

Awareness on the importance of forensic odontology in dentistry- a cross sectional study

A. Hema Malini*, M. Subha, T. Sarumathi, R. Tamil Selvi, M. Kavitha, B. Niveditha

Department of Oral Medicine and Radiology,

Madha Dental College and Hospital, , Kundrathur, Chennai, Tamil Nadu 600069.

Abstract

Forensic dentistry is a demanding and interesting branch of forensic science that involves the application of dental sciences in the identification of a person living or dead. It plays a major role in criminal, social, burial, monetary disputes, marital, and the identification of individuals missing for prolonged periods. The study aims to assess the awareness on the importance of forensic odontology among postgraduates and faculties in various specialty of dentistry. A cross-sectional study, using a structured questionnaire with 15 close-ended questions written in the English language was given to all willing participants. The questions were framed and standardized by two dental faculties who were experienced in the field of forensic odontology. Postgraduate students and faculties were included to assess their knowledge and importance. The participants showed adequate knowledge, attitude and practice scores through the survey. This survey was conducted to assess the knowledge and awareness of the practical usefulness in forensic odontology. By considering the development in forensic odontology, dentists should be knowledgeable of the role and importance of their specialization.

Keywords: Awareness, forensic odontology, knowledge, dental practitioners, attitude

Full length article *Corresponding Author, e-mail: malinianbalagan888@gmail.com

1. Introduction

The term forensic is from the Latin word, meaning forum. In Rome, a forum is a meeting place where civil and legal matters are discussed before the public. The science of dentistry related to the law is known as forensic dentistry. It is the most challenging and fascinating branch. It has three major fields of activity: crime/non-criminal, criminal, and research. It is a multidisciplinary approach as involves management, examination, evaluation, and presentation of dental evidence in criminal and civil proceedings [1]. Knowledge about various aspects of forensic science as well as dental and related evidence can help a dentist in fact find mission. Forensic odontology can utilize every dental discipline including oral medicine, oral pathology, oral and maxillofacial surgery, periodontitis, prosthodontics, conservative dentistry, orthodontics, and community dentistry [1,3]. There is a proposed working classification for odontology

For oral medicine and radiology

- Helps in age estimation using the radiographic method
- Changes in orientation of mental foramen and inferior alveolar canal.
- Eruption pattern
-

- Maintenance of records such as dental charting, cheiloscopy.

For Oral surgery

Identification of

- a) Maxillomandibular and dentoalveolar fractures
- b) Surgical repairs and implants
- c) Le fort 1 osteotomy procedure in autopsy

Oral pathology

- Age estimation using ground section
- Identification of developmental disturbances of teeth, tumor and cyst of teeth

For community dentistry

- Identification of endemic fluorosis, socio-economic grouping, caries, periodontal diseases, oral cancer , mass disaster, dental fraud and malpractice.

For orthodontics

- Age estimation by cephalometric analysis, OPG, X-ray of hand and wrist
- Identification of tooth rotation and malposition, orthodontic appliances, sexual dimorphism.

For periodontics

- Identification of Age, gingival morphology and pathology

For pedodontics

- Age estimation by eruption sequence, Demirjian methods, Nolla's classification

For conservative dentistry

- Identification of restoration and endodontic treatment
- Radiographic methods

For prosthodontics

- Identification of metallic crowns, bridges and implants^[4]

The study aims to assess the awareness on the importance of forensic odontology among postgraduates and faculties in various specialties of dentistry.

2. Materials and methods

The present questionnaire – based cross sectional study was conducted among post-graduate & faculties of various dental specialty in Tamil Nadu. The questionnaire consisting of 15 questions was pre-tested by 3 professionals to assess its feasibility, ease of understanding and reliability. The total sample size was 248 with an age range between 23 and 50 years.[Figure 1] They were requested to complete the survey. The concluded questionnaire was posted online through Google forms and distributed in digital platforms. The consent of the participants was given by their willingness to take part in the survey. The questionnaire was only in English language and the participants were appealed to respond each question by choosing suitable option. Postgraduate dental student, and faculties of various fields of dentistry were included in the study. undergraduate students, compulsory rotary residential internship students and general dental practitioner were excluded from the study. The participant information recorded were age, gender, educational qualification (postgraduate dental student/faculty/ field of dentistry) and years of dental practice.

3. Results and Discussions

Data collected from finished questionnaires were entered in a Microsoft excel spreadsheet. Using SPSS software, statistical analysis was performed. The categorical data was described by percentage and the responses were tabulated. [Table 1]

1. Is forensic dentistry useful in identifying criminals and dead people?

In our study, 70% of the participants felt forensic dentistry will be able to identify the criminal and dead people, and about 30% of the study population were unaware of it.

2. Do you know about any criminal cases solved with the help of forensic odontology?

89% of the study participants know forensic odontology can be helpful in solving criminal cases and remaining 11% of the study participants was not agreed with it.

