywords: Atherosclerosis; Aorta; Coronary artery.

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Received on: 05.11.2021
Accepted on: 12.02.2022

INTRODUCTION

Cardiovascular diseases (CVD) are one of the leading causes of death globally. As per the World Health Organization (WHO) factsheet, about 17.9 million (32%) of global deaths were caused by CVDs in 2019. Among these deaths, 85% were due to heart attack and stroke.[1] One-fifth of these deaths is noted in India especially in younger population. CVDs strike Indians a decade earlier than the western population. Causes of concern for CVD in Indians are early age of onset, rapid progression and high mortality rate. Indians are known to have the highest coronary artery disease (CAD) rates, and the conventional risk factors fail to explain this increased risk. Majority of deaths happen at home without knowing the exact cause of death. Hospital-based morbidity and mortality data may not be representative of overall disease burden.[2]

How to cite this article
Sunita Nyamagoudar, Ramesh BH, Radhika C Sasturkar/ Histomorphological study of atherosclerotic lesions of coronary artery and aorta: An autopsy study/Indian Journal of Forensic Medicine and Pathology/2021;14(4):835-840

Coronary artery disease due to atherosclerosis has become a major social epidemic in India. Atherosclerosis is a chronic degenerative condition manifesting with thickened arterial wall.[3] It is initiated by lipid retention, oxidation, and modification, which provoke chronic inflammation, ultimately causing thrombosis or stenosis. Most common risk factors include hypertension, tobacco smoking, diabetes mellitus, obesity, and genetic predisposition; the molecular details of how they work are not yet known.[4] Assessment of atherosclerotic lesions in living population is difficult as it is invasive and expensive. Hence autopsy studies are proving helpful in studying these lesions in developing countries. The aim of this study was to evaluate the incidence and severity of atherosclerotic lesions in coronary arteries and aorta in different age groups among the autopsy specimens we received.

MATERIALS AND METHODS

This study was conducted from January 2019 to August 2021 at Department of Pathology, Raichur Institute of Medical Sciences, Raichur. The hearts received with medico-legal autopsy cases were included in the study. Written informed consent was taken from the relative/guardian of the deceased patient. The study was ethically approved by Institute's ethical committee. 57 hearts were included in the study. Received hearts were fixed in 10% formalin, weighed and then dissected using inflow-outflow method. Gross examination of heart, coronary arteries and aorta was done. Coronary arteries mainly Right coronary artery (RCA), Left circumflex artery (LCX) and Left anterior descending artery (LAD) were examined for thickening of wall, thrombus, luminal narrowing. The coronary arteries were sectioned at 5mm intervals to look for presence or absence of atherosclerotic plaques. Aorta was examined for thickening of wall, presence and nature of atheromatous lesions including fatty streak, presence of calcification.

Multiple sections were taken from representative areas. After routine processing and paraffin embedding, 4µm sections were taken and stained with Hematoxylin-Eosin. All the histological sections were examined microscopically for presence of atherosclerotic lesions. All the atherosclerotic lesions were graded according to American Heart Association.[5] It is as given below:

Type I: Initial lesion with foam cells

Type II: Fatty streak with multiple foam cell layers

Type III: Preatheroma with extracellular lipid pools

Type IV: Atheroma with a confluent extracellular lipid core

Type V: Fibroatheroma

Type VI: Complex plaque with possible surface defect, hemorrhage, or thrombus

Type VII: Calcified plaque

Type VIII: Fibrotic plaque without lipid core

RESULTS

Out of the 57 hearts included in the study, majority of them were in 3rd decade of life

