Original Article

Forensic Odontology Acquaintance among the Students of a Dental Institution in Mysore City, India

Sushma Rudraswamy, Nagabhushana Doggalli[1], BR Chandrashekar, Maurya Manjunath, HS Sreeshyla[2]

From the Departments of Public Health Dentistry, [1]Oral Medicine and Radiology and [2]Oral and Maxillofacial Pathology, JSS Dental College and Hospital, Jagadguru Sri Shivarathreeswara University, Mysuru, Karnataka, India

Abstract

Background: Forensic odontology utilizes the dentist's knowledge to serve the judicial system. It has itself as an important indispensable science in medicolegal matters and in particular in personal identification, gender determination, and age estimation. It plays an important role in mass disasters, child abuse, bioterrorism, etc. Taken together, forensic dentistry has become one of valuable tools worldwide to be used in identification processes.

Objective: To evaluate the knowledge about forensic odontology among the students of a dental institution.

Methodology: A cross-sectional study was conducted among final year, interns, and postgraduate students of JSS Dental College and Hospital, Mysuru. A self-administered, structured questionnaire written in English and validated through a pilot survey was given to all available and willing student participants. Questionnaire included significance of dental records, dental age estimation, identification of child abuse and individuals bite marks, as a witness in the court, lip prints along with the demographic data.

Results: In the present study, 67% of the participants responded that DNA comparison was the most accurate method for person identification. About 27.3% responded tooth dimension and tooth morphology was the most accurate method of dental age estimation in elderly. Moreover, 89.1% reported their present knowledge level/awareness about forensic dentistry was not adequate.

Conclusion: Forensic odontology must be introduced into the BDS curriculum effectively as a separate subject so that the students get well acquainted with the required knowledge for handling the medicolegal cases in their future practice.

Key Words: *Acquaintance, awareness, dental students, forensic dentistry, forensic odontology, knowledge*

Received: February, 2017.
Accepted: March, 2017.

Introduction

The new millennium has brought many good things in our lives, for example, a boom in telecommunication and information technology (teledentistry), digitalization, etc., but it has also brought new challenges of terrorism, natural disasters, and high rate of crime.[1] Likelihood of such disasters and crimes in the past, most recent, and present require the dental profession to prepare for an expanded role and also have adequate awareness concerning the importance of forensic dentistry.

The term forensic dentistry is used interchangeably with forensic odontology. Forensic odontology has been defined by the Federation Dentaire Internationale (FDI) as "that branch of dentistry which, in the interest of justice, deals with the proper handling and examination of dental evidence, and with the proper evaluation and presentation of dental findings."[2]

Forensic odontology utilizes the dentist's knowledge to serve the judicial system. It has established itself as an important indispensable science in medicolegal matters and in particular in personal identification, gender determination, and age estimation. It emphasizes on comparing antemortem and postmortem dental records and depends on the unique features visible on dental radiographs to identify victims of crimes or accidents. It plays an important role in mass disasters (terrorist attacks, earthquakes, and tsunamis), child/adult/spouse abuse, bite mark analysis, criminal/natural deaths and injuries, bioterrorism, etc., It also helps in identification of decomposed and charred bodies like that of drowned persons, burns, and victims of motor vehicle accidents. There are several reliable alternative methods of establishing identity such as cheiloscopy, bite marks, rugoscopy, tooth prints, photograph analysis, molecular methods (DNA extraction) and biometrics analysis.[3] Taken together, forensic dentistry has become

Access this article online

Quick Response Code:

Website: www.ijofo.org

DOI: 10.4103/ijfo.ijfo_7_17

Address for correspondence:
Dr. Sushma Rudraswamy, E-mail: hisushhere@yahoo.co.in

How to cite this article: Rudraswamy S, Doggalli N, Chandrashekar BR, Manjunath M, Sreeshyla HS. Forensic odontology acquaintance among the students of a dental institution in Mysore City, India. Int J Forensic Odontol 2017;2:13-7.

one of valuable tools worldwide to be used in identification processes. In recent times, forensic odontology has evolved as a new ray of hope in assisting forensic medicine.[4]

Much of its expertise is based on clinical experience, fundamental research, and advances in knowledge in relation to dentistry in general. The dentist with special knowledge is the only one who can connect and evaluate all the skeletal/dental discoveries in a meticulously detailed way and with irreproachable scientific documentation that requires legal science in the resolution of problems.

With this background, the present study attempts to assess and also create awareness on the importance of forensic odontology implications among the students of a dental institution.

Aim and objectives

The aim of the present study is to assess and create awareness on the importance of forensic odontology implications among the students of a dental institution.