3. Are you aware of any forensic odontologist(s) working in Tamil Nadu?

53% of the study participants responded positively that they are aware of forensic odontologist working in Tamil Nadu and 47 % were unaware of it

4. How do you identify the dental age in children and adults?

90% of study participants will identify using eruption pattern and calcification, 4% study participants answered using histological method, 2% study participants will identify using biochemical method and remaining 4% study participants were unaware of it.

5. What is the 1st step for the identification of unclaimed bodies?

In our study, 60% of the respondents said visual identification as the first means of the identification, 16% of them answered fingerprinting, 13% of them answered physical and anthropological examination, 7% study participants answered serological, genetic and DNA composition and 5% of them were not aware of it. Visual identification is the standard protocol for identifying individuals in forensic medicine.

6. How will you identify a deceased person's age and gender in mass disasters like fire, stampedes, and accidents?

55% of the participants will identify a deceased person's using reconstruction the fragments of deceased body, 32% of participants will identify by dental records, 6% of participants will identify using finger prints and about 7% of study participants were not aware.

7. In your opinion, which of the following records of a patient should be maintained?

86% of study participants will maintain the patient records using patient case report, radiograph, photograph and cast, 8% of study participant will maintain patient records with only patient case reports, 2% of study participants will maintain patient records with radiograph, 2% of study participants will maintain patient records with photograph and remaining 2% of study participants will maintain patient records with cast.

8. What is the source of information about your knowledge in forensic odontology?

In the present study, 92% of study participants answered workshop/ seminar, book and internet, lectures are the information sources and remaining 8% of study participants have no knowledge in forensic odontology due to lack of time and interest.

9. Can extraction of DNA from pulp of tooth and extraction of DNA from ground up teeth are used for victim identification?

87% study participants were agreed that pulp of teeth can serve as source of DNA and about 13% study participants were not agreed with it

10. Are you aware of the bite mark patterns of teeth?

90% study participants were aware of the bite marks patterns of teeth, and 10% were unaware of it.

11. What would you do if you identify signs and symptoms of child abuse?

65% of them said that they would report it to the police, 27% of participants answered that they will inform parent and only 8% were in favor of reporting to the NGO

12. Does forensic odontology compare postmortem and anti-mortem record?

79% of study participants know that forensic odontologist can compare postmortem and anti-mortem record and about 21% of participants were not unaware of it.

13. Are you aware that you are eligible to appear to court to present forensic dental evidence?

70% of study participants were aware that dentist are eligible to appear as forensic evidence and 30% of participants were not known.

14. Are you aware of job offers in forensic odontology?

Only 58% of study participants were aware of forensic job offers and remaining 42% were not known of it

15. Are you interested to join forensic dentistry as a profession?

60% of participants were interested in joining as forensic odontologist and 40% of them were not interested.

It is the most important and fascinating branch in dentistry that would help in solving criminal cases and identification of victims. Many developing countries gained the knowledge, awareness and known the importance of forensic dentistry. Still our country is yet to attain its significant awareness [4]. In the present study the questionnaire was structured to assess the awareness and knowledge among the postgraduates and dental faculties of various field. Most of the study population knows that forensic dentistry is useful in identifying criminals and dead people. In the studies conducted by Rahman et al (2017), Abdul et al (2019) showed 95% participants were aware that forensic helps to investigate criminal and dead persons [1,4].

In our study, more than 90% participants were aware about the criminal cases solved with the help of forensic odontology. In Sahni et al study (2016) shows only 56% of