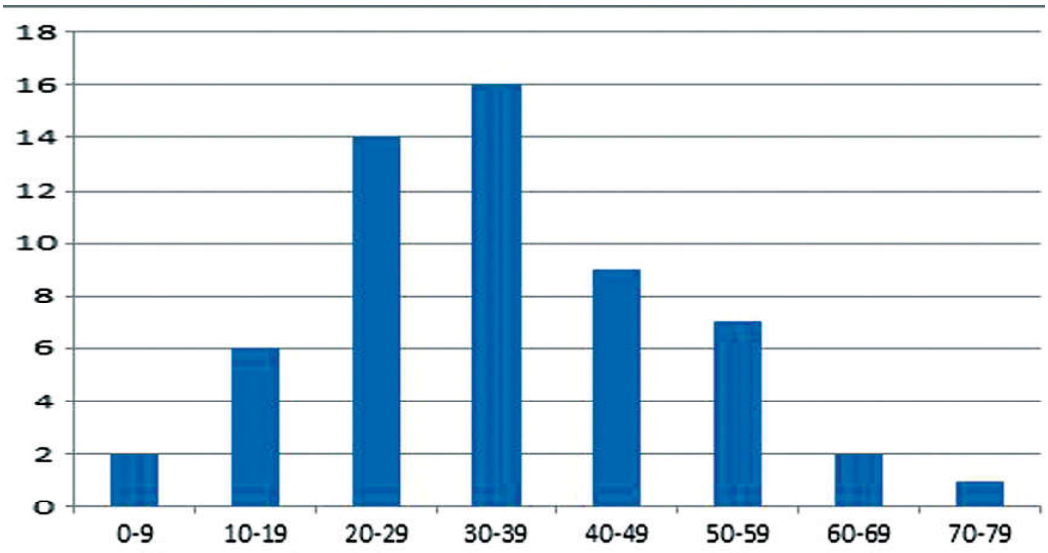

Fig. 1: Distribution of atherosclerotic lesions according to age group.

16(28%) followed by 2nd decade 14(24.6%) and then 4th decade 9(15.8%). Distribution of atherosclerotic lesions according to age is given in figure 1. 44(77%) of cases were male and 13(23%) cases were female. 4 cases had associated myocardial infarction.

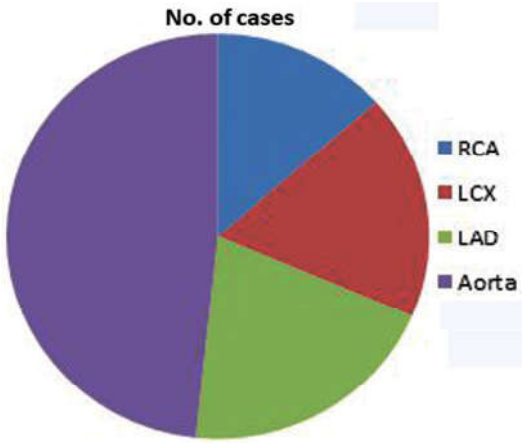

Fig. 2: Distribution of atherosclerotic lesion in aorta and coronary arteries.

Majority of atherosclerotic lesions were noted in aorta which accounted for 25(43.8%) of cases followed by LAD which showed lesions in 10(17.5%) of cases. 9(15.8%) of LCX and 7(12.3%) of RCA showed atherosclerotic lesions. The frequency distribution of these lesions in aorta and coronary artery is given in figure 2.

Grossly aorta and coronary arteries were checked thoroughly for atherosclerotic lesions. Gross photographs of few of the lesions as depicted in figure 3.

Microscopically aorta and coronary arteries were studied and athermanous lesions were graded according to American Heart Association Classification with few of them depicted in figure 4. Majority of the lesions were noted in grade II with 15(26.3%) cases followed by grade IV and grade III with 13(22.8%) and 10(17.5%) cases each respectively. Only two cases of grade VII and one case each of grade IV and grade V were noted.

