DOI: https://doi.org/10.54393/pjhs.v5i12.2419

PAKISTAN JOURNAL OF HEALTH SCIENCES
(LAHORE)
https://thejas.com.pk/index.php/pjhs
ISSN (P): 2790-9352, (E): 2790-9344
Volume 5, Issue 12 (December 2024)

Original Article

OPEN ACCESS

Knowledge, Attitude, and Practices of Practicing Dental Surgeons Towards Forensic Dentistry

Nabeel Khan[1*], Abdul Aleem[2], Samra Bokhari[3], Sanober Naveed[4], Munnawar Ul Haque[5] and Nauman Shirazi[1]

[1]Department of Oral Biology, Karachi Medical and Dental College, Karachi Metropolitan University, Karachi, Pakistan
[2]Department of Community Dentistry, Karachi Medical and Dental College, Karachi Metropolitan University Karachi, Pakistan
[3]Department of Orthodontics, National Institute of Child Health, Karachi, Pakistan
[4]Department of Dental Materials, Karachi Medical and Dental College, Karachi Metropolitan University, Karachi, Pakistan
[5]Department of Community Dentistry, Liaquat College of Medical and Dentistry, Karachi, Pakistan

ARTICLE INFO

Keywords:
Attitude, Dental Surgeon, Knowledge, Forensic Dentistry

How to Cite:
Khan, N., Aleem, A., Bokhari, S., Naveed, S., Haque, M. U., & Shirazi, N. (2024). Knowledge, Attitude, and Practices of Practicing Dental Surgeons Towards Forensic Dentistry: Dental Surgeons Towards Forensic Dentistry. Pakistan Journal of Health Sciences, 5(12), 184-188. https://doi.org/10.54393/pjhs.v5i12.2419

Corresponding Author:
Nabeel Khan
Department of Oral Biology, Karachi Medical and Dental College, Karachi Metropolitan University, Karachi, Pakistan
dr.nabeelkhan@hotmail.com

Received date: 12th November, 2024
Accepted date: 24th December, 2024
Published date: 31st December, 2024

ABSTRACT

Forensic dentistry and dental records are essential to the legal system and healthcare because they support human identification, individualized patient care, and court cases. **Objective:** To assess the knowledge, attitude, and practices of dental surgeons in Karachi towards forensic dentistry. **Methods:** A cross-sectional study was conducted among 227 practicing dental surgeons in Karachi, Pakistan. A purposive sampling technique was used to recruit dentists. Hence by obtaining informed consent participants' privacy was assured. The sample size was calculated using Open-Epi Software with an aim of 18% knowledge among practicing dental surgeons. Descriptive statistics were used for data analysis methods by using SPSS version 24.0. **Results:** The study's findings showed that of the 227 participants, 38.7% were female practicing dental surgeons and 61.3% were male. About 91.1% of active dental surgeons acknowledged the value of keeping dental records, 35% said that gender, and 20% said that race could be determined from dental records. **Conclusions:** The results of the study concluded that there was a favorable attitude toward forensic dentistry and its inclusion in the curriculum. Hence, further workshops, need to be conducted among practicing dental surgeons.

INTRODUCTION

Teeth have been used as identifying techniques for a long time, with the first recorded court case reaching back to 1849. The term "forensic" is derived from Latin and refers to a forum or place for legal deliberations [1]. In the legal environment, dentistry is referred to as forensic dentistry or forensic odontology [2, 3]. The primary principle of forensic dentistry is that each individual's oral structure is unique [4]. Essentially, it is applying dental knowledge to legal systems. According to the Federation Dentaire International (FDI), it is the "field of dentistry focused on the correct management, examination, and evaluation of dental evidence in the pursuit of justice." This area of work involves a range of duties, such as bite mark analysis, human identification, investigating cases of abuse (of children, spouses, or elderly people), and evaluating medicolegal situations [5]. Forensic dentistry places great emphasis on teeth and other dental tissues for several reasons. First of all, there is a consistent aging pattern for teeth and the structures that support them. Because of this predictability, forensic specialists may determine an individual's age from the state of their teeth, which helps with identification and creating a timeline of events. Secondly, teeth have distinguishing characteristics that help in comparative identification. In cases involving

