

Abstract:

Introduction: Forensic dentistry is a challenging and fascinating branch of forensic science that involves the application of dental sciences in the identification of deceased individuals through the comparison of ante and postmortem records. ⁽¹⁾

Objective: The research will not only highlight the need of implementing Forensic Odontology training in undergraduate and postgraduate curriculum in the country by investigating knowledge and awareness of dental professionals towards Forensic Odontology specially related to identification, age, mass disasters and child abuse

Methods: A cross-sectional descriptive study was conducted in 8 private and public dental colleges after approval from institutional authorities to assess knowledge and awareness of forensic Odontology among dental professionals in Karachi

Results: Most of the research participants (84.9%) denied having any experience related to medico-legal cases. For both genders of respondents, 69% thought their knowledge was not sufficient to give medico-legal opinion. In addition, approximately 79.3% of them did not receive any formal training for collecting and preserving dental evidence. However, a vast majority of respondents (75 %) dentists want Forensic Odontology to be included as a separate subject in the undergraduate curriculum

Conclusion: By including Forensic Odontology as a separate subject in the undergraduate curriculum and as a speciality in postgraduate curriculum, dentists will gain knowledge of theoretical and practical aspects of analysis and preservation of dental evidence.

Key words:

Forensic Odontology, Medicolegal, Under & Postgraduate Studies

Introduction:

Forensic Odontology relates to a huge variety of cases like identification of human remains, determination of age, gender and ethnic origin, bite mark analysis, particularly in case of child abuse and rape victims. ¹⁻² It deals with dental evidence and with the proper evaluation and presentation of dental findings. ³

Avon classified Forensic Odontology into civil, criminal and research, depending on the major fields of activity. ⁴

There are several areas of specialty, which include

- Assessment of bite-mark injuries and cases of abuse (child, domestic etc.)- The analysis of bite-mark evidence can assist the justice system to answer crucial questions about interactions between people at the scene of a crime.

- Identification of age, sex, race of human remains and identification in mass fatalities

- Excellent source for DNA material- attributed to the ability of the dental tissues to withstand environmental assaults and still retain some of its original structure, DNA is now becoming the "gold standard" in the area of forensic identification and Criminalistics. ⁵

Securely retained records, radiographs, models, photographs are very important for identification of deceased specially in mass fatalities. ⁶ Dentists can play an invaluable role in the resolution of heinous crimes by showing their ability to recognize, collect and preserve this evidence. ⁷

The research about Formal teaching of forensic Odontology showed that it has existed for over a 100 years. ⁸ There has been an immense development in the field over the last century, and, today, it is an integral

part of undergraduate dental training in many countries. Dentists have been trained in the specialty, and dedicated departments have been established in institutes and universities around the world. The Pakistan Medical & Dental Council, has laid down the minimum standard of basic and higher qualifications in Medicine & Dentistry, with 5 hours lectures of forensic medicine and toxicology. ⁹ Due to the increase in mass disasters, acts of terrorism, civil wars and genocide where severe mutilation or burning of the bodies may happen there has been an increase in the need of specialized forensic Odontologists. Unfortunately, Forensic Odontology has been neglected in Pakistan academically and in practice. The participation of dental practitioners in assisting legal and criminal issues has been limited which has led to opportunities for manipulation. In a famous murder case, of a teenager named Shahzeb in Karachi, attempts were made by the medical board of police to declare Shahrukh, the prime suspect, an underage person in order to send him to a juvenile prison. A new medical board was set up under Dr. Farhat Hussain Mirza, Professor of Forensic Medicine, consisting of radiologists, forensic experts and a dentist. X-rays of teeth and bones of Shahrukh helped to determine his actual age, which was more than 18 years and later it was verified by documents received from Aitchison College, Lahore. ¹⁰ The research will not only highlight the need of implementing Forensic Odontology training in undergraduate and postgraduate curriculum in the country by investigating knowledge and awareness of dental professionals towards Forensic Odontology specially related to identification, age, mass disasters and

child abuse¹¹, but will compare the statistics of maintaining dental records between various groups, e.g. house officers, residents, consultants.