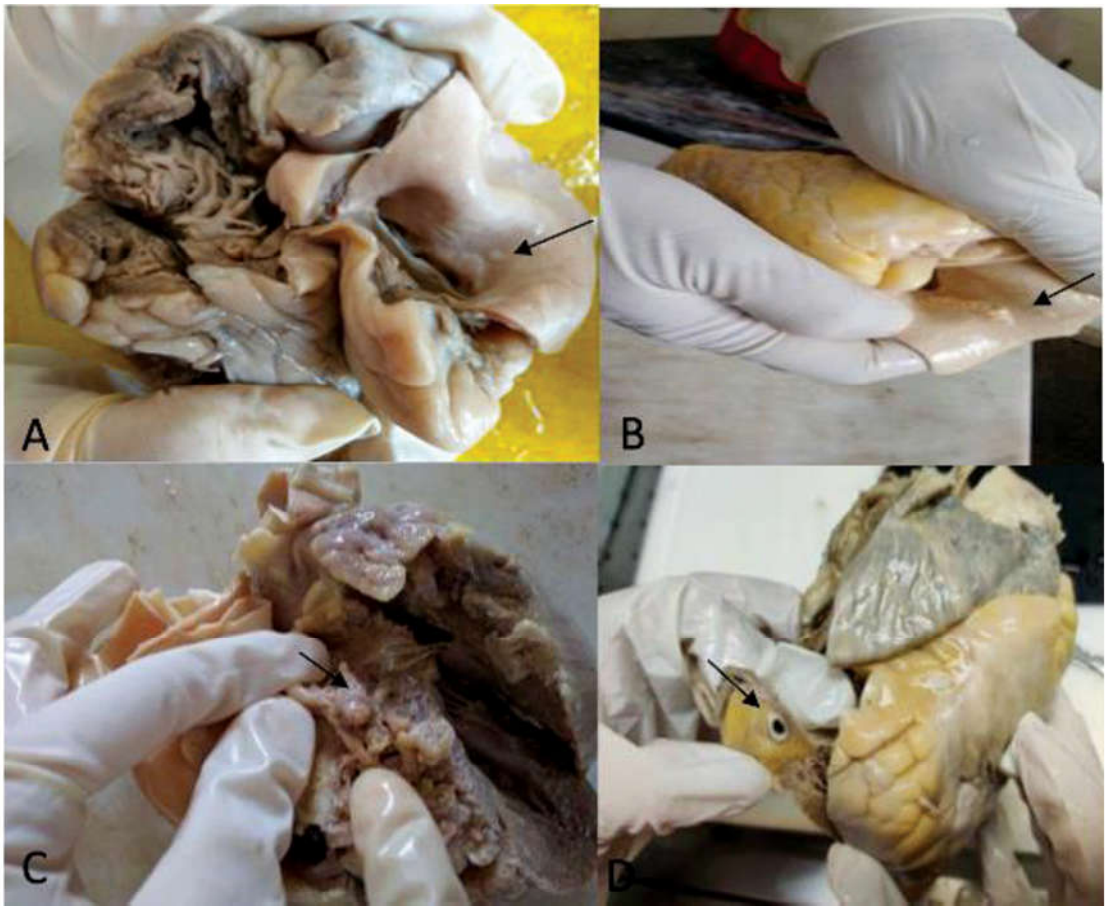

Fig.3: Gross photographs of atherosclerotic lesions: A, B-Aorta. C, D-Coronary arteries. Atherosclerotic lesion with thrombus noted in RCA in D.

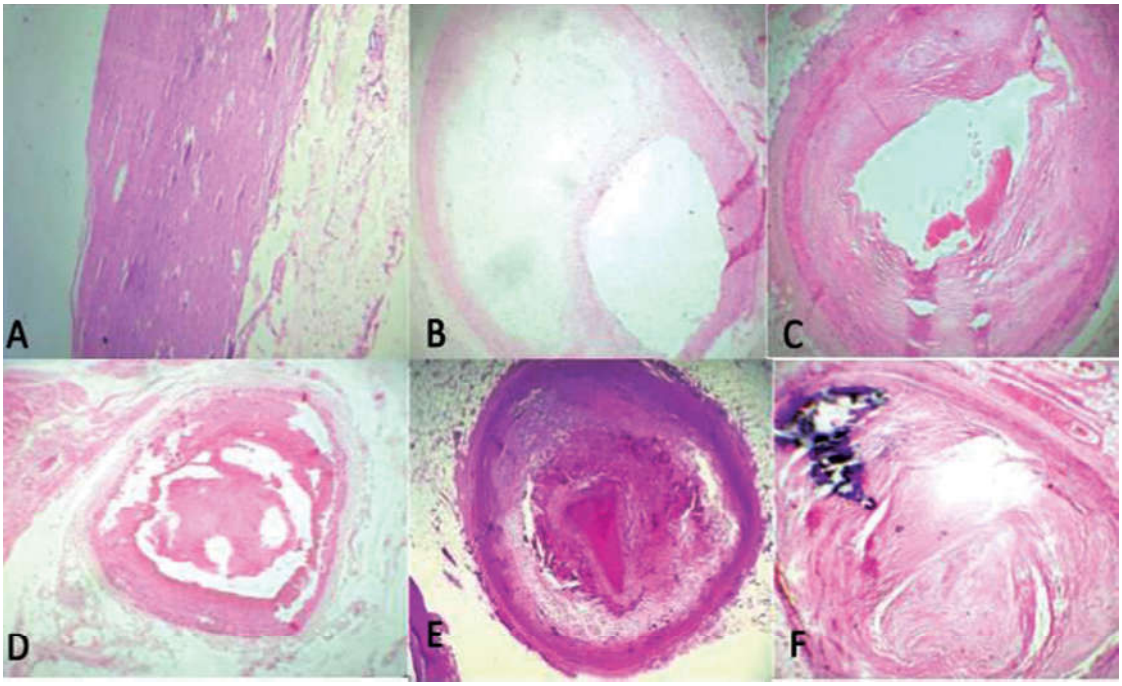

Fig. 4: Microphotographs of atherosclerotic lesions: A- Grade II lesion in Aorta. B, C, D, E, F- Grade III, IV, V, VI, VII lesion in coronary arteries.

