Original Article

Cognizance of Forensic Odontology among the Dental Practitioners in Lahore

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ABSTRACT

Objective: To assess the knowledge towards forensic odontology among dental professionals and to evaluate the need for initiation of formal training in this subject.

Study Design: Descriptive / cross sectional study.

Place and Duration of Study: This study was conducted at the Lahore Medical and Dental College, de'Montmorency College of Dentistry, Fatima Memorial Hospital, University of Lahore and CMH college of Dentistry over a period of months from July to September 2018.

Materials and Methods: A questionnaire that was distributed amongst various teaching dental institutes in Lahore after the approval from ethical committees of all these institutions. Data collected was analyzed through SPSS version 20; bivariate correlation was used with Pearson correlation coefficient, level of significance was set to $p \leq 0.01$.

Results: A total of 316 dental practitioners from five dental institutions in Lahore took part in this study. Our data reflected that 72.15% of the study population was familiar with forensic odontology however merely 6.32% of participants have adequate knowledge of subject. Interestingly 82.61% of the house surgeons, 75.64% of the postgraduates and 76% of the faculty members were interested in formal training regarding this subject.

Conclusion: The knowledge and practice of forensic dentistry is inadequate but it can expand if proper awareness and education is delivered. This condition could be improved by making forensic odontology an integral part of BDS academic curriculum.

Key Words: forensic odontology, cognizance, dental records, assessment, Lahore.

Citation of articles: Zahid N, Amjad A, Nadeem K, Ali F, Bakar U, Salimi AB. Cognizance of Forensic Odontology among the Dental Practitioners in Lahore. Med Forum 2019;30(6):59-62.

INTRODUCTION

Forensic odontology is a branch of forensic medicine which implements the use of dentistry to discuss legal matters. It deals with the teeth and the marks they leave behind in order to identify criminal suspects or human remains. It involves identification of a person living or dead, criminal records, data collection, preservation, processing and analysis of the given evidence[1].

Forensic dentistry has become a fundamental part of forensic medicine and has progressively recognized itself as an imperative science in medico-legal cases since late nineteenth century. This may be accredited to the increase in mass disasters consequent to civil war, acts of terrorism and genocide where severe mutilations or burning of bodies may happen.[2,3]

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Received: January, 2019
Accepted: February, 2019
Printed: June, 2019

Each individual has a unique set of teeth that can help in recognizing the one. The teeth are covered by a highly mineralized layer of enamel that is 96% mineralized as compared to bone that is only 50-70% mineralized. This tremendous mineralized layer supports the teeth to survive trauma better than any other body tissue.[4] Identification by teeth becomes imperative when human remains are charred, skeletonized or decomposed and cannot be identified through other means. When multiple bodies are recovered from a location or in mass disasters, it is comparatively easy to identify a person using dental aspects[5]. Dental pulp is also a source of DNA and polymerized chain reactions (PCR) allow amplification of even highly degraded DNA.[6]

We can also discover the fatalities by different comparative and reconstructive techniques including the bite analysis, age estimation, gender recognition, rugae pattern and lip prints.[7]

Bite mark analysis is worthwhile in eliminating certain suspects. Bite mark cases are frequently involved with heinous crimes; child abuse, sexual assault, homicide or domestic violence. Analysis includes the recognition, evidence collection, preservation, documentation, physical dental profiling of the victim and comparing with bite mark, physical dental profiling of the suspect.[8]

Age assessment has expanded reputation in the field of forensic odontology with rising need for identification

of unknown descendants. The neonatal lines seen in all primary teeth and first permanent molars are the indicators of birth, the age at the time of fetal death can be determined through incremental lines of von ebner. Amongst children and adolescents, tooth eruption and tooth calcification are valuable tools for age assessment. The third molar is also a valuable indicator of age estimation during the age of 16-23 years.[9] The determination of D- and L-aspartic acid (Asp) content from teeth has been applied in age estimation for forensic purposes over the past decades. It was first introduced to assess age from tooth enamel and later from dentin and cementum.[10]

Sex determination by using X and Y chromosome DNA analysis have been developed with advances in gene analysis techniques.[11] Sex differentiation is also based on morphology of the skull and metric features; the size of skull, mastoid process, suprarobital ridge, zygomatic extensions, nasal apture and mandibular gonial angle that is less obtuse and flared in males and it is more obtuse in females with no flaring.[12]