Objective

To evaluate the knowledge about forensic odontology among the students of a dental institution.

Methodology

A cross-sectional study will be conducted among students of a dental institution. A self-administered, structured questionnaire written in English and validated through a pilot survey werebe given to the students who gave their consent.

Pretesting of the questionnaire

Questionnaire was administered to a panel of three academicians and a convenience sample of 18 participants twice on successive days who were interviewed to gain feedback on the overall acceptability of the questionnaire in terms of length, language clarity, time, and feasibility of participants completing and returning it. Cronbach's coefficient ranged from 0.44 to 1.00.

Questionnaire included methods of person identification, dental age estimation of children and elderly, gender determination of individual and deceased, identification of child abuse and action taken against the same, bite marks, lip prints, any formal training, and present awareness about forensic dentistry and as a witness in the court.

All available and willing participants were given the questionnaire on the day of visit by investigator. Participants were asked to respond to each item in the questionnaire by choosing the most appropriate option. Confidentiality and anonymity of the respondents were assured.

The data thus collected were retrieved and were amiable to statistical analysis using SPSS software version 22 (IBM, Inc). Descriptive statistics such as percentages, frequencies, and inferential statistics were applied for data analysis.

Results

Study participants comprised 183 dental students of an institution (87 undergraduates, 61 interns, and 35 postgraduate students).

In the present study, 67% of the participants responded that DNA comparison was the most accurate method for person identification. About 63.4% of study participants said dental age estimation in childhood can be assessed with eruption pattern. Nearly 27.3% responded tooth dimension and tooth morphology was the most accurate method of dental age estimation in elderly.

With respect to gender identification method, 74.3% of participants replied the option all which included intercanine arch width, frontal sinus, and width/height of ramus. Moreover, 46.4% answered DNA examination was the most accurate method for gender identification among the deceased.

When asked how is physical/neglective/sexual/psychological abuse of a child is identified, 48.1% stated by behavioral changes. On identifying signs or symptoms of child abuse, 32.2% reported that they would counsel child.

Nearly 33.9% replied their source of knowledge regarding forensic dentistry was as a subject in college. This was statistically significant. About 76.5% had no formal training in collecting, evaluating, and presenting dental evidence. Moreover, 89.1% reported their present knowledge level/awareness about forensic dentistry was not adequate.

Nearly 86.9% were aware that dentist can testify as an expert witness in the court to present forensic dental evidence [Tables 1-8].

Discussion

Literature search shows poor knowledge and awareness about forensic odontology among dental students and has reported

Table 1: Distribution of study participants according to their responses on the most accurate method of person identification

	Most accurate method of person identification							
Level of training	Visual examination, *n* (%)	Fingerprints, *n* (%)	DNA comparison, *n* (%)	Physical and anthropological examination, *n* (%)	Serological examination, *n* (%)	Don't know, *n* (%)	Not answered, *n* (%)	Total, *n* (%)
Undergraduates	7 (8.0)	10 (11.5)	56 (64.4)	13 (14.9)	0	0	1 (1.1)	87
Interns	11 (18.0)	5 (8.2)	39 (63.9)	4 (6.6)	0	2 (3.3)	0	61
Postgraduates	3 (8.6)	1 (2.9)	28 (80.0)	3 (8.6)	0	0	0	35
Total	21 (11.5)	16 (8.7)	123 (67)	20 (10.9)	0	2 (1.1)	1 (0.5)	183
Statistical inference	Pearson Chi-square=14.280, df=10, *P*=0.161							

Table 2: Distribution of study participants according to their responses on the most accurate method of dental age estimation

Dental age estimation in childhood					
Level of training	**Eruption pattern, *n* (%)**	**Stages of teeth development, *n* (%)**	**Degree of root development, *n* (%)**	**Occlusal wear, *n* (%)**	**Total, *n* (%)**
Undergraduates	64 (73.6)	10 (11.5)	13 (14.9)	0	87 (100.0)
Interns	31 (50.8)	16 (26.2)	14 (23.0)	0	61 (100.0)
Postgraduates	21 (60.0)	8 (22.9)	6 (17.1)	0	35 (100.0)
Total	116 (63.4)	34 (18.6)	33 (18.0)	0	183 (100.0)
Statistical inference	Pearson Chi-square=8.916, df=4, *P*=0.063				