Cases in grade II, III, IV changes according to age in different coronary arteries and aorta is tabulated in table1, 2 and 3.

Table 1: Grade II atherosclerotic changes in different age groups in different vessels.

Age group	RCA	LCX	LAD	Aorta
0-9	0	0	0	0
10-19	0	0	0	0
20-29	0	0	0	0
30-39	01	01	0	04
40-49	0	0	0	03
50-59	01	0	01	02
60-69	0	0	0	02
70-79	0	0	0	0

Table 2: Grade III atherosclerotic changes in different age groups in different vessels.

Age group	RCA	LCX	LAD	Aorta
0-9	0	0	0	0
10-19	0	0	0	0
20-29	0	0	0	03
30-39	0	0	0	0
40-49	02	02	01	01
50-59	0	0	0	01
60-69	0	0	0	0
70-79	0	0	0	0

Table 3: Grade IV atherosclerotic changes in different age groups in different vessels.

Age group	RCA	LCX	LAD	Aorta
0-9	0	0	0	0
10-19	0	0	0	0
20-29	0	0	0	0
30-39	0	01	01	01
40-49	0	0	02	01
50-59	01	03	02	01
60-69	0	0	0	0
70-79	0	0	0	0

Severity grading of atherosclerosis in RCA with age showed grade IV changes in only one case, grade III in two cases, grade II in two cases and grade I in three cases. Majority of these cases were in 5th decade.

Severity grading of atherosclerosis in LCX with age showed one case in grade VII, one case in grade VI, four cases in grade IV, two cases in grade III and one case in grade II. Majority of these cases were in 5th decade.

Severity grading of atherosclerosis in LAD with age showed one case in grade V, five cases in grade IV, one case in grade III, one case in grade II and one case in grade I. Majority of these cases were in 5th decade.

Severity grading of atherosclerosis in Aorta with age showed majority of the lesions in grade II[11] followed by five cases in grade III, four cases in grade I and three cases in grade IV. Majority of these cases were seen in 4th decade.

DISCUSSION

Atherosclerosis develops progressively through continuous evolution of arterial wall lesions which have been described in the histopathology of plaques in humans and experimental animals. These changes are closely similar in coronary arteries and aorta which inturn form a strong description of cumulative development of atherosclerosis.[4]

The prevalence of atherosclerotic lesions in our study was 49% which is concordant with study by Khanna K et al and Garg M et al.[6,7] In the present study, majority (77%) of cases were male and 23% were female which is in concordance with studies done by Garg M et al, Thej MJ et al, Vyas P et al, Venkatesh K et al, Abedinzadeh et al and Yazdi et al.[8-11]

Early fatty streak development begins in childhood and adolescence. Atherosclerosis is believed to start when the lipid accumulation appears as confluent extracellular lipid pools and extracellular lipid cores with decreased cellularity. Considering age factor, majority of cases in present study were noted in younger population (3rd and 2nd decade) in concordant with studies done by Yazdi et al, Joseph A et al, Khanna K et al.[12] In few other studies majority of cases were in 3rd and 4th decade. These variations can be explained by diversity of lifestyle, food habits, Socio-economic status and environmental factors.

LAD was the frequently involved coronary artery which was concordant with other studies. Atherosclerotic lesions were noted most commonly in aorta and fatty streak (Grade II) lesions were mostly noted in aorta.

Our study had majority of lesions in grade II followed by grade IV and grade III. Khanna K et al noticed maximum lesions in grade III followed by grade IV. Thej M et al and Khanna K et al did not consider grade I and grade II lesions as atherosclerotic. But grade II lesions appear to be significant as they are occuring at younger age groups and can evolve into more advanced lesions.

According to a study by Dalager S et al, coronary arteries had the most prevalence of lipid core plaques which were considered vulnerable plaques and hence more deaths resulting from such lesions.[13] Fibrous plaque lesions start forming at about 15-30 years of age and continue throughout life. Atheromatous plaques seem to progress into advanced lesions as the age increases. This feature was noticed in this study and in most of the other studies.

CONCLUSION

The study of atherosclerotic lesions in living subjects is a difficult task. Autopsy study is a cost effective approach and helps in estimating future disease burden in the population. The study had a male preponderance but an increased proportion of females are seen presenting with atherosclerotic lesions. An increased prevalence of atherosclerosis was seen in younger population. This study suggests more screening programs and preventive measures be taken for atherosclerosis at young age.

