



The Open Dentistry Journal

Content list available at: <https://opendentistryjournal.com>



RESEARCH ARTICLE

Forensic Odontology: Knowledge and Attitude of Dental Students in Ajman University, United Arab Emirates

Raghad Hashim^{1,*} , Afraa Salah¹  and Ruba Odeh¹ 

¹Department of Growth & Development, Ajman University, Ajman, United Arab Emirates

Abstract:

Aims:

The aims of this study were to assess dental students' knowledge and attitude with regard to forensic odontology and to determine students' opinions in the current dental curriculum.

Methods:

This cross-sectional study was conducted among dental students at one of the main dental colleges in the United Arab Emirates; only dental students on their final year and internship were invited to participate. An online self-administrated questionnaire was used, which consisted of a set of 15 questions. All the data were entered into Microsoft Excel and then transferred into SPSS.

Results:

A total of 276 dental students contributed to this study. The highest percentage of correct responses stated by the students was related to the estimation of individuals' age and estimation of dental age based on radiograph and eruption status. However, there were clear deficiencies in students' knowledge in relation to other aspects such as gender identification and lip-print, palatal rugae as an indicator in forensic identification. A high percentage (84.8%) had no formal education in the field of forensic odontology. Moreover, 93.1% of the students agreed that their present knowledge about forensic odontology is inadequate. Most of the participants (95.0%) agreed upon the necessity of adding a module on forensic odontology to the current curriculum.

Conclusion:

Our study revealed inadequate knowledge among dental students in relation to forensic odontology. This lack of knowledge among them attributed to the lack of formal training, and lack of forensic odontology as a part of dental curriculum. Forensic odontology must be added to the undergraduate curriculum as a separate subject to enrich students' knowledge and awareness toward medico-legal cases in their future careers.

Keywords: Knowledge, Dental students, Forensic odontology, Radiograph, Dental curriculum, Lip-print.

Article History

Received: July 17, 2020

Revised: August 11, 2020

Accepted: August 13, 2020

1. INTRODUCTION

Forensic odontology is defined by the World Dental Federation as that branch of dentistry that deals with the proper investigation of dental evidence and with the appropriate evaluation and presentation of dental findings so as to ease the justice system [1]. This makes dental professionals exceptional and more important than others, especially in disastrous events [2]. The multiple functions of this distinctive discipline can range from the identification of human remains to mass disas-

ter management, including but not limited to the assessment of patterned skin injuries, bite marks, in addition to the use of dental materials in the inspection of evidence [2]. Dental identifications have always played a key role in victims' proof of identity during catastrophic events.

It has been recommended that dental practitioners should have the essential skills and knowledge about forensic odontology, for instance, they should be aware of how to handle dental records, DNA analysis of the teeth, radiographs, teeth morphology, and anatomy [3]. In cases where a fingerprint record or physical identification is unavailable, then dental practitioners should take charge of crime investigations [4]. Dentists do have legal and professional responsibilities to

* Address correspondence to this author at the Department of Growth & Development, Ajman University Ajman, PO. Box 346 Ajman, United Arab Emirates; Tel: +9716 705 6394; E-mail: r.hashim@ajman.ac.ae

generate and maintain dental records, which both serve the best interests of patients and contribute to the continuity of their dental care [5].

Dental records play a significant role in cadaver identification, which has been totally disintegrated and is difficult to identify visually. When this happens, a range of dental identification methods are used. This is attributed to the fact that dental tissues and dental restorations are resistant in nature, due to the changes caused by temperature and decomposition, which make them the most reliable source of DNA, that will be of enormous aid to identify an individual [6]. The success of identification depends on the accessibility and accuracy of these patients' records. Regrettably, due to dentists' negligence of maintaining proper records, resulting in ambiguity, dental identification sometimes becomes hard to achieve [7].

In spite of the significance of this field in criminal justice, the literature shows that forensic odontology is under-estimated in many countries; further exposures are needed to improve the utilization of this science [8]. Health personnel are often challenged with forensic cases; thus, the deficiency in the information about forensic cases might preclude the identification of such cases. Healthcare professionals who come across forensic cases should be well equipped to diagnose such an event [9].