Only a single study conducted in 2014 in the twin cities of Rawalpindi and Islamabad highlighted the lack of knowledge of the subject among general dental practitioners because solving criminal cases and maintenance of dental records is a job of dental surgeons in government service and no or very little role is played by general dental practitioners doing private practice.

Specific aspects of forensic Odontology are emphasized in individual institutions. In the University of Oslo, Norway, as many as five lectures and two 3-hours seminars are devoted to dental jurisprudence and ethics¹². In one of the seminars, students are given cases where problems have occurred or could occur, and they discuss what they would do under such situations in their own practice. Recognizing the need for forensic Odontologists to prepare injury reports, a lecture on dental injuries and a court case involving the same is organized. In the University of Adelaide, Australia, is brief, with a total of three lectures in 5 years (H. James, personal communication). There is, however, a substantial elective component in the fifth year, which lasts for 1 week and places emphasis on the court and legal procedures. The session on expert evidence is complemented with a visit to court.

At Tokyo Dental College, Japan, a comprehensive spectrum of subjects ranging from forensic medicine, serology and molecular biology are included in 'fourteen 85-min lectures'

Indian Association of Forensic Odontology (IAFO) was started in the year 2002, with the aim of promoting awareness of forensic Odontology among the medical and dental professionals and the keepers of law and justice. It also aims at conducting active research and interactive state and national level conference/symposia in this field and thereby contributes to the ever expanding science of forensic medicine. Journal of Forensic Dental Sciences (JFDS) is the official publication of the Indian Association of Forensic Odontology that is published 3 Issues. JFDS publishes scientific papers on well designed and controlled original

research involving forensic science. Papers may also include reports on unusual and interesting case presentations.

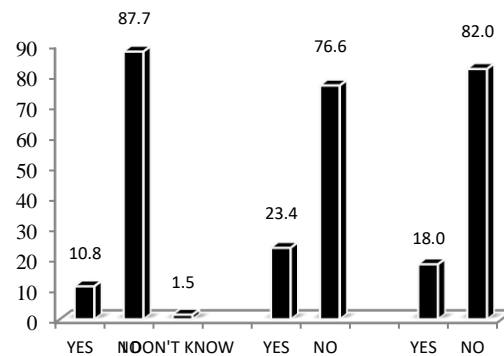
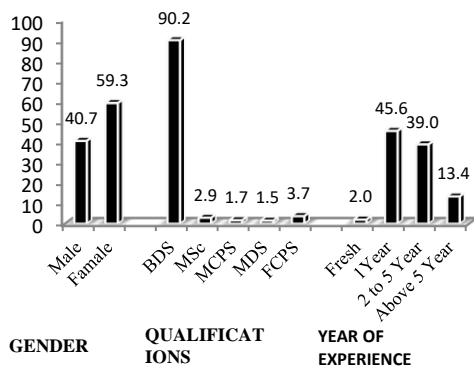
A survey undertaken at universities in Nepal revealed that a detailed curriculum in forensic Odontology has been developed, and a general standard exists in teaching Forensic Odontology, however, coverage of recent advances in forensic science may be lacking. While recognizing that these programs are not representative of teaching in forensic Odontology worldwide, suggestions are made for an alternative approach to teaching the subject. Moreover, it is stressed that teaching be undertaken by qualified forensic odontologists.

Methodology:

Cross-sectional descriptive study was conducted in 8 private and public dental colleges after approval from institutional authorities. Institutes from public sector included; Sindh institute of oral health sciences (JSMU), Dow dental college and Dr. Ishratulibad Khan Institute of Oral Health sciences (DUHS) and Karachi Medical and Dental College. The private institutes include; Fatimah Jinnah Dental College, Liaquat College of Medicine & Dentistry, Hamdard dental college, Sir Syed medical and dental college. The total number of forms distributed was 450 with 410 (91.1%) turnout. Information about the nature of the study was provided to participants and a consent form was attached to the questionnaire. The participants were asked 16 questions based on multiple choice and yes or no options. The descriptive statistical analysis of combined group (all 410 participants) and the postgraduate group (33 out of 410) was done using SPSS version 22.0

Result:

Out of the 450 total forms distributed, 410 were completely filled and returned. The study group included 370 BDS and 33 postgraduate participants. The postgraduate group comprised of 15 FCPS, 7 MCPS, 12 MSc and 6 MDS respondents. The experience of working as a dental professional ranged from those that had 1 year experience (45.6%), 2-5 years of experience (39.0%), 5 years or more of experience (13.4%) and less than 1 year of experience (2.0%).

