

Forensic Odontology: Knowledge and Awareness Among 2nd Year Medical Students

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Abstract

Introduction: Forensic odontology is the branch of forensic medicine which deals with the proper handling, examination and presentation of dental evidence in the best interest of justice. The present study was conducted to determine the awareness in medical students regarding the field of forensic odontology.

Material and Methods: A preformulated standardized questionnaire was circulated among 121 2nd year medical students.

Results: 96.69% students knew that Forensic Odontology is branch of forensic that deals with teeth while 95.04% students correctly said that Forensic Dentistry is a branch of Forensic Medicine. Only 3.3% students knew that Forensic Dentistry is useful for identification of person. 42.14% students were aware of the most reliable method of identification. 81.81% students were aware that DNA can be obtained from teeth. However only 28.92% students knew that gender could be identified from teeth. Students were aware that age can be estimated from teeth and that Bite marks are useful for identification. Majority of the students correctly answered that the evidence of forensic dentistry is legally acceptable in court.

Conclusion: Medical students were aware of the significance of the branch of forensic odontology. Practical application of the knowledge of the subject is lacking as there is deficiency of forensic dentistry

department. Use of forensic odontology along with the other scientific knowledge can be used to impart swift, impartial and adequate justice.

Keywords: Forensic Odontology; Forensic Dentist; Forensic Dentistry; Awareness; Identification.

Introduction

Forensic medicine is the application of medical knowledge for the purposes of law and administration of justice.^{1,2} With the advancement of science, there is increased scope of using subspecialties for the purposes of law and justice. Forensic odontology is the branch of forensic medicine which deals with the proper handling, examination and presentation of dental evidence in the best interest of justice.³ Dr Oscar Amoedo (1863-1945) is regarded as the father of Forensic Dentistry.⁴ The first case (1775) of medicolegal identification using dentition is of Dr Joseph Warren identified by Paul Revere. Later, time and again, dentition has been used for identification like in the fire of the Bazaar de la Charite (1897), murder at Tornbridge well (1947), the Luton murder (1943), the Ruxton case (1935), The Acid bath murders (1949) etc.⁴ Although the branch of forensic odontology has showed success in many cases, in India it is still in nascent stage. One reason could be that the Medical professionals like MBBS doctors are unaware of the medicolegal utility of this branch and hence do not utilize this branch to its full capacity. The present study was conducted to determine the awareness in medical students regarding the field of forensic odontology.

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Materials and Methods

The study was done in Department of Forensic Medicine involving students presently studying in 5th semester. Verbal informed consent was taken from students. Total 121 students participated in this study. A preformulated standardized questionnaire containing 12 questions was circulated. (Table 1) Questions consisted of multiple choice and Yes/ No responses. The data was analysed using SPSS 16 and Microsoft Excel software.

Results

One Hundred Seventeen (96.69%) students correctly answered that Forensic Odontology is branch of forensic that deals with teeth (Chart 1)