Previous studies conducted in the United Arab Emirates (UAE) assessed dental students' knowledge and attitude in relation to other topics such as oral health [10] and child abuse [11]. However, no study examined the knowledge and attitude of dental students and interns in relation to forensic odontology. The objective of this study was to assess the level of knowledge and attitude toward forensic odontology among dental students in Ajman University - UAE, and to determine students' opinions on the current dental curriculum.

2. MATERIALS AND METHODS

This study was conducted among dental students in one of the main dental colleges in the United Arab Emirates, namely: Ajman University (AU), during the period from January 2020 to March 2020. Only dental students in their final year and internship were invited to participate. This study was approved by the ethics committee of AU University (reference number D-F-H-2020-01-23). Prior to conducting the study, the students were informed that their participation was voluntary. No identity related information was gathered.

This study used an online self-administrated questionnaire in the English language on software from Microsoft Forms. The questionnaire consisted of a set of 15 questions that was customized based on previously published studies [12 - 14]. The questionnaire was divided into three parts; the first part included questions related to students' knowledge about forensic odontology. The second part investigated the respondent's source of information in forensic odontology and requested them to self-assess their level of knowledge and confidence in handling forensic dental cases. While the last part of the questionnaire was designed to determine students' opinion in the current dental curriculum and assess their

interest in pursuing further study in forensic odontology.

The questionnaire was pre-tested on ten students before the commencement of the study to ensure that all of the questions are directly understood by the students. The pre-testing showed a very clear understanding of the provided questions. The weblink of the questionnaire was distributed to all dental students in the final year and internship through their batch's email addresses with a covering letter to explain the purpose of the study, and to assure all participants of the anonymity of their responses. The average time to complete the survey was approximately five minutes. All the data were entered into Microsoft Excel, and then the data were analyzed using SPSS windows version 23.0 (SPSS Inc., Chicago, IL, USA). The responses received were categorized as nominal data.

3. RESULTS

A total of 276 dental students participated in this study (response rate, 92.9%), which included 153 undergraduates, and 123 interns. The percentage of correct responses for each question varied, as presented in Table 1. The highest percentage of correct replies was reported in Question 1 (245, 88.8%), 2 (230, 83.3%) and 3 (237, 85.9%), which was all related to the estimation of individuals' age and estimation of dental age based on radiograph and eruption status. However, the lowest proportion of correct responses was reported in questions 6 (28, 10.1%), 4 (78, 28.3%), 5 (100, 36.2%) and 9 (138, 50.0%). This shows that dental students had knowledge deficiencies that were mainly related to the significance of forensic odontology on other features such as gender identification, lip-print, and palatal rugae as an indicator in forensic identification and documentation.

Most (84.8%) of the dental students did not receive formal education in forensic odontology. Only ten percent of the participants pointed out that their source of information about forensic odontology was a dental school. While around half of the students who participated, obtained their information from the media. The majority (93.1%) of them would think that they do not have adequate knowledge in forensic odontology. Additionally, around 91.3% lack the confidence of handling forensic dental cases (Table 2). Most of the participants agreed upon the necessity of adding a module on forensic odontology to the current curriculum. However, only one-quarter of the students were interested in pursuing forensic in higher studies (Table 3).

4. DISCUSSION

This study was conducted to assess dental students' knowledge and attitude in relation to forensic odontology in order to define the educational needs related to this topic. There are many studies carried out on forensic odontology in other countries [13, 15], but no study was conducted in the UAE among dental students. Therefore, this study was the first of its kind in UAE, which targets undergraduate and intern dental students. However, the limitations of this study should be considered when interpreting the findings; the sample utilized was drawn from one educational institution, therefore, it does not represent all dental students in the United Arab Emirates. Further studies should be carried out at other dental colleges in the UAE.

Table 1. Knowledge toward forensic odontology among dental students.

S.No	-	Correct (%)	Wrong (%)	I don't know (%)
1	Can forensic odontology be utilized to estimate a person's age?	245 (88.8)	11 (4.0)	20 (7.2)
2	Can a person's dental age be estimated by radiography?	230 (83.3)	33 (12.0)	13 (4.7)
3	Can a person's dental age be estimated by the eruption status?	237 (85.9)	27 (9.8)	12 (4.3)
4	Can gender identification of victims be supported by forensic odontology?	78 (28.3)	11 (4.0)	187 (67.8)
5	Can palatal rugae serve as a marker in forensic identification?	100 (36.2)	69 (25.0)	107 (38.8)
6	Could each person has a unique lip-print?	28 (10.1)	41 (14.9)	207 (75.0)
7	Can analysis of bite-mark patterns aids in identifying criminals?	208 (75.4)	26 (9.4)	42 (15.2)
8	Can teeth of a deceased person serve as a source of DNA?	215 (77.9)	12 (4.3)	49 (17.8)
9	Is keeping dental record an essential component in forensic odontology?	138 (50.0)	27 (9.8)	111 (40.2)

Table 2. Source of information and perceived adequacy of knowledge in forensic odontology.

