

Assessment of the Impact of Knowledge and Awareness of Forensic Odontology on the Practical Attitude of Some Dental Students and Graduates of King Khalid University

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Abstract

Background: Forensic odontology is the branch of dentistry that is helping to evaluate, checking and present dental evidence for the benefit of justice. The current study aimed to evaluate the impact of knowledge and awareness of forensic odontology on the practical attitude of some dental students and graduates of King Khalid University.

Subjects and Methods: A Cross-sectional survey study involved 304 dental students and dentists who graduated from King Khalid University. They were divided into three different groups. Group I included 102 (33.6%) dental students from different clinical levels and interns, group II included 84 (27.6%) general practitioners for less than five years old and group III included 118 (38.8%) general practitioners for more than five years old. A closed-ended questionnaire containing 20 questions constructed to test their practical knowledge awareness and attitude towards forensic odontology based on the answering of some questions and using the alternatives answers Yes, No, or do not know. Data were collected and analyzed using the chi-square and t-tests, and a p-value less than 0.05 was considered the statistically significant difference in the assessment of participants' characteristics in the study and their answers according to their academic level and gender.

Results: The questionnaires were received from all participants. 58% of the participants were males, 42% of them were females, and the percentage of group III participants is approximately 38.8%, which is higher than other groups' participants. The females' participants were more than males' participants in all study groups except group III participants, where the males' participants were more than females' participants. The mean ages of group III participants were 30.19 ys of males, and 29.60 ys of females higher, than in group I (24.72ys, 24 ys) and group II (28.18 ys, 27.63 ys). Differences in the participants' answers detected where there were (No) answers about the knowledge of forensic odontology more than (Yes) answers, as well as this knowledge, was inadequate. In contrast, there was an increase of (Yes) answers about the practical awareness and attitude towards forensic odontology among the participants more than (No) answers.

Generally, the participants of group III revealed positive and adequate knowledge and the practical awareness, and attitude towards forensic odontology more than other participants in group I and II.

Conclusion: The results of this study exhibit that there is no adequate knowledge and awareness of forensic odontology to affect practical attitude among all participants within this study groups, especially among the participants of group I and group II.

Keywords: Dental Students; Forensic Odontology; Graduates; Knowledge; King Khalid University; Practical Attitude

Introduction

Human teeth of an individual like fingerprints and affected with different factors such as nourishment, drugs that are shown on the teeth [1]. Forensic odontology is the division of forensic science that depends on the teeth to help to recognition of dead persons and offenders [2]. As well as this branch of forensic science is assisting in the proper handling and evaluation of dental evidence that were introduced to justice [3]. The dental remains post mortem can be used in mass disasters, human-made or natural in personal identification. Moreover, dental records can assist in determine suspects in medico-legal issues and criminal investigations [4].

There is a significant role of forensic odontology in the investigations of social and marital disputes and the identification of personals missing after a long duration [5]. When the fingerprints and other material evidence are missing, the dentist can help in criminal investigations by lip print analysis [6]. Thus, a forensic dentist is eligible and able to analyze the evidence based on the characteristics of the teeth, lips, jaws, and other dental findings [7]. From AD 66 until now, dental evidences were introduced to help determine dead individuals, and then the law accepted the dental evidences in the year 1849. Recently, forensic odontology has developed to assisting of juristic medication [8].

There is an importance in the applications of forensic odontology to helping in suspected cases of adult and child abuse or physical injuries by bite marks as well as identifications of age and gender of individuals. Therefore, the forensic dentist can witness in court based on forensic dental evidence [9]. It should be noted that the government registries include store facial photographic archives and fingerprints for legal objectives. However, the dental records have not taken the same interest [10]. Consequently, the dentists should have enough skills and knowledge about forensic odontology during the dealing with dental records, DNA analysis of teeth-pulp, examination of bite-mark, reading of radiographs, evaluation of teeth morphology, and knowledge of dental anatomy [11].

Overall, there are a lack of forensic odontology training centers as well as the forensic odontology subjects during undergraduate years are inadequate, which are considered the main obstacles in the application of forensic odontology for the daily interest of the community [12]. For example, there are just four brotherhoods that are interested in forensic odontology in the United States: the American Board of Forensic Odontology, the Bureau of Legal Dentistry, the International Organization for Forensic Odonto-Stomatology, and the American Society of Forensic Odontology. In contrast, in other countries such as In the United Kingdom and Australia, there is an importance of Forensic Odontology more with the establishment of the British Association for Forensic Odontology and the Australian Society of Forensic Odontology [13].

The first application of forensic dentistry in India was 1995 in the survey study conducted by Sansare and Dayal [14]. In the United Arab Emirates (UAE), there was a study to evaluate the Knowledge and Attitude of Dental Students in Ajman University, the United Arab Emirates towards forensic Odontology, and another study evaluated dental students' knowledge and attitude about oral health and child abuse. Moreover, there was a study in Saudi Arabia conducted to assess awareness of the scope and practice of forensic dentistry among dental practitioners, there was a shortage in the knowledge of forensic dentistry among all participants of these studies maybe due to this subject do not include in Saudi dental schools curriculums [15-18].

