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Aims and Scope

This journal is published to expand the academic activities and spread the knowledge, ideas and latest research in the field of ethics, trauma, and victimology. This journal publishes original research papers, review articles, case reports, letters to the editor and review of books on ethics, trauma, and victimology. This journal is supported by the Society for Prevention of Injuries and Corporal Punishment (SPIC) and Indo Pacific Academy of Forensic Nursing Science (INPAFNUS). This journal is supporting the aims of the SPIC and the INPAFNUS. This journal also highlights the achievements of the SPIC, INPAFNUS and their members.

This journal covers the various aspects of ethics, evidence-based medical ethics, ethical dilemmas and various dynamic issues related to ethics. It also covers the ethical issues related to Forensic Nursing Science, Forensic Odontology, and Forensic Psychiatry. It also covers the ethical aspects of Toxicology including Environmental Pollution. It covers issues related to all sorts of corporal punishment and their prevention, particularly in schools. It covers physical as well as psychological aspects of trauma and clinical forensic medicine related to all types of injuries and prevention of injuries.It covers all aspects of victimology including etiology, crime scene investigation, and prosecution.

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Founder Editor in chief

Dr. R K Gorea
Email: editoretv@gmail.com

Founder Associate Editors

Dr. A. D. Aggarwal
Dr. Anil Garg

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Dr. R. K. Gorea
#E-209, FF, R1, DLF Hyde Park, New Chandigarh,
PO. Mullanpur Garibdas,
Distt. SAS Nagar, Punjab,
India 140901
Phone number: +919872020840
Email:gorea_r@yahoo.com

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Address for submission of articles

Dr. R. K. Gorea
#E-209, FF, R1, DLF Hyde Park, Sector 5, New Chandigarh, PO. Mullanpur Garibdas, Distt. SAS Nagar, Punjab, India 140901

Online Submission at

Email: editoretv@gmail.com

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Professor Emeritus & Advisor
Medicolegal Institute
Baba Farid University of Health Sciences
Faridkot, Punjab
India

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From the Editor's Desk

I would like to congratulate all of you that together we are entering the second decade of Publication of the International Journal of Ethics, Trauma and Victimology with the publication of the 21st issue of this journal.

I convey sincere thanks to all of you for your cooperation, which has made this possible. As a member of the Editorial Board and as a reviewer, you have provided me with unstinting support to enhance the quality of this journal.

My thanks are also due to those authors who provide good quality research papers, review papers and case reports, which enhances the status of this journal by getting many citations for this journal.

I also appreciate those who critically analyse the journal and write letters to the editor to improve the quality of the journal and share their new ideas.

I wholeheartedly thank the society for Prevention of Injuries and Corporal Punishment [SPIC] and the Indo Pacific Academy of Forensic Nursing Science [INPAFNUS] for supporting the publication of this journal. I also convey my thanks to MRI Publishers for keeping this journal alive online.

Warm regards,

Rakesh K Gorea

Editor-in-Chief

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EDITORIAL

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Beyond the Screen: The Expanding Role of Forensic Nursing in Managing Cybercrime Victimisation

Rakesh K Gorea*

Professor Emeritus & Advisor Medicolegal Institute Baba Farid university of health Sciences, Faridkot, Punjab, India.

Abstract

Cybercrime victimisation holds significant relevance in the present-day scenario of criminal activities around the world. Cybercrime victimisation occurs in many different ways. It may be from cyberbullying to digital stalking, revenge pornography to online sexual exploitation, and online platforms being used for human trafficking, to name a few examples. For solving these cases, forensic evidence is needed. Forensic nurses need to know how to respond to such cases when these cases are brought to them. They need knowledge about these crimes to effectively deal with them and report them. Forensic Nurses require skills to solve such cases by identifying, collecting and preserving the related pieces of online evidence. They should be able to make foolproof documentation in such cases.

They need to provide trauma-informed care to such victims and should be able to provide first aid in mental health care in such cases, in addition to their routine roles as forensic nurses. They will be required to work in collaboration with cyber experts to deal with the digital evidence, taking due care of their legal mandates as well as taking care of the ethical aspects in such cases.

Forensic nurses must have digital literacy. They should have an awareness of different types of digital crimes and how to collect online evidence of digital crime to successfully prosecute the culprits of digital crime.

Keywords: Cybercrime, Digital crime, Forensic nursing, Cyber victimisation.

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Introduction

Social media is used frequently by medical and nursing professionals, including forensic nurses. They are supposed to utilize this media effectively but keeping in mind the laws and ethics of use because they are dealing with the patients. They sometimes wish to highlight the successes of their professional achievements. Still, they should remember they should not do anything that may jeopardize the details of their patients and their patients become the victims in this cyberage. [1,2] This is usually the lack of awareness of the rules of digital use of the data. In other circumstances, some people may use digital data deliberately to harm another person, and such persons may become the victims of cybercrime.

Digital literacy

It is defined as the capability to solve problems by practising digital tools and technologies, and use the resources in an ethical manner to find, critically evaluate, create, and communicate information and handle the data skilfully. [3]

Forensic Nursing Science

Forensic Nursing Science is a branch of science that is a combination of knowledge and practice of Nursing health care, the criminal justice system and forensic sciences, including forensic medicine when applied to criminal investigation and the judicial system of a country.[4]

Corresponding Author: Rakesh K Gorea, Professor Emeritus & Advisor Medicolegal Institute Baba Farid university of health Sciences, Faridkot, Punjab, India, e-mail: editoretv@gmail.com

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Growth of Cybercrime

Cybercrimes are increasing day by day. This is due to the increased availability of the internet, and the majority of people are digitally illiterate or not sufficiently literate to prevent such crimes. Though financial frauds top the list of crimes yet online sextortion is one such crime where forensic nurses may get the opportunity to investigate such cases.[5]

There is a rising trend of cybercrimes in India and worldwide. In India, reported cases of cybercrime in 2018 were 208,456; 394,599 in 2019;1158,208 cases in 2020; 1402809 cases in 2021.[5]

Cybercrimes against children increased by 32% in 2022 as compared to 2021, and these include child pornography, cyberstalking, bullying and distribution of dirty material with

children in it.[6], 200 arrests have been made for cybercrime against children.[7]

Crimes destabilise the economy as social trust is undermined and harm the communities.[8]

Digital literacy for Nurses

Digital literacy will help nurses use their electronic records of patients. Health data can be accessed and analysed for better patient outcomes. Digital literacy among nurses is improving, but it is still not at a desired level. Low literacy makes them prone to cybercrimes. Low literacy also makes it difficult to deal with digital and cybercrimes.[9,10]

Digital literacy for Forensic Nurses

Though forensic nurses are more aware but still the level of literacy needs to be improved to make them efficient in handling cases of cybercrimes. They lack specialised training.[11]

Digital Crime

There are crimes that are done or facilitated on digital platforms or using digital techniques. These technologies are rapidly advancing, and so is the ease with which the offenders can perpetrate these crimes.[11]

Different types of Digital Crimes

Financial crimes, identity thefts, and unauthorised access in 2024: 62% of cases of cybercrimes involved finances.[7] A few examples are being given below, but this is not a complete list of the digital crimes to which forensic nurses can come across in their professional capacity.[11]

- *Cyberbullying*

When bullying is done using some online technique, social media, or texting,[12] and victim is afraid that if he tells this to his parents or teachers, the instrument through which he is being bullied will be taken away from him. Mostly children and people of a young age[13] are bullied online**.** Cyberbullying involves intimidation, denigration, exclusion, flaming, outing and trickery.[11,14] Mostly it is by the internet or mobile phones.[13]

- *Digital stalking*

Unwanted tracking or surveillance is done using GPS or hacking**.** This is a form of bullying that also happens online.[11,14] Cyberstalking usually leads to fear, as this is usually repeated a number of times.[15]

- *Online sexual abuse*

Persons wish to know others online for some sexual activity, and later on, they are pressured or persuaded into sexual abuse. Lower self-esteem, Poor psychological health, poor relationship with parents, and risk-taking behaviour are precursors for being victims of online abuse.[16] Initiation and facilitation of sexual abuse are helped by digital technology. Victims of online sexual abuse were more prone to develop psychopathy, depression and PTSD.[17] Online sexual abuse of children is from 13.5 to 21.7% in one of the studies. First, there are voluntary online sexual acts, and then there is nonconsensual sharing the images. This leads to psychological stress.[18]

- *Online sexual exploitation*

one of the studies conducted in the Philippines shows that poverty and low socioeconomic factors play a major role in it, and, for earning money, parents are involved in it. Children involved in this study ranged from 18 months to 18 years, with customers both local and foreigners in the cybersex dens, with different platforms being used, from online dating sites to Facebook and Skype. There were erotic displays as well as forced sex. This exploitation, in some cases, lasted for many years. This is also known as webcam child sexual tourism and cyber child porn. It has ill effects for the exploited children, for the well-being of the victims, both socially and health-wise.[19]

- *Emotional abuse*

It is well established that emotional abuse in children produces anxiety and depression when they grow up and increases susceptibility to psychiatric illnesses, and a person has neuroticism.[20] These effects may be affected by many internal and external factors.[21] Females and those families with one partner abusing the other are more prone to such abuse, especially when the Intimate Partner Violence is considered.[22] Emotional content use is more prevalent with online technologies, so emotional competencies should be promoted when using online technologies.[23] It may involve remote monitoring and technology-facilitated abuse.[24] Young people often seek help from anonymous communities and persons in such cases.[25]

- *Revenge pornography*

sexually explicit images of others without their consent are posted to defame or take revenge for some motives or entertainment. In some cases, motives may be political, and this is becoming a worldwide phenomenon. This may be done by heterosexuals, lesbians and gays.[26] It is used for the harassment of the victims, and it humiliates them. It happens more with women.[27] Usually, it happens when a relationship breaks down, and it used to cause fear and psychological harm.[28]

- *Grooming*

it is a process of preparation of a child or vulnerable adult by a perpetrator to gain the trust so that the person can be sexually abused later on. Evidence of grooming can help in the prosecution of the offender.[29] It can be a precursor to sexual assault offline.[30]

- *Intimate partner abuse*

Intimate partner cyber abuse is increasing in the world. Intimate Partners are threatened and intimidated. They are humiliated and harassed. Such conditions need intervention. When managing IPV and abuse, managing emotional abuse should be considered.[22] Resources may be many for the abusers, but for the victims, technologies often fall short.[31] Usually, after separation, women suffer from their ex-partners as they are

using mobile phones, the internet, and GPS systems.[32] Online help and interventions are available for the persons involved with intimate partner cyber abuse.[33]

- *Online human trafficking*

The internet is used for human trafficking, usually through illicit websites and social networks, through hidden advertisements and messages for illegal services. [34] In the process of illegal migration, persons become victims or modern slaves.[35]

Effects of Digital Crime on the Victims

As most of these crimes remain invisible to others so there are more chances that the victim may not discuss with others, leading to isolation associated with anxiety, Post Traumatic Stress Disorder (PTSD). Due to the fear of stigma, they remain silent and do not seek help.[17,36]

Cyberbullying may lead to decreased satisfaction in life, distress and suicidal ideation. Cyberbullying detection software may help in the detection of cyberbullying.[37]

Women are killed after they are separated from their abusers.[32]

Evidence in Digital Crime

Digital evidence has some properties that distinguish it from physical evidence. Digital evidence is tangible, and it is generated by the users and the system. Specific regulations for this evidence are not yet clear.[38] It may be information or data that is stored or transmitted electronically, which can help in the detection of crime and the prosecution of the offender. It may help to show the intent of the offender or may be an alibi for the crime or criminal.[38,39] These may be audio, video or text and images. These may be screenshots and chats on mobiles, computers and networks.

Techniques used by the perpetrators are getting more sophisticated, e.g., encryption. Deep web and darknet are providing tools for illegal work, and their detection is becoming harder and harder, almost impossible in certain situations [40]

Identifying the Evidence

Such data is fragile and sensitive. This data must be complete, accurate and authentic. This must be convincing to the court so that it is accepted in the court.[38] Investigating officer should be able to evaluate and assess it. Digital instruments will be able to work as digital evidence, and the crime scene will be digital.[41] Volume and vastness of digital evidence are becoming huge, and identifying the evidence is a huge problem.[40]

Collection of Digital Evidence

It needs careful handling. It is very vulnerable to changes. Evidence collection protocols for digital crimes should be followed. Never forget to collect screenshots and chats with time stamps. First responders at the crime scene have a big responsibility to collect this evidence. Blockchain technology is used.[42] Fundamental rights of persons must be respected while collecting such evidence.[38]

Device handling and collection should be properly done. The data is vulnerable to attacks.[43]

Preserving the Evidence

It requires sophisticated methods to preserve it. Preserve the data carefully in folders with strong passwords. Keep the machines also password-protected and in safe hands and safe places. Handling the digital evidence is very important, and the chain of evidence should never be forgotten. A secure system should be used to store and transfer the data.

A two-level blockchain can be utilised to manage the digital data and maintain the chain of custody. Hot and cold blockchain can be applied. Hot blockchain can be used for identity and investigation, whereas cold blockchain can be utilised for videos.[43]

Documentation should be Foolproof

Their trauma needs documentation as well as validation, and it should be done correctly and meticulously.[10] They should not be shy of collaborating with cyber experts and law enforcement agencies, as collaboration will provide more useful results.[11]

Handling of Victims of Digital Crimes

Telehealth can be useful in such circumstances for anonymous help. Crisis counselling plays a very important role in such circumstances.

Trauma-informed Care

To know the impact of trauma on victims is important, and how this can be minimised by trauma-informed care is important for forensic nurses. Core principles of trustworthiness should be taken care of so that victims can be safely treated and empowered [44]

All those victims and survivors must be provided trauma-informed care. Victims may be from diverse circumstances, but they should be treated in such a way that they do not feel retraumatized when care is being provided to them. Disclosure by the patients, screening of the patients, relationship between the provider and victims, with minimum agony, taking care of the full autonomy of the victims, though relevant information should be provided for agreeing or not agreeing to a suggested intervention.[45]

Psychological help to the Victims of Cybercrime

Forensic nurses must be psycho-educated so that they know how to deal with the victims of trauma.[46] It is a great time for forensic nurses to show their abilities as counsellors to help the victims come out of this trauma. They should advocate for their cause to make them resilient and productive members of society.

Ethics in Forensic Nursing in Digital Crimes

Informed consent is very important in sharing the digital evidence. Due care is needed when victims are minors or cognitively impaired for some reason. Those people who are

in crisis are especially emotionally impaired, and special care should be taken in such cases while collecting the digital evidence from them. Data to be collected in some cases may be very sensitive, as it may be concerned with financial transactions or intimate scenes. If this data is not handled carefully, there is are chance that it may become a case of revictimization.

Material & methods

Academic search engine Google Scholar has been used to find the relevant literature i.e. Journal articles, conference papers using the key words. Google Search engine has been used to supplement the scholarly research for some reports and whitepapers from reputed organizations and government websites and academic institutions which have been used to review the current situation and their applicability for the forensic nurses. Only relevant material available in English has been used. Materials from non-credible sources and not in English have been excluded. A thematic analysis was conducted for recurring patterns, gaps and emerging trends. Methodological strengths and limitations were studied by comparative evaluation.

Discussion

Forensic nurses are merging the clinical care of the victims with the advocacy of their legal rights and helping in the prosecution of the digital offenders. Digital literacy amongst forensic nurses is a must so that offenders can be successfully prosecuted in the present-day judicial system.

Digital crime victims often have trauma that is not visible, but such victims require special attention. Forensic nurses can become a bridge in such cases and provide holistic care.

