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Forensic odontology: A peek into the mind of dentists

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ABSTRACT

Background: Our study's objective was to evaluate the knowledge, attitudes, and understanding of forensic odontology in undergraduate and postgraduate students in Uttarakhand.

Materials and Methods: This is a cross-sectional institution-based study conducted among a total of 465 undergraduate and postgraduate dental students in the state of Uttarakhand. These included 428 undergraduate and 37 post graduate students. Males 94 (20.2%) and females 371 (79.8%) aged between 18 to 40 years were included.

Results: A statistically significant difference was also found among the responses received on the questions whether forensic odontology played a role in mass disasters and if teeth could serve as a source of DNA amongst both the groups. 94.5% of the postgraduate respondents were aware of the significance of bite mark patterns of teeth as opposed to 54.4% of undergraduates which was also statistically significant.

Conclusion: Our study revealed that postgraduate students had better knowledge, attitude and awareness about forensic odontology as compared to the undergraduate students. Both the groups together lacked adequate knowledge about forensic odontology but agreed that there is a scope in this field of dentistry and were interested in further courses to learn about the study of forensic odontology.

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1. Introduction

The essence of Forensic Science lies in the application of science and technology to the detection and investigation of crimes in order to bring justice is. Forensic odontology is a subspecialty of dentistry that deals with the appropriate management of dental evidence in the interest of justice as well as the appropriate appraisal and presentation of dental results, according to the Fédération Dentaire Internationale.¹ Since 66 AD, identifying deceased individuals have been done using dental identification.² Ever since, this science has developed in leaps and bounds. The field of forensic odontology sees evolving trends in identification of human dental remains as we speak.

Nevertheless, all the advancements are futile if not utilized in the right manner by the right people in the right situations. Currently, forensic odontology faces many hurdles as a specialised field of dentistry which include the lack of trained personnel, scarcity of training facilities and deficient introduction to the subject during undergraduate years.²

The practise of forensic odontology differs significantly and incommensurately across dental professionals in India.³ Other investigations undertaken over the past ten years in Indian cities like Kashmir, Chennai, Pune, Kanpur, Ghaziabad, and the Delhi National Capital Region showed that the respondents' levels of forensic odontology knowledge and awareness were insufficient.³

Our study's objective was to evaluate the knowledge, attitudes, and understanding of forensic odontology in undergraduate and postgraduate students in

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Uttarakhand.

No study, to the best of our understanding has been conducted in Uttarakhand about forensic dentistry and its applications in practice.

2. Materials and Methods

2.1. Study design

This is a cross-sectional institution-based study conducted among a total of 465 undergraduate and postgraduate dental students in the state of Uttarakhand. The study included those dental students who enrolled in their respective institutions for the course of Bachelor of Dental Surgery (BDS) or Masters of Dental Surgery (MDS) and were willing to participate in the survey.

2.2. Ethical statement

Ethical clearance was obtained from the institution concerned. Informed consent was obtained at the start of the online survey from participants after they had been informed of the study's goal and purpose.

2.3. Data collection

A self-administered, structured and validated questionnaire in English language was distributed among the 465 participants online via a google form link which directed them towards our questionnaire. These included 428 undergraduate and 37 post graduate students. Males 94 (20.2%) and females 371 (79.8%) aged between 18 to 40 years were included. Out of the total respondents, 18 participants did not provide consent for the study and hence were excluded from the study bringing the total number of valid responses to 447. (Figure 1) A validated questionnaire from previously conducted similar studies was used containing 19 questions.⁴⁻⁶ These 19 questions were further divided into twelve knowledge-based questions, four attitude-based questions and three practice-based questions. The questions contained both yes or no and multiple-choice questions. The prepared questionnaire was distributed among the two dental colleges of Uttarakhand.

2.4. Data analysis

The collected data were analysed using IBM SPSS Statistics, Version 26.0 (Armonk, NY, USA). Pearson's Chi square test was used to compare the two groups and the level of significance was set at $P \leq 0.05$.

3. Results and Observations

A total of 447 dental students completed the questionnaire which included 410 undergraduates and 37 postgraduates. Males 94(20.2%) and females 371(79.8%) aged between 18 and 40 years were included. Questions 1-12 were

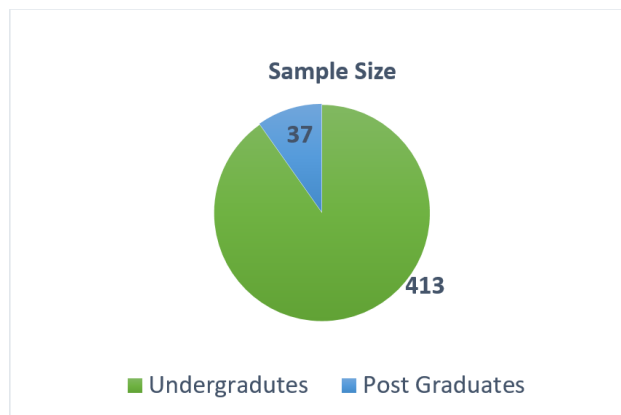


Fig. 1: Pie chart depicting the total number of responses received in the study. A total of 465 responses were received out of which 413 were undergraduate whereas 37 were post graduate responses

knowledge-based questions, 13-15 were practice-based questions and question 16-19 were attitude-based questions on forensic odontology.