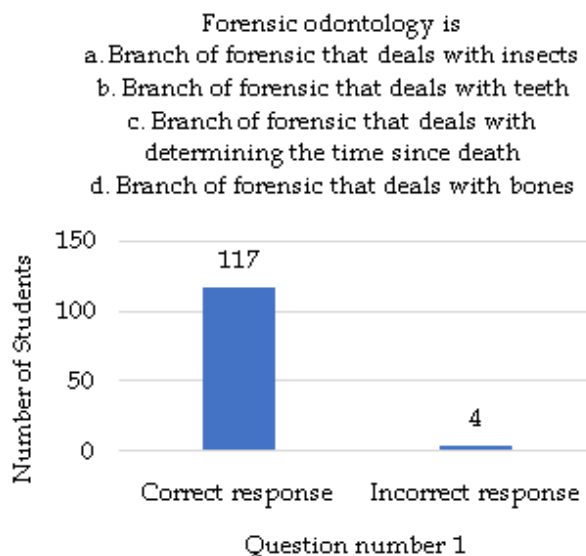


Chart 1: Response to question number 1

Table 1: Questionnaire used for the present study and students' responses

Question number	Question	Incorrect Response	Correct Response	
1	Forensic odontology is a. Branch of forensic that deals with insects b. Branch of forensic that deals with teeth c. Branch of forensic that deals with determining the time since death d. Branch of forensic that deals with bones	04 (3.3%)	117 (96.69%)	
2	Is Forensic Dentistry a branch of forensic medicine? Yes/ No	06 (4.9%)	115 (95.04%)	
3	Is Forensic Dentistry useful for identification of person?	117 (96.69%)	04 (3.3%)	
4	What is the most reliable method of identification? a. Fingerprints b. DNA Fingerprinting c. Physical examination d. Blood typing	70 (57.85%)	51 (42.14%)	
5	Can you get DNA from teeth? Yes/ No	22 (18.18%)	99 (81.81%)	
6	Will you preserve a bitten fruit found at a crime scene? Yes/ No	0 (0%)	121 (100%)	
7	Can you identify a person by bite mark? Yes/ No	25 (20.66%)	96 (79.33%)	
8	Can you estimate age from teeth? Yes/ No	1 (0.8%)	120 (99.17%)	
9	Can you determine gender from teeth? Yes/ No	86 (71.07%)	35 (28.92%)	
10	In a burnt/ charred body, what will be better preserved? a. Bone b. fingerprint c. teeth d. Internal organs	17 (14.04%)	104 (85.95%)	
11	Do you have forensic dentistry department in your institute? Yes/ No	Incorrect response 25 (20.66%)	Correct response 95 (78.51%)	Don't know 1 (0.8%)
12	Is the evidence of forensic dentistry legally accepted in court of law? Yes/ No	13 (10.74%)	108 (89.25%)	

115 (95.04%) students were correct in saying that Forensic Dentistry is a branch of Forensic Medicine (Chart 2).

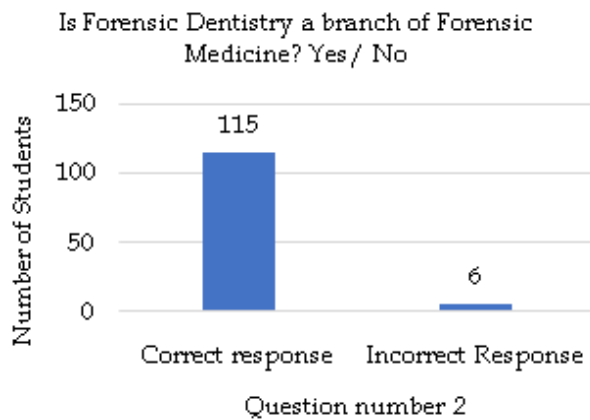


Chart 2: Response to question number 2

99 (81.81%) students were correct in stating that the DNA can be obtained from teeth (Chart 5).

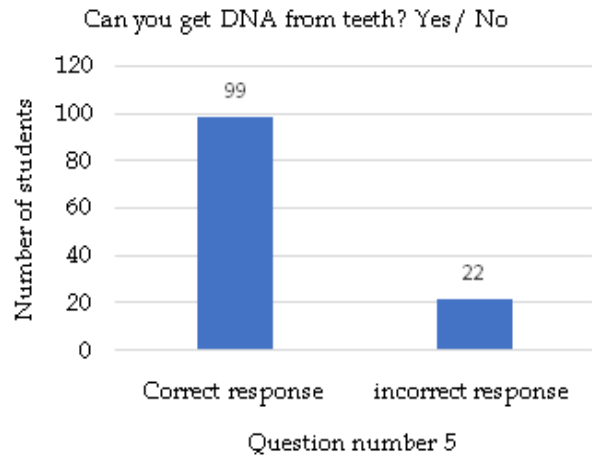


Chart 5: Response to question number 5

Only 04 (3.3%) students correctly mentioned that Forensic Dentistry is useful for identification of person (Chart 3).