Challenges

There is a complex system of collecting the evidence, and forensic nurses are not taught anything about digital crimes in their curriculum.

There will be cross-border jurisdiction challenges. There may be legal conflicts as well as privacy challenges in collecting the evidence. While making decisions in such cases, one should be aware of the local laws, but should not forget the international privacy laws.

Exposure to different types of digital evidence may drain the forensic nurses emotionally. This may result in professional burnout, and it is very important to recognise this amongst forensic nursing professionals.

Ethical Dilemmas

Forensic nurses have to be loyal to the victims. At the same time, they have to be loyal to the judicial system of their countries. A conflict can arise while collecting evidence and being loyal to the victims. This may be more common when intimate examination is to be done, as it is a must for successful prosecution, but may not be liked by the victims.

Sometimes situation may be emotionally surcharged, but forensic nurses should never be biased.

Methods to Overcome the Challenges

Disclosure of the evidence should be minimal and only to those for whom it is legally required.

In ethical dilemmas, established ethical frameworks should be followed. Wherever there is a doubt, principles of beneficence, autonomy, non-maleficence, and justice should be followed.

Still, if there is doubt, it is better to follow evidence-based circumstances.[47]

Consultation with the Hospital ethics committee and legal advisors can be useful in many circumstances when you are not able to make a decision.

Specialised courses can be started for forensic nursing, where they can be taught the complexities of dealing with cyber and digital crime victims and survivors and the use of social media.[48]

Personal beliefs should never stand in the way of a rightful approach. Biases can be mitigated by the regular training of forensic nurses on how to avoid biases.

After recognising the professional burnouts, one should not shy away the professional support. Debriefing after the sessions helps in recognising burnout, and timely help can be provided.

Forensic nurses can be made members of the cybersecurity units. In the national health policy, this issue should be given due importance.

Expansion of telehealth can also help in this process to deal with cases of digital and cybercrimes.

15 cyber forensic labs have been established in different parts of India, and the Data Protection bill was passed in 2023, and now there is the Digital Personal Data Protection Act to curb cyber-crimes. Collaboration with the social apps and telecom operators has helped to investigate the cases in a better way. The use of artificial Intelligence in the detection of cybercrimes has made the detection of cybercrimes better.7

Awareness

Various adverse events in childhood can create changes in the body which can be at the molecular level, cellular level, or at the level of organs and show their effect on the development in physical, emotional and behavioural health. Providing a safe environment is very important, and this should be taken care of by forensic nurses.[46]

When forensic nurses are aware, they can help by creating virtual digital trauma clinics, especially in the underserved regions of their countries and other parts of the world. There should be trauma-informed care policies, and these policies should be implemented properly so that the survivor is not revictimized.

Public awareness should be created so that the stigma associated with various types of trauma can be reduced.[44]

One of the authors has developed toolkits for the software on the computer-based programs to guard the computers from cybercrimes.[49]

Training and Courses

Forensic nurses should be trained to foster a safe physical and emotional environment for the victims and survivors, and it is very important to prevent re-traumatisation. The patient should be fully involved in all the decisions of the treatment so that they become part of the team. [44]

Specialised courses can be initiated where forensic nurses are taught the details of handling digital crime, evidence collection and documentation of such crimes with special reference to the cases in which vulnerable sections of the society can become the victims.

Team Work

A forensic nurse can help in building a case of digital crime, as well as help the victim come out of this turmoil. She can help in recovery from this emotional trauma in a holistic manner. She may need to work as a member of the team, involving investigating agencies and experts from other fields.

There is a need to collaborate with those who can be helpful in this process of providing treatment and collecting the evidence.[44]

Conclusion

It is utmost necessary that forensic nurses adapt to the realities of the modern day, in which digital crimes are going to be more common. They need to learn the identification of digital crimes, the collection of digital crimes and preserving them. Meticulous documentation will play a great role, and they should become expert in it. There will be technological and ethical challenges, and they should be able to overcome these challenges by various means, including teamwork. They should be part of the team to provide healing and justice, along with validation. It is time for policymakers and educators to propagate this cause of strengthening the role of forensic nurses in the investigation of digital crimes. There is a need to educate, innovate and advocate for changes in the existing system.

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RESEARCH ARTICLE

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Reassessing Poroscopy: Obsolete or Underrated? A Research Article

Venugopal T[1], Gambhir OS[2*]

[1]Intern, SRMMCH, Chennai, India.

[2]Professor & Head, Department of Forensic Medicine & Toxicology, AIIMS Kalyani, Nadia, West Bengal, India

Abstract

Poroscopy, the study of sweat pores on friction ridge skin, is an important sub-discipline of dermatoglyphics with applications in forensic science and biometric identification. Despite its established forensic value, limited data exist on poroscopic patterns in young adult populations, particularly among medical students.

To analyse the poroscopic patterns in fingerprints of 200 undergraduate medical students and evaluate any variations based on sex and digit type.

A cross-sectional observational study was conducted among 200 undergraduate medical students (100 males and 100 females). Fingerprint impressions were collected using standard ink methods. Pore characteristics—including pore frequency, shape (round, oval, elongated), arrangement, and position—were analysed under magnification. Statistical analysis was performed to determine sex-based and digit-based differences.

The average pore frequency per centimetre was significantly higher in females compared to males ($p < 0.05$). Round pores were the most prevalent shape across all fingers, while elongated pores were the least common. A notable asymmetry in pore distribution was observed between dominant and non-dominant hands. The middle and index fingers showed the highest pore density. No significant association was found between pore pattern and academic stress or lifestyle factors.

The study establishes baseline poroscopic patterns among young Indian adults in a medical academic setting. Findings suggest gender and finger-based variation in pore characteristics, supporting the forensic relevance of poroscopy in individual identification. Further research with larger, more diverse populations is recommended to expand on these observations

Keywords: Sweat pores, fingerprints, Poroscopy, identification, forensic medicine

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Introduction

Poroscopy is a personal identification method that involves comparing the impressions of sweat pores on the friction ridges of the palmar and plantar surfaces. The method was discovered and developed by Sir Edmond Locard in 1912.[1,2] He observed that, like the ridge characteristics, the pores are also permanent, immutable, and individual specific, and thus these are useful to establish the identity or otherwise of individuals when available ridges do not provide sufficient ridge characteristics. It comes under level 3 of fingerprinting. Fingerprint matching can be done at three levels; the first deals with macro features like pattern type, ridge count, core, delta, and orientation. Level 2 comprises comparing the relative nature and position of ridge characteristics, also known as Galton's minutiae. Individualisation can be achieved at this stage. Level 3 focuses on the use of intra-ridge details or microfeatures like sweat pores, edge contours, friction ridge width, dots, incipient ridges, creases, and scars.[2-4]

Sir Edmond Locard began to study Poroscopy as a result of a break-in and theft. A rosewood jewellery box, which had held the stolen jewellery, was found to be covered with fingerprints. Several latent prints were obtained, and two people, identified by the names of Boudet and Simonin, were suspected of having committed the crime.[4-6] The prints lacked an overall pattern configuration, and the convicts would not have confessed to the crime. Then, Sir Edmond Locard compared both the prints and observed that the first accused's prints contained 901 pores, and the second accused's palm print contained 2000 pores in their relative position. Based on this, both men were convicted and sentenced for that theft.[2,7,8]

Sir Edmund Locard reported that the ridge characteristics present on the fingerprint patterns are permanent, immutable and individual specific. Similarly, the pattern of sweat pores is permanent and individual-specific. These pore characteristics are useful for the establishment of the identification of an individual, especially when the finger ridges are not sufficient to provide sufficient ridge characteristics.[9-11] Locard proposed factors for the analysis of the pores for personal identification. The factors of pores, like number, frequency of pores per unit

Corresponding Author: Gambhir OS, Intern, SRMMCH, Chennai, India ,Professor & Head, Department of Forensic Medicine & Toxicology, AIIMS Kalyani, Nadia, West Bengal, India, e-mail; drgambhirsingh@gmail.com

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area, the distance between two pores, size, shape and position of the pores, are useful in the study of poroscopy. The main purpose of the present study is to study these characteristics of pores and to help in the establishment of identification of an individual.[4,12,13]

Material & Methods

The present study is based on inked fingerprints and palm prints of two hundred undergraduate medical students. After explaining the whole procedure in the vernacular of the individuals, we collected their written consent in the presence of a witness. For this study, we included 200 undergraduate medical students, 100 males and 100 females, in the age group of 21 to 23 years. Details of each individual, such as name, age, and sex, were recorded. Those students who refused to consent were excluded from the present study. The left-hand thumb was used for the print collection and analysis. The hands were washed thoroughly with Dettol soap before collecting the prints. We used Kore's Printer's ink to take prints of the left thumb impressions. Later on, these prints were treated with Ninhydrin Chemical. For latent fingerprints, we used plain glass slides.

These fingerprints were examined under the stereo microscope at 40X magnification to study the different pores. The features of pores used in the analysis include the number of pores, size, shape, the interspacing between them, and their position on the ridge. The number of pores can be calculated in two ways, i.e., average number of pores per unit length and per unit area. The results were tabulated for easy analysis and comparison with the previous studies.

Result

In Case of Visible (inked) Prints

Number of pores

On average, there were about 7 to 24 pores on one centimetre ridge. The maximum number of pores was seen in the outer side of the digital pad and the hypothenar area, 106 cases (53%). The minimum number of pores was seen on the thenar aspect, 19 cases (9.5%). In the present study, more pores are seen in females than in males.

Interspacing between Pores

In the majority of the cases, we observed that the pores were arranged one after another in a line with almost uniform interpore space, 112 cases (56%). In a few cases, pores were found to be arranged side by side of a ridge, 15 cases (7.5%), and the interspace was also found to be irregular, 8cases (4%). In 5 cases (2.5%), pores were found to be connected without any interspace, giving a chain-like appearance.

Size of pores

The sizes are very variable, at some places pores are very large and at other places very small. Even on one ridge, we observed pores of various sizes. So, we grouped these pores into large, 70 cases (35%), medium, 98 cases (49%) and small, 32 cases (16%) instead of studying by measuring every pore. However, medium-sized pores were most frequently observed in the present study.

Shape of pores

The shape of pores is quite variable, even on the same ridge. Some pores are rounded (seen in 68cases, 34%), oval (seen in 54 cases, 27%), some are rhomboid (seen in 45 cases, 22.5%), and others are elliptical (seen in 58 cases, 29%). Some pores were triangular (seen in 43 cases, 21.5%) in shape. In 5 cases, it was square. However, the most commonly encountered shape in all print was the round or oval shape.

Position of pores

We observed that pores were situated either in the middle of the ridge or on the outer side of the ridge towards to furrows. The pores lying along the middle of the ridges have clear-cut, intact boundaries. Those pores lying along the periphery show intact boundaries as well as incomplete or broken boundaries. Those pores with intact boundaries are known as closed pores, and those with broken or incomplete boundaries are known as open pores. In the present study, closed pores are more commonly seen in 64 to 80% of the cases.

In cases of Latent Prints

The analysis of these latent prints was conducted after processing with Ninhydrin to convert them into visible prints. Such a developed print was studied by analysing various pores and compared with that of the inked prints. In the present study, the majority of the pores were rounded or oval in shape, and our study is in concurrence with the study conducted by KR Nagesh[3] and D.S. Preethi.[8]

Discussion

This method of identification is especially useful when the recovered prints are blurred, incomplete, overlapping or contain a low number of minutiae.[1-4]

In the present study, we observed that the number of pores is comparatively higher in females, and a similar observation was also reported by Preethi *et al.*[8.] If the number of pores is more than 9/25 sq.mm. It is more likely a female, and if it is less than 8pores/25 mm, then it is more likely from a male.[14,15]

Different studies reported that the size of pores ranged from 88 to 220 µm in diameter.[7,12] The size of the pores is not useful in identification as it changes based on their physiological activities.[9,15,16]

In the present study, we observed an average about 7 to 24 pores per centimetre of epidermal ridge. Similar findings were also reported by Bindra *et al.*[5], O'Leary *et al.*[6] and by Ashbaugh [7]

The pores are mostly situated either on the middle or the periphery of the papillary ridge. This finding is consistent with the work of Ashbaugh.[7]

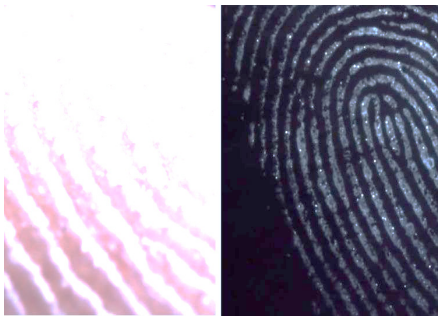

Figure 1: Rounded & oval shaped pores (400X)

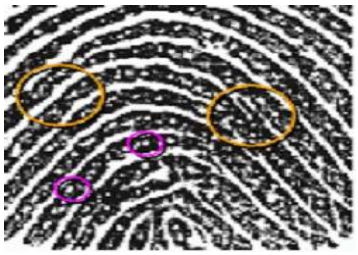

Figure 2: Square-shaped pores (400X)

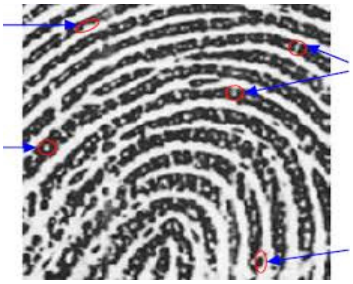

Figure 3: Rhomboid: Shaped pores (400X)

Owing to the elasticity and compressibility of the skin, there may be changes in the shape, size and type of the spores; however, the interspace between pores is constant.[7] Even during the flexion, the pores remain more or less constant, maintaining their distance.[7]

In the present study, we observed pores of various shapes like rounded, oval, triangular, elliptical, rhomboid and square. Various shapes of pores were also reported by Ashbaugh[7] and Bindra *et al*.[5.] In a study conducted by Bindra *et al*.[5] reported that rhomboid-shaped pores were most abundant, which was followed by round, elliptical, and rectangular-shaped pores. It was reported that pore shape is not a reproducible feature[9-11] because distortions caused due to pressure change will affect the basic shape of the pores. The type and shape of pores have no significant difference between the sexes.[5,14,16-19]

Conclusion

To conclude, the science of poroscopy is largely unexplored. The same can be understood by the search results, which show a dearth of available research data on poroscopy, thereby emphasising the need to conduct more work in this field. Forensic science is the science of justice, and evidence, no matter how minute, should never be overlooked. Sweat pores are a part of the valid information provided by fingerprints and should not be ignored. They are difficult to mimic, present in abundance and are permanent. If the limitations can be overcome as discussed before, they can act as a competent tool for facilitating personal identification when used along with ridge characteristics.

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RESEARCH ARTICLE

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Post-mortem Analysis of Burn Injury Cases in Forensic Medicine: A Medicolegal Perspective

Md. Syedur Rahaman Sumon[1*], Rowshon Ara Begum[2], Jannatul Ferdous[3], Nazia Sharmin[4], Md. Belayet Hossain Khan[5]

[1]Professor (CC), Department of Forensic Medicine, Bashundhara Ad-din Medical College, Bangladesh.
[2]Assistant Professor, Department of Forensic Medicine, Khwaja Yunus Ali Medical College, Bangladesh.
[3]Assistant Professor, Department of Forensic Medicine, Bashundhara Ad-din Medical College, Bangladesh.
[4]Assistant Professor, Department of Forensic Medicine, Shaheed Monsur Ali Medical College, Bangladesh.
[5]Professor & Head, Department of Forensic Medicine, Sir Salimullah Medical College, Bangladesh.