DOI: https://doi.org/10.54393/pjhs.v5i12.2419

unknown remains or victims, distinctive dental traits such as tooth morphology, dental restorations, and wear patterns can aid forensic investigators in differentiating between individuals and aid in the identification process [6]. In addition, the toughest tissue in the human body is found in the enamel that covers teeth. Compared to other body tissues, it is more resilient and can resist a wider range of traumas such as desiccation, submersion in water, burns, and chemical erosion. Because of this, dental evidence like enamel can frequently withstand adverse circumstances, offering crucial hints for forensic examination [7]. In addition, the dental pulp which is found in the tooth's center is a rich source of DNA. Enamel shielding the dental pulp allows genetic material to be preserved in challenging environments. As a result, forensic specialists can identify people implicated in criminal investigations or large-scale disasters by obtaining DNA from tooth pulp samples [8, 9]. Teeth and dental tissues are consequently essential tools in forensic science, aiding in both person identification and case resolution due to their special qualities and durability. Evaluating dental surgeons' forensic dentistry knowledge, attitudes, and practices residing in Karachi was the main objective of the study. A thorough analysis of the body of research indicates a sizable knowledge vacuum on the attitudes, behaviors, and knowledge of practicing dental surgeons employed by Karachi's dental facilities with regard to forensic dentistry.

The was to assess the level of knowledge, attitude, and practices of practicing dental surgeons of Karachi towards forensic dentistry

METHODS

A cross-sectional study was conducted from July till November 2024 among 227 practicing dental surgeons in Karachi, Pakistan. A purposive sampling technique was used to recruit the participants. A comprehensive list of practicing dental surgeons employed at these hospitals was obtained from the administrative departments before initiating the study. The inclusion criteria included practicing dental surgeons working in dental hospitals in Karachi with a recognized degree of at least one year of work experience and giving voluntary consent to participate. In contrast, those who had worked for less than six months or who had been very ill for three months were excluded. Permission was granted from the administrative department of the hospital and ethical approval was received from the Ethical Review Board (ERB) of Karachi Medical and Dental College (Reference No: ERB/KMDC/Approval/2024/067). All the participants were informed regarding the objective of the study and informed consent was taken from all recruited participants. They were also informed that they could withdraw from the study whenever they wanted to without excising pressure from the researchers. Open Epi software was used to determine the sample size, which was based on an estimated 18% prevalence of knowledge, attitude, and practices among dental surgeons, with a 95% confidence level and a 5% margin of error. This produced a sample size of 227 people, which was the minimum necessary. SPSS version 24.0 was used to analyze the data, and descriptive statistics were used to summarize the demographic data.

RESULTS

The results of the study revealed that the mean age was 37.5 years. The male participants made up the majority 61.3%, with female participants making up 38.7% of the group as shown in table 1.

Table 1: Demographic Characteristics of the Practicing Dental Surgeons

Variables	N (%)
Gender	
Male	139 (61.3%)
Female	88 (38.7%)

Almost 91.1% of participants showed that they understood the need to keep dental records in terms of their knowledge and abilities. Fewer participants, however, demonstrated specialized skills; only 32% were aware of distinguishing rugae patterns, 20% could identify race from teeth, and 35% could identify gender from teeth as shown in table 2.

Table 2: Knowledge of Forensic Dentistry of Practicing Dental Surgeons

Variables	N (%)
Understanding of Maintaining Dental Records	207 (91%)
Ability to Determine Gender by Teeth	81 (35%)
Ability to Determine Race by Teeth	47 (20%)
Forensic Dentistry Adopted as a Separate Subject	81 (35%)
Awareness of Distinctive Rugae Pattern	73 (32%)

Dental surgeons in Karachi have little experience and training in forensic dentistry, according to an evaluation of their knowledge, attitudes, and practices. Just 6.5% of respondents said they knew enough about the topic, and only 14.4% said they had received formal schooling in it. 49.3% of respondents were ignorant of the function that dental records play in identifying people, while 33.2% acknowledged its significance. Teeth were recognized as a feasible source for DNA extraction by more than half (57.5%). However, only 26.5% of them were aware of their prospective function as expert witnesses in court, and only 12.7% had received training in managing and presenting dental evidence. Despite this lack of readiness, a resounding 75% of respondents thought forensic dentistry ought to be taught as a distinct subject in undergraduate programs, underscoring the necessity for more focus as shown in table 3.