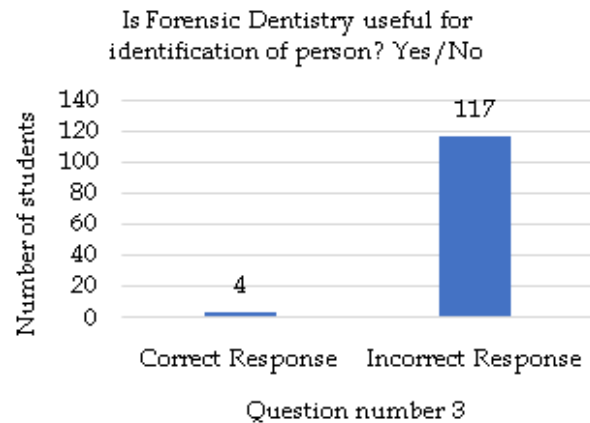


Chart 3: Response to question number 3

All the students (121 {100%}) were correct in answering that bitten fruit found at a crime scene should be preserved (Chart 6).

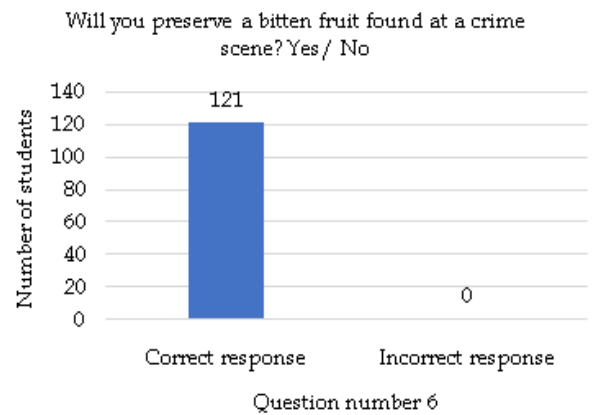


Chart 6: Response to question number 6

Fingerprints are the most reliable method of identification. This was correctly answered by 51 (42.14%) students. (Chart 4)

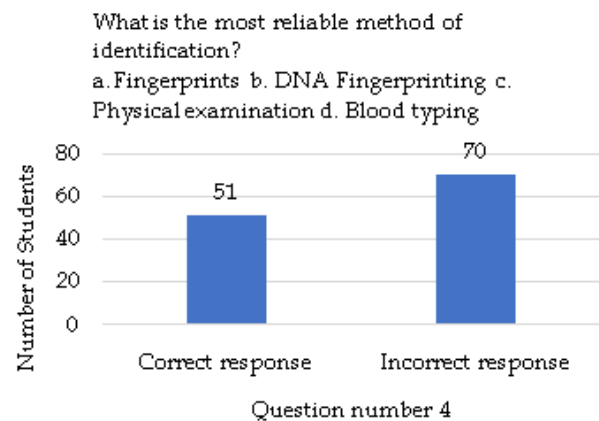


Chart 4: Response to question number 4

Ninety-six (79.33%) students knew that a person can be identified by bite mark (Chart 7).

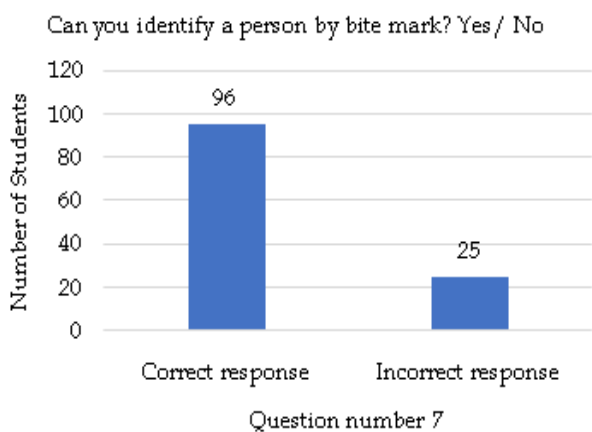


Chart 7: Response to question number 7

One Hundred twenty (99.17%) students correctly stated that age can be estimated from teeth (Chart 8).

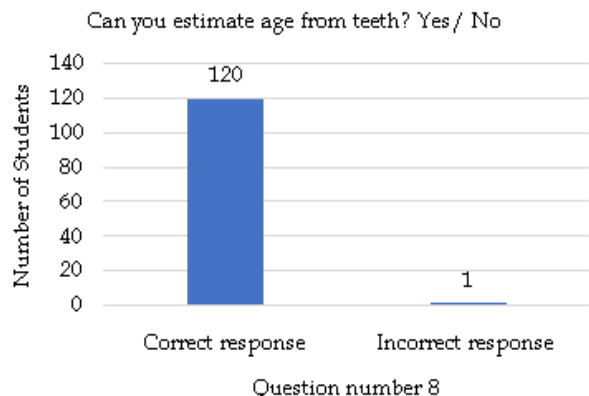


Chart 8: Response to question number 8

Only 35 (28.92%) students knew that gender could be identified from teeth (Chart 9).