them were aware of any criminal cases were solved with the help of forensic odontology and most of them mentioned about Nirbhaya case that was analyzed with the help of bite marks. Moreover, there are other cases where the forensic odontologists had played a very important role in the past, e.g., the assassination case of the former Prime Minister of India, Mr. Rajiv Gandhi; Nithari case; or Hitler suicide case etc. [3]. Most of the study participants will identify the dental age using eruption pattern and calcification. In the studies conducted by Preethi et al (2012), Sharma et al (2022), Abdul et al (2019) showed more than 70% of the participant will identify the dental age using eruption pattern. Identification of bodies is the most challenging step in forensic odontology. Visual examination was 1st and preliminary step in identification of human bodies. In the present survey, 68% of the respondents were answered visual examination which is in accordance with the study conducted by Sahni et al (2016) [2,6]. The present study shows 55% of the participants will identify a deceased person's age and gender in mass disasters using reconstruction of the fragments of deceased body. It is contrary to the study conducted by Abdul et al (2019) which shows 78% of the study participants will be able to identify using dental records. Dental records serve as a future reference for a practitioner. There has been an increasing awareness among the public regarding knowledge of dental record issues. Many of the dental practitioners were aware of the significance of maintaining dental records [1]. The pulp, dentine, cementum, and periodontal ligament fibers are the main sources of DNA. Nearly 87% of the study participants were aware that teeth can be used as a source of DNA. This is consistent with the study conducted by Sahni et al (2016) and Abdul et al (2019) [1,3]. In the present study, more than 90% of the study participants were aware of bite mark pattern of teeth. It is consistent with the study conducted by Preethi et al (2012), Rahman et al and Salam et al. Child abuse is the most notable and serious problem in society. It is greatly increasing in number in day-to-day life. In our study, 66% of study population will report to police, followed by parents and NGO, which is in accordance with the study conducted by Sahni et al (2016) [6]. In our study, 79% of the study participants know that the forensic odontologist compare both postmortem and ante mortem records. It is like the study conducted by Bipin et al (2020). Nearly 70% of study participants were aware that they are eligible to appear on court which is consistent with the study conducted by Preethi et al, Sharma et al, and Abdul et al. Only 58% of participants in our study, knows about the forensic dentistry job offers. In contrast, Abdul et al study, showed 80% participants were aware of job offers [9]. In the present study, 60% of study participants were interested to join forensic odontology as a profession. In the studies conducted by Sahni et al, Abdul et al showed more than 90 % were willing to join as forensic odontologist [1]. In the results, the participants showed adequate knowledge, attitude and practice scores through the survey. And there is an enthusiasm among the dental professionals to further upgrade their knowledge and follow forensic odontology as a carrier option. Every dentist must understand the forensic implication related to their practice. In India dentist are less involved in forensic circumstance because of lack of training, experience, and exposure. [3]

Table 1: Questionnaire and responses

Questionnaires	Response	Percentage
1. Is forensic dentistry useful in identifying criminals and dead people?	Agree	70%
	Disagree	30%
2. Do you know about any criminal cases solved with the help of forensic odontology?	Yes	89%
	No	10%
3. Are you aware of any forensic odontologists working in Tamil Nadu?	Yes	53%
	No	47%
4. How do you identify the dental age in children and adults?	Eruption pattern and calcification	90%
	Histological method	4%
	Biochemical method	2%
	Don't know	4%
5. What is the 1st step for the identification of unclaimed bodies?	Visual examination	60%
	Physical and anthropological examination	13%
	Finger printing	16%
	Serological and genetic DNA comparison	6%
	Don't know	5%
6. How will you identify a deceased person's age and gender in mass disasters like fire, stampedes, and accidents?	Reconstruct the fragment of deceased parts	55%
	Dental records	32%
	Fingerprints	6%
	Don't know	7%
7. In your opinion, which of the following records of a patient should be maintained?	Patient case record, radiograph, photograph	86%
	Radiograph	2%
	Photograph	2%
	Only Case reports	8%
	Patient Cast	2%
8. What is the source of your knowledge about forensic dentistry?	Workshop/ seminar, Book and internet and lectures	92%
	Don't know	8%
9. Can extraction of DNA from the pulp of tooth and extraction of DNA from ground-up teeth be used for victim identification?	Yes	87%
	No	13%
10. Are you aware of the bite mark patterns of teeth?	Yes	90%
	No	10%
11. What would you do if you identify signs and symptoms of Child abuse?	Inform police	65%
	Inform NGO	8%
	Inform parents	27%
12. Do forensic odontologists compare postmortem and antemortem records?	Yes	79%
	No	21%
13. Are you aware that you are eligible to appear in court to present forensic dental evidence?	Yes	70%
	No	30%
14. Are you aware of job offers in forensic odontology?	Yes	58%
	No	42%
15. Are you interested in joining forensic dentistry as a profession?	Yes	60%
	No	40%

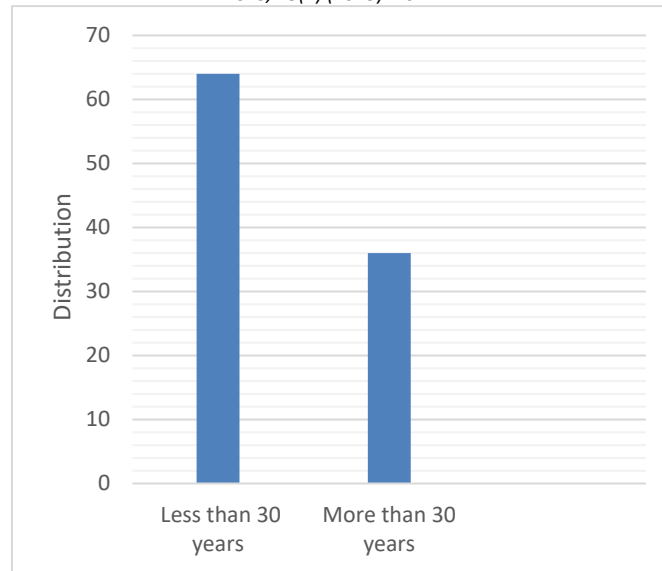


Figure 1: Sample distribution as per age

4. Conclusions

Forensic dentistry plays a major role in the identification of those individuals who cannot be identified visually or by other conventional methods. Interdisciplinary knowledge of forensic dentistry and modern-day investigations plays a small but important role in enforcing justice in civil and criminal cases. Forensic odontologist allows the dentist to help in solving medicolegal cases and to maintain law and order in society. Dentists are health care professionals who routinely assess the head and neck of the patients and have a great chance of identifying the signs of abuse and neglect. ^[4,5]