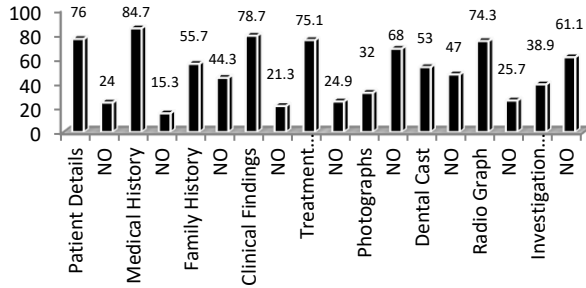


Forensic odontology part of your undergraduate curriculum
 You have sufficient knowledge to give medical legal opinion
 Have you had any training in collecting and presenting dental evidence?

Figure No:1 &2

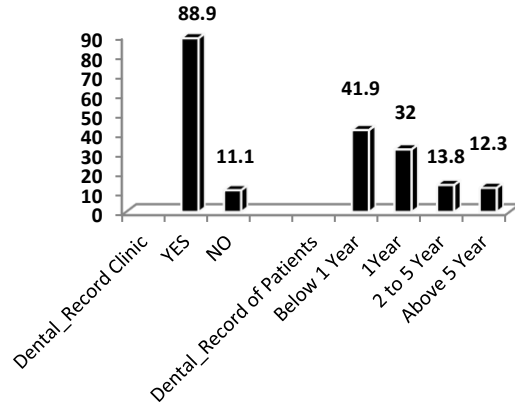
A vast majority of research participants (88.9 %) maintain dental record at their clinics and majority of

(Figure No.2



participants maintain the dental record below 1 year (41.9 %).

Figure No 3 & 4



Most of the research participants (84.9%) denied having any experience related to medico-legal cases. For both genders of respondents, 69% thought their knowledge was not sufficient to give medico-legal opinion. (Figure No:4) In addition, approximately 79.3% of them did not receive any formal training for collecting and preserving dental evidence. However, a vast majority of respondents (75 %) dentists want Forensic Odontology to be included as a separate subject in the undergraduate curriculum and only30.7% aware that they can testify as an expert witness in the court to present forensic dental evidence . (Table

TABLE NO.1 QUESTIONNAIRE

Q No	Question	Yes	No	don't know
1.	Was Forensic Odontology part of your undergraduate curriculum	14.4	84.4	1.2
2.	Have you ever experienced a medico-legal case of forensic Odontology?	15.1	84.9	Option not mention
3.	Do you think you have sufficient knowledge to give Medico-legal opinion in a case related to Forensic Odontology?	30.7	69.3	Option not mention
4.	Can you estimate the dental age of an individual by examining the teeth?	88.5	8.8	2.7

Do you maintain dental record in your clinic?

For how long you maintain the dental records of patient

5.	Do you know the relevance of dental records in recognizing the dead and accused criminal?	33.2	49.3	17.6
6.	Do you think you have a crucial role in identifying deceased in mass fatalities?	40.2	49.5	10.2
7.	Do you think a dental surgeon can identify physical/neglected/sexual abuse?	46.6	47.8	5.6
8.	Which of the following in your opinion the most accurate method to develop the identity of an individual in living or dead?	<ul style="list-style-type: none"> Visual examination 15.1 Fingerprints 23.2 DNA comparison 1.5 Physical/anthropological examination of bone and teeth 1.2 Serological Examination 49.0 		
9.	Do you know about bite mark patterns of teeth?	69.3	30.7	Option not mention

10.	Have you had any training in collecting, evaluating and presenting dental evidence?	20.7	79.3	Option not mention
11.	Are you aware that you can testify as an	30.7	69.3	Option

	expert witness in the court to present forensic dental evidence?			not mention
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Discussion:

This study highlighted the general lack of knowledge of forensic Odontology among the dentists in Karachi. It also showed a paucity of the legal mandates to present evidence as an expert in a medico-legal case and the role of a dentist.