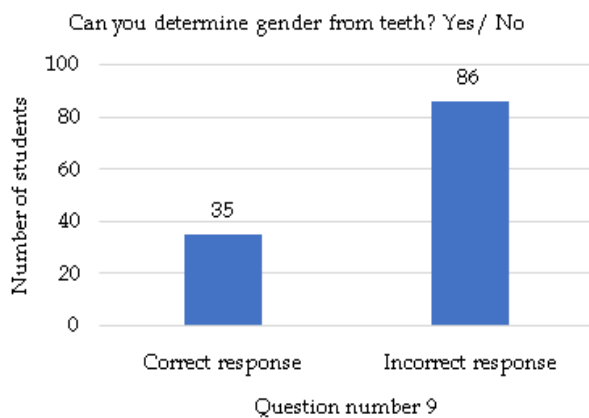


Chart 9: Response to question number 9

One Hundred-four (85.95%) students knew that teeth can be preserved in a burnt/ charred body (Chart 10).

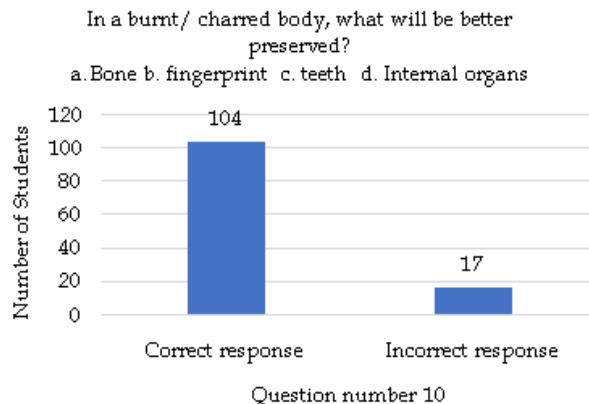


Chart 10: Response to question number 10

Twenty-five (20.66%) students incorrectly answered that there was Forensic Dentistry

department in the institute while one student (0.8%) did not know (Chart 11).

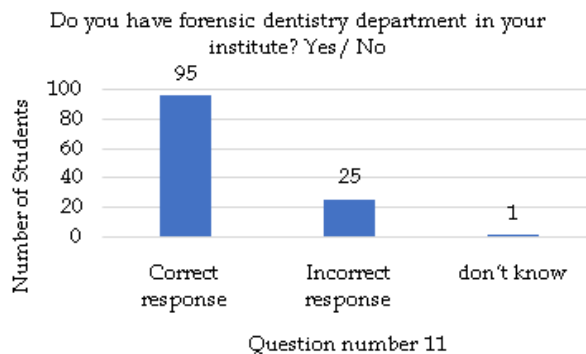


Chart 11: Response to question number 11

One Hundred-eight (89.25%) students were aware that the evidence of forensic dentistry is legally acceptable in court (Chart 12).

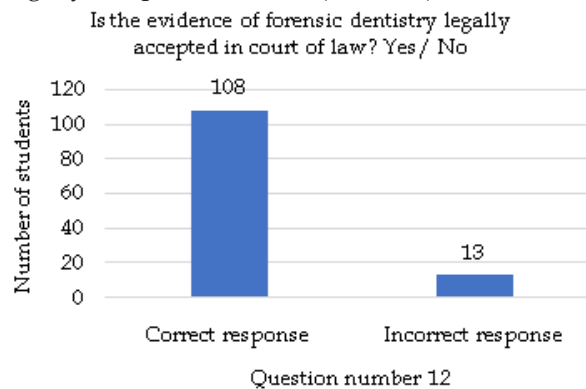


Chart 12: Response to question number 12

Discussion

Forensic Odontology is an integral part of Forensic Medicine.^{5,6} Some authors have even subclassified the field as Forensic-odonto-toxicology.^{7,8} Forensic Odontology has been used in cases like examining sexual assault, child trauma, identification of unidentified bodies⁹, identification in mass disaster, crime scene investigation¹⁰ etc. With the advancement in knowledge and use of allied disciplines, justice and law will be served better. The awareness of medical students regarding the utility of forensic odontology is important so that the knowledge may be used to its fullest extent in the administration of justice.