Abstract

Even before the primitive man learnt to use fire, he had been a victim of it. Our study was carried out for 1 year, starting from 1st January 2019 to 31st December 2019 at Sir Salimullah Medical College & Hospital, Dhaka, Bangladesh, on burn deaths. The aim and objective of the study were to know the demographic pattern, cause of death and relation of the body surface involved.

The rate of burn death was 7.63% of the total autopsies. Male victims outnumbered female victims with a female to male ratio of approximately 2.1:1. The Majority of the cases belong to the adolescent and young adult (21- 30 years) age group. The maximum no. of victims was married. In most of the fatal period was within 6 hours. Most of the deaths occurred when >50% of TBSA is involved. Most of the victims died within 1 to 3 days. The major cause of death in burns was septicemia.

Keywords: Burn, demography, cause of death, body surface involved

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Introduction

Fire, a groundbreaking discovery in early human history, has significantly advanced our development, yet it remains a source of both progress and peril. Throughout the ages, different cultures have intermittently revered it as sacred or divine.[1] Burn is a tissue injury due to application of heat in various forms (flame, moist heat, chemicals, radiation, or electric spark) to the external or internal body surface.[2] Forensic pathologists frequently encounter burn cases to distinguish whether the injury is antemortem or post-mortem.[3] An estimated 180,000 burn-related deaths were recorded worldwide each year, and 8.4 million new cases were identified in 2019. Among the top causes, burn injuries are the major contributor to the loss of disability-adjusted life years (DALYs) in low- and middle-income countries.[4] Thus, burn constitutes the fourth notable cause of trauma globally following traffic accidents, falls and interpersonal violence.[5] Each year, burn injuries affect roughly 450,000 people, necessitating treatment, with about 30,000 requiring care in burn units. Approximately 3,400 individuals succumb to burns or related complications such as inhalation injuries, toxic exposure, organ dysfunction, or infection.[6] In Bangladesh, it is statistically seen that more than 3000 people die annually due to burns, with a mortality of 2.2 per 100,000 population.[7] Dhaka, being the capital of Bangladesh, has a staggering density of population density, presiding over 23.9 million, according to the most recently published statistics.[8]

Accidental causes accounted for most burn cases, whether they originated in domestic settings, occupational contexts, or vehicular situations. Death also occurs while escaping from a burning building or the collapse of walls in a building, or collapse in fire incidents. Worse burn cases are from flame ignited to garments in contact with coal, gas, or a kerosene oil stove.[9]

Mortality rates remain elevated due to delayed healthcare access and public unawareness of emergency protocols. Additionally, self-inflicted burns linked to socio-economic stressors—such as family disputes, academic failures, mental health challenges, or chronic illnesses—are rising. Criminal acts, including attempts to conceal crimes like homicide or assault through post-mortem burns, further complicate the issue. Rapid industrialisation and fire-related disasters amplify the burden on Bangladesh's healthcare infrastructure.

Assessing outcomes for burn patients is critical for optimising care, including diagnostic approaches, surgical interventions, and rehabilitation. Identifying hidden prognostic factors can enhance treatment strategies and resource allocation, ultimately improving survival and recovery in vulnerable populations.

Corresponding Author: Md.Syedur Rahaman Sumon, Professor (CC), Department of Forensic Medicine, Bashundhara Ad-din Medical College, Bangladesh e-mail: drsumonadib@gmail.com

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Aim and Objectives

- To analyse the demographic profile of individuals affected by burn injuries.
- To investigate the primary causes of mortality associated with burn-related trauma.
- To evaluate the correlation between survival outcomes and the extent of total body surface area affected by burns.

Materials and Methods

This retrospective study was conducted at Sir Salimullah Medical College & Hospital, Dhaka, Bangladesh, from January 2019 to December 2019. The research included all burn injury cases admitted to the Central Morgue at SSMCH, irrespective of the reported circumstances of injury. Data were collected from multiple sources: medical records of the Burn Unit, interviews with family members of deceased individuals, accompanying law enforcement personnel, inquest reports, and official documentation provided during autopsies. Additional details such as treatment histories, laboratory test results, autopsy findings, and available circumstantial evidence were systematically reviewed and cross-referenced to ensure comprehensive analysis.

Exclusion Criteria

Cases involving instantaneous fatalities due to severe burns (e.g., extensive charring, muscle or bone involvement) or those displaying post-mortem burn characteristics were excluded. Pediatric burn patients treated in the Department of Paediatrics at Sir Salimullah Medical College & Hospital were also excluded from the study cohort.

Result

A total of 1792 cases of unnatural deaths were autopsied during the study period in the SSMC morgue, of which 137(7.63%) cases were deaths due to burn cases (Table 1).

Among the total burn cases, Flame burn was the commonest cause, 104 (75.92%), out of the other causative factors, followed by moist burn from chemical burn & scald, 25 (18.24%) (Table 2)

The highest incidence of burn was found among the 21 to 30 years age group, 54 (39.42%), followed by 33 (24.08%) in the 31 to 40 years age group & 21 (15.33%) in the 41 to 50 years age group (Table 3).

Table 4 presents the sex wise distribution of the burn cases; 93 (67.88%) out of 137 cases were male, and 44 (32.14%) were female, with male male-to-female ratio being 2.1:1.

Table 1: Prevalence of Burn cases among total autopsy cases (N = 1796)

Nature of death	*Frequency*	*Percentage (%)*
Burn	137	7.63
Other cases	1659	92.37
Total	1796	100

Table 2: Distribution of Type of burn among the burn cases (n = 137)

Type of Burn	*Frequency*	*Percentage (%)*
Flame burn	104	75.92
Electric burn	8	5.84
Scald & Chemical burn	25	18.24
Total	137	100

Table 3: Age distribution of burn cases (n = 137)

Age group in year	*Frequency*	*Percentage (%)*
0–10	2	1.46
11–20	14	10.22
21–30	54	39.42
31–40	33	24.08
41–50	21	15.33
51–60	9	6.57
61–70	3	2.18
>71	1	0.74
Total	137	100

Table 4: Distribution of death by sex among the Burn Cases (n=137) [Ratio M: F = 2.1:1]

Sex	*Frequency*	*Percentage (%)*
Male	93	67.88
Female	44	32.12
Total	137	100

Maximum cases of death due to burns occurred in work workplace 79 (57.67%), followed by home 33 (24.08%) and outdoor 25 (18.25%) shown in Table 5.

Table 6 depicts the marital status of the sufferers, showing maximum victims, 69 (50.36%), were married & followed by 64 (46.72%) victims who were unmarried.

Most of the death cases from burns were due to septicaemia 58(42.34%), followed by neurogenic shock 38(27.74%) & hypovolemic shock 29(21.16%) (Table 7).

The majority of the deaths, 46 (33.58%), due to burns, occurred immediately within <6 hours of the incident. Whereas 33(24.08%) deaths occurred within 1 to 3 days, 21(15.33%) deaths within 1 week, 11(8.03%) deaths within 1-2 weeks from the post-injury period, as shown in Table 8.

Considering the fatality of total body surface area involved to be >50% were the larger group 67(48.91%) and maximum number of victims 36(26.27%) were sustained 71 to 90% of total body surface area (TBSA) burns followed by 21(15.33%) victims sustained <50% total body surface area (TBSA) burns (Table 9).

It is observed in Table 10 that accidental deaths were the commonest manner of burn death, accounting for 102 (75.46%), followed by suicidal deaths, which were 26 (18.97%).

Table 5: Distribution of burn victims by location (n=137)

Place of incidence	*Frequency*	*Percentage (%)*
Workplace	79	57.67
Home	33	24.08
Outdoor	25	18.25
Total	137	100

Table 6: Marital status distribution among the burn cases (n=180)

Marital status	*Frequency*	*Percentage (%)*
Married	69	50.36
Unmarried	64	46.72
Others (Divorce/ Widow/Single)	4	2.92
Total	137	100

Table 7: Cause of death in burn cases (n=137)

Cause of death	*Frequency*	*Percentage (%)*
Neurogenic shock	38	27.74
Septicaemia	58	42.34
Hypovolemic shock	29	21.16
Asphyxia	5	3.65
Multi-organ failure	7	5.11
Total	137	100

Table 8: Duration of survival of the victims (n=137)

Duration of survival	*Frequency*	*Percentage (%)*
<6 hrs	46	33.58
7-24 hrs	18	13.13
1-3 days	33	24.08
4-7 days	21	15.33
1-2 weeks	11	8.03
>2 weeks	8	5.84
Total	137	100

Table 9: Distribution of total body surface area (TBSA) (n=137)

TBSA	*Frequency*	*Percentage (%)*
<50 %	21	15.33
51-70 %	67	48.91
71-90 %	36	26.27
90 %	13	9.49
Total	137	100

Table 10: Manner distribution of burn victims (n=137)

Manner	*Frequency*	*Percentage (%)*
Accidental	102	75.46
Suicidal	26	18.97
Homicidal	9	6.57
Total	137	100

Discussion

The present research indicates that (7.63%) of the total 1796 deaths in the morgue of SSMC during the given period are classified as death by burn. Maximum deaths were principally caused by flame (75.92%), which is consistent with the result of Chowdhury MIB *et al.*, Virendra K *et al.*, Singh D *et al.* and Hilal A *et al.* (96.33, 94.1, 90 and 91%, respectively) of all unnatural death autopsies.[10,11,12,13]

It is observed that the age group mostly encountered death from burn are 21-40 years with peak incidence between 21-30 years (39.42%), which is similar to study of Chowdhury MIB *et al.*, Nayak PK *et al.*, Virendra K*et al.*, Faizunnahar *et al.* and Singh D *et al.*[10,11,12,13,14] It explains that this specific age group is productive and faces midlife crisis, including family problems, financial problems or the effect of modern life style.[13] But in contrast, K. Soltani *et al.* show peak incidence between the 16-25 years age group, with maximum burn cases being (93%) below 60 years.[15] Whereas a study done by Hilal A. *et al.* found that maximum burn cases were younger age group 0-5 years.[17]

This literature shows that males have outnumbered the females with the ratio being 2.1:1, which is quite similar to a study done by Chowdhury MIB *et al.* and Faizunnahar *et al.* (2.03:1 and 2.3:1, respectively).[10,13] The commonest cause of male predominance is considered as due to more involvement in risky work, both indoor to outdoor, professionally.[13] Gupta R *et al.* have also compiled data on male victim prevalence over females in burn cases.[19] However, Nayak PK *et al.*, Singh D *et al.*, Hilal A. *et al.*, and Vipul NA study found females are more prone to burn explaining because their chores are mainly in the kitchen.[11,14,16,17] While engaged in cooking, women usually dress in loose traditional attire and remain distracted due to family life stress, frequently owing to a lack of awareness, which renders them more susceptible to burns.

The current study reveals that (57.67%) cases were reported as death from burn incidence in the workplace rather than indoor (24.08%) or outdoor (18.25%). This result is close to the study conducted by Faizunnahar *et al.* (44.01%).[13,] but a study by Chowdhury MIB *et al.* reported that the highest burn incidences were (64.91%) at home, followed by the workplace, ranked second (27.06%).[10] Workplace incidents often involve burn injuries caused by thermal, chemical, electrical, and gas explosions affecting various professions like labourers, electricians, restaurant staff or industrial workers, as well as individuals at home. Here, men make up the majority of the workforce. Gas cylinder explosions have become a significant safety concern following recent incidents both at home and at workplaces, which involve both men and women.[18] As for the marital status of the victims in our study, the maximum sufferers (50.36%) were found to be married, and 46.72% were

unmarried in both sexes, which is consistent with the findings of the study by Nayak PK *et al.*[11]

The leading cause of death from burns in our study was septicemia (42.34%), followed by Neurogenic shock (27.74%) and Hypovolemic shock (21.16%). Similar findings were also observed by Nayak PK *et al.*, Virendra K *et al.*, Singh D *et al.*, Gupta R *et al.* and Chawla R *et al.*[11,12,14,19,20] Instantaneous death due to Neurogenic shock in burn cases has been found by Chowdhury MIB *et al.* as the major cause of death, which is dissimilar compared to our study.[10]

The fatal period in most of the cases (33.58%) is within 24 hours, and the studies conducted by Chowdhury MIB *et al.*, Nayak PK *et al.* and Chawla R *et al.* reported similar findings to ours.[10.11.20] But in contrast to our study, Virendra K *et al.* & Singh D *et al.* differ on it, showing the majority of the deaths being within 1 week.[12,14]

In the present study, the majority of cases (84.67%) were >50% TBSA, indicating reduced life expectancy even if medical attention has been received. Findings by Chowdhury MIB *et al.* and Gupta R *et al.* are similar to our study.[10,19] Nayak PK *et al.* and Virendra K *et al.* found maximum cases >40% TBSA, which is also quite similar to the current study.[11,12]

Though the majority of the incidents are accidental (75.46%), suicidal and homicidal cases were also observed. Chowdhury MIB *et al.*, Faizunnahar *et al.*, Singh D *et al.*, A.K. Batra *et al.*, Buchade D *et al.* and Chakraborty S *et al.* noted the similar finding.[19,21,22,23]

Conclusion

This study highlights the significant burden of burn injuries in the forensic and medicolegal context, emphasising that most burn-related deaths occur among young adult males, predominantly due to flame burns in domestic and occupational settings. The findings underscore the crucial need for targeted preventive measures, public awareness campaigns, and improved emergency response protocols to reduce mortality and morbidity associated with burn injuries. Additionally, the data on the distribution of causes and survival periods can aid clinicians, forensic experts, and policymakers in devising strategies for better management, timely intervention, and effective resource allocation. Continued research and implementation of safety regulations are imperative to mitigate the incidence of burn injuries and save lives in vulnerable populations.

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REVIEW ARTICLE

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Reframing Harm: Ethical Gaps in Trauma Informed Dental Care in India

Arya Sabnis[1*], Sonali Kadam[2], Shweta Vilvadrinath[3], Anusree J.[1], Divya Tripathi[1]

[1]Postgraduate Student, Department of Oral Medicine and Radiology, Government Dental College and Hospital, Mumbai, St. George's Hospital campus, Mumbai, India

[2]Associate Professor and Professor (Academic) , Department of Oral Medicine and Radiology, Government Dental College and Hospital, Mumbai, St. George's Hospital campus, Mumbai, India.

[3]Assistant Professor, Department of Oral Medicine and Radiology, Government Dental College and Hospital, Mumbai, India.

Abstract

Domestic violence (DV) significantly impacts one's oral and maxillofacial health, with patients experiencing it often presenting to dental settings with unexplained trauma and a confusing history. Most common clinical manifestations of the same may include visible bruises, lacerations, tooth fractures and even temporomandibular joint disorders. Injuries of the oro-facial regions may be the first visible signs and, ironically, the hidden indicators of abuse, thereby putting dental surgeons at the forefront in suspected DV cases. The Dental Council of India emphasises patient confidentiality in the information entrusted by the patient unless the laws of the state require a revelation for medicolegal cases. There is a lack of a specific code of conduct concerning known or suspected DV cases. There are a few law enforcement helplines available for reporting such cases, like the Domestic Violence Helpline (1091) and the National Commission for Women (NCW) Helpline. However, when compared with the mandatory reporting laws in countries like the U.S. and Australia, Indian protocols remain vague and optional. There is a significant knowledge gap among the Indian dental professionals regarding how to properly identify DV while diagnosing a patient, documentation of cases and reporting procedures worsened by insufficient training and the dentist's agitation concerning legal implications. This article highlights the urgent need for incorporating structured information and awareness programs in dental curricula and continuing dental education. In conclusion, reinforcing dentists with knowledge and clear reporting channels is critical for timely intervention, ensuring that neither ethical compliance nor victim protection is compromised through the process

Keywords: Review, domestic violence, dental trauma, Maxillofacial injuries, oral health, oral injuries.