3.1. Knowledge about forensic odontology: (Questions 1-12) (Table 1)

There was a statistically significant difference in the responses received by the participants on the source of knowledge about forensic odontology where 75.6% of the postgraduates responded with workshops and lectures in college as their source of information whereas undergraduates chose Media as their answer to the question in majority. A statistically significant difference was also found among the responses received on the questions whether forensic odontology played a role in mass disasters and if teeth could serve as a source of DNA amongst both the groups. 94.5% of the postgraduate respondents were aware of the significance of bite mark patterns of teeth as opposed to 54.4% of undergraduates which was also statistically significant.

3.2. Practice of forensic odontology: (Questions 13-15) (Table 2)

A statistically significant result was found between the groups when asked about their practices of forensic odontology. The questions asked to the participants were if they maintained dental records of their patients where 97.2% of the postgraduates responded positively. Secondly, when asked about the method with which they maintained records, majority of the responses were found to be with all of the above in both groups which contained casts, radiographs, patient photograph, case record of the patient as a multiple-choice question.

Table 1: Results of knowledge based questions

S. No.	Question	Response	Level of Qualification			X2, P
			UG (N=410)	PG (N=37)	Total (N=447)	
1.	Are you aware of a branch in dentistry called forensic odontology?	Yes	380(92.6)	35 (94.5)	415 (92.8)	X2=0.187 P=0.666
		No	30(7.4)	2(5.4)	32 (7.2)	
2.	Do you have “forensic odontology” as part of your curriculum?	Yes	160(39)	17(45.9)	117 (39.6)	X2=0.680 P=0.410
		No	250(61)	20 (54)	270 (60.4)	
3.	What is the source of your knowledge about forensic odontology?	Workshops or Lectures in College	182 (44)	28 (75.6)	210(47)	X2=13.992 P=0.003
		Media (Internet, Television, etc.)	190(46)	7 (18.9)	197(44.1)	
		Newspapers	12(2.9)	0	12(2.7)	
		Other:	26(6.3)	2 (5.4)	28(6.3)	
4.	Are you aware that a dentist can testify as an expert witness in court to present forensic dental evidence (dental records)?	Yes	348 (84.2)	35 (94.5)	383(85.7)	X2=2.612 P=0.106
		No	62 (15)	2(5.4)	64(14.3)	
5.	Do you think forensic odontology plays a role in mass disaster?	Yes	286(69.2)	34(91.8)	320(71.6)	X2=8.176 P=0.004
		No	124(29.7)	3(8.1)	127(28.4)	
6.	Can teeth serve as a source of DNA?	Yes	323(78.2)	36 (97.2)	359(80.3)	X2=7.395 P=0.025
		No	17(4.1)	0	17(3.8)	
7.	How do you identify dental age in children and adults?	Don't Know	70(16.9)	1(2.7)	71(15.9)	X2=1.405 P=0.704
		Eruption patterns and calcification	385(93.2)	36(97.2)	421(94.2)	
		Histological methods	10(2.4)	1(2.7)	11(2.5)	
		Biochemical methods	3(0.7)	0	3(0.7)	
		I don't Know	12(2.9)	0	12(2.7)	
8.	How can you identify signs and symptoms of child abuse?	Physical Injuries	15(3.6)	0	15(3.4)	X2=2.278 P=0.517
		Behavioural change	23(5.5)	2(5.4)	25(5.6)	
		Any scars	4(0.9)	1(2.7)	5(1.1)	
		All of the above	368(89.1)	34(91.8)	402(89.9)	
9.	Do you know the significance of bite mark patterns of teeth?	Yes	325(54.4)	35(94.5)	360(80.5)	X2=5.086 P=0.024
		No	85(20.5)	2(5.4)	87(19.5)	
10.	Can dental records be used to identify deceased persons or crime suspects?	Yes	393 (95.1)	37 (100)	430(96.2)	X2=1.595 P=0.207
		No	17(4.1)	0	17(3.8)	
11.	What is the study of lip prints in forensic dentistry called?	Lipology	17(4.1)	1(2.7)	18(4)	X2=7.245 P=0.064
		Cheiloscopy	295(71.4)	34(91.8)	329(73.6)	
		Dermatoglyphics	8(1.9)	0	8(1.8)	
		I don't know	90(21.7)	2(5.4)	92(20.6)	
12.	Do you know the name of any formal forensic courses in India?	Yes	137(33.4)	14(37.8)	151(33.8)	X2=0.297 P=0.586
		No	273(66.5)	23(62.1)	296(66.2)	