Rugoscopy is an old method of human identification particularly for edentulous people where different patterns of rugae are analyzed for comparison. Rugae are ridges present on the anterior part of the palatal mucosa on each side of the midpalatal raphe behind the incisive papilla. The rugae can resist decomposition to an extent. Predominant pattern seen in the rugae is wavy followed by curved, straight and circular, respectively. Females in general have slightly more rugae than males.[13]

Cheiloscopy is the technique that deals with the identification of humans based on lip traces when fingerprints are absent. It usually presents in cases when a person has been bound or gagged, prints on a glass that a person drank from, prints on cigarette butt, prints on glass window if they were pressed up against it.[14,15]

The history of forensic odontology dates back 4500 years. One of the first dental identifications' was recorded in 2500 BC in which molars linked by a gold wire were located in a tomb in Giza. The earliest recorded case was in 66 AD of Roman Emperor Nero's mother who sent for the head of her enemy and verified his death using a discolored front tooth.[16,17]

The death of Adolf Hitler in 1945 and the mystery behind it was also solved using forensic odontology evidence. His remains consisted of charred pieces of bone, including the upper and lower jaw which had a 9 unit bridge. Later, a 5 unit x-ray of Hitler's head taken in 1944 was released from the archives in Washington which revealed bridgework and periodontal disease which all matched the evidence given by Hitler's American dentist; Hugo Blaschke.[18] Forensic odontology was also used to successfully identify 80% of the Tsunami victims in South East Asia in December 2004.[19]

Historically in Pakistan, one of the most famed cases was of General Zia-ul Haq's; he died in a plane crash in 1988 due to explosion and was identified by his dentition.[20] In 2016, a renowned celebrity, Junaid Jamshed died in a plane crash and was identified by his dentition. His remains were identified on the bases of dental records; OPG radiograph and amalgam fillings, data was used for mandibular reconstruction.

In conclusion, forensic odontology plays a major role in the recognition of a person who cannot be recognized by other means. Unfortunately, there is no significant work progress or formal training going on in this regard in Pakistan; this subject is included as a topic in oral and maxillofacial surgery with only five didactics lectures as showed on the website of Pakistan Medical and Dental Council (PM&DC).[21]

MATERIALS AND METHODS

This study is designed as a cross sectional study, including 318 dental professionals from five teaching dental institutions in Lahore; Lahore Medical and Dental College, Punjab Dental Hospital, Fatima Memorial Hospital, University of Lahore and CMH college of Dentistry.

We designed a close ended questionnaire consisting of 14 questions which include gender, awareness, court witness, bite marks, formal training and scope. The questionnaire was thoroughly discussed amongst our ethical committee and research team; the questions were short listed and chosen specifically to highlight our topic. The dental professionals were visited on a single day after the approval from ethical committees of all these institutions. The questionnaire was handed out to all available and willing participants. Confidentiality and anonymity of the participants was assured.

Data collected was analyzed through SPSS version 20. Bivariate correlation was used with Pearson correlation coefficient. Level of significance was set to $p \leq 0.01$.

RESULTS

A total of 316 dental practitioners from five dental institutions in Lahore took part in this study. 93(29.4%) of our participants were males, 211(66.77%) were females and 12(3.81%) were non-specified. As we have divided our population into three categories; there were 138(43.67%) house surgeons, 78(24.68%) postgraduate trainees and 100(31.65%) faculty members. The participants were inquired about their knowledge related to forensic odontology and their attitude towards the subject, their feedback was then compared. Our data reflected that 72.15% of participant were familiar with forensic odontology (Table-1) but only 6.32% of the study population; 5% of the house surgeons, 5.13% of the postgraduates and 10% of the faculty felt that their knowledge was adequate(Table-2). Result showed that 90.51% of study group was unaware regarding forensic odontology as part of their BDS undergraduate

curriculum(Table-3). However 56.52% of the house surgeons, 60.26% of the postgraduates and 79% of the faculty members were familiar in this regard that a dental practitioner can present in court as an expert witness for the identification of suspect or victim when it comes to legal issues.

Secondary objective was to assess the need to initiate formal training in this subject. The data revealed that 82.61% of the house surgeons, 75.64% of the postgraduates and 76% of the faculty members were interested in formal training regarding this subject.

Table No. 1: Do you think your knowledge of forensic odontology is adequate?