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Introduction

The pervasiveness of domestic violence can be assessed from the fact that it has been reported in different cultures and societies all over the world. Today, there is growing awareness that domestic violence is a serious issue in developing countries as well. The prevalence of domestic violence in India ranges from 6 per cent to 60 per cent, with significant variations among different states.[1]

Despite the range of abuse that may include people of all ages, genders or socio-economic status, it is the most common cause of non-fatal injury in women, who suffer, blame themselves and are unable to report it. Most of them simply accept it as their fate and continue to live with it.[2]

Dental professionals are in a unique position to identify cases of such abuse owing to their signs being most commonly visible in the head and neck region. Studies have demonstrated that the common site of injuries in domestic violence cases is the head and neck, accounting for 38.7%.[3] Domestic violence also significantly impairs the temporomandibular joint and the muscles associated with it. Even after all possible interventions, suicide and death rates among these cases are high due to a deteriorated quality of life, be it physically, aesthetically, or mentally.[4]

Corresponding Author: Arya Sabnis, Postgraduate Student, Department of Oral Medicine and Radiology, Government Dental College and Hospital, Mumbai, St. George's Hospital campus, Mumbai, India, e-mail: aryasabnis.18@gmail.com

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However, the dental professionals are not well-trained to identify such victims, and if identified, they lack the appropriate resources to manage them. This article explores the current dental scenario, especially the lack of protocol in the clinic and discusses details on how the dental professional should respond.

Signs of Domestic Abuse

Dental professionals play a crucial role in identifying potential abuse because domestic violence is often associated with the head and neck region. All the signs stated below may show overlapping features of general trauma, but these are some

features hidden in plain sight, so one ought to have awareness of how to differentiate between them. They tend to be as follows-

- Visible bruises over the malar region and surrounding eyes, especially the shape and size of the bruising indicative of a fingerprint pattern.
- Skin discolouration or scars, which may be present because of healed burns or lacerations, one should also look out for bite marks.
- Teeth may show discolouration, mobility, fractures involving enamel, dentin and root. There can be forced avulsion of the tooth out of the alveolar bone socket.[5]
- Fractures of the jaw and facial bones and malunion of previously fractured bones as incidental findings because of inadequate or no treatment.
- The temporomandibular joint is most prone to functional disturbances in the head and neck region. The patient will present with symptomatic features, which can be due to repetitive trauma and stress or anxiety-related habits like bruxism.
- Unexplained soft tissue lacerations, traumatic ulcerations or petechial haemorrhages involving the gingiva, tongue, soft palate, buccal mucosa or lips.

In our clinical experience, we have seen cases that raise suspicion while correlating the history and clinical findings. Such an example was a patient with a unilateral mandibular angle fracture who claimed to have fallen from the stairs; however, she had no other bruises or injuries indicative of the same. In a study done by Hansa Kundu et al, the relation of individual psychological, physical and sexual domestic violence was assessed with the oral health status of those with domestic violence. A significant correlation was found between psychological domestic violence and Periodontal status, and physical domestic violence with tooth fracture.[6]

How should a Dental Professional Respond?

It is a dilemma on behalf of the dentist to decide how to respond in such situations, taking into consideration the ethical responsibility along with maintaining patient confidentiality. The maximum cases we go through in India in this setting are due to Intimate partner violence.[7] The patient will have the fear of a negative impact of their confessions in such settings on their personal life and its repercussions in their social life as well. Detecting risk factors specific to rural regions, including alcoholism, poor literacy rates, and even having a girl child, should be considered.[8] Following points can be taken into consideration pertaining to the same.

- Firstly, to note any irregularities in the history given by the patient and/or the accompanying person, including time, place and order of events
- To make a safe environment for the patient that will minimise the triggers, if there are any.Ensure obtaining explicit consent of the patient before and during any procedures, may it be examination or treatment.
- Communicating using clear and simple terms without confusing the patient or using any violent language to avoid further hesitation in the conversation flow.
- Reassurance for treatment protocols and to manage general anxiety by preventing retraumatization by being mindful about the use of tone, touch and instruments.
- Recognising the psychological aspect behind the trauma, which may manifest as severe anxiety, emotions, and avoidance behaviour.
- To establish a feeling of trust and support by giving the patient choice and control during the dental procedures.
- Making proper referrals by incorporating mental health professionals at any point of the treatment, if and when required.
- To keep proper records of known domestic violence cases for further legal applications.

Discussion

The Protection of Women from Domestic Violence Act, 2005, provides for more effective protection of the rights of women guaranteed under the Constitution who are victims of violence of any kind occurring within the family and for matters connected therewith or incidental thereto. Under section 10 (1) of this act, a service provider, which includes medical professionals, can record a domestic violence incident if the aggrieved person so desires; get the aggrieved person medically examined; and ensure that the aggrieved person gets shelter in a shelter home, if she so requires [9]

However, this Act does not necessitate the need to report such a crime.

The POCSO Act, on the other hand, under section 19, necessitates the need to report such an offence to the special juvenile police unit or the local police [10]

As a medical professional, it becomes necessary to uphold the dignity of the medical code of ethics and maintain patient confidentiality. This often leads us to a dilemma where the choice between reporting such crimes and maintaining confidentiality is a tough one. According to the Indian Medical Council Regulations, 2002, section 7.14, the medical practitioner shall not disclose the secrets of the patient that have been learnt in the exercise of his/ her profession except-

- In a court of law under the orders of a presiding judge
- In a situation where there is a serious and identified risk to a person.
- Notifiable diseases.

The Dental Council of India doesn't explicitly discuss domestic violence, but it follows principles similar to the MCI code of ethics.

Conclusion

The overall prevalence of oral and maxillofacial injury and Traumatic dental injury in DV victims is 29% and 4%, respectively. Women present higher rates of OFMI (41%) and TDI (6%).[11] In India, trauma-informed care is a newly understood and not yet completely established concept. The major knowledge gap present in such scenarios is due to the lack of awareness and professional training.[12] Another

significant issue pertains to the stigma in Indian culture when it comes to understanding and treating mental health issues. This proves as an additionWal barrier for the patient to disclose their trauma in an already depressed state.

A proper interdisciplinary approach between the dental, mental health and legal professionals can nullify these problems. Additional achievable modalities include integration of training concerning psychological management in continuing education programmes or even dental curricula. This is where one can say that the horizons of dentistry are not just concerned with treating fractured bones or replacing missing teeth, but are way beyond that.

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REVIEW ARTICLE

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Clinical Judgment and Limitations in Prenatal Imaging: No Negligence Originates

Mukesh Yadav[1*], Rakesh K Gorea[2]

[1]Principal & Dean, MRA Medical College, Ambedkar Nagar, Uttar Pradesh, India.
[2]Medicolegal Institute, Baba Farid University of Health Sciences, Faridkot, Punjab, India.

Abstract

A child after birth had significant abnormalities, underdevelopment of the Fetal Femur Length, lumbar and sacrum. This type of abnormality can be detected in an ultrasound before birth, for which the doctors get an ultrasound done for prenatal care. All the findings were indicated as normal. On repeated ultrasounds at different intervals report was given as normal development.

Following the birth of her child, the MRI revealed that the child's lower lumbar spine and sacrum were either absent or severely underdeveloped.

In a complaint before DCDRC, the complaint was allowed, directing the opposite party to pay damages. In an appeal preferred by Doctor/Hospital, SCDRC did not find medical negligence and the Impugned judgment and order passed by the District Commission, Haridwar, was set aside.

Keywords: Congenital Anomaly, USG Study, MRI, Expert Committee, Error of Diagnosis, Medical Negligence, Compensation.

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Introduction

Congenital abnormalities are the anatomical, functional and metabolic anomalies that occur during foetal life but can be detected before or after birth.[1] Detection of foetal abnormalities is usually done using 2D-US, 3D-US and MRI imaging. After birth, Echocardiography, X-ray and CT scan are also used.[1,2]

The most commonly involved system is the musculoskeletal system, and is followed by the cardiovascular system. Congenital anomalies may not be preventable, but they can definitely be reduced by early detection and proper counselling, and this helps to reduce the anguish of the parents.[1]

MRI is better and more sensitive than 3D scans and 2D scans in detecting CNS anomalies, as MRI provides crucial additional information which can help in management, as well as in prognosis and counselling, but it shows a high false positive result for subtle CNS findings as compared to ultrasonography. Ultrasound 2D, 3D, and MRI had similar sensitivity for non-CNS anomalies. Specificity was higher with 3D-US for all the anomalies. But the use of ultrasound is more common than MRI due to cost factors and better availability.[2]

Background of the Case

This appeal under Section 15 of the Consumer Protection Act, 1986, has been directed against the judgment and order dated 31.10.2018 passed by the learned District Consumer Disputes Redressal Forum, Haridwar (the District Commission) in consumer complaint No.576 of 2014 styled as Smt. Renu vs. Dr. Manoj Singh, wherein and whereby the complaint was allowed, directing the opposite party to pay Rs. 8,00,000/- as compensation and Rs. 3,50,000/- towards mental and physical agony, a total sum of Rs. 11,50,000/- together with interest @ 6% per annum from the date of filing of consumer complaint, i.e., 17.10.2014, till the date of actual payment along with Rs. 10,000/- towards cost of litigation.[3]

Corresponding Author: Mukesh Yadav, Principal & Dean, MRA Medical College, Ambedkar Nagar, Uttar Pradesh, India, e-mail: drmukesh65@yahoo.co.in

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Facts of the Case

The complainant gave birth to a child on 22.04.2014 in the Himalayan Hospital, Jolly Grant. After the birth, she found that the child had significant abnormalities, including absence or severe underdevelopment of the Fetal Femur Length, lumbar and sacrum. These anomalies resulted in the child's inability to sit, stand, or move the lower part of the body independently. On inquiring from the doctors, it was found that this type of abnormality is detected in an ultrasound before birth, for which the doctors get an ultrasound done for prenatal care. The complainant, too, had undergone an ultrasound at the opposite party's clinic on 14.10.2013 before the birth of her child. According to the report provided by the opposite party, the foetus was measured to be 8 weeks and 4 days old. All the findings were indicated as normal. The complainant underwent subsequent ultrasound examinations at the opposite party's

clinic on 19.12.2013 and 03.03.2014 and later on 26.03.2014, i.e., just before the delivery. In each of these reports, the clinic reported that the foetus was developing normally and did not indicate any abnormalities.

Investigation and Treatment at Himalayan Hospital, Jolly Grant, Jolly Grant, Dehradun

Following the birth of her child, the complainant obtained an MRI. The MRI revealed that the child's lower lumbar spine and sacrum were either absent or severely underdeveloped. The doctors indicated that such anomalies are detectable during three months of pregnancy. Despite undergoing multiple ultrasound examinations at the opposite party's clinic during her pregnancy, the complainant was informed that the foetus was developing normally with no abnormalities reported.

Referral to AIIM, New Delhi

Following the refusal for further treatment at the local hospital, she shifted her child to AIIMS Hospital, New Delhi, seeking appropriate medical care. There, the doctors also indicated that the above disability was due to the absence or severely underdeveloped Lower Lumbar Spine and Sacrum and that the opposite party had committed gross negligence and gross deficiency in providing medical services.

Treatment at AIIMS Hospital, Rishikesh

On getting the child examination in AIIMS Hospital, Rishikesh, the doctor also indicated that the opposite party did not give correct ultrasound report at the right time and informed very belatedly about physical disability of the child due to which the child is unable to sit, stand or move the lower part of the body independently and he was physically handicapped.

As a result of the above-mentioned actions by the opposite party, the complainant has faced significant mental, physical and financial distress. The failure to detect and communicate such abnormalities during the ultrasounds constitutes a serious breach of medical duty. This is indicative of gross medical negligence and a deficiency in the standard of care expected from medical professionals.

Subsequently, the complainant lodged a complaint before the District Commission seeking relief and compensation for hardship due to gross medical negligence and deficiency in providing medical services by the opposite party.

Investigation of Treatment of BHEL, Haridwar

In a written statement, the opposite party stated that the facts presented by the complainant are fabricated and wrong. The answering opposite party stated that the complainant was referred to him by BHEL, Haridwar, for examination of the fetal well-being of the baby through a basic 2D ultrasound for fetal well-being. The opposite party also stated that he had an agreement with BHEL Hospital to conduct a 2D basic ultrasound as a part of the empanelment arrangement.

According to the opposite party, the ultrasound was correct because it is not clear to tell about the abnormalities of the Lumbar and Sacrum in a basic 2D ultrasound. The opposite party also stated that when the MRI was done after the delivery, the MRI report showed that the femur, lumbar and sacrum bones of the child were underdeveloped.

He did not do an MRI, nor were any instructions given by the BHEL Hospital to conduct any test other than a 2D ultrasound in respect of the complainant. He has no instructions regarding the child's fetal biophysical profile level II ultrasound/anomaly scan/3D/4D ultrasound, which would have provided detailed information about the child's growth in the fetus. The opposite party has agreement and instructions for conducting a 2D ultrasound only. The opposite party has stated that he saw the movement and growth of the child in the foetus of the complainant through a 2D ultrasound, which was normal.

The opposite party further stated that BHEL Hospital, Himalayan Hospital Jolly Grant, and AIIMS New Delhi have not been made parties in this complaint. The opposite party contended that the complainant had not submitted any evidence indicating that any doctor from any hospital had/reported any error or deficiency in the examination conducted by the answering opposite party.

The opposite party further stated that he has conducted a 2D ultrasound as per modern medical techniques and has not committed any negligence. Therefore, the complaint is liable to be dismissed with costs.

The District Commission, after hearing both parties and taking into consideration the facts and evidence on record, has passed the impugned judgment and order dated 31.10.2018, whereby the District Commission has allowed the complaint in the above terms.

Appeal before SCDRC

Having been aggrieved by the aforesaid judgment and order of the District Commission, the opposite party has preferred the present appeal.

In the appeal, the learned counsel for the appellant–opposite party has contended that the impugned judgment and order of the Commission below are against law, facts and merits of the case; the Commission below has not considered the written statement and evidence filed by the appellant.

Because the District Commission has not taken into consideration the reply, evidence and report constituted by the Chief Medical Officer, Haridwar. The District Commission has ignored the fact that the appellant neither committed any negligence in conducting the ultrasound nor, due to such ultrasound report, any harm was caused to the respondent or her child. The respondent has also failed to submit any expert report or any affidavit from any doctor that proves any carelessness or negligence on the part of the appellant.

Alleged Failure to Recommend Further Investigation

On the contrary, the findings of the report of the committee constituted by the Chief Medical Officer, Haridwar, no

negligence or malice was found against the appellant. The District Commission has also ignored the fact that the respondent was suffering from diabetes during her pregnancy and the treating doctors Dr. Sangeeta Singhal and Dr. Sharda Swaroop of BHEL Hospital, should have recommended/ prescribed for higher level diagnostic test, such as level II ultrasound/anomaly scan / 3D/ 4D ultrasound / MRI to know the status of foetus. Instead, the appellant was directed to conduct a 2D (fetal well-being) ultrasound test on all occasions.

Issue of Contractual Agreement

It is important to note that the appellant's contractual agreement with BHEL was only for providing 2D (fetal well-being) ultrasound and did not have any contract regarding the 4D and level II or any other higher-level test.

Issue of Accurate Diagnosis

The District Commission has ignored the important fact that the basic 2D ultrasound test may not detect the anomalies in the lumbar or sacrum. Advanced imaging techniques such as level II ultrasound/anomaly scan / 3D/ 4D ultrasound / MRI are often necessary for accurate diagnosis of such conditions.

