

A questionnaire survey on forensic odontology: Are we really aware?

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Introduction

In today's scenario, when crime rates are at peak identification of the victim or the mode of crime is a brain-storming process. The dentist plays a small yet significant role in crime investigation through the speciality known as forensic odontology. According to Keiser-Nielson, forensic odontology is a branch of forensic medicine that deals with the proper handling, examination, and presentation of dental evidence in the best interest of justice.^[1] Forensic odontology involves the management, examination, evaluation, and presentation of dental evidence in civil or criminal proceeding along with research. Thus, the forensic odontologist assists the legal authorities by examining the dental evidences in these situations.^[2]

Abstract

Introduction: The role of a dentist is not only to examine and treat the oral diseases but also to assist the legal authorities by means of its branch—forensic odontology. Through forensic odontology, a dentist plays a very important role in crime investigation of any type.

Objective: To analyze the knowledge, awareness, and interest of forensic odontology among the dental teaching staff who are working in the dental colleges within the Delhi NCR. **Materials and Methods:** A questionnaire of 12 questions (both open-ended and close-ended) was prepared and the survey was conducted with 200 dental teaching staff. **Results:** A sufficient knowledge but poor awareness and interest among the dental teaching staff was observed. **Conclusion:** The study highlighted that although dental teaching staff themselves have sound knowledge regarding forensic odontology, their awareness and interest need to be upgraded on a regular basis. The success of acquiring such extensive knowledge would be valid if better job opportunities in these fields would be increased.

Key words: Awareness, dental teaching staff, forensic odontology, survey

Although globally forensic odontology has taken giant steps in the technical advancements, in India the field of forensic odontology is still miles behind in this regard. There is increased need for dental surgeons to have good knowledge about forensic odontology, as it is useful in identification of an individual and to detect abuse among all ages. Dentists are the health-care professionals who routinely assess the head and neck of the patients and have a great chance in identifying the signs of abuse and neglect.^[2] Every dentist has to understand the forensic implications associated with their practice. In India dentists are less involved in forensic circumstances because of lack of training, experience, exposure, etc., Although there are many studies published regarding the knowledge, interest,

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and awareness of the general dental professionals who are attached with dental colleges and are constantly in touch with academics, latest news, articles, etc.; thus their knowledge is constantly updated but their level of interest about forensics is dubious.

Keeping this as the background, the present study was undertaken to evaluate the awareness, knowledge, and interest of forensic odontology among the dental teaching faculty of dental colleges within Delhi NCR.

Materials and Methods

The present cross-sectional study was conducted in different dental colleges in Delhi NCR. The surveyed individuals were 200 dental faculty members of various dental specialities. Data were collected in a personalized manner by means of a pretested questionnaire that was circulated after obtaining an institutional ethical committee clearance. The questionnaire [Table 1] consisted of 12 questions to assess the following: Awareness, knowledge, and interest of forensic odontology among the dental faculty members. The questions were both open-ended and close-ended. The results were calculated on percentage basis.

Question 1–5 were regarding knowledge, 6–9 were regarding awareness, and 10–12 were related to the interest among the dental faculty members.

Results and Observation

Q1. Can teeth serve as a source of DNA?

Ninety-five percent of them were aware of the fact that teeth act as an accurate source of DNA material and only 5% were not aware about it. The main sources of DNA are pulp, dentine, cementum, and periodontal ligament fibers. Thus, teeth can be successfully used for human identification.

Q2. What is the first step for the mean of identification for unclaimed bodies?

Sixty-eight percent of the respondents said visual identification, 38% of them were not aware of it, and 8% of them answered DNA fingerprinting as the first means of the identification. Visual identification is the standard protocol of forensic medicine to use in individual identification.

Q3. Can sex determination be done using Barr bodies?

Nearly, 72% of the faculty members answered that sex determination can be done using Barr bodies, 13% did not agree, and the remaining 15% were unaware about this fact. Barr body is an intranuclear mass usually lying against the nuclear membrane in the females and thus it is an important aid in sex determination.