DOI: https://doi.org/10.54393/pjhs.v5i12.2419

Table 3: Assessment of Knowledge and Attitude of Dental Surgeons Working in Public and Private Dental Hospitals of Karachi Towards Forensic Dentistry

Item	Variables (Knowledge/Attitude)	Yes	No	Not Sure
1	Have you Received Formal Education in Forensic Dentistry in your Course?	14.4	84.4	1.2
2	Do you think you have adequate Knowledge about Forensic Dentistry?	6.5	91.2	2.3
3	Are you aware of how important Dental Records are for Identifying the Deceased and Charged with a Crime?	33.2	49.2	17.6
4	Do you believe that Teeth are an Appropriate Source for the Extraction of DNA?	57.5	10	32.5
5	Do you believe that a Court may Summon you at any Moment to Testify as an Expert Witness on Dental Evidence?	30.7	66.1	3.2
6	Do you Possess any Training in Obtaining, Assessing, and Presenting Dental Evidence?	12.7	79.3	8.0
7	Are you aware that you can Provide Forensic Dental Evidence in Court by Testifying as an Option Expert Witness?	26.5	69.3	4.2
8	Do you think Forensic Dentistry to be Included as a Separate Subject in the Undergraduate Curriculum?	75	23.2	1.8

The table 4 presented responses from male and female participants regarding their knowledge and awareness of forensic dentistry. It includes the distribution of responses (Yes, No, Not Sure) for various questions, along with the corresponding p-values for gender-based comparisons. The questions assess whether participants have received formal education in forensic dentistry, their self-perception of knowledge, their awareness of the importance of dental records, and their opinions on whether teeth are an appropriate source for DNA extraction. Additionally, the table examines participants' beliefs about their potential role as expert witnesses in court, their training in forensic dental evidence, and their awareness of the option to provide forensic dental testimony in court. The final question evaluates the respondents' opinion on whether forensic dentistry should be included as a separate subject in the undergraduate curriculum. Statistically significant differences are indicated by p-values marked with an asterisk (*), suggesting gender-based differences in knowledge or opinions on certain topics (Table 4).

Table 4: Comparison of Gender with Knowledge, Attitudes, Or Practices Regarding Forensic Dentistry

Variables	Yes	No	Not sure	p-value
Have you received formal education in forensic dentistry?				
Male	12 (8.6%)	123 (88.5%)	4 (2.9%)	0.045*
Female	21 (23.9%)	64 (72.7%)	3 (3.4%)	
Do you think you have adequate knowledge?				
Male	7 (5.0%)	128 (92.1%)	4 (2.9%)	0.098
Female	8 (9.1%)	78 (88.6%)	2 (2.3%)	
Are you aware of how important dental records are?				
Male	50 (36.0%)	64 (46.0%)	25 (18.0%)	0.022*
Female	25 (28.4%)	48 (54.5%)	15 (17.1%)	
Do you believe that Teeth are an Appropriate Source for the Extraction of DNA?				
Male	82 (59.0%)	10 (7.2%)	47 (33.8%)	0.310
Female	48 (54.5%)	13 (14.8%)	27 (30.7%)	
Do you believe that a Court may Summon you at any Moment to Testify as an Expert Witness on Dental Evidence?				
Male	82 (59.0%)	83 (59.7%)	6 (4.3%)	0.036*
Female	48 (54.5%)	67 (76.1%)	1 (1.2%)	
Do you Possess any Training in Obtaining, Assessing, and Presenting Dental Evidence?				
Male	18 (12.9%)	110 (79.1%)	11 (8.0%)	0.512
Female	11 (12.5%)	71 (80.7%)	6 (6.8%)	
Are you aware that you can Provide Forensic Dental Evidence in Court by Testifying as an Option Expert Witness?				
Male	37 (26.6%)	96 (69.1%)	6 (4.3%)	0.089
Female	37 (26.6%)	61 (69.3%)	4 (4.5%)	
Do you think Forensic Dentistry to be Included as a Separate Subject in the Undergraduate Curriculum?				
Male	106 (76.3%)	30 (21.6%)	3 (2.2%)	0.411
Female	65 (73.9%)	23 (26.1%)	0 (0.0%)	

* A statistically significant difference between genders is shown by a p-value < 0.05.