REFERENCES

1. WHO. World Health Organization; Geneva: 2019. Global Health Estimates 2019: Deaths by Cause, Age, Sex, by Country and by Region,2019.

2. Kumar AS, Sinha N. Cardiovascular disease in India: A 360 degree overview. Med J Armed Forces India. 2020 Jan; 76(1): 1–3.

3. Vyas P, Gonsai RN, Meenakshi C, Nanavati MG. Coronary atherosclerosis in noncardiac deaths: An autopsy study. J Midlife Health. 2015 Jan-Mar; 6(1): 5–9.

4. Insull W. The Pathology of Atherosclerosis: Plaque Development and Plaque Responses to Medical Treatment. William Insull, Jr., MD. The American Journal of Medicine. 2009 Jan; Vol 122, No 1A.

5. Cai J-M, Hatsukami TS, Ferguson MS, Small R, Polissar NL, Yuan C. Classification of Human Carotid Atherosclerotic Lesions With In Vivo Multicontrast Magnetic Resonance Imaging. Circulation. 2002;106:1368-1373.

6. Khanna K, Garg V, Khanagwal VP, Dagar T, Paliwal PK, Sen R. Atherosclerotic changes in aorta and coronary arteries at autopsy in North Indian population. Int J Adv Med 2019;6:994-1002.

7. Garg M, Agarwal AD, Kataria SP. Coronary atherosclerosis and myocardial infarction: An autopsy study. J Indian Acad Forensic Med. 2011 Jan; 33(1): 39-42.

8. Thej MJ, Kalyani R, Kiran J. Atherosclerosis in coronary artery and aorta in a semi-urban population by applying modified American Heart Association classification of atherosclerosis: An

autopsy study. J Cardiovasc Dis Res 2012;3:265-71.

9. Venkatesh K, Deepak DC, Venkatesha VT. Postmortem Study of Hearts – Pathology of Coronary Artery Atherosclerosis. J Forensic Sci& Criminal Inves. 2019; 12(4): 001-006.

10. Abedinzadeh N, Pedram B, Sadeghian Y, Nodushan SMHT, Gilasgar M, Darvish M. A histopathological analysis of the epidemiology of coronary atherosclerosis: an autopsy study. Abedinzadeh et al. DiagnPathol (2015) 10:87.

11. Yazdi SAT, Rezaei A, Azari JB, Hezari A, Shakeri MT, Shahri MK. Prevalence of Atherosclerotic Plaques in Autopsy Cases with Noncardiac Death. Iran J Pathol (2009);4 (3), 101- 104.

12. Joseph A, Ackerman D, Talley D, Johnstone J, Kupersmith J. Manifestations of Coronary Atherosclerosis in Young Trauma Victims-An Autopsy Study. J Am Coil Cardiol 1993;22:459-67.

13. Dalager S, Paaske WP, Kristensen IB, Laurberg JM, Falk E. Artery-related differences in atherosclerotic expression: Implications for atherogenesis and dynamics in intima-media thickness. Stroke 2007;38:2698-2705.

Indian Journal of Forensic Medicine and Pathology
Volume 14 Number 4, October - December 2021
DOI: http://dx.doi.org/10.21088/ijfmp.0974.3383.14421.10

Case Report

Misconception, Misbelieve of Child sexual Abuse and Cure of HIV in Transkei, South Africa: A Case Report

B Meel

ABSTRACT

Background: South Africa has one of the highest numbers of rapes in the world, and Transkei, a former black homeland, now a part of the Eastern Cape Province, is one locality with many child rapes. The unemployment, poverty and crime levels are very high in the region.

Objective: To highlight the problem of sexual abuse and HIV in the Transkei region of South Africa.

Case History: This report presents a victim of rape, a two-year-old female child, who was brought to the Umtata General Hospital in the evening with profusely bleeding per vaginum. She was sexual assaulted by a HIV positive caretaker adult male in his 30s, acting on a mistaken belief that sex with a virgin will cure an HIV-infected person or AIDS sufferer of his illness. The young mother of the victim has also experienced a rape in her childhood, and her husband was murdered a year ago in front of her child. She does not know about her father and was raped in her childhood by a foster father. The history, the physical examination and the uneventful antiretroviral therapy are discussed in this manuscript. Conclusions is drawn and preventive steps are suggested.

Conclusion: There is a high misconception and strong misbelief in child sexual abuse and a cure of HIV infection in the Transkei region of South Africa.

Keywords: Misbelief; Misconception; HIV infection.