Duty of Referral /Radiologist/Ultrasonologist

The responsibility for determining the appropriate disease lies with the treating doctor. The Sonographer / Radiologist performs the ultrasound examination as prescribed by the treating doctor. The Sonographer / Radiologist are not authorised to independently examine without a referral/ prescription from the treating doctor.

The respondent has not made BHEL, Hospital, a party to the suit, which is a necessary party. The District Commission overlooked the fact that the respondent must have undergone multiple prenatal tests, including an ultrasound, before the delivery procedure. Despite this evaluation, no fetal deformities were detected at that time. It was only after delivery through the MRI scan – a more advanced diagnostic technique – that the deformation was identified. Notably, the respondent has not submitted any ultrasound or related reports conducted before the operation.

The District Commission below ignored the fact that abnormalities in the lower lumbar and sacrum are seen in only one patient out of 75000 to 100000 and are not detected by a 2D ultrasound, i.e. first-level test.

The District Commission has ignored that the respondent is neither a consumer of the appellant nor does she fall under the category of a consumer because the respondent got her treatment done in BHEL Hospital and did not make any payment to the appellant. Any charges incurred by the complainant, if applicable, were paid to the BHEL Hospital. The appellant operates under the contractual agreement with BHEL Hospital, wherein BHEL pays the amount to the appellant on a monthly basis.

The District Commission has also ignored the fact that according to the established medical guidelines, Level II ultrasound/anomaly scan / 3D/ 4D ultrasound / MRI are conducted between 20 to 24 weeks of pregnancy because it provides to assess all parts of foetus including brain, face, spine, heart, stomach, bowel, kidneys & limbs etc. The District Commission has also overlooked the fact that the respondent has filed a complaint against the appellant with the BHEL Hospital; however, BHEL Hospital did not take any action, as the allegations made against the appellant were found unsubstantiated. The District Commission has passed the impugned judgment and order based on surmises and conjectures. Hence, the appeal is allowed, and the impugned judgment and order are liable to be set aside.

Observations of SCDRC

During the arguments, learned counsel for the appellant stated that the appellant performed only a 2D ultrasound examination as prescribed by the doctors of BHEL Hospital. This was following the agreement between the appellant and the BHEL Hospital, which authorises the appellant to conduct a 2D ultrasound only. The appellant adhered to the medical protocol and procedure; therefore, there was no medical negligence on the part of the appellant.

Case Law Relied

In support of his contention, learned counsel for the appellant has cited the case laws.[4,5]

SCDRC observed that in the case of Hemlata vs. Dr. Vipin Premi [2] (supra), the Commission concluded that the ultrasound report should not be considered conclusive proof of internal organ conditions. Such diagnostic tools are interpretative and should be corroborated with additional evidence to establish definite conclusions.[4]

SCDRC observed that in the case of Senthil Scan Centre (supra), the Hon'ble Apex Court has held that the ultrasound is not a perfect depiction of the foetus and the scan result cannot be 100% conclusive.[5] Further, at para No.3 of this judgment, the Hon'ble Apex Court has observed in Martin F. D' D'Souza v. Mohd. Ishfaq 2009[5] SCC 1, this Court had adopted the above test as applicable to cases of medical negligence in this country. This Court relied upon the following passage from Hunter v. Hanley, 1955 SLT 213, which deals with the tests applicable for establishing negligence in diagnosing or treatment on the part of a doctor.[6]

"In the realm of diagnosis and treatment, there is ample scope for genuine difference of opinion and one man is not negligent merely because his conclusion differs from that of other professional men.... The true test for establishing negligence in diagnosis or treatment on the part of a doctor is whether he has been proved to be guilty of such failure as no doctor of ordinary skill would be guilty of if acting with ordinary care...."

Applying the above test recognized by precedent in this country to the case at hand, we are of the view that the State Commission and also the National Commission fell in error in holding that service was deficient since the centre had failed to detect the deformity with which the respondent gave birth to her child. What is significant is that the respondent-

complainant had not led any expert evidence to controvert the case of the centre that the doctor who conducted the ultrasound was highly qualified and that the ultrasound was done with due care and diligence. There was also no evidence to show that the failure to detect the deformity was due to any negligence on the part of the doctor conducting the ultrasound."

SCDRC concluded that negligence was not proved. The principle laid down in both citations applies to the case in hand.

Learned counsel for respondent Nos. 1/2 to 1/4 has stated that the appellant has conducted four ultrasounds during the complainant's pregnancy, but the appellant failed to detect any fetal anomalies. This omission on the part of the appellant reflects a breach of his duty amounting to medical negligence.

On perusal of the record, it is admitted that the appellant has conducted four ultrasound tests on 14.10.2013, 19.12.2013, 03.03.2014 and 26.03.2014. The prescription/referral schedule of ultrasound examinations conducted on 14.10.2013 and 19.12.2013 is not available on record. However, the ultrasound reports to this effect indicate that the complainant was referred to the appellant by the BHEL Hospital (papers Nos. 26 & 27). Further, these reports indicate that the foetus was 8 weeks & 4 days old on 14.10.2013 and 18 weeks & 5 days old on 19.12.2013, respectively.

The prescription/referral schedule for ultrasound conducted on 03.03.2014 and 26.03.2014 is available on record. (Prescription/referral schedule dated 25.02.2014, paper No. 28 and prescription/referral schedules dated 26.03.2014, paper No. 30). These prescription/referral schedules were for the diagnosis complete Fetal Profile and Fetal well-being. These prescription/referral schedules established that the complainant was referred to the appellant by BHEL Hospital for an ultrasound for fetal well-being. The appellant performed a 2D ultrasound examination as per the directions of the doctors of BHEL Hospital. The BHEL Hospital empaneled the appellant to conduct a lower abdomen in pregnancy for fetal well-being & fetal weight (paper No. 32), and the appellant was not authorised or empanelled for conducting MRI and the child's fetal bio-physical profile II ultrasound/ anomaly scan/3D/4D ultrasound. This empanelment was further renewed for one year on 03.04.2014 (paper No. 33). It is also admitted that the complainant was suffering from high BP and diabetes during the pregnancy.

Issue of the involvement of the Necessary Party

It is further admitted by the complainant (paper No. 43) that Dr. Sangeeta Singhal of BHEL Hospital kept insisting that the complainant, as treating doctor, till the end that the child was normal and healthy; therefore, in our opinion, she should be impleaded as a necessary party to the complaint case but the same was not done.

Report of the Committee: Medical Report

SCDRC observed that [We] have also perused the finding of the report of Committee doctor consisting by the Chief Medical Officer, Haridwar (paper No. 46) which states that the complainant was suffering from Congenital Abnormality, which is a rare disease, probability of which is one case in 75000 to 100000 and its probability increases further in mothers suffering from diabetes. As per the report, the detection rate of this disease by 2D ultrasound (normal ultrasound) is only 15 to 20%.

The report states that BHEL Hospital referred the complainant for a normal ultrasound and was neither asked nor referred for a level II / 4D ultrasound. The report further states that the BHEL Hospital should have referred the complainant for Level II ultrasound / 3D/ 4D ultrasound examination, keeping in view the High Blood Pressure in the previous pregnancy and the risk caused by diabetes during this pregnancy.

The committee concluded that the investigation conducted by the appellant was without malice and did not constitute negligence. Thus, the above expert report does not reveal that there was any medical negligence on the part of the appellant. Moreover, the complainant has not filed any such expert report wherein it was observed that the appellant was negligent in conducting the ultrasound and making his report. It is also pertinent to mention that the MRI was conducted on the child of the complainant after the birth of the child, and no such report was filed on record by the complainant that any fetal deformity was detected in prenatal tests, including ultrasound, before the delivery procedure.

Conclusion

Given the above, SCDRC finds no merit in the complaint. The respondent Nos. 1/2 to 1/4 have failed to substantiate their claim by adducing cogent and trustworthy evidence that there was any deficiency in service on the part of the appellant. Accordingly, SCDRC is of the considered opinion that the impugned judgment and order passed by the District Commission lack adequate reasoning and fail to account for relevant facts, evidence of the case. The impugned judgment and order are perverse and have suffered from illegality and irregularity in passing the same; thus, the impugned judgment and order are liable to be set aside, and the appeal is also to be allowed.

SCDRC concluded that, accordingly, the appeal is allowed. Impugned judgment and order dated 31.10.2018 passed by the District Commission, Haridwar, is hereby set aside.

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REVIEW ARTICLE

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An Analysis of the Psychological and Legal Dimension of Child-Maltreated Victimisation and Its Consequences on Mental Health

Manisha Agrahari*

Assistant Professor (Vice Principal), Department Of Nursing, Radiant Institute Of Nursing, Kishanganj, Bihar, India.

Abstract

Maltreatment of children is defined as the neglect or abuse of children younger than eighteen. In the context of an association of responsibility, trust, or power, it encompasses all forms of physical and possibly emotional abuse, sexual abuse, neglect, carelessness, and commercial or other forms of exploitation that cause real or possible damage to the child's health, survival, development, or dignity. The prevalence of child abuse is still too high, and it will probably worsen as long as COVID-related economic issues persist. To prevent, identify, and address child abuse, a thorough and evidence-based strategy is required. Impaired mental and physical well-being throughout life is among the effects of child abuse, and its societal and professional repercussions might eventually impede a nation's social and economic advancement.[1] Maltreatment of children is frequently concealed. Only a small percentage of abused children ever receive assistance from medical experts. Although there is a correlation between mental health issues and childhood abuse, it is unclear how causative this association is. A serious public health issue, bullying in kids raises the likelihood of negative health, social, and educational outcomes during childhood and adolescence. All parties involved in bullying—bullies, victims, and bully-victims—experience these repercussions, which are now known to last far into adulthood. Apart from the conventional kinds of bullying, which include direct physical, direct verbal, and indirect bullying, cyberbullying is a relatively recent form of bullying. Very few new victims are generated by cybercrime since most victims are already victims of conventional bullying. In general, bully-victims are the ones who suffer the most from the negative mental health effects of childhood bullying. Achieving the Sustainable Development Goals includes avoiding bullying, and the best evidence for effective results comes from whole-school cooperative learning programs.[2]

Eliminating vulnerability is a top concern, and preventing violence requires a public health strategy. Challenging childhood raises the chance of a number of negative effects throughout life, according to research conducted worldwide. This study looked at the relationship between experiencing a buzz with children and the likelihood of experiencing assault by force, abuse by intimate partners and sexual harassment as an adult.[3]

The importance of current neurocognitive results in offering a multilayered framework for conceptualising mental health vulnerability after abuse is then covered, building on earlier studies.[4] We also examine how changed neurocognitive functioning after abuse may explain why impacted children are far more inclined to experience peer victimisation. We specifically look at the threat, encouragement, and psychological recall systems and how they relate to social thinning, stress creation, and stress vulnerability. To shift to a preventative approach of behavioural health care and lessen the possibility of peer victimisation among children exposed to abuse, such mechanistic knowledge is required.

Keywords: Peer victimisation, Sexual harassment, Sustainable development goals, Cybercrime, Bully-victims, Adolescence, Maltreatment.

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Introduction

Domestic violence against children is a widespread issue that can have serious, long-lasting effects on their psychological well-being. The exact mechanism by which maltreatment raises a child's risk of experiencing psychological issues is still unknown, as is the reason why some abused children are more susceptible to mental health issues than others.[5] Any mechanistic framework must take into consideration the part played by social conditions that emerge following the experience of abuse. Unfortunately, it is well known that children who have been abused as children are more likely to become victims again later in adulthood.

We methodically examine the data supporting a link between peer victimisation and childhood abuse, as well as the correlation with disapproval from peers, which can be easier to notice and study in younger populations. Next, we

Corresponding Author: Manisha Agrahari, Assistant Professor (Vice Principal), Department Of Nursing, Radiant Institute Of Nursing, Kishanganj, Bihar, India, Affiliation, e-mail: manisha_agrahari@rediffmail.com

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look at the data supporting a link between peer rejection, mental health, and child abuse. We are especially curious to know if these negative experiences have additive or cumulative consequences on mental health outcomes. After that, we take a quick look at many theoretical developmental perspectives that have proposed potential processes that might explain the link between peer victimisation and child abuse.

Over the past 15 years, there have been significant developments in English mental health services for children and adolescents and legislation, which have affected financing, access, and service delivery patterns.[6] A strong legislative focus on the idea of an integrated "Universal" The acronym CAMHS service, with a dream scenario of relatively effortless interactions between mental health and other services, and an emphasis on responsive, accessible, and appropriate resources for children and families, was heralded by the 1995 document "Together We Stand," which set an atmosphere for a wave of restructuring under "New" Labour. On the other hand, a new wave of CAMHS reform was heralded by Conservative/ Liberal coalition government policy in 2010, which placed a strong focus on localisation, service choice, and the merging of adult and child services.

Thus, there is strong evidence for long-term alterations in neurological, physiological, and molecular regulating systems in a wide number of retrospective investigations, including people with a criminal history. The majority of human studies tend to be cross-sectional and based on retrospective assessments in adult samples, which precludes concluding causality, even though this research has significantly shed light on prospective biological and genetic mechanisms that coordinate the long-lasting effects of child abuse on disease risk. Furthermore, cross-sectional studies do not provide information regarding early embedding mechanisms or the developmental trajectories of biological and behavioural changes across time.[7]

The Child Abuse Prevention and Treatment Act defines child abuse and neglect as any act or inaction on the part of a parent or carer (teacher, coach, or anyone else with an educational or caregiving role) that results in bodily or psychological harm, sexual exploitation or abuse, or death, or any act or inaction that creates an immediate risk of harm. The effects of abuse and neglect on children might differ greatly. A lack of awareness of the severe lifelong repercussions has hampered prevention strategies and regulations. Psychiatric conditions, including severe depression, anxiety disorder, PTSD, ADHD, drug misuse, personality disorders, and psychosis, are among the conditions that maltreated children are more prone to experience.[8]

Bullying: What Does It Mean?

Bullying victimisation occurs when individuals of the same age group repeatedly attack one another, and because of an imbalance of power, the victims find it impossible to protect self. Bullying, a type of victimisation by peers, can occur amongst adults, adolescents, or children. When a parent or teacher abuses a child, it is not bullying. Whereas harassment and peer assault are often employed interchangeably, they are not the same thing. For instance, a fight or argument between two people of similar strength is not bullying; rather, it is victimisation by peers.[9] The power disparity that exists between bullies and their victims is a particularly significant aspect of bullying. The victims may be at a disadvantage because of the size, strength, or number of people participating. With elements like popularity, IQ, or disability, the power disparity may additionally be more arbitrary and challenging to quantify. The surroundings can also have an impact: a child who has started attending a new school or a youngster who is a member of a minority group may be vulnerable to bullying. According to Dan Olweus, the pioneer of bullying research, the victims themselves are the best people to identify the power disparity. Bullying victims can bully other young people who are at risk. Victims of harassment are, by definition, a group of people who are less inclined to take revenge when they see abusive conduct from their peers for a variety of reasons. They make up a diverse and susceptible population that, despite having been bullied, may eventually face hardship, struggle with adjustment, or even suffer from mental health issues.

It is crucial to ascertain how childhood bullying victimisation affects kids' and teens' mental health and well-being, in addition to lowering the prevalence of bullying practices for some reasons. First, bullying among adolescents and children is widespread around the world.[10] According to a poll of kids in over 40 nations, 13% of 11-year-olds said they had experienced bullied. Prevalence rates are typically greater for males than for girls, vary widely between nations, and decrease with age.[11] Eleven European nations' rates showed a similar trend: According to Analitis *et al*. (2009), 20% of children aged 8 to 18 reported having experienced bullying; harassment victimisation was more common among boys and tended to decrease with age.