In a study conducted by *Kumaraswamy et al.*¹¹, 87% (172) participants knew the meaning of forensic odontology and 99% (192) participants knew that forensic odontology is a part of forensic medicine as against 96.69% (117) and 95.04% (115) respectively, in the present study. This shows that participants

are aware of the field of forensic odontology and its relation with forensic medicine.

Indian medical graduates are taught forensic odontology while they are studying forensic medicine in their second year. Presently there has been a change in medical regulations wherein forensic medicine will now be taught in both second as well as third year. Although in the subject, Identification is extensively taught, only 3.3% (4) students knew that teeth can be used for identification. This shows a greater need to emphasize the role of identification by the medical teachers. In a study done by Al azri *et al.*¹² in the dentists practicing in Australia, 94% (361) participants were aware that teeth can be used for personal identification. 42.14% (51) students correctly answered that the most reliable method of identification are the fingerprints. This is in contrast to study done by Preethi *et al.*¹³ where 38% dental practitioners were not aware of the most reliable method of identification.

In the present study 81.81% students knew that DNA can be obtained from teeth whereas in the studies done by Sahni *et al.*¹⁴ 95% participants, Kumaraswami *et al.*, 63% participants, Al azri *et al.*¹² 63.3% participants and Almutairi *et al.*¹⁵ 64.2% dentists were aware that teeth are a source of DNA material. Once DNA material can be recovered, positive identification of person becomes very easy. However, in the present study only 28.92% students could correlate that gender could be identified from teeth which is in concordance with the studies conducted by Kumaraswamy *et al.* (41%) and Almutairi *et al.* (23.1%). In the study conducted by Preethi *et al.*¹³, 60% participants were aware that age and gender can be determined from teeth in mass disasters.

In the present study 85.95% students knew that teeth can be preserved in a burnt/ charred body. This is useful in identifying individuals in cases of mass disasters when identification by other physical appearances and methods may not be of much use.¹⁶ In the study done by Preethi *et al.*¹³, 42% dental practitioners were not aware as to how the age and gender can be determined from the victims of mass disaster. Our results were comparable with the study done by Al azri *et al.*, where 94.8% participants were aware that identification from teeth is possible in victims of mass disaster.

All the students [121 (100%)] were correct in answering that bitten fruit found at a crime scene should be preserved. Bitten fruit is preserved to collect saliva (for DNA) and for recovering bite mark. Though the formation of bite marks depends

on a number of factors, like dental characteristics, force applied, area of bite, covered or exposed, struggle by victim etc, it is still a useful method of identification. In the present study, 96 (79.33%) students knew that a person can be identified by bite mark. This is in accordance with the study done by Preethi *et al.*¹³ where about 18% of the dental practitioners did not know the significance of bite mark patterns of the teeth. In a study done by Rathod *et al.*¹⁷, 30% dentists did not know the significance of bite mark patterns of the teeth.

The eruption of teeth and the degeneration with age are important methods of age determination. Age determination in children less than 14 years is best done by teeth. In the studies by Kumaraswamy *et al.*, 76% (147), Al azri *et al.* 78.9% (303) participants Almutairi *et al.*¹⁵, 88.9% (320) knew that age can be determined from teeth while in the present study, 99.17% (120) students were aware of the fact.

Presently our hospital does not have a department that is dedicated to Forensic odontology. The forensic work is handled by the department of forensic medicine in association with department of dentistry. 20.66% (25) students incorrectly answered that there was Forensic Dentistry department in the institute while one student (0.8%) did not know.

In the present study, 89.25% (108) students were aware that the evidence of forensic dentistry is legally acceptable in court. This is in contrast to the study done by Preethi *et al.*¹³ and Rathod *et al.*¹⁷, where 93% and 85% dental practitioners respectively, did not have any formal training in collecting, evaluating and presenting dental evidence and 30% and 75% respectively, were not aware that they could testify as an expert witness in the court of law.