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Received on: 11.09.2021
Accepted on: 31.12.2021

INTRODUCTION

The virgin rape myth is prevalent in the community of Transkei, South Africa, and poses a major social problem in contributing to the spread of HIV infection.[1] There is increasing belief in the virgin sex myth with the increase in child rape in South Africa.[1] There is an increasing rate of sexual abuse in the Transkei region of South Africa.[2] South Africa has the highest incidence of child rape in the world.[2] HIV infection is a life-threatening consequence of rape.[3] Probably, this could be a reason for the high HIV sero-negativity (90%) of the victims at the time of the incident in a very high HIV/AIDS prevalent community.[3] HIV postexposure prophylaxis (PEP) can serve as a means of secondary prevention in an environment where the majority of children are negative, and the majority of perpetrators seems to be HIV positive. It is a life saving prophylaxis.

How to cite this article
BMeel/Misconception,misbelieve of child sexual abuse and cure of HIV in Transkei, South Africa: a case report /Indian Journal of Forensic Medicine and Pathology/2021;14(4):841-845

Therefore, anti-retroviral drug treatment should be carried out in all the cases of rape that are represented within 72 hours of the rape.[4] Child rape is becoming more common in South Africa.[5]

Africa is the continent most severely affected by the HIV/AIDS pandemic, with east and southern Africa more severely affected than west and central Africa. Differences in the spread of the infection can be accounted for by a complex interplay of sexual behaviour and biological factors that affect the probability of HIV transmission per sex act.6 The purpose of this case report is to highlight the problem of misconception and misbelief in sexual abuse of children and a cure for HIV infection in the Transkei region of South Africa.

CASE REPORT

On the first of April 2000 at about 20 hours, I received a call from a nursing staff member of the Gynaecology out-patient department (GOPD) that there was a girl of two years (VZ) who had been sexually assaulted by an unknown male in the B.H., a place of safety for infants. When I reached the GOPD an elderly lady in white clothes was waiting for me. There was no official document (J88 form) with sister as the case had not yet been reported to the police, but I carried out an examination without the police in quest and noted the findings on a piece of paper to transfer them later whenever the J88 form was available. It was available after one day and then the findings were transferred onto the J88 form. The male suspect had been working in the B.H. for many months and was the only male member in the B.H.; therefore, he was suspected and taken into police custody. Unfortunately, there was a history of HIV seropositivity of the suspect rapist and he was under treatment for HIV/AIDS.

On physical examination, the child was apprehensive and crying. She had painful and swollen external genitalia. The hymen was ruptured with a swollen margin 10 mm in diameter. The posterior fourchette was torn. Dried up blood was seen around her external genitalia and perineum. No discharge was visible. The genital injuries were compatible with recent sexual assault. The blood of the child was examined for HIV, and it was found to be negative. HIV testing was carried out after pre-counselling with the child's guardian (who brought the child to the GOPD). Liver functions were advised. Treatment was advised including prophylactic antiretroviral drugs (AZT & 3TC). The second blood test for HIV was carried out after three months and again it was negative.

FS, a 25-year-old woman, is one of the unfortunate mothers of a child who has suffered many setbacks in her life, including being sexually abused by her foster father when she was staying at a foster home with her sister away from her mother. Her mother did not have money for schooling, so she sent her daughter to a foster parents' home, as she seemed to be a bright girl. It was in E.L. where the foster parent's brother used to touch her and fondle her genitalia. FS was 12 years old at that time and used to run away to the other room. Likewise, this man used to do the same with her younger sister as well and FS was very worried about her sister.

She told this story to her schoolteacher who referred her to a social worker, but the social worker did not take much interest in her situation. She stayed at the foster home until she was 17 years of age. This happened, she narrated, because her mother's boyfriend was a friend of the foster parents. Therefore, her mother never revealed the name of her father to her, and she was abandoned by her mother in early childhood in Umtata, and her mother married another man in E.L. She hardly enjoyed her childhood as she had undergone lots of hardships.

She encountered a male in 1995 and started living with him as a boyfriend. More misfortune for FS was not far away as her boyfriend was gunned down by robbers in 1999 in front of the child. She moved to another city in search of a job as there was no support for FS. She was unemployed and could not look after the child properly. A neighbour reported to the social worker that there was a neglected child and therefore the child was taken away to a safe home called B.H. FS was repenting her mistake as she was not aware of how safe the safe home was. She was devastated by the sexual assault of her child. The story was told to her on the 5th day after this incident after the culprit was put behind the bars. She is still unaware of the fact that the rapist was HIV positive. This was the third tragedy in the life of FS as she never thought of a sexual assault on her child in the safe home which took place on 1st of April 2000.