-	n(%)	
Have you ever received formal education in forensic odontology?	-	-
Yes	63	(22.8)
No	234	(84.8)
What was your source of information in forensic odontology?	-	-
Dental school	28	(10.1)
Media	130	(47.1)
Others (<i>Journals, conferences, workshops</i>)	118	(42.8)
Do you think that you have adequate knowledge in forensic odontology?	-	-
Yes	19	(6.9)
No	257	(93.1)
Are you confident in handling forensic dental cases?	-	-
Yes	24	(8.7)
No	252	(91.3)

Table 3. Students willing to study forensic dentistry.

-	n(%)	
Module on forensic odontology should be included in the undergraduate curriculum	-	-
Yes	262	(95.0)
No	14	(5.1)
Interested in pursuing higher studies in forensic dentistry	-	-
Yes	69	(25.0)
No	207	(75.0)
-	-	-

This study revealed that there was a lack of knowledge and awareness of forensic odontology among dental students. Similar findings have been reported by other researchers [13, 14]. In forensic odontology, age is considered as one of the crucial indicators in assessing the identity of an individual. Estimation of the human age is a process implemented by archaeologists, anthropologists, and forensic scientists [15 - 17]. The majority of dental students agreed that forensic odontology help in estimating an individual's age. A range of approaches are used to identify the dental age, including the radiographic method, histological method, and visual method [18]. Fortunately, the majority of the participants were aware of the fact that dental age can be estimated by radiograph and eruption status. This finding is in contrast to previous studies

[19, 20]. However, around three-quarters of the students were unaware that forensic odontology assists in the identification of the victims' gender. A similar observation was noted by Preethi and co-workers [19].

Possessing a critical eye is a necessity for all dentists when legal authorities require forensic consultation [21]. Palatal rugae have been shown to be extremely distinct and constant in shape throughout life [22, 23]. When identification of an individual by other methods is difficult, palatal rugae may thus be considered as an alternative source of information. Only 36.2% of the dental students in this study acknowledged this fact. Additionally, one-quarter of the students were unaware that bite marks aid in identifying criminals. Although bite marks are definite to an individual, no two people have the

exact identical dentition in relation to teeth arrangement and dimension [24]. Furthermore, the significance of forensic odontology can be attributed to the fact that dental tissues are resistant in nature, and able to withstand the extreme temperature and decomposition, which makes them an appropriate source for DNA material [25]. Around three-quarters of the respondents agreed that DNA could be obtained from a deceased person's teeth.

Dental records are considered as an essential aid in identification of persons who are victims of an illegal act. The dental record might act as a future reference for the dentist when needed, but unfortunately, it is not constantly preserved for a forensic purpose [26]. In the current study, only half of the dental students agreed that maintaining dental records is an essential component in human identification. This insufficient knowledge highlights the necessity for proper education and further training [27]. Dentists should know not only the importance of preparing an accurate dental record but also the importance of preserving these records.

The majority of respondents reported that they did not have forensic odontology as part of their academic curriculum, which would have a negative impact on the progress and advancement of the field. Similar observation has been noted by other researchers [13, 28]. However, their knowledge can be enriched by initiating forensic dentistry as a subject in the dental curriculum at both undergraduates and postgraduates levels. All dental institutes should consider offering formal training in forensic odontology in order to upgrade the knowledge and skills of their graduates, supported by workshops, seminars, conferences and continuing dental education programs.

Almost half of the students reported that their source of information in forensic odontology is from the media. Media plays a definitive role in creating awareness among the public [29]. The same holds true for the present study. Additionally, journals and conferences continue to remain as one of the most reliable and correct sources of this knowledge. However, the focus should be on the worrying finding that the majority of students in this study think that they do not have adequate knowledge or confidence in handling forensic dental cases. However, 95% of the students welcomed the idea of adding a module on forensic odontology to the current undergraduate curriculum. Whereas, only one-quarter of them are interested in pursuing higher studies in forensic odontology; that might be attributed to the limited work opportunities for this specialty in UAE.