Dental age estimation in elderly						
Level of training	**Tooth dimension and tooth morphology, *n* (%)**	**Occlusal wear, *n* (%)**	**Presence or absence of third molars, *n* (%)**	**Angle of mandible, *n* (%)**	**Not answered, *n* (%)**	**Total, *n* (%)**
Undergraduates	21 (24.1)	25 (28.7)	13 (14.9)	26 (29.9)	2 (2.3)	87 (100.0)
Interns	20 (32.8)	11 (18.0)	11 (18.0)	19 (31.1)	0	61 (100.0)
Postgraduates	9 (25.7)	9 (25.7)	5 (14.3)	12 (34.3)	0	35 (100.0)
Total	50 (27.3)	45 (24.6)	29 (15.8)	57 (31.1)	2 (1.1)	183 (100.0)
Statistical inference	Pearson Chi-square=5.360, df=8, *P*=0.718					

Table 3: Distribution of study participants according to their responses on the most accurate method of gender identification

Gender determination of individual						
Level of training	**Intercanine arch width, *n* (%)**	**Frontal sinus, *n* (%)**	**Width and height of ramus, *n* (%)**	**All, *n* (%)**	**Not answered, *n* (%)**	**Total, *n* (%)**
Undergraduates	7 (8.0)	3 (3.4)	6 (6.9)	67 (77.0)	4 (4.6)	87 (100.0)
Interns	8 (13.1)	5 (8.2)	3 (4.9)	43 (70.5)	2 (3.3)	61 (100.0)
Postgraduates	2 (5.7)	4 (11.4)	3 (8.6)	26 (74.3)	0	35 (100.0)
Total	17 (9.3)	12 (6.6)	12 (6.6)	136 (74.3)	6 (3.3)	183 (100.0)
Statistical inference	Pearson Chi-square=6.682, df=8, *P*=0.571					

Gender determination of the deceased						
Level of training	**Jaw examination, *n* (%)**	**Erupted teeth examination, *n* (%)**	**DNA examination, *n* (%)**	**Don't know, *n* (%)**	**Not answered, *n* (%)**	**Total, *n* (%)**
Undergraduates	25 (28.7)	3 (3.4)	33 (37.9)	24 (27.6)	2 (2.3)	87 (100.0)
Interns	12 (19.7)	4 (6.6)	27 (44.3)	18 (29.5)	0	61 (100.0)
Postgraduates	7 (20.0)	3 (8.6)	25 (71.4)	0	0	35 (100.0)
Total	44 (24.0)	10 (5.5)	85 (46.4)	42 (23.0)	2 (1.1)	183 (100.0)
Statistical inference	Pearson Chi-square=21.239, df=8, *P*=0.007					

that there is an urgent need to train and educate all the students, to do efficient forensic practice. A chain is as strong as the weakest link in it, thus the entire team involved in forensic practice at some point or the other should be trained properly.

Before providing the training program, it is mandatory to understand the existing gaps and deficiencies in the study participants' knowledge and perceptions toward forensic odontology. With this background, the present study was carried out to assess and create awareness on the importance of forensic odontology implications among the students of a dental institution.

The present survey indicates that dental students (89.1%) have a lack of awareness about forensic odontology. This is mainly because of inadequate exposure in the field of forensic dentistry and lack of practical exposure to forensic cases.

Age is one of the essential factors in establishing the identity of a person. Estimation of the human age is a procedure adopted by anthropologists, archaeologists, and forensic scientists. Though 76.5% of the subjects claim to have not undergone a formal training in dental evidence, it is not surprising to see that 37.5% of the dental students did not know how to estimate the dental age; whereas in another study, 41% of dental students did not know how to estimate the age. Majority of students did not know the most accurate method of gender determination. The reasons for this could be multifactorial, either their ignorance or lack of basic knowledge or lack of confidence in answering this question, apart from not knowing the significance of dental age with regard to forensics.

A study conducted by Gopal and Gayathri[5] among undergraduate and postgraduate dental students to evaluate the knowledge and attitude about forensic odontology indicated that only two-thirds of dental students had adequate

Table 4: Distribution of study participants according to their responses on identifying of child abuse and actions they would take against the same

Child abuse identification							
Level of training	**Physical injuries, *n* (%)**	**Behavioral changes, *n* (%)**	**Any scar, *n* (%)**	**Clothing, *n* (%)**	**Don't know, *n* (%)**	**Not answered, *n* (%)**	**Total, *n* (%)**
Undergraduates	29 (33.3)	42 (48.3)	2 (2.3)	2 (2.3)	9 (10.3)	3 (3.4)	87 (100)
Interns	28 (45.9)	23 (37.7)	7 (11.5)	1 (1.6)	2 (3.3)	0	61 (100)
Postgraduates	11 (31.4)	23 (65.7)	1 (2.9)	0	0	0	35 (100)
Total	68 (37.2)	88 (48.1)	10 (5.5)	3 (1.6)	11 (6.0)	3 (1.6)	183 (100.0)
Statistical inference	Pearson Chi-square=21.295, df=10, *P*=0.019						