DISCUSSION

Sexual promiscuity is common, and this is a contributory factor to the spread of HIV in the community. The widespread rape and forced sexual abuse of children is a serious social and health issue. One of the motives behind this unsocial and unhealthy epidemic is the strong belief in a myth of achieving a cure for a person's HIV/AIDS through sexual intercourse with a virgin. The resistance to change the attitudes of African people regarding their false beliefs and persistent myths about sexual practices is an obstacle to the HIV/AIDS prevention programmes. There is a strong challenge to all the leaders-political, community and religious-to dispel this virgin cleansing myth. Due to the magnitude of the problem of rape in South Africa, it is necessary to develop a rational policy to offer PEP to the victims.[4]

In the Transkei, it could be presumed that less than 10% of the child abuse cases are reported to the police.[2] The poor reporting and return of the victims for the test could be explained, as most women in this region are poor and live in very remote areas where the roads are just tracks and there is no proper transport service. Getting to a hospital is difficult for most of them.[2] If, anyhow, they manage to reach hospital, it is usually quite late. In such cases, there are limitations on the medical evaluations validating sexual abuse.[7] In fact, medical examination of sexual child abuse cases seldom provides legal proof of sexual abuse in many cases. The most important evidence is the story told by the child. Therefore, the examination is a supplement, which may support or remain neutral to the story told by the child.[8]

The police were not informed by the guardian of BH about the VZ, but the author took the findings on a piece of paper and later transferred them onto a J88 form. Vague obtained evidence and delay in transferring to a J88 form leads to distortion of the evidence. A careful examination of the sexually abused child may reveal evidence of male ejaculation which is important evidence. The examining doctor must try to collect a specimen which could procure seminal stain in the laboratory for the legal proof of sexual assault. Courts heavily depend on medical evidence for the purpose of prosecution or acquittal of the perpetrator, even though medical evidence has its own limitations. The society in question is a fragmented society with poor social norms and family values. The family fabric is very fragile in what is a poverty-stricken area with high sexual promiscuity. The problem of child rape is peculiar in that those who are supposed to protect children themselves are involved in causing harm. Most of the times the perpetrators are close relatives or persons known to the children. The role of schoolteachers in child rape has been reported in many African countries.[9]

It is difficult to measure the psychological trauma in the life of FS as she has undergone repeated trauma during her lifetime, including sexual abuse. But she seems to me a courageous lady as her first reaction after the sexual assault of her child was that she wanted to kill the man who assaulted her daughter. Depressed people tend to feel powerless and angry about changing their situation. Because they often depend on others for many of their personal needs, depressed people are extremely sensitive to criticism and rejection.

Depressed persons have often experienced many losses and their grief is frequently unresolved which may only confirm their feeling of worthlessness. On asking how she felt about the man, she narrated that she disliked all the men on the street, and she can't trust anybody. FS is lacking any support from her mother. She has one stepsister and two stepbrothers in E. L. Her mother is not working and stays at home. She is feeling depressed and cannot sleep at night. She is also not eating well as she is worrying about her child. She is worrying about the effects of the rape on her. She asked me, in fact, about the effects. It is again difficult to measure the effects on the life of a child (VZ) as, firstly, she experienced the trauma of her father being killed by robbers in front of her and, secondly, she has now been sexually assaulted. VZ is hardly two years old, but she has undergone two traumas. There is a wide range consequence for the victims of rape,

both in the immediate period following the assault and in the long-term.[10]

A study carried out by Campbell et al. in 2001 showed that the victims often agree as to what reactions are healing (positive), but that they do not agree as to what is hurtful (negative).[11] This happened in the case of FS. She recalled her own rape when her child VZ was raped. There was hardly any support for her child VZ, as her mother was not employed, and her boyfriend get killed. The author spoke to the grandmother on the boyfriend side of VZ, but instead of supporting her she made a case against the author at the Health Professions Council just for enquiring about the reason for abandoning her grandchild. It could be a racial problem as the boyfriend is a white, and she is an African black person.