Do Children Who are Abused have a Higher Chance of Becoming Victims Themselves? An Investigation of the Data

Peer victimisation and child abuse are significantly correlated, according to a growing body of research.[12] Any kind of neglect or mistreatment directed at children under the age of eighteen is considered child maltreatment. Peer victimisation is defined as "harm produced by another human being, in the instance at hand, other children, participating beyond the parameters of appropriate conduct."[13] Since "peer victimisation" is more flexible and open than Olweus's standard definition of bullying, which calls for components of persistent violence and power imbalance, we choose to adopt it. Strictly focusing on bullying runs the danger of being too limited and overlooking several detrimental peer relationships (or unintentional exclusion patterns) that are significant in connection with the cycle of violence and their effects on mental health. We also take into account the related idea of peer disapproval and how it is linked to child abuse.[14]

The association was also seen regardless of gender. While the majority of research concentrated on children aged 10 to 16, child abuse and peer victimisation were found in children of all ages, from kindergarten and elementary school to high school.

A sociometric assessment based on peer nominations frequently captures peer rejection. Peer rejection and child abuse were shown to be significantly correlated in all but one study. Once more, this was discovered regardless of whether research focused on specific maltreatment subtypes or on maltreatment as a general notion.[15] According to several studies, the effects were similar for both boys and girls, just like their peers. It was remarkable to see that there was proof of a higher risk of rejection from peers as early as infancy.[15]

Societal Elements Linked to Abuse of Children

Within Bronfenbrenner's social ecological paradigm, we address systemic drivers of child maltreatment, highlighting the critical responsibilities that communities, families, and schools play in shielding children from abuse.[16] The risk and protective variables for children are considered multi-systemic and frequently layered in this paradigm (e.g., risk and protective factors at the individual's, family, and community level). A cumulative risk model that accounts for child abuse potential is preferred by empirical research over a social ecological arrangement (i.e., risks significantly predict child abuse prospectively regardless of the category of social system they arise from), so we use this framework as a heuristic mechanism rather than a theoretically driven mechanism[17] To highlight exosystemic influences, we first provide an overview of the micro and mesosystems associated with trauma, such as the neurobiological and genetic processes linked to trauma. We then draw on connection and trauma theories to discuss the long-standing harm caused by threats of protection and broken trust and the significance of functional, evidence-based, and well-resourced systems of support for abused children in their recovery process.

The Systematic Approach of Neurobiology

Domestic violence throughout childhood causes a series of neurological changes that make people more susceptible to ill health as adults. Long-term stress-induced modifications to the neuroendocrine system and associated brain regions, such as the locus coeruleus/autonomic nervous system and the hypothalamic–pituitary–adrenal (HPA) axis, are examples of core changes. Recent studies of neuroimmune and inflammatory pathways, microbiota, stress-related oxidation, metabolic in nature, and sleep/circadian system modifications address additional neurobiological alterations linked to early life stress.[17] The brain changes that occur after early exposure to maltreatment have been reconstructed by influential recent proposals compared to general associations with stress damage to an adaptive reaction that may help the youngster cope in the inappropriate context, albeit possibly increasing the risk of psychological disorder or other negative health outcomes. Changes in the glucocorticoid, noradrenergic, vasopressin-oxytocin stress systems, and neurotransmitters are the first signs of stress brought on by abusive events.[18]

In people with genetic vulnerability, these impacts fundamental neural development methods (neurogenesis, synaptic pruning, and myelination) throughout vulnerable times, resulting in subsequent impacts on the structure and possibly function of brain regions with a substantial quantity of glucocorticoid receptors and undergoing prolonged postnatal development.[19] Research on child abuse has focused especially on the limbic structures of the hippocampus and amygdala, which support emotional responses and memory formation/organisation, respectively. Adult hippocampal volume decrease is a persistent finding, even in non-clinical samples that are not influenced by the stress of dealing with mental health issues or the results of therapy.

Changes in areas and pathways linked to four neurocognitive systems—threat and reward thinking about, managing emotions, and executive control—have been found in maltreated people by functional neuroimaging.[20] The striatum is less active when benefits are anticipated and received, whereas the amygdala is excitable when processing threats and hypoactive when avoiding them. When processing socio-affective signals (such as facial expressions), whole-brain meta-analyses show that the amygdala and ACC are hyperactive. There is also conflicting evidence of hyperreactivity in the dorsomedial PFC, superior/middle temporal gyri, parahippocampal gyrus, and insula. When engaging in controlling themselves (self-control) and performance monitoring tasks, maltreated individuals additionally exhibit ACC excitation.

Early Childhood and Adolescent Educational Repercussions

Children who encounter harassment regularly are more likely to feel alienated at school, and indirect bullying in particular has been demonstrated to negatively impact socialisation and acceptability in schools. Consequently, a child's emotions about involvement in education increase as bullying decreases. Being bullied can also have an impact on one's ability to continue attending school.[21] Children who are consistently bullied are almost twice as likely to regularly miss their lessons and are significantly more inclined to wish to drop out of school after completing secondary education than their non-bullied peers.

The Association between Regular Victimisation and Adverse Consequences on Schooling

Victims of harassment do worse on tests than their non-bullied peers. Victimised children's test results were 2.1% lower in maths and 2.5% worse in reading than those of non-bullied children in 15 Latin American nations, for instance. Average academic performance scores were 2.7% lower for children who were bullied monthly and 7.5% worse for those who were bullied weekly when compared to children who were never or nearly never tormented.[22]

How Does Peer being Victimised and Child Abusive Behaviour Affect Mental Health?

Child abuse has major negative and enduring impacts on children's mental health. Anxiety, anger, sadness, and substance addiction problems, for instance, have all been linked to child abuse. Peer victimisation has also been linked to major negative mental health outcomes, such as externalising problems, psychosomatic problems, psychotic symptoms, self-harm, and suicide, according to research. The studies conducted over time, this link persists even after controlling for genetic confounding and baseline mental health issues. Being accepted by others is linked to better mental health outcomes, but rejection has been strongly linked to worse mental health outcomes.

A small proportion of research has thoroughly examined both peer victimisation and child abuse, which is necessary to better understand how these incidents may eventually affect one another. After controlling for potential confounding variables, previous longitudinal studies of young adolescents have found that peer victimisation and childhood maltreatment have independent effects on psychotic symptoms, depressive illness, and harming themselves.[23] These effects were seen even after adjusting for genetic risk. Research on the mental health consequences of young people and older teenagers reveals a similar pattern. These investigations were cross-sectional in design, as opposed to the research on early adolescents. Lifetime maltreatment and peer/sibling victimisation were associated with social anxiety disorders in female adolescents as opposed to in teenage boys. Verbal abuse increased young people's cognitive susceptibility to depression[9] First-year college students who experienced both peer victimisation and maltreatment that is, bullying had greater levels of post-traumatic stress disorder (PTSD) than those who just experienced maltreatment.[24]

In long-term research looking at schizophrenia, while genetic risk was linked to the early onset of emotional issues, exposure to future peer victimisation exacerbated the course of emotional disorders. Genetically informative research has also demonstrated that peer victimisation is exacerbated by genetic characteristics that promote sensitivity to mental health issues. Preexisting both genetically triggered mental health vulnerabilities may be risk factors for exposure to peer victimisation, as Schoeler and colleagues (2019) showed that genetic risk scores for depressive illness and attention-deficit/hyperactivity disorder indicated an increased risk of peer victimisation.[25]

Why is Peer Victimisation Increasing due to Child Maltreatment?

The connection between peer victimisation and child abuse has been examined and comprehended through a variety of theoretical frameworks. According to Bowlby's attachment theory (1969), children who have experienced maltreatment are less likely to develop stable attachment bonds with their primary carers.[18] Such kids end up with a skewed internal functioning model as a result, which makes them more likely to form abnormal peer interactions. According to research, insecure attachment relationships are linked to child abuse

By emphasising the significance of environmental risk factors (such as parental behaviour or family instability) on the one hand and the child's traits on the other, Finkelhor's developmental victimology paradigm enhanced this research further. Cicchetti *et al.* (2000) introduced the ecological–transactional framework for child abuse, a widely important paradigm that includes these techniques. This paradigm holds that a child's development is influenced by the interactions between many layers of their ecosystem.[25]

Effective emotion control and the development of healthy social interactions are two examples of developmental tasks. Child abuse is believed to impede the effective achievement of these developmental objectives, which may subsequently impair the person's ability to reach later developmental milestones. Ineffective emotion regulation, for instance, can make it difficult to navigate complicated social connections both inside and outside of the family and raise the likelihood of victimisation and rejection by peers. Science has made great strides in identifying the neurobiological connections of victimisation in general, but there hasn't been much attention paid to the precise relationship between these brain alterations and peer victimisation. This work has to be expanded upon by offering more neurological specifics on how experiences of abuse impact information processing, which in turn affects social interactions throughout development. We will be in a better position to guide preventative and intervention strategies if we can more clearly define these developmental pathways.

Discussion

Consequences of Child Abuse on an Individual's Growth and Health

The Adverse Childhood Experiences study conducted in the United States discovered "a strong and consistent association between the magnitude of time spent exposed to misconduct or dysfunction in the home during early childhood alongside multiple risk factors for one or more of the most prevalent causes of death in adults." Similar findings from the LONGSCAN trial, which was also These connections between ACEs and unfavourable adult outcomes seem clear. There have been recent calls for scholars and practitioners who use ACE instruments in maltreatment screening programs to take "cautionary lessons" from other health screening research who have documented unacceptable levels of false positives and false negatives. The Early Intervention Foundation's thorough analysis of the advantages and disadvantages of ACE research to date mirrored Finkelhor's warning. Carried out in the USA, confirmed the long-lasting nature of ACE risk findings.

The potential "dose–response" link between ACEs and early adolescent mental and physical health issues was also investigated by the LONGSCAN project. 90% of the cohort had experienced an ACE by the time they were 14 years old,

according to the authors. "On the other hand, there was a progressive connection between harmful adolescent exposure to these substances and any of their well-being issue, whereas 2 and ≥3 negative interactions were correlated with somatic complaints," the authors write.

The Legal System as a Source of Health Issues and a Manifestation of Institutional Harassment

Every community has underprivileged sections where the system of enforcing justice is prioritised.

On one side, society is given priority; on the other hand. As previously mentioned, there is low-level harassment of society in general, and the justice system itself either does not act or acts in a way that could be considered low-level, allowing most crimes unpunished (files are lost, prosecutors fail to prioritise them, etc. These contributors explain how individuals of particular groups are "disappearing" in the legal system, mainly concerning the hidden economy.

The judicial system stigmatises both offenders and victims. These pieces show how the system fails to protect lawbreakers from harassment, wrongful arrests, assaults, and other forms of violence, and how the perpetrators of these attacks are also part of the legal system. However, the contrary is also true: the system discriminates against and harasses victims. The result is unmistakable: both abuse victims and perpetrators are assaulted by the police and the legal system, although unintentionally and in a "low-level" manner.

However, victims' mental health can be affected by how the judicial system treats them. Two investigations, for example, show this. The mental health of military reservists who had been sexually abused by other members of their organisation, particularly their PTSD level, improved when they received proper treatment from the legal system and their statements were taken seriously. Conversely, the mental condition of those who received disrespectful treatment from the legal system deteriorated.

Silbey's legal awareness theory explains prejudice by integrating hegemony, ideology, and consciousness. It contrasts law enforcement's practice and theoretical conception, arguing that law enforcement is often iatrogenic, causing harm to victims. Silbey questions how people can tolerate a judicial system that perpetuates inequality despite claims of equal treatment.

Crime's Effect on Victims

It was as probable that the word "victim" would be used to describe ill luck in general as it was to describe criminal action.

" Someone who is exposed to violence, inequality, or another brutal or abusive situation, or is experiencing loss, harm, collapse, etc., as a result of an event, situation. Instead, or repressive or unfavourable impersonal agency," instead of "a person assassinated or tortured by another, was the original definition. Over the last ten years, changes in crime have been measured by the number of persons found guilty in criminal courts. The number of offences documented by the police was then used to measure trends. These days, surveys of the general population are utilised to gauge the level of victimisation and track trends in crime. The above interpretation states that the phrase refers to the victim's inevitably subjective evaluation of the entire significance of the incident. This covers the victim's comprehension of its importance and meaning, and additionally, whether it has altered the victim's self-perception and caused them to feel like a victim. In contrast to any potential intangible or measurable "effects," the victim's perception and response to a crime are greatly influenced by its "impact" at the subsequent stage that encompasses the exploitation process linked to the initial phase.

India's Justice System and Victims

Ignorance of crime victims exists in the justice system. They have endured a great deal more misery. Since there is now no particular legislation in India, the Supreme Court has provided justice to crime victims, which is a positive side. In a number of instances, the nation's highest court has taken a pro-victim attitude, and the group is trying to establish a special judicial system that prioritises victims as well as criminals and ensures that everyone receives equal justice.

In "Rattan Singh v. One of the issues with our judicial system, according to Justice Krishna Iyer of the State of Punjab, is that it fails to focus on those who are victims of the crime that was committed. Indeed, our criminal code's primary trigger is still victim recompense. This systemic problem has to be addressed by the lawmakers. More attention has to be paid to this problem.

The duration of the punishment will not compensate for the disabled or the bereaved, but rather will make it more severe and pointless. Even yet, it is morally right for the offender to compensate for the harm or make amends within the framework of the punishment. Victimisation must be met by holding the offender responsible for the harm they caused, not by using violence, but by limiting the mourners' losses.

The justice system for crimes concentrates on the crime, the perpetrator, the trial, proving the defendant's guilt, and determining the right punishment. After being used as information in the procedures, the victims are disregarded and stigmatised. They don't get any help, and feeling abandoned causes anxiety, which may later generate issues for the criminal justice system. In India, victims are denied their rights by the legal system and treated as mere witnesses in the trial and sentencing of criminals. Under civil law, injured victims receive fair compensation for their losses, and the guilty party is responsible for making this payment. In Indian courts, victimisation and compounding are seen as justice.

Jurisprudence firmly defines the borders of authority that separate the judicial, legislative, and executive departments. The judiciary is unbiased and has a free press. India's punitive philosophy has acknowledged the concepts of prevention of crime, treatment, and offender rehabilitation, as evidenced by many decisions from the Court of Appeals and the High Court of India. In the judicial system, victims are seen as just

witnesses, and the state has complete control over whether to charge offenders and impose punishments on them.

Acts and Clauses of the Constitution

Article 21A of the Indian Constitution requires all Indian states to offer free and obligatory schooling to all children between the ages of six and fourteen. Article 23 of the Indian Constitution 12 forbids forced work, human trafficking, and begging. Children are not allowed to work in mines, factories, or any other dangerous jobs, according to Article 24(25). Numerous legislations have been established to implement the aforementioned fundamental rights. Take the Right to Education Act of 2009, which, under Article 21A of the Indian Constitution, requires free and compulsory education.

Conclusion

Children who experience violence have a higher probability of being victimised and rejected by their peers. In addition to having a detrimental effect on their well-being, there is strong evidence that peer victimisation and child abuse both independently worsen mental health consequences**.** The whole Indian judiciary is focused on violators. The study aims to evaluate the efficacy of preventative and early intervention measures by mapping child abuse trends using reliable metrics, including anatomical and functional brain changes and DNA methylation processes. Preventing abuse against children is a crucial objective, and the results of the current study indicate that such initiatives will also help to avoid violence between individuals throughout the life cycle. Despite its medical affiliation, claims of social risk detection and management skill, and an echo chamber, psychiatric language is inconsistent with the principles of recovery in practice and intellectual foundations. Several thorough studies, as previously reviewed, offer compelling evidence that bullying victimisation throughout childhood contributes independently to the development of negative life outcomes, such as mental, physical, and economic consequences.