The previous literature reveal that forensic odontology is non-considered in many countries, so it is significant to clarify the needful for using this dental specialty and help the healthcare professionals to diagnose forensic cases. Depend on this background, this study conducted to evaluate the impact of knowledge and awareness of forensic odontology on the practical attitude of some dental students and graduates of King Khalid University.

Subjects and Methods

Study population and sampling

This cross-sectional study was designed on 300 participants and done among 304 dental students and general practitioners who graduated from King Khalid University 176 (58%) males and 128 (42%) females. We carried out this study from May 2020 to August 2020. The participants were divided into three groups. Group, I included 102 (33.6%) dental students in clinical levels and the interns, group II included 84 (27.6%) general practitioners for less than five years old, and group III included 118 (38.8%) general practitioners for more than five years old.

Inclusion criteria

- The ready and obtainable participants according to this study design.
- Dental students in the final levels
- Internship doctors.
- The dentists who graduated from King Khalid University and practiced less than 5 years.
- The dentists who graduated from King Khalid University and practiced more than 5 years

Exclusion criteria

- The dental students in the final levels not ready to participate
- Internship doctors not ready to participate.
- The dentists who graduated from King Khalid University not ready to participate.
- Dental students in pre-clinical levels
- The dentists who graduated from other dental schools.
- Dental students in other dental schools.
- Faculty staff members.
- Dental clinics staff.

Design of the study questionnaire

The questionnaire was designed on software from Microsoft Forms in the English language then sent to the participants online. The questionnaires included the participants' reports about their ages, gender and graduation status, and the duration after graduation. It included 20 questions to evaluate the impact of knowledge and awareness of forensic odontology on the practical attitude of the participants. These questions classified into three parts of questions; the first part questions related to the participants' distributions and ages according to graduation and gender. The second part assessed knowledge and awareness of forensic odontology, and the third part included questions to clarify the practical attitude of the participants towards forensic odontology. The questionnaire was evaluated with five participants in each group before starting the study to check that all questions are clear. The time of these questions answers was approximately ten minutes.

Ethics statement and ethical clearance certificate

The aims of the study were clarified to the participants as well as informed consent of participation was obtained before starting the study. Moreover, the ethical approval and ethical clearance certificate were obtained from the Institutional Review Board of college of dentistry, King Khalid University (IRB/KKUCOD/ETH/2019-20/2056).

Collection of data

This study questionnaire included 14 questions to evaluate the participants' knowledge and awareness of forensic odontology. There were two possible answers (Yes or No) or (Correct or Incorrect) to some questions and three possible answers (Yes or No or I don't

know) to other questions. Moreover, The practical attitude of participants towards the forensic odontology part of the questionnaire has six questions. There were three possible answers (Yes or No or I don't know) to some questions and two possible answers (Yes or No) or (Correct or Incorrect) to the remaining questions. The questionnaire link was sent to participants through their email addresses and WhatsApp numbers with the instructions to clarify the objectives of the study with confirmation of the anonymity of participants.

Statistical analysis

After receiving all the participants' answers to the study questionnaire questions. The collected data were analyzed using the Chi-square test and t-test. Chi-square test was used to reveal the distributions of participants according to graduation and gender, their knowledge and awareness of forensic odontology, and their practical attitude towards forensic odontology. Further, a t-test was used to analyze the participants' ages according to graduation and gender. P-value less than 0.05 were used to show the statistically significant differences in the comparison between the participants' answers ($p < 0.05$).

Results

The distributions participants according to graduation and gender in table 1 and figure 1 revealed that the number of the participants in group III 118 (38.8%) was more than group I 102 (33.6%) and group II 84 (27.6%), and female participants of group I (64.7%) and group II (57.1%) were more than males (35.3%, 42.9%) respectively whereas the males of group III (88%) were more than females (12%). There were statistically significant differences in the distributions of participants according to graduation and gender in the comparison between males and females of group II ($p = 0.022$), whereas there were highly statistically significant differences in the distributions of participants according to graduation and gender in the comparison between males and females of group I ($p = <0.001$) and III ($p = 0.000$). Generally, table 1 and figure 1 revealed there were statistically significant differences in the distributions of participants according to graduation and gender in the comparison between groups I, II, and III ($p = <0.051$).

		Number of participants		Chi-square(P value)
		Female	Male	
Groups	N (%)	N (%)	N (%)	
Dental Students (Group I)	102 (33.6%)	66 (64.7%)	36 (35.3%)	52.18 (<0.001*)
Graduates (< 5years.) (Group II)	84 (27.6%)	48 (57.1%)	36 (42.9%)	22.36 (0.022*)
Graduates (≥ 5years) (Group III)	118 (38.8%)	14 (12%)	104 (88%)	41.874 (0.000*)
Total	304 (100%)	128 (42%)	176 (58 %)	24.631 (<0.051*)

Table 1: The participants' distributions according to graduation and gender.