This study provides a baseline for the upcoming studies in the United Arab Emirates. Findings from this study might be considered as a reference for endorsing the area of forensic odontology in the undergraduate training of dental students. Thus, the undergraduate program must be improved by including preclinical lectures on forensic odontology, followed by clinical training and a field trip to forensic departments. These recommendations might have a positive impact on students' knowledge and awareness concerning forensic odontology

CONCLUSION

Our study revealed inadequate knowledge among dental students. This lack of knowledge among them attributed to the lack of formal training, and lack of forensic odontology as a part of dental curriculum in Ajman University, United Arab Emirates. This situation, however, can be handled if necessary steps are taken. Forensic odontology must be introduced to the undergraduate curriculum to enhance students' capabilities in handling medico-legal cases in the future.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The current study was approved by the ethics committee of Ajman University, Saudi Arabia (reference number D-FH-2020-01-23).

HUMAN AND ANIMAL RIGHTS

Not applicable.

CONSENT FOR PUBLICATION

Informed consent was obtained from all individual participants included in the study.

AVAILABILITY OF DATA AND MATERIALS

The data that support the findings of this study are available from the corresponding author, [R.H.], upon reasonable request.

FUNDING

None.

CONFLICT OF INTEREST

The author declares no conflict of interest, financial or otherwise.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the contribution of Dr. Aisha Khamees in data collection, and all dental students who participated in this study.

REFERENCES

- [1] Devi P, Bhovi T, Vishal M, Singla V. Automated Dental Identification System: An Aid to Forensic Odontology. *J Indian Acad Oral Med Radiol* 2011; 23(3): S360-4. [<http://dx.doi.org/10.5005/jp-journals-10011-1169>]
- [2] Nuzzolese E, Di Vella G. Future project concerning mass disaster management: a forensic odontology prospectus. *Int Dent J* 2007; 57(4): 261-6. [<http://dx.doi.org/10.1111/j.1875-595X.2007.tb00130.x>] [PMID: 17849685]
- [3] Stavrianos C, Kokkas A, Eliades A, Andr eopoulos E. Applications of forensic dentistry: part I. *Res J Med Sci* 2010; 4(3): 179-86. [<http://dx.doi.org/10.3923/rjmsci.2010.179.186>]
- [4] Singh NN, Gowhar O, Ain TS, Sultan S. Exploring trends in forensic odontology. *J Clin Diagn Res* 2014; 8(12): ZC28-30. [PMID: 25654026]
- [5] Dental Board of Australia. Guidelines on dental records 2010.
- [6] Schwartz TR, Schwartz EA, Mieszerski L, McNally L, Kobilinsky L. Characterization of deoxyribonucleic acid (DNA) obtained from teeth subjected to various environmental conditions. *J Forensic Sci* 1991; 36(4): 979-90.