Even the legislators, the court system, and others are concerned for the guilty or defendants. The system should function to provide victims justice, and the legal system must be accessible to those who want it. Suppose the framework does not guarantee that witnesses and victims may participate in court proceedings, speak effectively without fear, and have their rights and interests protected. In that case, justice will only be carried out in line with the text of the constitution rather than its spirit.

Until law enforcement, various officials, parents, the general population, it's time to and other stakeholders understand children's rights, I believe that no amount of legislation will accomplish the aim. The significance of educating people about child rights legislation among these people is urgent. Strictly enforced laws will also aid in achieving this objective. Child abuse is a social problem that calls for consideration, action, and a review of the way that investigations and prosecutions are currently conducted.

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REVIEW ARTICLE

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Identification of Unknown Dead Bodies: Integrating AI and Forensic Biometrics in Facial Recognition, Fingerprint Databases, Forensic Odontology, and DNA Profiling

Shilekh Mittal[1*], Ishwer Tayal[2]

[1]Professor, Department of Forensic Medicine, GGS Medical College, Faridkot, Punjab, India.
[2]Associate Professor, Department of Forensic Medicine, GGS Medical College, Faridkot, Punjab, India.

Abstract

The identification of unknown dead bodies is a pivotal process in forensic medicine, with implications for law enforcement, public health, disaster victim management, and human rights. Conventionally, biometric techniques such as facial recognition, fingerprinting, Forensic odontology, and DNA profiling have been used to establish identity. However, these methods can face significant limitations, especially in cases involving decomposition, mutilation, or a lack of comparative data. The recent integration of artificial intelligence (AI) with forensic biometrics has dramatically enhanced the accuracy, efficiency, and scalability of identification processes. AI algorithms can analyse massive datasets, learn from patterns, and assist in automated decision-making, offering superior performance over traditional manual techniques. This review explores the synergy between AI and key forensic modalities, examines their real-world applications, highlights the challenges in implementation, and considers future directions for a comprehensive and ethically sound Forensic identification framework.

Keywords: Unknown dead bodies, Artificial intelligence, Postmortem identification, Automated identification systems, Disaster victim identification.

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Introduction

The process of identifying unknown deceased individuals is central to both legal and humanitarian obligations. Whether due to accidents, homicides, suicides, or mass disasters, unidentified bodies pose serious social and investigative challenges. Traditional methods often require ante-mortem records, which may not always be available or accessible. Moreover, manual analysis is time-consuming and prone to human error.[1]

Technological advances—particularly in artificial intelligence and machine learning—are revolutionising the field of Forensic.[2] By incorporating AI into biometric systems, Forensic experts can now handle large-scale identification efforts with unprecedented accuracy and speed. AI's ability to recognise patterns, optimise comparisons, and learn from incomplete datasets makes it an ideal companion in Forensic applications.[3]

Facial Recognition and Artificial Intelligence

Facial recognition is commonly used in the early stages of identification when the deceased's face is still relatively intact. Traditional facial comparison involves visual inspection or morphometric analysis, but these are hindered when facial features are distorted due to trauma or decomposition.[4]

AI enhances facial recognition through convolutional neural networks (CNNs) and deep learning algorithms, which are capable of extracting facial features even from low-quality or altered images. Software like FaceNet and Amazon Rekognition can detect and match facial landmarks with databases containing millions of images. [5] These tools are useful in matching images from missing person databases, passports, surveillance footage, or even social media.[5]

Moreover, AI can assist in facial reconstruction. In cases where only the skull is recovered, algorithms can generate probable facial appearances using predictive modelling. While still developing, these techniques are being tested for use in archaeological and Forensic anthropology contexts.[3]

Nevertheless, challenges remain, especially regarding algorithm bias, the need for high-quality data, and privacy issues related to image scraping and surveillance.[2]

Fingerprint Identification Enhanced by AI

Fingerprints have been used in forensics for over a century due to their uniqueness and permanence.[1] The evolution from manual comparison to automated fingerprint identification systems (AFIS) marked a turning point in Forensic identification.

Corresponding Author: Shilekh Mittal, Professor, Department of Forensic Medicine, GGS Medical College, Faridkot, Punjab, India, e-mail: shilekh@gmail.com

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Today, AI further advances this capability by enhancing degraded prints and improving matching accuracy[3].

Deep learning models can identify ridge patterns and minutiae even in partial, smudged, or decomposed fingerprints[3]. These systems are especially useful in postmortem situations where conventional ridge analysis may fail due to tissue degradation[3]. Machine learning is also being used to improve the speed of searching vast fingerprint databases like the FBI's IAFIS or India's NAFIS.[7,9]

An additional development is the use of AI in ridge pattern classification. By learning from thousands of known prints, AI can classify and match latent prints with minimal human input, thereby reducing workload and increasing objectivity[3].

However, limitations still include variability in print quality, missing fingerprints due to decomposition or trauma, and the need for integration across law enforcement agencies.[7]

Forensic Odontology and AI-based Analysis

Dental identification is a robust method used particularly in mass disasters, as teeth and restorations are resilient to decomposition and fire. Traditional dental identification involves manual comparison of dental records and X-rays with postmortem findings, which can be time-consuming and subjective.[4]

AI significantly optimises this process by using radiograph matching algorithms[3]. These algorithms compare postmortem dental X-rays with large databases of ante-mortem records using pattern recognition and shape-matching techniques. AI also aids in identifying unique dental characteristics like crowns, root patterns, and fillings.[3]

Furthermore, AI-driven 3D modelling helps in reconstructing dentition from skeletal remains, especially when soft tissues are absent. These reconstructions are often used in combination with facial reconstructions to improve identification confidence.[4]

Despite these advances, challenges persist—particularly in populations lacking consistent dental records or in under-resourced regions where digital dental records are not routinely maintained[2].

DNA Profiling and Machine Learning

DNA profiling is the gold standard for human identification. Short tandem repeat (STR) analysis is the most widely used method, offering high discriminatory power. However, DNA analysis can be time-intensive and complex, particularly in cases involving degraded samples or DNA mixtures[8].

AI has been increasingly employed to enhance DNA analysis. Machine learning models assist in mixture interpretation, anomaly detection, and rapid database matching.[3] AI also facilitates predictive DNA phenotyping, a technique that predicts physical characteristics—such as eye colour, hair type, and ancestry—from genetic material[8]. Tools like the Parabon Snapshot use such models to generate facial sketches based on DNA extracted from remains.[9]

Another significant contribution is kinship analysis. AI can rapidly match unknown DNA profiles with those of relatives in missing person databases, thereby streamlining investigations and reducing reliance on direct comparisons.[3]

Yet, AI applications in genomics are data-intensive and require significant computational infrastructure, posing challenges in resource-limited settings.[2]

Multimodal Biometric Integration

One of the most promising applications of AI in forensic identification lies in the integration of multiple biometric systems.[3] A single modality may be inconclusive or unavailable; hence, combining fingerprints, facial recognition, dental data, and DNA enhances reliability and redundancy.[1]

AI platforms can process and cross-verify data from various sources to build a comprehensive identity profile.[3] In mass disasters, for instance, AI-assisted systems can simultaneously evaluate facial images, dental charts, and genetic information to expedite victim identification.[10] Such integrated systems also support probabilistic reasoning, offering statistical confidence in identification outcomes[3].

Multimodal systems can be particularly useful in combating identity fraud, cross-border crimes, and undocumented deaths, where conventional methods often fall short.[3]

Ethical, Legal, and Implementation Challenges

While AI enhances forensic identification, it also raises significant ethical and legal questions. Consent, data security, algorithmic bias, and surveillance concerns are at the forefront of debates. Unregulated use of facial recognition or DNA databases may violate individual rights and lead to wrongful identification or discrimination.[2]

Moreover, the implementation of AI tools requires standardisation across agencies and countries.[7] Many Forensic labs lack the digital infrastructure or trained personnel to operate such systems effectively. Inconsistencies in data collection formats, privacy legislation, and database accessibility further hinder seamless integration.[2]

To address these challenges, a comprehensive framework involving policy-makers, technologists, Forensic experts, and legal professionals is required. International collaboration and open-source platforms may also help democratize access to Forensic AI tools.[6]

Future Directions

The future of forensic identification lies in real-time, AI-driven analysis integrated with national and international biometric databases. Initiatives like India's crime and criminal tracking network system (CCTNS), INTERPOL's Biometric Hub, and the FBI's NGI (Next Generation Identification) system are moving in this direction.[6,7]

Wearable devices, smart sensors, and mobile forensics are also likely to converge with AI-based biometric tools. Moreover, advances in explainable AI (XAI) will ensure greater transparency and accountability in automated decision-making.[2]

Continued investment in research, capacity-building, and cross-sector collaboration will be key to fully realising the potential of AI in Forensic identification.[2]

Conclusion

The integration of artificial intelligence with traditional forensic biometric techniques marks a new era in the identification of unknown deceased individuals. Whether through AI-enhanced facial recognition[5], fingerprint analysis[3], dental imaging[4], or DNA interpretation[8], these technologies collectively offer unparalleled efficiency and accuracy. While significant ethical, legal, and infrastructural challenges remain, the potential benefits of AI-driven Forensic identification are transformative.[2] As technology advances, the Forensic community must adopt a balanced, responsible, and inclusive approach to ensure that the identification of the dead upholds both scientific integrity and human dignity.

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CASE REPORT

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Humanitarian Forensic Approaches in Forensic Nursing for Victim Management: A Vindicative Case of Victim's Reunion with Family

Sunit Bhalerao, Rajesh Babu*, Devashish Silajiya, Sweety Raval

School of Medicolegal Studies, National Forensic Science University, Gandhinagar, Gujarat, India.

Abstract

Forensic Nursing is one of the most evolving specialties in Nursing science. Forensic nursing has been conventionally considered a nursing science disciplinethat is more related to support and assistance in medicolegal cases. But in addition to this, it is also a skill of rendering comprehensive care to the victims of any trauma, violence, abuse, neglect and disasters. This sort of ideological humanitarian forensic approach has been referred to, in this article, as a case study which was found to be unique. For the obvious reason of maintaining professional secrecy and integrity of both the victim and the hospital where the person was treated, the identity has not been revealed/ disclosed (instead named as X). The above-stated person X was a victim of forced migration and was a mentally ill individual. The victim belonged to the state of Maharashtra and was reunited with the family after being provided and compassionate care by the prospective students of Forensic Nursing during their clinical posting. This case reveals the importance of forensic nursing with the holistic humanitarian approach, with the orientation of reuniting the victim with family.

Keywords: Forensic nursing, Psychiatric illness, Humanitarian forensics, Reunion.

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Introduction

Forensic Nursing is a well-known application of nursing skill and knowledge used to assist medical experts in the administration of justice in any such relevant cases, and the application of nursing knowledge for the holistic management of the victims of any trauma or disaster.[1] In the contemporary context, forensic nursing science is the application of nursing skills to every aspect of victim care, irrespective of the origin or cause of such an incidence (which has resulted in any kind of unforeseen/ hostile/ unlikely events)[2]. The term forensic nursing implies every aspect of victim care, irrespective of the origin or cause of such an incident, which results in any individual or individuals deteriorating in deterioration of physical and mental condition.[2,3] Forensic nursing plays a vital role in regaining the physical and mental homeostasis of the victims. The victims are traumatised, victimised, or ostracised in regaining normal homeostasis. Forensic nursing is not only applied in the cases of examination of the victims of sexual abuse, but it also includes a holistic management of the victims of trauma and disaster.[3] This field plays a significant role in comprehensive victim care, especially in cases of abuse against women, children and the elderly and also the cases of human trafficking, forced migration, and disasters of any kind and origin.[3] This encompasses the concepts of Humanitarian forensics, which is one of the recent advances in the broad spectrum of forensic science. Unlike the core objective of forensic sciences, here the expertise is associated with victim care and management. In any case of mass disaster or trauma, where the individual is affected physically and mentally humanitarian approach leads to their normalcy or homeostasis in physical, clinical and psychological perspectives.[4] In addition to that, the humanitarian forensic approach also plays a vital role in reuniting the missing individual with their family members. One of the other areas of humanitarian forensics is taking comprehensive care of the victims of disasters of any kind with the vital components of compassion, empathy and solace.[4]

Corresponding Author: Rajesh Babu, School of Medicolegal Studies, National Forensic Science University, Gandhinagar, Gujarat, India, e-mail: drrajeshbabu.babu@gmail.com

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Case Description

For the obvious reasons of integrity, modesty and professional secrecy, the victim's name and identity have not been revealed.

In this present article, emphasis has been placed on the humanitarian forensic approach in a particular case of a victim of a psychiatric illness by the student forensic nursing practitioners. Victim X had been out of their native place and house due to a hostile environment and had been admitted to the psychiatric hospital due to a history of mental illness. The particular victim was subjected to an interaction with the M.Sc.

Forensic Nursing students during their clinical posting were subjected to examination in as same way as the psychiatric victims in that hospital. The name of the hospital is also not revealed. However, during the process of interaction, the victim murmured in their native language, identifying themselves as a person from the neighbouring state of Maharashtra. A thorough discussion in Marathi revealed that the victim had been wandering in neighbouring states, as they were not in a good state of mind. After realising that the victim had been displaced with a fragile mental state, the individual was admitted to the psychiatric hospital. A routine medical and psychological examination was conducted in a complete state of restraints within the hospital, but the recovery was slow. Once the students interacted with the subject during their posting, it was found that the victim could only communicate in Marathi. Among the posted students, a few spoke Marathi and started interacting with the individual and got confirmation from the victim's brother. Once the information was sent to the family members about the physical condition of the individual, the brother made calls to the nursing officials about the mental and physical condition.

Based on the general physical examination and the psychological assessment, the victim was found to have been forcefully migrated. The victim only has the acquaintance of their mother tongue, i.e., Marathi. In such a scenario, the origin and the history could not be obtained. However, upon comprehensive clinical examinations, it was found to be a case of human trafficking /or exploitation, with the emaciated look and the probable deprivation of basic needs of nutrition (vital)[5]. There were minor, old healed bruises suggestive of trauma. The most remarkable aspect of the case was that victim X was a psychologically ill individual.[5,6] There was a point of the re-emergence of the contact number of their kin as the individual had been whispering in Marathi. The forensic nursing interns were able to decipher the intermittently murmured words and confirmed them in the same language that the victim understood. Later on, a telephone conversation was arranged to have an assessment of the genuineness of the number that was whispered. There was an interaction between the nursing interns and the family members of the victim. In the initial stages, the family members were so reluctant and mistrustful of the statements mentioning the presence of the victim under their observation. Once the family expressed their concern to have a video call with the interns, the same was arranged. They were heaven-struck. They became speechless and were so elated to see the individual alive (since what they believed was otherwise). Finally, they came from their native state in Maharashtra to Gujarat to take the victim back with them. There was a wonderful reunion of the victim with the family. This vindicates the effective and professional practices of forensic nurses that are being contemplated in their true sense.

