

Awareness among Medical Students about Forensic Odontology

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Abstract

Every tooth possesses a set of unique characteristics and the way the teeth are arranged in different oral cavities are unique in every individual. Therefore, dentition is useful for individual identification and comparison, especially in mass disasters where the bodies of the victims become mutilated beyond recognition. Forensic odontology deals with the science of dentistry to aid in the administration of justice. There is a huge void in the number of forensic odontology experts required to meet the demand and those that are actually getting trained in this concern. In order to ease this, there is a need to incorporate MBBS undergraduate curriculum with the shortlisted particulars of forensic dentistry. The study was conducted to evaluate the awareness and knowledge about forensic dentistry amongst the 2nd Year MBBS under graduates in Mahavir Institute of Medical Sciences. The study showed that the level of awareness on topic was adequate in the participants but they had little knowledge about the practical application of forensic odontology in routine practice. Conducting regular seminars and workshops can be helpful to develop the practical skill required in handling forensic odontology related cases in emergency department.

Keywords: Awareness, Forensic Odontology, 2nd Year MBBS students, Forensic Dentistry, Mass Disasters.

Introduction

The dental patterns are unique for every individual. This uniqueness is due to the changing status of a person's teeth throughout the life & also due to variety of treatments given by the dentist. Teeth are the hardest, robust tissues and are more reliable than any other remains for identification of the individual. Therefore, dentition is useful for individual identification and comparison, if records exist for the purpose¹.

Forensic odontology deals with the science of dentistry to aid in the administration of justice.² Forensic odontology has importance in identification, estimation of age of a person, determination of sex, determination

of race, DNA evidence, bite-mark evidence, Injury, occupation, habit, time since death and detection of poison³. It is very essential for identification of individuals in the event of any disaster. In recent times, natural and man-made disasters are occurring frequently, in such catastrophies the bodies of the victims become mutilated beyond recognition and also the body parts of individual are shattered where there are least chances of obtaining any piece of identity. Here the vital role of forensic odontologist comes into picture in the identification of such individuals.

Forensic odontology is still in its infancy state in India where as in other developed countries it has acquired a recognized branch of dentistry in medical forensicology⁴. Forensic odontologist plays a very important role in crime investigation of any type by assisting the legal authorities in the confirmation of identity. In India, there is a huge void in the number of forensic odontology experts required to meet the demand and those that are actually get trained in this concern. In

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order to ease this we need to incorporate our curriculum of the medical undergraduates with the shortlisted particulars of forensic dentistry. Studies show that only 12% of all dentists maintained complete dental records⁵. It states that the knowledge and awareness about Forensic Odontology is less among the dental doctors and much lesser in MBBS students. This study necessitates the exposure of medical graduates to the basic principles and techniques of the forensic odontology.

This study was undertaken to analyse and assess the awareness about forensic odontology among the MBBS graduates in Mahavir Institute of Medical Sciences. This article is an attempt to reinforce the awareness among MBBS students about various disciplines of forensic odontology and a role of an odontologist in identification of a person.

Methodology

This was a cross sectional prospective study done over a period of 3 months from 1st July to 30th September 2019. 150 MBBS under graduate students belonging to one academic year, 2nd year MBBS studying at Mahavir Institute of Medical Sciences, comprising of both male and female sex. The participants were given a questionnaire (Dichotomous Two Category Questionnaire) during their teaching sessions and were briefed about the objectives of the study and asked to choose the answer which they found appropriate. The data were analysed in SPSS and expressed as number and percentages and presented in the form of text, tables, and figures.

Results

Table 1: Awareness on forensic odontology

Statement/Fact		Frequency	Percentage
Application Of Knowledge on Dental Sciences to Legal Investigation is defined as Forensic Odontology	Agree	140	93.3%
	Disagree	7	4.7%
	Don't Know	3	2%
Dental Examination helps in identification of unknown persons	Agree	112	74.7%
	Disagree	27	18%
	Don't Know	11	7.3%
The term Forensic Dentistry is Interchangeable with Forensic Odontology	Agree	71	47.3%
	Disagree	22	14.7%
	Don't Know	57	38%
Forensic Odontology plays a key role in mass disasters	Agree	91	60.7%
	Disagree	32	21.3%
	Don't Know	27	18%
Bite marks are referred as "Dental Fingerprints"	Agree	107	71.3%
	Disagree	21	14%
	Don't Know	22	14.7%

67 (44.7%) participants were aware of the uniqueness of the tooth print and that it could be used as a valuable tool in forensic science for personal identification. 38 (25.3%) students did not consider them to be unique and 45(30%) of them did not know about tooth prints. 141 (94%) of the respondents agreed that maintaining records will be helpful for the forensic experts in identification, 2(1.3%) disagreed and 7(4.7%) did not understand its importance. 132 (88%) of the participants were aware that the effects of Drugs, Nutrition and Diseases can also be manifested on the teeth, 8 (5.3%) disagreed to this and 10 (6.7%) of them were not aware of this fact. 93 (62%) of them were aware that there are some

dental characteristics which are predominant in one of the racial groups which help in the racial identification process. 14 (9.3%) disagreed to this and 43 (28.7%) of them did not know about the differences in teeth in different races. Loss of tooth due to assault is grievous Hurt, 116 (77.3%) were aware of this, 27 (18%) believed the given statement to be false and 7 (4.7%) of them did not consider it to be grievous hurt. Only 59 (39.3%) of the students were aware that it was difficult to dislodge your tooth or have it knocked completely out without affecting the surrounding soft and hard tissues. 52 (34.7%) disagreed and 39 (26%) said they did not have knowledge about this.