DISCUSSION

A branch of dentistry utilized in court cases was called forensic dentistry. This topic needs increased attention because crime, terrorism, and natural catastrophes have all been increasing globally over time. The majority of the time, forensic dentists were asked to assist with catastrophe victim identification, which helps identify victims' malformed corpses that were difficult for family members to recognize [9, 10]. Hence, similar to results in Lahore, where the same low level of awareness was seen [11]. The study's conclusions show that practicing dental surgeons in Karachi have a severe lack of knowledge, attitudes, and practices around forensic dentistry. Comparisons with both domestic and foreign research help to put these findings in a broader context and emphasize the need for better forensic dental education and training globally. In Lahore, Pakistan, similar research found that 87% of dental practitioners did not know the importance of forensic dentistry in identifying individuals, and just 16% had received basic training in preserving dental records. This was in line with these finding that 84.4% of participants had no formal training in forensic dentistry, indicating a widespread lack of foundational knowledge in Pakistan's biggest cities. Additionally, just 33.2% of participants recognized the need for dental records for identification, which was Despite being aware that dental surgeons could be called at any time in the court, unfortunately, the majority of dental surgeons had never submitted any dental evidence which was similar to a study

DOI: https://doi.org/10.54393/pjhs.v5i12.2419

conducted by Prakash P *et al.*, in Punjab of India [12]. Another study unequivocally demonstrates that dental professionals in India generally lack forensic odontology understanding and practice. Few universities provide formal instruction in forensic odontology. The majority of practitioners lacked formal education [13]. Dental schools in Canada, Japan, Norway, and the neighboring nations, including India and Nepal, have incorporated the subject into their undergraduate curriculum [14-16]. There aren't many universities that provide forensic odontology courses. Most practitioners have no formal schooling [14]. The topic has been included in the undergraduate dental curricula of dental schools in Canada, Japan, Norway, and the neighboring countries, such as India and Nepal [15-17]. Most participants did not know that forensic dentistry was taught in undergraduate programs as required by the Pakistan Medical and Dental Council [17]. Although 45% of dentists were aware of the function teeth play in DNA extraction, only 19% of them were able to accurately describe the process, according to a survey done in Rawalpindi by Shoro S *et al.*, 2020. However, this poll found that while 57.5% of respondents believed teeth may be a source of DNA, a significant 32.5% were not convinced, suggesting that while there was some information, a comprehensive understanding was still lacking [18]. Due to their lack of education and experience, the majority of respondents believed they were not qualified to offer an opinion in medico-legal cases requiring forensic dentistry [19]. This field has been ignored in the modern world. It was strongly recommended that more studies be conducted in this area in Pakistan. As a result, the focus should be placed on enhancing the curriculum by offering dental professionals specialized seminars and training courses, as well as raising awareness of forensic dentistry procedures in dental offices and financing them [19]. Due to their lack of education and experience, the majority of respondents believed they were not qualified to offer an opinion in medico-legal cases requiring forensic dentistry [20]. This area of study has been overlooked in the modern world. Additional research in this area was required in Pakistan. As a result, the focus should be placed on enhancing the curriculum by offering dental professionals specialized seminars and training courses, as well as raising awareness of forensic dentistry procedures in dental offices and financing them.

CONCLUSIONS

The field of forensic dentistry has not gained acceptance among the masses. It has been discovered that there were gaps in knowledge and practice, although practicing dental surgeons have expressed support for the inclusion of forensic dentistry as a course in the dental curriculum.

Authors Contribution

Conceptualization: NK
Methodology: NK, AA, SB, SN, MUH, NS
Formal analysis: SB
Writing, review and editing: NK, AA, MUH, NS

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

Source of Funding

The author received no financial support for the research, authorship and/or publication of this article.

REFERENCES

[1] Ireland CA, Chu S, Ireland JL, Hartley V, Ozanne R, Lewis M. Extreme stress events in a forensic hospital setting: Prevalence, impact, and protective factors in staff. Issues in Mental Health Nursing. 2022 May; 43(5): 418-33. doi: 10.1080/01612840.2021.2003492.

[2] Hachem M, Mohamed A, Othayammadath A, Gaikwad J, Hassanline T. Emerging applications of dentistry in medico-legal practice-forensic odontology. International Journal on Emerging Technologies. 2020; 11(2): 66-70.

[3] Mânica S, Gorza L. Forensic odontology in the 21st century–Identifying the opinions of those behind the teaching. Journal of forensic and legal medicine. 2019 May; 64: 7-13. doi: 10.1016/j.jflm.2019.03.006.

[4] Mohammed F, Fairozekhan AT, Bhat S, Menezes RG. Forensic odontology. 2019.