N: Number of participants. *: statistically significant differences. **: High statistically significant differences.

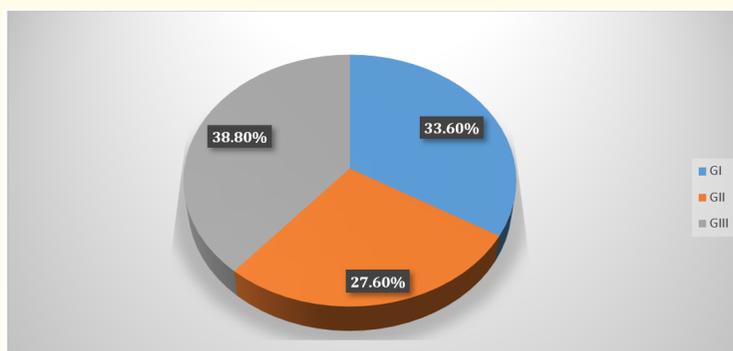


Figure 1A: Participants distribution according to study groups.

GI: Group I. GII: Group II. GIII: Group III.

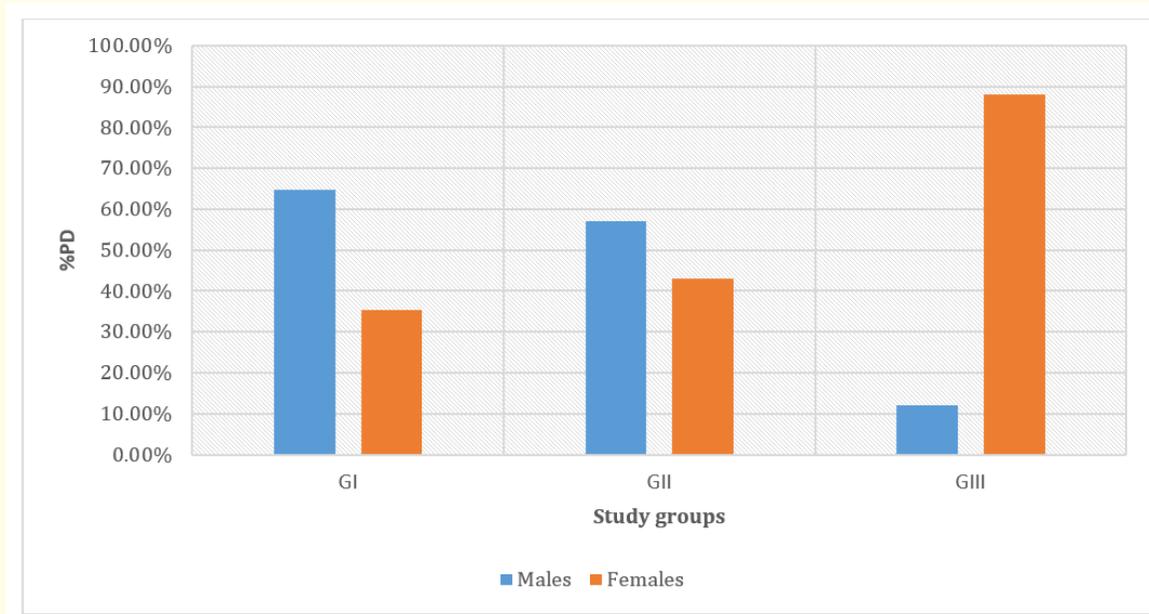


Figure 1B: participants' distribution according to the gender.

% PD: Percentage of participants' distribution. GI: Group I. GII: Group II. GIII: Group III.

On the other hand, table 2 and figure 2 showed that the mean ages of the males who participated in group I, II, and III were 24.72 years, 28.18 years, and 30.19 years more than the mean ages of females (24.00 years, 27.63 years, and 29.60 years) of group I, II, and III. Generally, table 2 and figure 2 revealed that the mean ages of the participants in group III more than group I and II, and there were statistically differences in the mean ages comparisons between males and females in groups I, II, and III ($p < 0.05$).

Groups	Mean \pm SD of Age				t-test	P value
	Male		Female			
	Mean	\pm SD	Mean	\pm SD		
Dental Students (Group I)	24.72	1.018	24.00	1.118	-2.69	0.010*
Graduates (< 5years.) (Group II)	28.18	.883	27.63	1.555	-1.07	0.021*
Graduates (\geq 5years) (Group III.)	30.19	.930	29.60	1.140	0.57	0.013*

Table 2: The participants' ages according to graduation and gender.