Action they would like to take against child abuse							
Level of training	**Child counseling, *n* (%)**	**Ask question to parents, *n* (%)**	**Medical examination of child, *n* (%)**	**Neglect, *n* (%)**	**Report to police/social worker, *n* (%)**	**Don't know, *n* (%)**	**Not answered, *n* (%)**	**Total, *n* (%)**
Undergraduates	28 (32.2)	6 (6.9)	21 (24.1)	1 (1.1)	28 (32.2)	2 (2.3)	1 (32.2)	87 (100)
Interns	24 (39.3)	4 (6.6)	13 (21.3)	2 (3.3)	17 (27.9)	1 (1.6)	0	61 (100)
Postgraduates	7 (20.0)	1 (2.9)	6 (17.1)	0	21 (60.0)	0	0	35 (100)
Total	59 (32.2)	11 (6.0)	40 (21.9)	3 (1.6)	66	3	1 (0.5)	183 (100.0)
Statistical inference: Pearson Chi-square=14.544, df=12, *P*=0.267								

Table 5: Distribution of study participants according to their responses on source of knowledge regarding forensic dentistry

Source of knowledge regarding forensic dentistry							
Level of training	**As a subject in college, *n* (%)**	**Journal, *n* (%)**	**Internet, *n* (%)**	**Newspaper, *n* (%)**	**Television, *n* (%)**	**Others, *n* (%)**	**Total, *n* (%)**
Undergraduates	38 (43.7)	5 (5.7)	24 (27.6)	4 (4.6)	13 (14.9)	3 (3.4)	87 (100)
Interns	15 (24.6)	1 (1.6)	24 (39.3)	8 (13.1)	13 (21.3)	0	61 (100)
Postgraduates	9 (25.7)	16 (45.7)	6 (17.1)	2 (5.7)	2 (5.7)	0	35 (100)
Total	62 (33.9)	22 (12.0)	54 (29.5)	14 (7.7)	28 (15.3)	3 (1.6)	183 (100.0)
Statistical inference	Pearson Chi-square=60.471, df=12, *P*=0.005						

Table 6: Distribution of study participants according to their responses if they had any formal training and their present knowledge level/awareness about forensic dentistry was adequate

Had any formal training in collecting, evaluating, and presenting dental evidence				
Level of training	**Yes, *n* (%)**	**No, *n* (%)**	**Not answered**	**Total, *n* (%)**
Undergraduates	21 (24.1)	66 (75.9)	0	87 (100.0)
Interns	14 (23.0)	46 (75.4)	1 (1.6)	61 (100.0)
Postgraduates	7 (20.0)	28 (80.0)	0	35 (100.0)
Total	42 (23.0)	140 (76.5)	1 (0.5)	183 (100.0)
Statistical inference	Pearson Chi-square=2.256, df=4, *P*=0.689			

Present knowledge level/awareness about forensic dentistry was adequate			
Level of training	**Yes, *n* (%)**	**No, *n* (%)**	**Total, *n* (%)**
Undergraduates	14 (16.1)	73 (83.9)	87 (100.0)
Interns	5 (8.2)	56 (91.8)	61 (100.0)
Postgraduates	1 (2.9)	34 (97.1)	35 (100.0)
Total	20 (10.9)	163 (89.1)	183 (100.0)
Statistical inference	Pearson Chi-square=5.193, df=2, *P*=0.075		

knowledge. This was mainly because of inadequate exposure to subject in the field of forensic dentistry, less importance given to the subject in the curriculum, and lack of practical exposure to forensic cases.

Knowledge, attitude, and approach of forensic odontology among dental practitioners in Pune were analyzed.[6] Results showed inadequate knowledge, poor attitude, and lack of practice pertaining to record keeping or clinical knowledge of forensic odontology prevailing among the dental practitioners. Nagarajappa *et al*.[7] in their study assessed the knowledge, attitude, and practice of forensic odontology among dental practitioners in Kanpur city and revealed adequate knowledge and good attitude. Lack of practice in maintaining dental records for longer time was observed among majority of the study participants.

Sharma *et al*.,[8] in their study on knowledge, attitude, and practice of forensic odontology among private dental practitioners in Ghaziabad city, reported inadequate knowledge, poor attitude, and lack of practice pertaining to patient's dental record maintenance and clinical knowledge of forensic odontology among dental practitioners in Ghaziabad.