There should be response from legal, medical, and mental health systems to the needs of rape victims which was lacking in the case of VZ. Community support is also lacking in VZ's case which is required and predicts victim's outcomes and future consequences related to the sexual assault.[12] VZ was examined with a kit as the police were not contacted on that Saturday evening. There are some people in the investigation team who are engaged in harmful behaviours that are detrimental to rape survivors' psychological well-being.[13]

FS is depressed due to the sexual assault on her daughter, and she is labelling it due to own her fault. If she had not put her child in safe home (BH) the child might have not been raped by the caretaker of that home. She is having mixed feelings of guilt and self-accusation. She is experiencing this reaction due to situational stressors such as the loss of her child's dignity, her emotional trauma, and life-threatening HIV and other infections. There is no support for FS. The only support she expected was from her grandmother but after the death of her boyfriend her doors were closed. When misfortune comes, it comes in multiple times, and the poor lady has no place to live in this world along with a child of two years. Reassurance is needed to restore a sense of security or worth. BH did help FS to get anti-retroviral drugs as the perpetrator was known to be HIV positive. The fear of getting HIV infection is a life-threatening situation.[4]

The prevalence of physical, sexual, and emotional abuse is a common experience as in this case of FS. Patients with a history of abuse, particularly sexual and emotional abuse, are at increased risk of suicidal behaviour.[14] She fails to sleep at nights and feels depressed. FS also has lost trust in males, and she fears them. Suicidal ideation in the case of FS needs urgent attention in treatment to reduce the risk of suicide. There is a strong correlation between childhood sexual abuse and mental health issues. Childhood sexual abuse is more frequent in women from disrupted homes as well as those who have been exposed to inadequate parenting.[15] All of a sudden, she became unemployed after the death of her boyfriend. She failed to support her child and that made her leave the child at a so-called safety home, BH. Later, she realised her mistake of keeping her child in BH. She could remember the agony of rape of her child as she has experienced it herself in her childhood.

CONCLUSION

The misconception and misbelief of sexual abuse of children and cure of HIV/AIDS is widely prevalent in the rural community of the Transkei region of South Africa. There are many children rape in this community. It is sad that a protector becomes a perpetrator of rape. It is also fuelling HIV/AIDS in this region of South Africa.

Ethical issue

The author has ethical permission for case report publication (approved project No. 4114/1999) from the Ethical Committee of the University of Transkei, South Africa.

Conflict of interest: None

Funding: Self-funded

REFERENCES

1. Meel BL. The myth of child rape as a cure for HIV/AIDS in Transkei: A case report. Medicine, Science, and the Law 2003;43(1):85-88.

2. Meel B. Trends of rape in the Mthatha area, Eastern Cape, South Africa. Journal of South African Academy of Family Practice/ Primary Care 2008;50(1):69-69b.

3. Meel BL. A study on the prevalence of HIV-seropositivity among rape survivals in Transkei, South Africa. J Clin Forensic Med.2003;10(2):65-70.

4. HIV/AIDS post-exposure prophylaxis for victims of sexual assault in South Africa. Med Sci Law.2005;45(3):219-24.

5. Jeweks R, Abraham N. The epidemiology of rape and sexual coercion in South Africa: an overview. Social Science Medicine 2002; 55(7): 1231-1244.

6. Buve A, Bishikwabo-Nsarhaza K, Mutangadura G. The spread and effect of HIV-1 infection in sub-Saharan Africa. Lancet. 2002 Jun 8; 359(9322):1960.

7. Muram D. Child sexual abuse-genital tract findings in prepubertal girls. The unaided medical examination. Am J ObstetGynecology 1989;160(2):328-33.

8. Lauritsen AK, Charles AV. Forensic examination of sexually abused children. UgeskrLaeger 2001;163(18):2485-8.

9. Omaar R, de Waal A. Crimes without punishment: sexual harassment and violence against female students and universities in Africa. Discussion Paper Number 4, African Rights, July 1994.

10. Rentoul L, Appleboom N. Understanding the psychological impact of rape and serious sexual assault of men: a literature review. J PsychiatrMent Health Nurs 1997;4(4):267-74.

11. Campbell R, Ahrens CF, Self T, Wasco SM, Barnes HE. Social reactions to rape victims: healing and hurtful effects on psychological and physical health outcomes. Violence Vict 2001 Jun;16(3):287-302.

12. Campbell R. The community response to rape: victims' experiences with the legal, medical, and mental health systems. Am J Community Psychol 1998;26(3):355-79.

13. Campbell R, Raja S. Secondary victimization of rape victims: insights from mental health professionals who treat survivors of violence. Violence Vict 1999;14(3):261-75.

14. Goulda DA, Stevens NG, Ward NG, Carlin AS, Sowell HE, Gustafson B. Self-reported childhood abuse in an adult population in a primary care setting. Prevalence, correlates, and associated suicide attempts. Arch Fam Med 1994 Mar;3(30):252-6.

15. Mullen PE, Martin JL, Anderson JC, Romans SE, Herbison GP. Childhood sexual abuse and mental health in adult life. Br J Psychiatry 1993; 163:721-32.

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[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/HSQ 20.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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