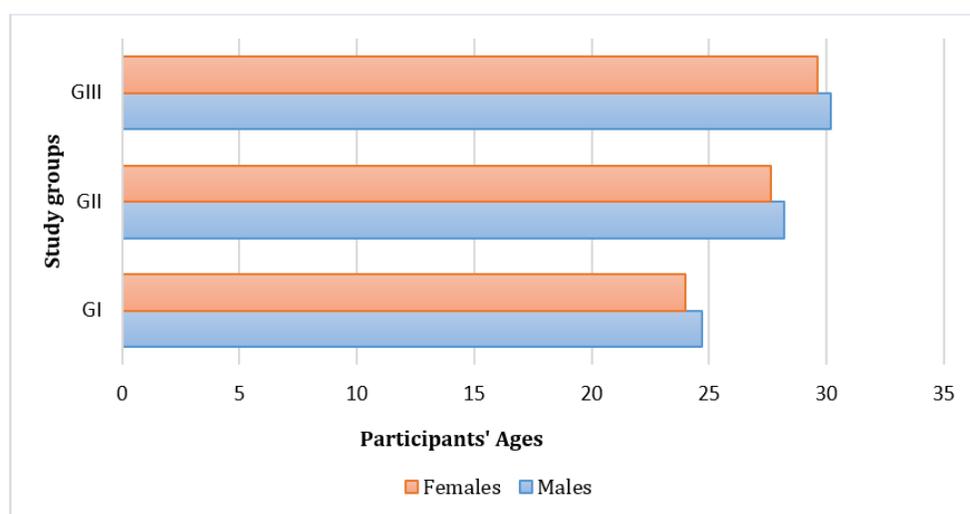


Figure 2: Participants ages according to graduation and gender.

GI: Group I. GII: Group II. GIII: Group III.

Table 3 clarified participants' knowledge and awareness of forensic odontology. 39.20% of dental students in group I and 54.80% of dentists in group II, as well as 67.8% of dentists in group III, reported that they know there is a branch in dentistry termed Forensic Odontology, while the other participants reported that they didn't know. Regarding the limitation in funds or supplies in Saudi Arabia to study forensic dentistry. The highest proportion was observed among the answers of group III participants (74.60%) more than the answers of group I participants (31.40%) and the answers of group II participants (35.70%). All participants in the current study reported that they didn't take forensic odontology as a course in the college. That is in agreement with 60.80% of group I participants and 53.50% of group II participants as well as 44.40% of group II participants said that they don't know forensic odontology, and others reported that the exporter of their information about forensic dentistry from external sources such as internet and Scientific articles/journals. Only about 15.70% of the group I participants, 26.20% of group II participants and 13.60% of group III participants reported that their information about forensic odontology is enough. About 27.50% of the group I participants, 21.40% of group II participants and 33.90% of group III participants revealed that they have an idea of jobs offers in forensic odontology in Saudi Arabia. Most of the participants (70.60% of group I participants, 61.90% of group II participants and 71.20% of the group III participants) said that the patterns of teeth eruption and calcification help to determine the dental age of the patients.

N	Questions N (%)	GI (n = 102)	GII (n = 84)	GIII (n = 118)	Chi (P value)	
		N (%)	N (%)			
1	Do you know there is a branch in dentistry that termed forensic Odontology?	Yes	40 (39.20%)	46 (54.80%)	80 (67.8%)	35.5 (<0.001*)
		I don't know	12 (11.80%)	6 (7.10%)	14 (12 %)	
		No	50 (49.00%)	32 (38.10%)	24 (20.2%)	
2	Do you think that there are limitation in funds or supplies in Saudi Arabia to study forensic dentistry?	Yes	32 (31.40%)	30 (35.70%)	88 (74.60%)	32.5 (<0.001*)
		No	70 (68.60%)	54 (64.30%)	30 (25.40%)	
3	Did you take forensic odontology as course in your college?	Yes	0 (00%)	0 (00%)	0 (00%)	0 (0.398)
		No	102 (100%)	84 (100%)	118 (100%)	
4	What is the exporter of your information about forensic dentistry?	Books	4 (3.90%)	2 (2.30%)	6 (5.60%)	49.9 (0.049*)
		I don't have knowledge	62 (60.80%)	46 (53.50%)	48 (44.40%)	
		Internet	20 (19.60%)	20 (23.30%)	30 (27.80%)	
		Postgraduate lecture	2 (2.00%)	2 (2.30%)	0 (0.00%)	
		Scientific articles/journals	2 (2.00%)	8 (9.30%)	10 (9.30%)	
		Seminars	0 (0.00%)	2 (2.30%)	2 (1.90%)	
		Undergraduate lectures	6 (5.90%)	2 (2.30%)	6 (5.60%)	
		Workshops	6 (5.90%)	4 (4.70%)	6 (5.60%)	
5	Is your information about forensic odontology is enough?	Yes.	16 (15.70%)	22 (26.20%)	16 (13.60%)	28.2 (0.002*)
		No	48(47.10%)	42 (50.00%)	96 (81.40%)	
		I don't Know	38 (37.30%)	20 (23.80%)	6 (5.10%)	
6	Do you have an idea of jobs offers in forensic odontology in Saudi Arabia?	Yes.	28 (27.50%)	18 (21.40%)	40 (33.90%)	9.2 (0.511)
		No	60 (58.80%)	54 (64.30%)	64 (54.20%)	
		I don't Know	14 (13.70%)	12 (14.30%)	14 (11.90%)	