Table 1: Questionnaire for survey

Questions	Responses
Can teeth serve as source of DNA	Agree Disagree Don't know
What is the 1 st step for the identification of unclaimed bodies	Fingerprinting Physical and anthropological examination Visual examination Serological and genetic DNA comparison Don't know
Can sex determination be done using Barr bodies	Agree Disagree Don't know
Can enamel/dentin act as an aid for identification of age	Agree Disagree Don't know
According to the DCI norms, forensic odontology is taught to BDS students in which year	BDS 2 nd year BDS 3 rd year BDS final year Both a and b
What would you do if you identify sign and symptoms of child abuse	Inform police Inform NGO's Inform parents Take no action
Are you aware of any forensic odontologist in India	Yes/no If yes, then name
Do you know about any criminal case solved with the help of forensic odontology	No/yes If yes, than name
What is the source of information regarding forensic odontology	Electronic sources-TV, mobiles, radio etc. Lectures, journal, and seminars etc. Both of the above Any other source
As a dentist we can help forensic experts by maintaining records	Agree Disagree Don't know
Are you aware of any formal training centers in India for forensic odontology	No Yes If yes than name
If given choice, would you like to go any such training	Yes No If no specify reason

Q4. Can enamel/dentin act as an aid for identification of age?

Eighty-nine percent were able to answer it correctly that enamel/dentin act as an aid for age identification. The remaining 11% did not answer it correctly. Enamel and dentin both act as an aid for the identification of age as it represents incremental growth lines.

Q5. According to the DCI norms, forensic odontology is taught to BDS students in which year?

Ironically, only 41% were aware and 59% were not aware of the fact that forensic odontology should be

taught both in the third and final year of dentistry according to the DCI norms.

Q6. *What would you do if you identify signs and symptoms of child abuse?*

Forty-one percent of them said that they would report it to the parents, and all of them were in favor of reporting to the police and only 18% were in favor of reporting to the child-care authorities. Ideally, in any case of child abuse, it should be first reported to the child-care authorities, as in many of the cases parents are directly involved with the child abuse.

Q7. *Are you aware of any forensic odontologist in India?*

Fifty-nine percent of dental faculty were not aware of any forensic odontologist, 41% were aware of them, out of which only 64% were able to name "Dr. Ashith Acharya" who is a renowned forensic odontologist of Indian origin.

Q8. *Do you know about any criminal case solved with the help of forensic odontology?*

Only 56% of them were aware of any criminal cases that were solved with the help of forensic odontology and most of them mentioned about Nirbhaya rape case that was analyzed with the help of bite marks, and the remaining 44% were not aware of any such case.

Q9. *What is the source of information about your knowledge in forensic odontology?*

For 92% of the respondents, TV serials, radio, and internet were proved to be the source of knowledge. Remaining 8% were in favor of various journals, lectures, and seminar that are considered accurate sources.

Q10. *As a dentist, can we help forensic experts by maintaining records?*

Ninety-six percent agreed that maintaining records will be helpful for the forensic experts for the identification and only 4% did not agree. These 4% of the respondents probably have not maintained records due to the lack of time and interest.

Q11. *Are you aware of any formal training centers in India for forensic odontology?*

Only, 26% were aware of any formal training centers in India and the remaining 74% were unaware of any training centers in India. Most of those who were aware, answered it as Shri Dharmasthala Manjunatheshwara (SDM) College, Dharwad, Karnataka.

Q12. *If given a choice, would you like to undergo any such training?*

Ninety-four percent of them were affirmative, and the remaining 6% of them refused due to the lack of time or interest.