References

- [1] N. S. Abdul, L. Alhazani, R. Alruwail, S. Aldres, S. Asil. (2019). Awareness of forensic odontology among undergraduate, graduate, and postgraduate dental students in Riyadh, Saudi Arabia: A knowledge-, attitude-, and practice-based study. *Journal of Forensic Dental Sciences* ;11:35-41.
- [2] S. R. Sharma, F. R. Karjodkar, K. P. Sansare, M. Saalim, A. H. Sharma, S. A. Chavan. (2021). Awareness towards forensic dentistry - A questionnaire-based cross-sectional study. *Journal of Indian Academy Oral Medicine and Radiology* ;33:385-90.
- [3] A. Sahni, S. Rehani, Y. Mathias, P. Kardam, R. Nagpal, R. Kumari. (2016). A questionnaire survey on forensic odontology: Are we really aware. *Journal of Forensic Dental Sciences* ;8:113.
- [4] J. Rahman, S. Routray, S. S. Mishra, I. Mohanty, N. Mohanty, N. Sukla. (2017). Knowledge, awareness, and practice of forensic odontology among dental surgeons in Bhubaneswar, India. *Journal of Unexplored Medical Data* ;2:26-33.
- [5] M. Salam et al. (2019). Public awareness of forensic odontology and willingness to enroll in a prospective dental registry: A survey conducted in Saudi Arabia. *Saudi Dental Journal* ;32(1):21-28.
- [6] S. Preethi, A. Einstein, B. Sivapathasundharam. (2011) Awareness of forensic odontology among dental practitioners in Chennai: A knowledge, attitude, practice study. *Journal of forensic dental sciences* Vol 3, Issue 2.
- [7] YRS. Susmitha, M. Yelapure, MN. Hegde, et al. (2020). Knowledge and awareness of role of endodontics in forensic odontology- a questionnaire-based survey among postgraduate students. *Journal of Evolution Medicine and Dental Sciences*. 9(05):262-265.
- [8] DK. Isher, PP. Singh Isher, N. Kaur, J. Rakhra. (2019). Knowledge, awareness and practice of forensic odontology among the dentists of Punjab. *Journal of Indian Academy of Oral Medicine and Radiology* ;31:239-45.
- [9] Bipin, Keerthi Sasanka, Kavitha, Kiran kumar. (2020). Awareness on forensic odontology among dental undergraduate. *European Journal of Molecular & Clinical Medicine*, Volume 07, Issue 01.
- [10] J. Rahman, S. Routray, SS. Mishra, I. Mohanty, N. Sukla. (2017). Knowledge, awareness, and practice of forensic odontology among dental surgeons in Bhubaneswar, India. *Journal of Unexplored Medical Data* ;2:26-33.
- [11] Suman Shoro, Falak Murad Shah Syed, Scheila Manica. (2020). Awareness and importance of forensic odontology amongst faculty members and students of dental institutes in Pakistan. *Forensic Science International: Reports*, Vol. 2, 100116.
- [12] T. Khalid Aboalshamat, S. Doaa Alghamdi, A. Fatmah Almaqboul, A. Duaa Almarhabi, Hala Aleissa, Tahani Alattas, A. Aljawharah Aqely, N. Rawan Albishry. (2021). Knowledge and Attitudes of the Public in Saudi Arabia about Forensic Odontology during COVID-19. *Journal of Research in Medical and Dental Science*, Volume 9, Issue 9, Page No: 107-115
- [13] Raghad Hashim, Afraa Salah and Ruba Odeh. (2020). Forensic Odontology: Knowledge and Attitude of Dental Students in Ajman University, United Arab Emirates. *The Open Dentistry Journal*. Volume 14, 515-519

- [14] Mohit Gupta, Sanjay Kumar, Abhishek Yadav, Manish Kumath. (2019). Forensic Odontology: Knowledge and Awareness Among 2nd Year Medical Students. *Indian Journal of Legal Medicine.* ;1(2):55-60.
- [15] M. Kashif, MA. Kamran, S. Rizwan, S. Iqbal, A. Aslam, S. Shifa. (2020). Awareness of dental students about forensic odontology in Karachi, Pakistan. *Journal of Oral Health Oral Epidemiology* ; 9(3): 149-55.