The aim of a study[9] was to analyze the knowledge, attitude, and practice of forensic odontology among dental practitioners in Chennai. This study revealed inadequate knowledge, poor attitude, and lack of practice of forensic odontology prevailing among the dental practitioners in Chennai.

Table 7: Distribution of study participants according to their responses on awareness if dentist can testify as an expert witness in the court to present forensic dental evidence

Awareness that dentist can testify as an expert witness in the court to present forensic dental evidence				
Level of training	**Yes, *n* (%)**	**No, *n* (%)**	**Not answered**	**Total, *n* (%)**
Undergraduates	73 (83.9)	13 (14.9)	1 (1.1)	87 (100.0)
Interns	53 (86.9)	7 (11.5)	0	61 (100.0)
Postgraduates	33 (94.3)	1 (2.9)	1 (2.9)	35 (100.0)
Total	159 (86.9)	21 (11.5)	2 (1.1)	183 (100.0)
Statistical inference	Pearson Chi-square=7.152, df=6, *P*=0.307			

Table 8: Distribution of study participants according to their responses on awareness if dentist can testify as an expert witness in the court to present forensic dental evidence

Awareness that dentist can testify as an expert witness in the court to present forensic dental evidence				
Level of training	**Yes, *n* (%)**	**No, *n* (%)**	**Not answered**	**Total, *n* (%)**
Undergraduates	73 (83.9)	13 (14.9)	1 (1.1)	87 (100.0)
Interns	53 (86.9)	7 (11.5)	0	61 (100.0)
Postgraduates	33 (94.3)	1 (2.9)	1 (2.9)	35 (100.0)
Total	159 (86.9)	21 (11.5)	2 (1.1)	183 (100.0)
Statistical inference	Pearson Chi-square=7.152, df=6, *P*=0.307			

In line with studies reported earlier, the observations of the present study indicate that there is lack of practice of forensic odontology among majority of the study participants.

This could be due to various reasons like there are no fully equipped laboratories for forensic odontology in India. The other reason could be their busy dental academics, which does not allow them an opportunity to probe deeper into the forensic odontology. Further, forensic odontology was not included as a part of the academic curriculum until recently.

In our study, MDS dental students presented better level of knowledge and awareness about forensic odontology than BDS dental students. Reason could be justified as majority of BDS dental students upgrade their knowledge related to forensic dentistry by books and internet while MDS dental students upgrade their knowledge through Continuing Dental Education (CDE), conferences, journals, and workshops which are more updated sources.

Conclusion

Current worsening of the conditions due to increasing crime and human-made disasters has amplified the role of forensic odontology in identification of the victims. Hence, in the near future, forensic odontology must be introduced into the BDS curriculum effectively as a separate subject so that the students get well acquainted with the required knowledge for handling the medicolegal cases in their future practice.

The demand for accurate forensic investigation in India will increase the scope of this interesting science in the near future. We wish to conclude that for an efficient forensic investigation, a highly competent dental team should actively involve for a fruitful outcome.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Jurel SK. Role of dentist in forensic investigations. J Forensic Res 2012;3:148.
2. Acharya AB, Sivapathasundhararn B. Forensic Odontology. Shafer's Textbook of Oral Pathology. 5th ed. Elsevier India; 2006. p. 1199-227.
3. Sharma B. Forensic: At first sight. Ann Dent Spec 2014;2:59-63.
4. Chandra Shekar BR, Reddy CV. Role of dentist in person identification. Indian J Dent Res 2009;20:356-60.
5. Gopal SK, Gayathri PS. Knowledge and attitude about forensic odontology among undergraduate and postgraduate dental students. Indian J Forensic Med Toxicol 2015;9:93-6.
6. Harchandani N, Marathe S, Hebbale M, Ul Nisa S, Hiremutt D. Awareness of forensic odontology among general dental practitioners in Pune – A cross sectional study. J Adv Med Dent Sci Res 2014;2:10-6.
7. Nagarajappa R, Mehta M, Shukla N, Tuteja JS, Bhalla A. Awareness of forensic odontology among dental practitioners in Kanpur city, India: A KAP study. J Dent Res Updates 2014;1:6-12.
8. Sharma A, Shokeen S, Arora R, Dhaginakatti SA. Survey on knowledge, attitude and practice forensic odontology among private dental practitioners in Ghaziabad city, India. J Dent Specialities 2015;3:43-7.
9. Preethi S, Einstein A, Sivapathasundharam B. Awareness of forensic odontology among dental practitioners in Chennai: A knowledge, attitude, practice study. J Forensic Dent Sci 2011;3:63-6.