7	How can we determine the dental age of the patients?	Biochemical evaluation	8 (7.80%)	10 (11.90%)	4 (3.40%)	68.3 ($<0.001^*$)
		Histological evaluation	14 (13.70%)	18 (21.40%)	24 (20.30%)	
		Patterns of eruption and calcification	72 (70.60%)	52 (61.90%)	84 (71.20%)	
		I don't know	8 (7.80%)	4 (4.80%)	6 (5.10%)	
8	How can you determine the psychological abuse of children and other abuses such as physical/neglected/sexual abuses ?	Any scar	4 (3.90%)	10 (11.90%)	4 (3.40%)	87.2 ($<0.001^*$)
		Behavioral changes	18 (17.60%)	12 (14.30%)	0 (0.00%)	
		Clothing	12 (11.80%)	10 (11.90%)	4 (3.40%)	
		Physical injuries	12 (11.80%)	8 (9.50%)	0 (0.00%)	
		All above	52 (51.00%)	44 (52.40%)	108 (91.50%)	
		Don't know	4 (3.90%)	0 (0.00%)	2 (1.70%)	
9	How can we recognize the gender and age of a dead person in the collective catastrophes such as rush, fire, and accidents?	A dead body reconstruction	32 (31.40%)	24 (28.60%)	46 (39.00%)	32.4 (0.006*)
		Fingerprints	24 (23.50%)	16 (19.00%)	12 (10.20%)	
		I don't know	12 (11.80%)	6 (7.10%)	28 (23.70%)	
		patients' files	34 (33.30%)	38 (45.20%)	32 (27.10%)	
10	Do you believe that forensic dentistry is helpful in recognize culprits and dead persons?	Yes	28 (27.50%)	32 (38.10%)	96 (81.40%)	58.6 ($<0.001^*$)
		No	46 (45.10%)	40 (47.60%)	8 (6.80%)	
		I don't know	28 (27.50%)	12 (14.30%)	14 (11.90%)	
11	Do you know, what is the lip prints in forensic dentistry?	Cheiloscopy	42 (41.20%)	42 (50.00%)	22 (18.60%)	37.6 (0.001*)
		Cytology	6 (5.90%)	10 (11.90%)	8 (6.80%)	
		Pathology	14 (13.70%)	8 (9.50%)	4 (3.40%)	
		I don't know	40 (39.20%)	24 (28.60%)	84 (71.20%)	
12	Can DNA sample be obtained from teeth?	Yes	30 (29.40%)	30 (35.70%)	76 (64.40%)	32.1 ($<0.001^*$)
		No	40 (39.20%)	28 (33.30%)	12 (10.20%)	
		I don't know	32 (31.40%)	26 (31.00%)	30 (25.40%)	
13	Do you know the importance of teeth bite type print?	Yes	18 (17.60%)	28 (33.30%)	64 (54.20%)	29.9 (0.001*)
		No	34 (33.30%)	20 (23.80%)	32 (27.10%)	
		I don't know	50 (49.00%)	36 (42.90%)	22 (18.60%)	
14	Do you know that you can testify as an expert witness in the court to present forensic dental evidence?	No	72 (70.60%)	46 (54.80%)	52 (44.10%)	12.1 (0.034*)
		Yes	30 (29.40%)	38 (45.20%)	66 (55.90%)	

Table 3: Participants' knowledge and awareness of forensic odontology.

GI: Group I (Dental Students). GII: Group II [Graduates (< 5 years)]. GIII: Group III [Graduates (≥ 5 years)].

Concerning how they could determine the psychological abuse of children and other abuses such as physical/neglected/sexual abuses. 51.00% of group I participants, 52.40% of group II participants and 91.50% and group III participants knew to determine child abuse by any scar, the behavioral changes, clothing, and physical injuries, whereas the remainders were unable to recognize the child abuse. When we asked the participants how they can recognize the gender and age of a dead person in collective catastrophes such as rush, fire, and accidents. 33.30% of group I participants. 45.20% of group II participants and 27.10% of group III participants reported that they could recognize that by patients' files. But 23.50% and 31.40% of group I participants. 19.00% and 28.60% of group II participants and 10.20% and 39.00% of group III participants reported that they could recognize that by Fingerprints and dead body reconstruction. While the rest reported that they could not recognize the gender and age of a dead person in the collective catastrophes such as rush, fire, and accidents.

Regarding the ask of the participants on their belief about the help of forensic dentistry in recognize culprits and dead persons. 27.50% of group I participants, 38.10% of participants of group II and 81.40% of participants of group III answered Yes while the remainder of participants answered No. Moreover, about 41.20% of group I participants, 50.00% of group II participants, and 18.60% of group III participants reported that they know they know the importance of lip prints in forensic odontology, While the other participants did not recognize it is significant.