- [7] [http://dx.doi.org/10.1520/JFS13113J] [PMID: 1680960]
Spitz WU, Spitz DJ, Fisher RS. Spitz and Fisher's medicolegal investigation of death: Guidelines for the application of pathology to crime investigation. Springfield: Charles C. Thomas Publisher 2006.
- [8] Kumar S, Dagli N. Forensic Odontology- An area unexplored. *J Int Oral Health* 2014; 6(1): i. [PMID: 24653619]
- [9] Lynch VA. Forensic nursing science: global strategies in health and justice. *Egypt J Forensic Sci* 2011; 1: 69-76. [http://dx.doi.org/10.1016/j.ejfs.2011.04.001]
- [10] Hashim R, Ibrahim M. Oral health attitudes and behavior among dental students in Ajman, United Arab Emirates. *Journal of International Dental & Medical Research* 2013; 6(2): 84-7.
- [11] Hashim R, Al-Ani A. Child physical abuse: assessment of dental students' attitudes and knowledge in United Arab Emirates. *Eur Arch Paediatr Dent* 2013; 14(5): 301-5. [http://dx.doi.org/10.1007/s40368-013-0063-2] [PMID: 23824733]
- [12] Almutairi AF, Alkhatheer 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. *Clin Exp Dent Res* 2018; 4(6): 297-304. [http://dx.doi.org/10.1002/cre2.148] [PMID: 30603113]
- [13] Hannah R, Ramani P, Natesan A, *et al.* Evaluation of knowledge, attitude and practice of forensic odontology among undergraduate dental students. *Int J Orofac Biol* 2017; 1: 16-20.
- [14] Govindaraj S, Jayanandan M, Vishnu Priya V, Thirumal R, Shamsudeen S. Knowledge and attitude among senior dental students on forensic dentistry: A survey. *World J Dent* 2018; 9: 187-91. [http://dx.doi.org/10.5005/jp-journals-10015-1531]
- [15] Duraimurugan S, Gokkulakrishnan S, Karthikeyan M, Suresh KG, Abishek RB, Srinivasalu P. Awareness of forensic dentistry among dental students and practitioners in and around Kanchipuram district. *Int J Recent Sci Res* 2017; 8: 16749-52.
- [16] Singh N, Grover N, Puri N, Singh S, Arora S. Age estimation from physiological changes of teeth: A reliable age marker? *J Forensic Dent Sci* 2014; 6(2): 113-21. [http://dx.doi.org/10.4103/0975-1475.132541] [PMID: 25125919]
- [17] Rai B. Five Markers of Changes in Teeth: An Estimating of Age. *Internet J Forensic Sci* 2006; 1: 2.
- [18] Shamim T. Forensic odontology. *J Coll Physicians Surg Pak* 2012; 22(4): 240-5. [PMID: 22482381]
- [19] 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(2): 63-6. [http://dx.doi.org/10.4103/0975-1475.92145] [PMID: 22408322]
- [20] Khare P, Chandra S, Raj V, Verma P, Subha G, Khare A. Status of forensic odontology in metro and in tier 2 city in urban India. *J Forensic Dent Sci* 2013; 5(2): 134-7. [http://dx.doi.org/10.4103/0975-1475.119783] [PMID: 24255563]
- [21] Ahmed NHM, Naidoo S. Oral Cancer Knowledge, Attitudes, and Practices among Dentists in Khartoum State, Sudan. *J Cancer Educ* 2019; 34(2): 291-6. [http://dx.doi.org/10.1007/s13187-017-1300-x] [PMID: 29151257]
- [22] Lysell L. Plicae palatinae transversae and papilla incisiva in man; a morphologic and genetic study. *Acta Odontol Scand* 1955; 13(Suppl. 18): 5-137. [PMID: 14387629]
- [23] Azab SMS, Magdy R, El Deen MAS. Patterns of palatal rugae in the adult Egyptian population. *Egypt J Forensic Sci* 2016; 6: 78-83. [http://dx.doi.org/10.1016/j.ejfs.2015.01.006]
- [24] Wright FD, Dailey JC. Human bite marks in forensic dentistry. *Dent Clin North Am* 2001; 45(2): 365-97. [PMID: 11370460]
- [25] Pretty IA, Sweet D. A look at forensic dentistry--Part 1: The role of teeth in the determination of human identity. *Br Dent J* 2001; 190(7): 359-66. [http://dx.doi.org/10.1038/sj.bdj.4800972] [PMID: 11338039]
- [26] Charangowda BK. Dental records: An overview. *J Forensic Dent Sci* 2010; 2(1): 5-10. [http://dx.doi.org/10.4103/0974-2948.71050] [PMID: 21189983]
- [27] Gupta A, Mishra G, Bhutani H, Hoshing C, Bhalla A. Forensic revolution need maintenance of dental records of patients by the dentists: A descriptive study. *J Int Soc Prev Community Dent* 2016; 6(4): 316-20. [http://dx.doi.org/10.4103/2231-0762.186799] [PMID: 27583219]
- [28] Abdul NS, Alhazani L, Alruwail R, Aldres S, Asil S. Awareness of forensic odontology among undergraduate, graduate, and postgraduate dental students in Riyadh, Saudi Arabia: A knowledge-, attitude-, and practice-based study. *J Forensic Dent Sci* 2019; 11(1): 35-41. [http://dx.doi.org/10.4103/jfo.jfds_52_19] [PMID: 31680754]
- [29] Wadhwan V, Shetty DC, Jain A, Khanna KS, Gupta A. A call for a new speciality: Forensic odontology as a subject. *J Forensic Dent Sci* 2014; 6(2): 97-100. [http://dx.doi.org/10.4103/0975-1475.132535] [PMID: 25125916]