Table 2: Results of practice based questions

S. No.	Question	Response	Level of Qualification			X2, P
			UG (N=410)	PG (N=37)	Total (N=447)	
1.	Do you maintain the dental records of your patients?	Yes	321(77.7)	36(97.2)	357	X2=7.623 P=0.006
		No	89(21.5)	1(2.7)	90	
		Casts	5 (1.2)	0	5	
2.	If yes, Which of the following are maintained?	Radiograph	15(3.6)	2(5.4)	17	X2=25.643 P=0.000
		Patient	1(0.2)	2(5.4)	3	
		Photograph				
		Case record of the patient	98(23.7)	3	101	
		All of the above	223(53.9)	29(78.3)	252	
3.	What would you do if you identify signs and symptoms of child abuse?	Inform Police	211(51)	19(51.3)	230	X2=0.497 P=0.920
		Inform Non Governmental Organisations	58(14)	4(10.8)	62	
		Inform Parents	140(33.8)	14(37.8)	154	
		Take no action	1(0.2)	0		

Table 3: Results of attitude based questions

S. No.	Question	Response	Level of Qualification			X2, P
			UG (N=410)	PG (N=37)	Total (N=447)	
1.	How confident are you in giving an opinion on forensic odontology?	Very Confident	28(6.7)	4(10.8)	32	X2=3.110 P=0.375
		Confident	196(47.4)	17(45.9)	213	
		Not Confident	115(80.4)	13(35.1)	128	
		No Idea	71(17.1)	3(8.1)	74	
2.	Are you interested in formal training in forensic odontology?	Yes	374(90.5)	32(86.48)	406	X2=0.913 P=0.339
		No	36(8.7)	5(13.51)	41	
3.	Do you think there is scope of forensic odontology as a profession?	Yes	387(94.4)	36(97.3)	423	X2=0.564 P=0.452
		No	23(5.6)	1(2.7)	24	
4.	Do you feel our country has limited resources for forensic science?	Yes	374(91.3)	34(91.9)	408	X2=0.019 P=0.890
		No	36(8.7)	3(8.1)	39	

3.3. Attitude towards forensic odontology: (Questions 17-19) (Table 3)

In this section, the participants were asked about their attitude towards forensic odontology by asking them their thoughts on their confidence towards forensic odontology and their willingness to receive formal training in forensic odontology. Only 45.9% of the PG's said that they were confident in giving their opinion on the subject whereas 80.4% of the UG's opted for the option not confident. Both the groups (90.5% UG's and 86.48% PG's) showed interest in receiving formal training in forensic odontology. All the participants of this survey agreed that there is a scope of forensic odontology as a profession (94.4% UG's and 97.3% PG's) but they also felt that our country has limited resources for forensic science (91.3% UG's and 91.9% PG's). There was no statistically significant data

found among the two groups in this section.

4. Discussion

Forensic odontology is the most misprized branch of dentistry across the world. With the rise in unemployment rate in the field of dentistry in the country, many undergraduates and postgraduates are looking towards alternatives to clinical practice and forensic odontology is one of the frontrunners in this regard. Although there are various studies discussing the knowledge, attitude and awareness of dental practitioners as well as dental students in India, our study is the first of its kind to be conducted in the state of Uttarakhand, India.

Forensic science has gained much popularity in India through television shows but the field of forensic odontology still remains unexplored. Despite the fact that

there are changing trends in the career opportunities in forensic odontology, law enforcement agencies still approach dental surgeons in government service rather than dentists qualified in this field but not associated with government service. This has resulted in a scarcity of qualified forensic odontologists in India as most dentists do not see it as a profitable source of income.⁵

The present study showed that only 94.5% of the participants were aware of the branch called forensic odontology and 60.5% of the students said that they do not have forensic odontology as a part of their curriculum which is in contrast to a study where they found 100% awareness for the same. We observed that 91.8% of the students were aware of the role of dentists in mass disasters. On the contrary Abdul et al. (2019) reported that 77.5% of the participants were aware about it.⁷

5. Conclusion

Our study revealed that postgraduate students had superior knowledge, attitude and awareness about forensic odontology as compared to the undergraduate students. Both the groups together lacked adequate knowledge about forensic odontology but agreed that there is a scope in this field of dentistry and were interested in further courses to learn about the study of forensic odontology. Thus, the authors would like to suggest that there must be an increase in exposure of students towards forensic odontology as a field under the umbrella of career opportunities in dentistry.

6. Sources of Funding

None.


7. Conflict of Interest

None.

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