Conclusion

Forensic nursing is popularly considered and presumed to be the specialty associated with the examination of victims of abuse against women. There is a vast potential that is yet to be explored for the capability and the efficiency of forensic nursing professionals, as they are among the true saviours of the victims of any trauma and disaster, irrespective of their causes.[7] They are the true protectors of the victims of any unforeseen events without discrimination of caste, creed, race and gender. The prospective forensic nursing professionals are one of the most supportive pillars of victims' care with the comprehensive clinical, physical, psychosocial, medico-social and medicolegal perspectives, with the guidance and supervision of the medical officers in their respective hospitals/ clinical setups and medical teaching institutions, all other clinical care providing organisations [7,8]

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CASE REPORT

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Road Traffic Accident, Drowning and Secondary Drowning: Case Series

Ashish Mittal[1], Hussanpreet Singh[2], Shilekh Mittal[3*], Ishwer Tayal[4]

[1]Junior Resident-2, Department of Forensic Medicine & Toxicology, GGSMCH, Faridkot, Punjab, India.
[2]Junior Resident-3, Department of Forensic Medicine & Toxicology, GGSMCH, Faridkot, Punjab, India.
[3]Professor, Department of Forensic Medicine & Toxicology, GGSMCH, Faridkot, Punjab, India.
[4]Associate Professor, Department of Forensic Medicine & Toxicology, GGSMCH, Faridkot, Punjab, India.

Abstract

Road traffic accidents (RTAs) commonly result in deaths due to blunt force trauma; however, in certain environmental conditions, drowning can become a primary cause of mortality. We present a series of six cases following a road traffic accident where a bus plunged into a drain after colliding with a truck. Five passengers died at the scene due to drowning, while one succumbed two days later to secondary complications consistent with drowning-associated acute respiratory distress syndrome (ARDS). This report highlights the forensic features of drowning and secondary drowning and emphasises the importance of meticulous autopsy examinations in multi-causal deaths following vehicular accidents.

Keywords: Road Traffic Accidents, Drowning, Secondary Drowning.

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Introduction

Drowning as a consequence of road traffic accidents is an underrecognized cause of death. In cases where vehicles submerge into water bodies, drowning can occur either immediately or after a survival period, resulting in secondary drowning due to delayed pulmonary complications such as acute respiratory distress syndrome (ARDS).[1] Forensic pathologists must differentiate between traumatic injuries and asphyxia due to drowning, especially in complex scenarios involving both mechanisms.[2]

Corresponding Author: Shilekh Mittal, Professor, Department of Forensic Medicine & Toxicology, GGSMCH, Faridkot, Punjab, India, e-mail: shilekh@gmail.com

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Case Series Description

Incident overview

On 18/02/2025, a fast-moving bus collided with a truck and fell into a drain. Five passengers, including a woman, died at the scene, and over 30 individuals were injured. One additional male passenger succumbed two days later while under medical care. Postmortem examinations were conducted at the Department of Forensic Medicine, GGSMCH, Faridkot, after proper identification and police procedures.

Case 1

A male aged 52 years old was brought dead on 18/02/2025 at 10:21 AM with alleged history of road traffic accident and on external examination, cyanosis over nails of both hands and blackish mud was present over nostrils and both ears and fine tenacious froth mixed with dirty water was coming out of nose and mouth. On opening of the trachea, whitish froth mixed with blackish foul-smelling mud and liquid material was present. Rib markings were present on both lungs, and both lungs were heavy. The cause of death was declared as asphyxia due to ante-mortem drowning.

Case 2

A male aged 63 years old was brought dead on 18/02/2025 at 10:15 AM with an alleged history of road traffic accident, and on external examination, an abraded lacerated wound was present over the forehead, reddish abrasion over the nose, all injuries were ante-mortem in origin. Blackish mud was present over both nostrils; fine, tenacious froth mixed with dirty water was coming out of the nose and mouth. On opening of the trachea, whitish froth mixed with blackish foul-smelling mud and dirty liquid was present. Both lungs were congested, voluminous and heavy and rib markings were present on the surface. The cause of death was declared as asphyxia due to ante-mortem drowning.

Case 3

A male aged 45 years was brought dead on 18/02/2025 at 10:16 AM with an alleged history of a road traffic accident,

and on external examination, a lacerated wound was present over the forehead. Injury was ante-mortem in origin. Blackish foul-smelling mud was present over the chest, both ears, and nostrils; fine tenacious whitish froth mixed with dirt and water was coming out of the nose and mouth. On opening of the trachea, whitish froth mixed with blackish foul-smelling mud with dirty liquid was present. Both lungs were congested, voluminous and heavy and rib markings were present on the surface. The cause of death was declared as asphyxia due to ante-mortem drowning.

Case 4

A female aged 35 years old was brought dead on 18/02/2025 at 10:22 AM with an alleged history of road traffic accident, and on external examination, reddish abrasion and lacerated wound were present over the forehead, reddish bruise was present over the left forearm and right leg, all the injuries were ante-mortem in origin. Crushed glass particles were present over the chest. Blackish foul-smelling mud was present in the right ear and in both nostrils, fine tenacious froth mixed with dirty water coming out of the nose and mouth, with cyanosis present over the ear lobules. On opening of the trachea, blackish mud and whitish froth mixed with dirty liquid were present. Both lungs were congested, voluminous and heavy and rib markings were present on the surface. The cause of death was declared as asphyxia due to ante-mortem drowning.

Case 5

A male aged 75 years old was brought dead on 18/02/2025 at 09:12 AM with an alleged history of road traffic accident, and on external examination, a lacerated wound was present over the forehead and face; all injuries were ante-mortem in origin. Blackish mud was present over both nostrils; fine, tenacious froth mixed with dirty water was coming out of the nose and mouth. On opening of the trachea, blackish mud and whitish froth mixed with dirty liquid were present. Both lungs were congested, voluminous and heavy and rib markings were present on the surface. The cause of death was declared as asphyxia due to ante-mortem drowning.

Case 6

A male aged 56 years died during treatment of 2 days in hospital, having a bruise over the left elbow and visible deformity of the left forearm, fracturing the radius. All injuries were ante-mortem in nature. The left side of the pleura contained about 300 mL of blood-stained fluid, and the right side of the pleura contained about 300 mL of blood-stained fluid. Both lungs were congested on dissection, and foul-smelling, dark colored fluid mixed with pus was coming out. The cause of death was declared as complications of drowning, acute respiratory distress syndrome.

Discussion

This case series illustrates both immediate and delayed fatalities following drowning secondary to an RTA. Ante-mortem drowning findings — such as fine froth from airways, voluminous heavy lungs with rib markings, and mud in the tracheobronchial tree — were consistently present in the five individuals who died on the scene.[1,3]

The sixth case represents secondary drowning, wherein a delayed pulmonary response led to ARDS, sepsis, and death after hospitalization.[2,4] This emphasises that drowning-related deaths may not always be immediate and can occur hours to days later due to evolving respiratory failure.

In road traffic accidents, blunt trauma injuries are commonly seen. Still, the injuries and cause of death can vary in different environmental conditions, as in these cases of RTA, the few non-fatal injuries were more. Still, the cause of death came to drowning and secondary drowning. While doing these kinds of cases, we should be able to; Differentiating primary trauma deaths from drowning, identifying drowning-specific features even in the presence of traumatic injuries, certifying cause of death accurately, particularly in complex RTA scenarios involving submerged vehicles.[5]

Conclusion

Road traffic accidents resulting in vehicle submersion can cause immediate drowning or delayed secondary drowning due to pulmonary complications. In forensic practice, awareness of such mechanisms is crucial for the accurate determination of the cause of death, especially when multiple factors like trauma and drowning coexist.

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LETTER TO THE EDITOR

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Revolutionising Digital Forensic Facial Reconstruction: Recent Advances and Emerging Trends

Arjun Kundu*

Senior Resident (Forensic Odontology), Maulana Azad Institute of Dental Sciences, New Delhi, 110002.

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Forensic facial reconstruction (FFR) is a technique that combines scientific methods and artistic skills to recreate a person's facial appearance from skeletal remains, particularly the skull.[1,2] This process is based on the relationship between soft facial tissues and the underlying cranial structure. There are two main approaches: two-dimensional (2D) and three-dimensional (3D) reconstruction; 2D methods involve drawing facial features on overlays superimposed on skull images or craniographs, providing Frontal and lateral profile views. The 3D method involves a sculpting technique on the skull replica, which can be done manually or digitally. Three primary schools of thought exist in forensic facial reconstruction procedure: the tissue depth method and the American method. Developed by Krogman in 1946, this approach uses average tissue thickness at various landmarks on the skull to guide soft tissue reconstruction. Anatomical or Russian Method: Developed by Gerasimov in 1971, this technique involves carving muscles, glands, and cartilage layer by layer onto the skull. It requires a higher degree of anatomical expertise. Combination or Manchester Method: Developed by Neave in 1977, this approach considers both soft tissue thickness and facial muscles, combining aspects of the American and Russian methods.[3-6] Recent technological developments have led to computerised facial reconstruction methods, which improve versatility, performance, and speed. These digital systems can be divided into automated systems and modelling systems. Automated systems focus on anthropometrical data and templates, while 3D modelling software uses animation techniques to approximate manual reconstruction processes.[7-10] Some solutions incorporate haptic feedback for a more intuitive sculpting experience. Digital forensic facial reconstruction leverages advanced imaging, modelling, and sculpting tools to recreate an individual's face from skeletal remains with enhanced precision, flexibility, and efficiency. The process begins with creating a high-resolution 3D model of the skull, often generated from CT or 3D scans that capture essential details of bone structure critical for accurate forensic facial approximation.[11] Digital tissue depth markers, based on standardised measurements for age, sex, and ancestry, are applied at specific cranial landmarks to guide the addition of virtual "flesh" layers.[12] Specialised 3D modelling software, like Geomagic FreeForm, ZBrush or Blender, supports detailed sculpting, allowing practitioners to accurately replicate underlying muscle and tissue layers while ensuring anatomical precision. The digital environment offers unique advantages, including undo capabilities, symmetry tools, and the ability to adjust or save reconstructions, making the process reproducible and efficient. A transformative addition to digital facial reconstruction is the use of a haptic device like the Touch X by 3D Systems, along with Geomagic Freeform Plus software, which allows us to perform the forensic facial reconstruction procedure digitally. The brush-like 3D sculpting tool provides tactile feedback, enabling a forensic expert to "feel" the skull's surface virtually, closely mimicking the experience of traditional clay sculpting.[13,14] This haptic feedback allows experts to detect skeletal details, which enhances anatomical accuracy and control in contouring delicate facial features like the nose and eyes. Haptic systems also reduce subjectivity and the skill level needed compared to manual methods, enabling faster creation of multiple facial variations and facilitating the digital reassembly of fragmented skulls with enhanced accuracy.[15,16] The Touch X device's intuitive interface for manipulating 3D models makes it more user-friendly than traditional mouse-based systems, improving the overall user experience.[17] Furthermore, digital facial reconstructions can be saved, modified, and reused without additional material costs, unlike physical models, allowing for efficient testing of different facial representations. While initial investments in haptic systems like the Touch X may be high, they offer long-term cost savings through increased reusability and reduced material expenses. Ultimately, devices like Touch X have made computerised forensic facial reconstruction faster, more precise, and accessible, enabling forensic experts to leverage their sculpting skills in a digital environment while still allowing for necessary artistic interpretation. The advent of high-resolution 3D scanning technologies, including structured light, laser scanning, and photogrammetry, has fundamentally transformed the initial stages of forensic facial reconstruction. These modalities allow the digital capture of skull morphology with remarkable precision, often achieving higher accuracy. Structured light and laser scanning produce a rich 3D point cloud and surface mesh that can be archived, manipulated, and analysed without direct contact with the often fragile or fragmentary remains, avoiding risk of physical damage or data loss.[11,18] Photogrammetry, using multiple 2D photographs from different angles, further democratizes skull digitisation as it requires comparatively less specialised equipment. Once digitised, the skull model can be virtually manipulated for alignment, symmetry correction, or defect repair. Subsequently, 3D printers (using materials from resin

to plaster) generate tangible skull models or completed facial reconstructions. This has dual benefits: (a) it enables artists and scientists to work collaboratively on physical models when digital access is limited, and (b) it provides durable and reproducible reference objects for further forensic, educational, or exhibitory use.[11] Finally, 3D scanning and printing facilitate international remote collaboration and can be invaluable in court presentations or public appeals by lending a palpable dimension to forensic findings.[6,11] Integration of diverse high-resolution medical imaging modalities has further refined the anatomical accuracy and evaluative potential of FFR. Multislice computed tomography (CT), cone-beam computed tomography (CBCT), and magnetic resonance imaging (MRI) each offer unique contributions. CT and CBCT efficiently image bone in exquisite detail, enabling precise segmentation of cranial structures, detection of pathological changes, and reconstruction even when remains are incomplete or commingle.[1,19] MRI, although less effective for mineralised tissues, excels in rendering residual soft tissue and can be fused with CT data for a comprehensive anatomical map. Advanced imaging not only aids in the creation of digital skull models but also supports the digital placement of anatomical landmarks crucial for facial reconstruction protocols.[1,10] Furthermore, these modalities are non-destructive, allow repeated and shared evaluation, and facilitate the storage of the entire evidentiary record in a digital format. The availability of extensive, population-specific databases of facial soft tissue thickness has greatly enhanced the reliability of FFR. These datasets, stratified by sex, age, ancestry, and body mass index (BMI), serve as foundational reference points for both manual and computer-driven reconstructions.[20,21] Data-driven approaches, including statistical shape modelling (SSM), morphometric analysis, and finite-element modelling, enable practitioners to predict facial geometry based on the complex relationships between skeletal architecture and overlying soft tissues. SSM, for instance, can model probable facial appearances from collections of 3D landmarks, while finite-element analysis aids in simulating the biomechanical properties of facial tissue.[21,22] A recent, promising advance in FFR is the application of artificial intelligence (AI) and deep learning approaches. These methods employ algorithmic models, including neural networks, regression trees, and Bayesian frameworks, to learn complex, nonlinear mappings between cranial morphology and facial appearance from large training datasets. Supervised deep learning models can automate the assignment of soft-tissue thickness values, predict the presence or morphology of facial features (such as the nose or lips), and even simulate facial changes related to ageing or expressions.

AI-driven FFR aims to reduce the degree of subjective decision-making that has traditionally characterised the field, potentially increasing both speed and standardisation. Although these techniques are still developing and face issues like data quality, validation, and transparency, they show strong potential to create reconstructions that are more accurate and based on probabilities.

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SM - 002	Arti Maurya	SM - 024	Praduamn Kumar
SM - 003	Anchal Gautam	SM - 025	Priya Yadav
SM - 004	Ankit Kumar	SM - 026	Preeti Yadav
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SM - 008	Ansh Jaiswal	SM - 030	Soni Rai
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SM - 013	Neelam Kumari	SM - 035	Shikha Verma
SM - 014	Arti Verma	SM - 036	Shalini Verma
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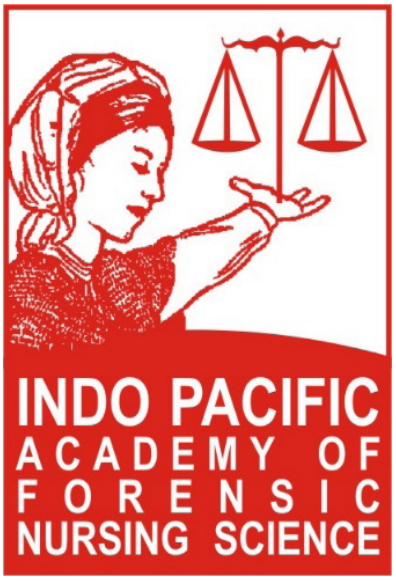

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297	P. Suba Sooria	337	Ms Arockia Dharshana J
298	Beniya Elizabeth Rani R		

Delivering a keynote address at Subharti University, Meerut, in a Conference under the aegis of INPAFNUS, organised by Prof Bhim Singh.

Participated as a chief guest and delivered a keynote address at PSG Nursing College, Coimbatore, organised by Prof. Jeyadeepa R

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