Forensic Odontology is not just concerned with identification using dental evidence; it involves the management, examination, evaluation and presentation of dental evidence in criminal or civil proceedings, all in the interest of justice (11). Dental schools in countries including Canada, Japan, Norway and our neighboring countries, including India and Nepal have integrated the subject into their undergraduate curriculum.

A huge majority of participants were not aware of the fact that according to the Pakistan Medical and Dental Council guidelines forensic Odontology is a part of the undergraduate curriculum. Most of the respondents had no training or exposure to medico-legal cases related to forensic Odontology, therefore they believed they did

not have enough knowledge to give opinion in such cases.

In a country where mass disasters are not so uncommon, we need dentists who are able to maintain complete and precise dental records and. Necessary radiographic studies should be retained. Although dental records were being maintained by a large number of respondents but there was no uniformity in the duration of maintaining the records.

Only 25% of the postgraduate dentists had experienced a medico-legal case and 24% considered their knowledge to be sufficient for giving opinion in a medico-legal case which shows reluctant attitude towards medico-legal cases and court attendances. The percentage of postgraduate participants who knew the relevance of dental records in recognizing dead and accused criminals was higher compared to the combined response. Positive perception related to the role of dentists in the identification of deceased in mass fatalities using dental records, and in cases of physical/sexual abuse was also higher in postgraduate groups. (Table No.2)

S.no	QUESTION	COMBINED			POSTGRADUATE		
		YES	NO	Don't Know	YES	NO	Don't Know
1	Have you ever experienced a medico-legal case of forensic Odontology?	15.1%	84.9%	Option not mention	25	75	Option not mention
2	Do you think you have sufficient knowledge to give medico-legal opinion in a case related to Forensic Odontology?	30.7	69.3	Option not mention	26	74	Option not mention
3	Do you know the relevance of dental records in recognizing dead and accused criminal?	33.2	49.3	17.6	58	29	13
4	Do you think you have a crucial role in identifying deceased in mass fatalities?	40.2	49.5	10.2	70	24	6
5	Do you think a dental surgeon can identify physical/neglected/sexual abuse?	46.6	47.8	5.6	67	13	0.01
6	Which of the following in your opinion the most accurate method to develop the identity of an individual in living or dead?	Visual examination 15.1 Fingerprint 23.2 DNA comparison 11.5 Physical/anthropological examination of bone and teeth 1.2 Serological Examination 49.0			Visual examination 16 Fingerprint 25 DNA comparison 51 Physical/anthropological examination of bone and teeth 3 Serological Examination 3		
7	Do you know about bite mark patterns of teeth?	69.3	30.7	Option not mention	68	32	Option not mention
8	Have you had any training in collecting, evaluating and presenting dental evidence?	20.7	79.3	Option not mention	32	68	Option not mention

Table No.2

With the advent of Polymerase chain reaction in the late twentieth century, the use of pulp and dentin of teeth has become increasingly popular as a source of DNA^(13,14,15). 51% of the postgraduate participants considered DNA to be the most accurate method to develop the identity of a living or dead individual. There was little difference in the knowledge about bite mark patterns in both the groups. The number of postgraduate participants having formal training in collecting and evaluating dental evidence was only 32%.

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A dentist having received training on the subject can provide medico-legal evidence by age estimation from teeth and by using bite marks patterns in cases of abuse and assault.

Conclusion:

By including Forensic Odontology as a separate subject in the undergraduate curriculum and as a speciality in postgraduate curriculum, dentists will gain knowledge of theoretical and practical aspects of analysis and preservation of dental evidence.

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