On the other hand, 31.40% of group I participants, 31.00% of group II participants, and 25.40% of group III participants did not know if there is a DNA sample that could be obtained from teeth. In contrast to that, 29.40% of group I participants, 35.70% of group II participants, and 64.40% of group III participants their answers were positive, and the answers of the remaining participants were passive. Regarding the importance of teeth bite type print. About 49.00% of group I participants, 42.90% of group II participants, and 18.60% of group III participants did not know the significance of teeth bite type print. But about 17.60% of group I participants, 33.30% of group II participants, and 54.20% of group III participants reported that they know the significance of teeth bite type print, and the rest said that there is no importance of teeth bite type print. When we asked the participants if they know that they can testify as an expert witness in the court to present forensic dental evidence. 70.60% of group I participants, 54.80% of group II participants, 44.10% of group III participants did not know that they could testify as an expert witness in the court to present forensic dental evidence. While the rest reported that they Know it.

There were statistically significant differences in all answers regarding the participants' knowledge and awareness of forensic odontology ($p < 0.05$) except the questions answers of numbers 3 and 6, where there were differences in these questions' answers without statistically significant differences ($p > 0.05$). Generally, the results of table 3 indicate that there was a shortage in the levels of knowledge and awareness of forensic odontology among all participants of the three study groups, but group III participants revealed positive and adequate knowledge and awareness in forensic odontology more than the participants of group I and II.

Table 4 shows the participants' practical attitude towards forensic odontology based on the answers to six questions. There was a question on keeping dental records in the clinic where 68.60% of group I participants, 69.00% of group II participants, and 57.60% of group III participants revealed that they are keeping dental records in their clinics.

No	Questions N (%)	GI (n = 102)	GII (n = 84)	GIII (n = 118)	Chi (P value)		
		N (%)	N (%)				
1	Do you keep dental records in your clinic?	Yes	70 (68.60%)	58 (69.00%)	68 (57.60%)	24.3	<0.001*
		No	32 (31.40%)	26 (31.00%)	50 (42.40%)		
2	What do you do, if you know child abuse?	Inform parents	54 (52.90%)	44 (52.40%)	30 (25.40%)	30.6	0.001*
		Inform police	36 (35.30%)	34 (40.50%)	86 (72.90%)		
		Nothing	12 (11.80%)	6 (7.10%)	2 (1.70%)		
3	Do you have any experience in forensic odontology?	Yes	18 (17.60%)	22 (26.20%)	14 (11.90%)	7.9	0.163
		No	84 (82.40%)	32 (73.80%)	104 (88.10%)		
4	Do you want to participate in workshops and seminars in forensic odontology?	Yes	32 (31.40%)	46 (54.80%)	92 (78.00%)	35.3	<0.001*
		No	70 (68.60%)	38 (45.20%)	26 (22.00%)		
5	Are you interested to study in forensic odontology, if there are postgraduate study?	Yes	18 (17.60%)	36 (42.90%)	70 (59.30%)	32.9	<0.001*
		No	68 (66.70%)	42 (50.00%)	40 (33.90%)		
		I don't know	16 (15.70%)	6 (7.10%)	8 (6.80%)		
6	Do you want to be a specialist in forensic dentistry?	Yes	24 (23.50%)	32 (38.10%)	64 (54.20%)	14.8	0.011*
		No	78 (76.50%)	52 (61.90%)	54 (45.80%)		

Table 4: The participants' practical attitude towards forensic odontology.

GI: Group I (Dental Students). GII: Group II [Graduates (< 5 years)]. GIII: Group III [Graduates (≥5years)].

Concerning ask the participants about what they are doing, if they detected child abuse. Only 35.30% of group I participants, 40.50% of group II participants, and 72.90% of group III participants reported that they are informing the police, whereas 52.90% of group I participants, 52.40% of group II participants, and 25.40% of group III participants reported that they are informing the parents. The remainder of the participants answered that they are doing nothing.

Regarding the question about the participants, if they have any experience in forensic odontology. Most of the participants (82.40% of group I, 73.80% of group II and 88.10% of group III) reported that they haven't any experience in forensic odontology. When we asked the participants if they want to participate in workshops and seminars in forensic odontology. 31.40% of group I participants, 54.80% of group II participants, and 78.00% of group III participants agreed that there is needful to participate in workshops and seminars in forensic odontology. In contrast, the rest reported that they don't want to participate in workshops and seminars in forensic odontology.

Regarding asking the participants if they interested to study in forensic odontology, if there is postgraduate study or if they want to be a specialist in forensic dentistry. Only 17.60% of group I participants, 42.90% of group II participants, and 59.30% of group III participants were interested to study in forensic odontology if there is postgraduate study. These participants' reports harmonious with 23.50% of group I participants, 38.10% of group II participants, and 54.20% of group III participants said they don't want to be a specialist in forensic dentistry.