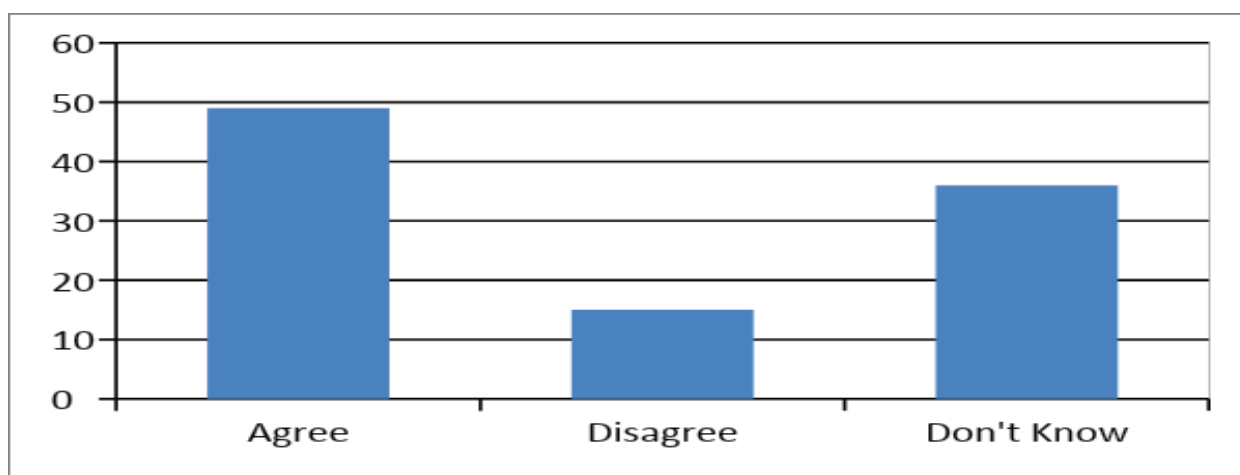


Fig 1: If Blood Group can be determined from the cells of the Dental pulp cavity

Table 2: Awareness on application of Forensic Odontology

Statement/Fact		Frequency	Percentage
A missing tooth can also help in establishing identity of a person	Agree	104	69.3%
	Disagree	25	16.7%
	Don't Know	21	14%
DNA of an individual can be obtained from teeth also	Agree	91	60.7%
	Disagree	25	16.6%
	Don't Know	34	22.7%
Criminals can be identified through Bite marks left either in human tissues or in food stuffs	Agree	108	72%
	Disagree	16	10.7%
	Don't Know	26	17.3%

Cont... Table 2: Awareness on application of Forensic Odontology

In mass disasters, comparison of Ante-mortem and Post-mortem Dental X-rays is done for Identification	Agree	104	69.3%
	Disagree	11	7.3%
	Don't Know	35	24.3%
Dentures are useful in identification if they have patient's name or code number included in them	Agree	75	50%
	Disagree	14	9.3%
	Don't Know	61	40.7%

In Mongolians, lower molars have three roots. 17 (11.3%) of them agreed to this fact, 17 (11.3%) disagreed and 116 (77.3%) did not know the differences in molar teeth among races. 39 (26%) of the respondents are agreed that in civilized societies, first permanent molar is larger than third molar of this fact. 21 (14%) disagreed and 90 (60%) did not know of such a distinction between civilized and primitive societies. Only 48 (32%) were aware that Y-chromosome can be demonstrated from pulp of teeth. 22 (14.7%) disagreed and 80 (53.3%) did not know.

Discussion

Many studies have been done in the last decade to know the level of the knowledge and awareness on the subject of forensic odontology among students but all have been done on dental graduates and postgraduate students. Forensic odontology has multiple disciplines which not only includes dental identifications but also has recognition in abuse of children and elderly, age assessment and bite mark analysis that have legal importance.⁶ As per the curriculum established by the Medical Council of India, Forensic Odontology is taught in forensic medicine as a part of anthropology. Keeping that in the background, this study was conducted to assess the level of awareness among MBBS students on the subject.