[5] Tahir F, Raja HZ, Saleem MN, Iqbal A, Ullah MS, Yasser F. Awareness of forensic odontology among dentists in Pakistan and its impact on dental record keeping. Pakistan Journal of Medical & Health Sciences. 2022 Sep; 16(08): 92-. doi: 10.53350/pjmhs2216892.

[6] Kundu A. Forensic Odontology: Bridging the Gap between Dental Science and Criminal Investigation. International Journal Of Ethics, Trauma & Victimology. 2024 Aug; 10(01): 18-27.

[7] Saxena V, Datla A, Bhargava A, Deheriya M. Forensic Dentistry in Disaster Management A Comprehensive Literature Review and Case Study Analysis. 2023.

[8] Qadri AW, Yadav S, Jain A, Shetty DC, Gulati N. Tooth as a vital source of DNA in forensic odontology: Recent perspective. Journal of Academy of Dental Education. 2023 Dec; 9(2): 73-9.

[9] Ketsekioulafis I, Katsos K, Kolentinis C, Kouzos D, Moraitis K, Spiliopoulou C *et al.* Humanitarian forensic medicine: a systematic review. International Journal of Legal Medicine. 2024 Dec: 1-5. doi: 10.1007/s00414-024-03381-2.

DOI: https://doi.org/10.54393/pjhs.v5i12.2419

[10] Lessig R, Prinz M. Mass Disaster Victim Identification. Handbook of Forensic Medicine. 2022 Jun; 1: 291-309.
[11] Zaheen U and Khan HA. Unlocking Clues Through Dental Records: A Descriptive Analysis of Dentists'role in Forensic Investigations. Pakistan Journal of Physiology. 2024 Jun; 20(2): 61-4. doi: 10.69656/pjp.v20i2.1576.
[12] Prakash P, Singh K, Bhandari SK. Forensic odontology: The prosthetic ID. Journal of Forensic Dental Sciences. 2019 Sep; 11(3): 113-7. doi: 10.4103/jfo.jfds_91_19.
[13] Isher DK, Isher PP, Kaur N, Rakhra J. Knowledge, awareness and practice of forensic odontology among the dentists of Punjab. Journal of Indian Academy of Oral Medicine and Radiology. 2019 Jul; 31(3): 239-45. doi: 10.4103/jiaomr.jiaomr_108_19.
[14] Monsy M, Thomas KS, Jijin MJ, Sanaka SR, Tiwari RV, Tiwari H. Knowledge and Awareness of Forensic Odontology amongst Dental Graduates: An Original Research. Journal of Advanced Medical and Dental Sciences Research. 2020 May; 8(5): 112-5. doi: 10.21276/jamdsr.
[15] Akram S, Arif Z, Khan S, Tauheed S. Knowledge, awareness and practice of forensic odontology among dental practitioners in Karachi, Pakistan. Pakistan Journal of Medicine and Dentistry. 2019 Apr; 8(1): 4.
[16] Hortsch M, Girão-Carmona VC, de Melo Leite AC, Nikas IP, Koney NK, Yohannan DG, et al. Teaching cellular architecture: the global status of histology education. In: Biomedical Visualisation: Volume 17-Advancements in Technologies and Methodologies for Anatomical and Medical Education. Cham: Springer International Publishing; 2023 Aug. 177-212. doi: 10.1007/978-3-031-36727-4_9.
[17] Wass V, Ng V, editors. Family Medicine in the Undergraduate Curriculum: Preparing medical students to work in evolving health care systems. CRC Press; 2023 Oct.
[18] Shoro S, Syed FM, Mânica S. Awareness and importance of forensic odontology amongst faculty members and students of dental institutes in Pakistan. Forensic Science International: Reports. 2020 Dec; 2: 100116. doi: 10.1016/j.fsir.2020.100116.
[19] Savić Pavičin I, Jonjić A, Maretić I, Dumančić J, Zymber Çeshko A. Maintenance of dental records and forensic odontology awareness: a survey of Croatian dentists with implications for dental education. Dentistry Journal. 2021 Mar; 9(4): 37. doi: 10.3390/dj9040037.
[20] Alamoudi RA and Alghamdi NS. Awareness of forensic dentistry among dental professionals in western Saudi Arabia: A knowledge, attitude, and practice-based cross-sectional study. Medicine. 2024 Apr; 103(14): e37738. doi: 10.1097/MD.0000000000037738.