Overall, table 4 revealed that there were statistically significant differences between group in the answers of the participants' practical attitude towards forensic odontology questions ($p < 0.05$) except for their experience in forensic odontology ($p > 0.05$).

Table 5 summarized the responses of all participants to the knowledge and attitudes questions towards forensic odontology. Most of the participants (80.3%) did not take forensic odontology in their education. Consequently, 80% of them don't have any experience in forensic odontology. About 43.7 of all participants indicated that they don't know forensic odontology, and 27% reported that their information about forensic odontology was from the internet, while the reset revealed that their information about forensic odontology was from other sources. That is in agreement with nearly half of all participants who revealed that there were limitations in funds or supplies in Saudi Arabia to study forensic dentistry and their information about forensic odontology is not enough. Where 43.4% of all participants reported that they don't know what is the lip print in forensic dentistry, and 34% of them don't believe that forensic dentistry is helpful in recognize culprits and dead persons, despite 40.8% revealed that the DNA samples could be obtained from teeth. On the other hand, table 5 exhibited that 60.2% of all participants haven't any idea of jobs offers in forensic odontology in Saudi Arabia, so about half of them don't interested to study in forensic odontology if there are postgraduate study moreover, they don't want to participate in workshops and seminars in forensic odontology. That is consistent with 63.2% of all participants in this study don't want to be specialists in forensic odontology.

Variables	Frequency	Percent (%)
Did you take forensic odontology as course in your college?		
Yes	60	19.7
No	244	80.3
Do you think that there are limitation in funds or supplies in Saudi Arabia to study forensic dentistry?		
Yes	134	44
No	170	56
What is exporter of your information about forensic dentistry?		
Books	21	6.9
I don't have knowledge	133	43.7
Internet	82	27
Postgraduate lecture	4	1.3
Scientific articles/journals	20	6.6
Seminars	7	2.3
Undergraduate lectures	23	7.6
Workshops	14	4.6

Is your formation about forensic odontology is enough?		
Yes	49	16.2
No	180	59.2
I don't know	75	24.6
Do have an idea of jobs offers in forensic odontology in Saudi Arabia?		
Yes	74	24.3
No	183	60.2
I don't know	47	15.5
Are you interested to study in forensic odontology, if there are postgraduate study?		
Yes	111	36.6
No	142	46.7
I don't know	51	16.7
Do you believe that forensic dentistry is helpful in recognize culprits and dead persons?		
Yes	128	42
No	103	34
I don't know	73	24
Do you know that you can testify as an expert witness in the court to present forensic dental evidence?		
Yes	122	40
No	182	60
Do you know, what is the lip print in forensic dentistry?		
Cheiloscopy	108	35.5
Cytology	38	12.5
I don't know	132	43.4
Pathology	26	8.6
Can DNA samples be obtained from teeth?		
Yes	124	40.8
No	84	27.6
I don't know	96	31.6
Do you want to participate in workshops and seminars in forensic odontology?		
Yes	143	47.0
No	161	53.0
Do you have any experience in forensic odontology?		
Yes	61	20
No	243	80
Do you want to be a specialist in forensic odontology?		
Yes	112	36.8
No	192	63.2

Table 5: The responses to the knowledge and attitudes questions.

With all that, 60% of participants in this study (dental students and graduates of King Khalid University) reported that they know that they can testify as an expert witness in the court to present forensic dental evidence.

Discussion

Forensic dentistry is a significant branch of forensic science that includes the use of dental sciences in the identification of living or dead persons and the recognition of somebodies who were exposed to criminal acts by dental records [19]. In this study, above 50% of participants know there is a branch in dentistry termed forensic Odontology, while other studies clarified that 31.6% and 59.4% know of this field [20,21].

Therefore, the knowledge and awareness of forensic odontology among dentists should evaluate in this growing field of medicine. There was a shortage in the availability of information and research on forensic dentistry in Saudi Arabia. This study is the first study in King Khalid University that was designed to help to detect the impact of knowledge and awareness of forensic odontology on the practical attitude of some dental students and graduates of King Khalid University. Moreover, This study will help to clarify the role of the forensic dentist in detecting the crime rate regarding illegal immigrants and identification of persons in mass disasters of holy pilgrimages in Saudi Arabia.

The findings of this study revealed that the knowledge and awareness of forensic odontology and its impact on the practical attitude of some dental students and graduates of King Khalid University was less than 50%, especially among group I and II participants. These findings are corresponding the results of other Saudi study revealed that there was a lack of knowledge and practice of forensic dentistry amongst Saudi dental practitioners [22]. Another Saudi study revealed that there were a reduction of training and education chances in forensic dentistry in Saudi Arabia because it is not within the teaching curriculum in dental schools [23]. This result is similar to this study result, where most of the participants (80.3%) reported that they did not take forensic odontology in their education. Moreover, The highest proportion of participants of the current study reported that there are limitations in funds or supplies in Saudi Arabia to study forensic dentistry.