	Designation			Total
	House Surgeon	Postgraduate	Faculty	
Yes	11 (7.97%)	6 (7.69%)	13 (13%)	30 (9.49%)
No	127 (92.02%)	72 (92.30%)	87 (87%)	286 (90.50%)
Total	138	78	100	316

Table No.2: Do you think your knowledge of forensic odontology is adequate?

	Designation			Total
	House Surgeon	Postgraduate	Faculty	
Yes	6 (4.34%)	4 (8.12%)	10 (10%)	20 (6.32%)
No	132 (95.65%)	74 (94.87%)	90 (90%)	296 (93.67%)
Total	138	78	100	316

DISCUSSION

Forensic odontology is an important branch of dentistry that would assist in solving cases of abuses and deaths. The progress in forensic odontology in Pakistan has been relatively slow. The objective of this study was to assess the understanding and inclination of dental practitioners towards forensic odontology. Our results revealed that 72.15%study group; 57.25% of the house surgeons, 78.21% of the postgraduates and 88% of the faculty members were aware of this branch of dentistry. However the adequacy of knowledge was only 6.32% comprising 1.9% of the house surgeons, 1.3% of the postgraduates and 3.2% of the faculty.

Study by Muhammad Zeeshan Baig *et al* concluded that there is lack of knowledge and awareness among dental professionals of twin cities of Rawalpindi-Islamabad. The results of their study revealed that about 27.84% of their dentists were not aware of forensic odontology; only 0.67% of the participants had studied forensic odontology in undergraduate or postgraduate courses. Mainstream of the participants (63.85%) were even not cognizant of this subject as a part of their curriculum. None of the participants ever received any formal training in this field[22].

Al-Khalaf A H et al conducted a survey to measure the familiarity and practice of forensic dentistry among dental practitioners in the eastern province of Saudi Arabia. Their results showed that 74.7% of the participants considered themselves to have insufficient information of forensic dentistry; only 23.1% updated their knowledge through internet and two-third of the participants had not been trained in this subject during their undergraduate program.[23]

Our next query was about forensic odontology as a part of curriculum. Result showed that 92.03% of the house surgeons, 92.31% of the postgraduates and 87% of the faculty members were unaware regarding forensic odontology as part of curriculum; it had not been taught at any level that there is a lack of adequate knowledge among dental practitioners regarding forensic odontology and its part in the BDS curriculum. As per PMDC curriculum for BDS, 5 lectures of forensic odontology are included in the subject of oral and maxillofacial surgery.[24]

When we asked about that dentist can testify as an expert witness in court to present forensic dental evidence we get surprisingly high awareness; 56.52% of the house surgeons, 60.26% of the postgraduates and 79% of the faculty members were familiar in this regard that a dental practitioner can present in court as an expert witness for the identification of suspect or victim when it comes to legal issues like child abuse, domestic violence, rape cases, suicide attempts

When asked about the maintenance of these records, 59.52% of the house surgeons, 78.21% of the postgraduates and 73% faculty members were aware of maintaining records. Study done by Naggarajappa et al in Kanpur proved that all the dental practitioners maintained the dental records can become valuable members of the dental identification process by developing and maintaining standards of record keeping.[25]

Participants showed immense response regarding training and teaching in this subject; the data revealed that 82.61% of the house surgeons, 75.64% of the postgraduates and 76% of the faculty members are interested in formal training regarding this subject There is a tremendous need of commencing a formal training regarding this subject; also there should be seminars, lectures and courses for general dentists.

Regarding the scope of this field; 80.43% of the house surgeons, 85.9% of the postgraduates and 92% of the faculty members are in favor of forensic odontology.

CONCLUSION

Forensic odontology plays a major role when it comes to the identification procedure during calamities and disasters. The knowledge and practice of forensic dentistry is inadequate among dental practitioners. It is high time to get our undergraduates and postgraduates students trained in this subject. It should be included effectively in BDS curriculum and additional extensive training at postgraduate level would be helpful to

acquire modern technical skills related to forensic odontology. Government and Health department should arrange workshops and seminars for reaching a level of cognizance and training that is required.

Author's Contribution:

Concept & Design of Study:	Nighat Zahid
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Acknowledgment: We would like to offer recognition to the individuals who participated in the project and to the staff of all the institution for their cooperation.

Conflict of Interest: The study has no conflict of interest to declare by any author.

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