According to the current study, 93.3% of the study group had basic knowledge regarding the definition of Forensic Odontology. 71.3% knew each individual has unique dentition and hence, they are also referred to as dental fingerprints. The term “Amelogyphics” means the study of enamel rod end patterns.⁷ The uniqueness of the tooth print could be used as a valuable tool in forensics for personal identification, but 55.3% were unaware

of it. Though majority i.e. 74.7% of them were aware of the importance of dental examination in unknown and unidentified bodies, 39.3% did not know the vital role it played in identification of disfigured, mutilated or unidentifiable bodies in mass disasters. Forensic odontology is regarded as one of the most reliable and economical scientific methods for victim identification in mass disasters.⁸ Mass disasters are sudden, violent and unexpected events that are associated with a large number of casualties. These casualties can be treated both on an outpatient or surgical basis and medical doctors are first respondents to such cases. Thus, they may inherently become involved in the identification of victims. In mass disasters, like fire accidents or blast injuries, visual recognition of facial features and fingerprints is often not possible due to extensive soft tissue destruction; this requires the use of hard tissues such as bones and dentition for human identification. Though 94% were aware that maintaining Dental Records can be useful for forensic Investigation, 31.6% did not know that comparison of Ante-mortem and Postmortem Dental X-rays can be done for identification. *Dentures* are prosthetic devices that replace the missing teeth. They are made to be acid resistant, to survive elevated temperatures and to be easily retrievable after an accident. All dentures are marked with codes or unique identification number.⁹ 50% of the study group did not know that dentures have a crucial role in identification when they are marked with patient's name or code number on them. These criteria show that the students were aware of general principles of forensic odontology; they had minimal knowledge about the applications of forensic odontology in routine practice. These findings are similar to those found by Khare P et al in their study on dental practitioners.¹⁰

As per the study conducted by Preethi S et al in Chennai, 93% percent of the dental practitioners lacked

formal training in collecting, evaluating and presenting dental evidence.¹¹ Hence, medical graduates must not only be aware of basic techniques of identification but also about preservation of ideal samples to be sent for DNA analysis. 49.3% of the participants were not aware of the fact that teeth act as a source of DNA material. Pulp and cementum are the most valuable sources of nuclear DNA in the tooth and both these tissues along with dentine are good sources of mitochondrial DNA.

Only 51.3% of the participants were aware that the presence of ABO blood group from soft and hard dental tissues makes it possible to assist in human identification even in decomposed bodies. 68% of the respondents did not know Y-chromosome can be demonstrated from pulp of teeth and sex determination by fluorescent staining of the Y chromosome is a reliable technique in teeth with healthy pulps.¹²

Though 62% of the students were aware that each human race has its own characteristic appearance regarding dentition and there are certain dental characteristics which are predominant in some racial groups which help in the racial identification process. Majority did not know about specific characteristics of each human race like Mongolians have shovel-shaped incisors and their mandibular molars have three roots, 88.6% of the participants did not know about that. 74% of them were also unaware of distinctions between civilized and primitive societies.

Teeth mineralisation gives a better estimate of chronological age than the bone mineralisation.¹³ Age of the individual can be estimated based on the type of etching patterns on the enamel.¹⁴ Dental profile comprises of a group of specific individual characteristics related to the teeth and surrounding tissues. These characteristics help in the estimation of age, sex, socio-economic status, personal habits, oral health, occupation and dietary status of the person.¹⁵ 69.3% agreed that a single tooth can also help in establishing identity of a person, 30.7% did not know about dental profiling. 88% of the group was aware that teeth and surrounding tissues are affected by many local and systemic diseases. Drug abuse can lead to acidic erosion of enamel and increased numbers of decayed, missing and filled teeth in the mouth.

Majority of the students were aware of the medicolegal aspects of forensic dentistry. 77.3% of the respondents were aware of that fracture or dislocation of a bone or tooth, Grievous hurt as it is included in the seventh clause of Sec.320 of the Indian Penal Code. But 60.7% did not know that it is difficult to dislodge a healthy tooth without fracturing or loosening the neighbouring teeth. Bite marks can occur either in the victim or attacker or on both. Teeth are used as a weapon by the perpetrator and also in self-defence by the victim. In addition to the location of the bite mark, the type of severity of the injury may give investigators relevant clues as to the mental state of offender. 72% said they knew about bite mark analysis and the key role it plays in identification of the perpetrator.

Conclusion

The study revealed that majority of students showed adequate awareness in the basics of forensic odontology but lacked in knowledge about the applications of the subject in routine practice. Forensic Odontology plays a major role in the identification of unknown persons, unclaimed dead bodies and mutilated body parts in cases of mass disasters and natural calamities. Bite mark analysis has also been used as evidence by the judiciary all around the world including India. Because of inadequate practical exposure and training regarding latest trends in Forensic odontology and minimal importance given to the subject at the undergraduate level, it still remains at a nascent stage in India. Similar studies should be conducted on a wider scale to include medical graduates and emergency physicians.

As a health-care provider, medical professionals should understand the implications of forensic odontology. Hence, medical students should be included in periodic conferences and seminars conducted in forensic odontology which would improve their knowledge. Workshops may be conducted so that the practical skill would be developed in handling forensic odontology related cases in emergency medicine and forensic medicine departments.

Ethical Clearance: Taken

Conflict of Interest: Nil

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