Discussion

Forensic odontology is an important branch of the study of dentistry that would assist in solving cases and identifying victims of abuse and deaths. Greater knowledge and awareness of forensic odontology among the dental practitioners would be required in the growing field of medicine. The practice of forensic odontology has gained importance in a number of developed countries across the world. In the developing countries such as India, it is yet to attain its significant position. Dentists who are working as academicians are constantly upgrading their knowledge by means of continuing dental education (CDEs), conferences and articles etc., thus their knowledge and awareness are generally updated. However, their interest in forensic is doubtful because in India it is not a well-established subject as of yet. Keeping this as the background, the present study was undertaken to evaluate the awareness, knowledge, and interest of forensic odontology of the dental teaching staff in Delhi NCR.

In the present survey, the questionnaire was designed, which consisted of 12 questions, to assess the awareness, knowledge, and interest in forensic odontology of the dental teaching staff. Every respondent was aware of forensic odontology as an upcoming specialty.

Ninety-five percent of the respondents were aware of the ability of the dental tissues to withstand environmental assaults and still retain some of its original structure. This property of the teeth makes it as an excellent and an accurate source of DNA.^[3] Most of the techniques involve nuclear DNA but mitochondrial (mt) DNA can also be used that is more abundantly found in tissues and can be used when nuclear DNA is insufficient. Dental tissues, such as dentin and cementum, are rich in mtDNA. Even in a small amount of source material DNA can be amplified using polymerase chain reaction (PCR) technique, and this amplified DNA is then compared with antemortem samples, such as blood, hair, clothes, cervical smear, and biopsy.^[2]

Human identification is one of the most challenging subjects in the field of forensic odontology. Visual examination remains the first and preliminary step for the identification of the unclaimed individual. In the present survey, 68% of the respondents were in favor of it. The identification of an individual is mandatory for personal, social, and legal reasons. Hence, one of the main focuses of forensic odontology is identification of an individual.^[4]

Although canine dimorphism is a very popular method for gender determination, Barr bodies identification is one of the simplest and easiest methods using buccal smears.^[5] Barr body is the inactivated X-chromatin that is present against the nuclear membrane in females. These are present in 40% of the females who are considered chromatin positive

but are absent in the males who are considered chromatin negative.^[6] Sex determination from human tooth pulp in cadavers is possible up to a period of 4 weeks. However, in the present study, 72% of the respondents did not know about Barr bodies. The reasons for this could be multifactorial—their ignorance, lack of basic knowledge, and lack of confidence in answering this question, regarding the significance of Barr bodies in forensic odontology.

Tooth acts as a reliable tool in age estimation that is adopted by most of the anthropologists, archaeologists, and forensic odontologists. The age-related changes in tooth can be divided into three categories: Formative, degenerative, and histological changes. Formative changes include the completion of the crown/root and eruption of tooth and thus it act as good predictors till the age of 12 years. Degenerative changes include periodontitis, periodontosis, secondary dentin and cementum apposition (both seen microscopically), root resorption, and transparency of the root seen in ground sections. Histological measures mainly include incremental lines of enamel/dentin, neonatal lines, dentinal translucency, degree of formation of crown, and root etc. Incremental lines remain in the fossils and represent internal record and may serve as a valuable tool in age determination. Dentinal translucency is one of the morphohistological parameters considered best for dental age estimation, not only in terms of accuracy but also in terms of simplicity.^[6]

Regarding the inclusion of forensic odontology in the curriculum of dentistry, only 41% of the respondents were aware of the fact in the present survey that according to Dental Council of India (DCI) curriculum forensic odontology should be taught in the third and final years of bachelor of dental surgery (BDS) course. The DCI curriculum guidelines for forensic dentistry are parallel to those in foreign countries such as Australia, Norway, and Malaysia. Thirty four hours of instructions that includes theory session as well as practical exercises are specified for forensic dentistry.^[7] Although DCI has included forensic odontology in their undergraduate curriculum, yet in most of the colleges very few hours are dedicated on it. Considering the increase in the occurrence of accidents, crimes, and natural calamities, forensic odontology should be a separate subject at the undergraduate level itself. This will act as new hope for BDS graduates who cannot pursue MDS or who are inclined toward the medical field as it can bridge the gap between the dental and medical fields to some extent.