Conclusion

The present study showed that the medical students are aware of the branch of forensic odontology and its significance. Hence, unawareness of the medical professionals regarding the role of forensic odontology is not the reason for under-utilization of the subject. Problem is that there are very few hospitals which have a forensic dentistry department and forensic dentists. As a result, when required, the practical application of the subject become difficult. There is an under-utilization of the knowledge of this subject in practice. The hospital administration should endeavour to develop forensic dentistry department under the aegis of the forensic medicine department. This department

should be actively involved in all medicolegal work of hospital including casualty and one stop crisis centres. Hospital protocols in cases of mass disasters should include forensic dentists as a part of response team.

With the novel methods being used for committing crime, it is required for the law enforcers to keep abreast with the recent scientific developments and to use all possible methods in the interest of imparting swift, impartial and adequate justice. Use of forensic odontology along with the other scientific knowledge can go a long way to achieve this objective.

Conflict of Interest: *None*

References

1. Aggrawal A. Textbook of Forensic Medicine and Toxicology. First ed. New Delhi: Avichal Publishing Company 2014.
2. Reddy DKSN. The Essentials of Forensic Medicine and Toxicology. Twenty ninth ed. Hyderabad: Om Sai Graphics 2010.
3. Keiser-Nielsen S. Person Identification by Means of the Teeth. Bristol: John Wright and Sons 1980.
4. Bruce-Chwatt RM. A brief history of forensic odontology since 1775. Journal of forensic and legal medicine 2010;17(3):127-30.
5. Phillips VM. The role of forensic dentistry in South Africa. Med Law. 1993;12(6-8):487-91.
6. Smock WS. Development of a clinical forensic medicine curriculum for emergency physicians in the USA. J Clin Forensic Med. 1994 Jun;1(1):27-30.
7. Kumar S, Dagli N. Forensic Odontology- An area unexplored. J Int Oral Health. 2014 Feb;6:i.
8. Gambhir RS, Singh G, Talwar PS, Gambhir J, Munjal V. Knowledge and awareness of forensic odontology among dentists in India: A systematic review. Journal of forensic dental sciences 2016; 8(1):2-6.
9. Chandra Shekar BR, Reddy CV. Role of dentist in person identification. Indian journal of dental research : official publication of Indian Society for Dental Research 2009;20(3):356-60.
10. Naiman M, Larsen AK, Jr., Valentin PR. The role of the dentist at crime scenes. Dent Clin North Am. 2007 Oct;51(4):837-56.
11. Kumaraswamy J NR, Keshavaiah R, Susainathan A, Reddy MBS, Naidu J. A cross-sectional study to assess knowledge, attitude, and awareness of forensic odontology among medical students: An emergency concern. Int J Forensic Odontol 2018, 3(1):17-20.
12. Al-Azri AR, Harford J, James H. Awareness of forensic odontology among dentists in Australia: are they keeping forensically valuable dental records? Aust Dent J. 2016 Mar;61(1):102-108.
13. Preethi S, Einstein A, Sivapathasundharam B: Awareness of forensic odontology among dental practitioners in Chennai: A knowledge, attitude, practice study. Journal of forensic dental sciences 2011;3(2):63-6.
14. Sahni A, Rehani S, Mathias Y, Kardam P, Nagpal R, Kumari R. A questionnaire survey on forensic odontology: Are we really aware? Journal of forensic dental sciences 2016;8(2):113.
15. Almutairi AF, Alkhtheri BA, Aleidan HN, Alhabib AA, Alotaibi EA, Salam M. Examining the perceived versus the actual knowledge about forensic odontology: A cross-sectional survey among dentists. Clinical and experimental dental research 2018;4:297-304.
16. Sarode SC, Zarkar GA, Kulkarni MA. Role of forensic odontology in the world's major mass disasters: facts and figures. SADJ. 2009 Oct;64(9):388-90, 392-3.
17. Rathod V, Desai V, Pundir S, Dixit S, Chandraker R. Role of forensic dentistry for dental practitioners: A comprehensive study. Journal of forensic dental sciences 2017;9(2):108-9.