In another Australian survey study, the participants reported that there was a shortage in forensic odontology during their undergraduate and postgraduate education. Furthermore, errors to accurate record-keeping [24]. That is consistent with Brazilian study results that revealed unsatisfactory information in forensic odontology among general dentists due to the insignificant of hours in undergraduate courses and the shortage of teachers in this field [25].

In this study, 51.00% of group I participants, 52.40% of group II participants, and 91.50% and group III participants agreed that forensic odontology aids in identifying physical abuse. For example, physical injuries and any scar that might often requires dental consultation. These results consistent with the results of another study which revealed that 36.4% of participants agreed that forensic odontology aids in identifying physical abuse [26]. That is due to the teeth in the child abuse cases may leave marks to help a forensic dentist to identify the biter [27]. Thus, the dentists have to know about the different physical and behavioral evidence to determine child abuse suspicion. But the results of the current study revealed that nearly one-third of participants did not know the significance of teeth bite type print, and the second third of participants said that there is no importance of teeth bite type print. That is maybe due to the defect in knowledge and awareness of forensic odontology among the participants. if there is suspicion of physical child abuse, the dentist should have another dentist witness the physical abuse and help in documentation. Therefore, most of participants in this study reported that they know that they can testify as an expert witness in the court to present forensic dental evidence.

The present study revealed that 41.2% of group I participants, 50% of group II participants, and 18.6% of group III participants know lip prints comparison to about 71.4% of the participants in another study were aware of lip prints [28]. Moreover, 29.4% of group I par-

ticipants, 35.7% of group II participants, and 64.4% of group III participants agreed that DNA could be gained from a dead individual's teeth. That is due to dental structures are resistant to decomposition and maximum temperature [29].

Another Indian study revealed that few numbers participants kept their patients' records while nearly two-thirds of the current study participants exhibited that they are keeping dental records in their clinics [28]. Similarly, the results of other Indian cross-sectional study revealed that more than half of participants keeping handwritten documents as dental records of patients. Moreover, the participants of this Indian study reported that neither could estimate dental age, whereas most of the participants of the current study said that the patterns of teeth eruption and calcification help to determine the dental age of the patients [30]. The identification of the gender and age of a dead person in collective catastrophes such as rush, fire, and accidents is difficult, so a forensic anthropologist may be called in when human remains are detected [31]. Most of the participants in this study were not aware of a forensic odontologist can help to identify the age and gender of the deceased persons.

In the present study, most of the participants haven't any experience in forensic odontology, and they haven't any idea of jobs offers in forensic odontology in Saudi Arabia. Moreover, Only 17.60% of group I participants, 42.90% of group II participants, and 59.30% of group III participants were interested in forensic odontology if there is postgraduate study. These participants' reports harmonious with 23.50% of group I participants, 38.10% of group II participants, and 54.20% of group III participants said they don't want to be a specialist in forensic dentistry compare to 89.6% of participants in another Indian study believed that forensic odontology is good specialty as job [32]. Which conflicts with the results of this study and with the results of another Saudi Study revealed that only 30% of the participants showed attention to forensic odontology as a job [33].

The study revealed that there is a high shortage of the impact of knowledge and awareness of forensic odontology on the practical attitude among the participants, maybe due to no institutions offering official education and training in forensic odontology in Saudi Arabia. Moreover, Forensic odontology not included in their academic curriculum, and there were no workshops or conferences that were done in forensic odontology for dentists in Saudi Arabia. Identical study results have been revealed by other authors [33,34].

Finally, the present study revealed that the impact of knowledge and awareness of forensic odontology on the practical attitude of graduates of King Khalid University is adequate more than the dental students, which is similar to the results of other studies [20,21,36,35]. However, there were inadequate knowledge and practice of forensic odontology among all dentists in the other Saudi, Nigerian, and Indian studies [36-40].

This study was carried out to evaluate the impact of knowledge and awareness of forensic odontology on the practical attitude of some dental students and graduates of King Khalid University to determine the educational needs of this branch in dentistry. There were limitations of this study that should be pointed during explaining the results; where the samples represented the output of one dental school in Saudi Arabia, so it did not represent all dental students and dentists in Saudi Arabia. Consequently, additional studies should be done at other dental colleges in Saudi Arabia to evaluate the level of knowledge and awareness of this branch in dentistry among Saudi dental students and dentists. The results of this study might be considered as a recommendation for including forensic odontology in the undergraduate education in Saudi dental schools. Where the undergraduate program should be including preclinical and clinical courses in forensic odontology, as well as field training in forensic centers.

Conclusion

There was adequate knowledge among all participants about know of this branch of dentistry, how to determine the age of patients, how to identify the psychological abuse of children, as well as how to recognize the gender and age of a dead person in the collective catastrophes. Moreover, the three groups also revealed adequate practical awareness towards keeping dental records in their clinics and what they should do if they are known of child abuse.

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Conflict of Interest

There is no conflict of interest between the authors or any others in the publication of this original article.

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