Child abuse presents as a serious social problem with global dimensions, increasing at an alarming rate in all socioeconomic strata and in all ethnic or racial communities. All cases of child abuse that are greatly growing in number in day-to-day life should be detected as early as possible. Child abuse and neglect is the result of the lack of interaction

between a caregiver and a child that leads to nonaccidental harm to the child's physical and developmental state, so it should be reported to child-care authorities as soon as it is detected. A research suggests that parents may physically abuse children and nearly 1 in 10 children witnesses such violence. The number of children in the United States who died of child abuse or neglect in 2012 were 1,593, and in over 80% of the cases the culprits were parents.^[8] However, the result of the present survey showed that 41% of the practitioners suggested that it is important to first inform the parents rather than the NGOs as they were unaware of the fact that in most cases parents were found to be the main culprits. Forensic odontology also plays very important role in solving criminal cases; one such recently solved case is the Nirbhaya rape case. The numerous bite marks on the victim's corpse were compared with the dental models of the accused. Dr. Ashit B Acharya analyzed the bite marks with the aid of a computer software and postulated that two of the bite marks matched with the dental models of the two suspects.^[9] However, there are many other cases where the forensic odontologists had played a very valuable 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. In the present survey, only 56% of the respondents were aware of it and all of them mentioned only about the Nirbhaya case.

Media plays a definitive role in creating awareness among the common man in general population.^[10] The same holds true for the present study as TV serials, radios, and internet etc., proved to be the source of knowledge for 92% of the respondents in the present survey. Journals and publications continue to remain as one of the most reliable and correct sources of this knowledge. According to the present survey, very few dental practitioners update themselves by reading forensic-related journals or publications.

In the present study, 96% of the individuals agreed that maintaining records will be helpful for forensic experts for the identification. Dentists should know not only the importance of preparing an accurate dental record but also the importance of preserving these records. These dental records serve the purpose of future reference for their practice when needed and for medicolegal cases. As stated by the law, the records should be maintained for a minimum of 7 years to a maximum of 10 years for forensic purposes.^[3]

Only 26% of the respondents were aware of any formal training centers in India and most of them answered it as SDM College, Dharwad. However, there are various other colleges that provide similar courses as follows:

- Lady Hardinge Medical College—New Delhi, Delhi
- Guru Gobind Singh Indraprastha University—Delhi
- Moti Lal Nehru Medical College—Allahabad, Uttar Pradesh
- The Grant Medical College and Sir Jamshedjee

- Jeejeebhoy Group of Hospitals—Mumbai, Maharashtra
- Postgraduate Institute of Medical Education and Research—Chandigarh, Punjab
- Medical College and Hospital Kolkata—Kolkata, West Bengal
- Institute of Medical Science and Research—Ambala, Haryana
- University Of Hyderabad—Hyderabad, Andhra Pradesh
- Government Dental College—Thiruvananthapuram, Kerala.

A few forensic odontologists in India are trained and qualified from foreign countries, whose qualifications are recognized only recently by the government of India. Majority of the respondents were interested in undergoing any such training, but few of them were not because of the lack of time and interest.

Conclusion

The present survey revealed the current situation of forensic odontology among the dental teaching staff of Delhi NCR dental colleges. The survey surfaced their sufficient knowledge that they must have acquired during their study period, continuing dental education or while teaching. Other two parameters that were evaluated in the survey was awareness and interest, which are interrelated but was found to be less among dental teaching staff. Periodic conferences, workshops, CDEs, and seminars, if conducted for the dental surgeons, will help to enrich their knowledge and awareness. Moreover, if there are more job opportunities created in this field, more dentists will have interest in attending and participating in such programs.

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Conflicts of interest

There are no conflicts of interest.

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