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RESEARCH ARTICLE

THE KNOWLEDGE AND PRACTICE OF FORENSIC DENTISTRY AMONG DENTAL PRACTITIONERS IN THE EASTERN PROVINCE, SAUDI ARABIA.

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Abstract

Objective: To evaluate knowledge and practice of forensic dentistry among dental practitioners working in the Eastern province, Saudi Arabia.

Materials and methods: Cross-sectional, descriptive study was conducted through a self-administered questionnaire among a sample of 323 dentists working in the Eastern province, Saudi Arabia. Simple descriptive statistical analyses performed to calculate means, standard deviations and frequency distributions. Inferential statistical analyses involved using Pearson's Chi-square test and comparing proportions of various categorical variables between private and governmental dentists. Statistical significance determined at p-value less than 0.05.

Results: In our study 73% of the participants considered themselves to have inadequate knowledge about forensic dentistry. More than two-thirds of the participants have not been trained in forensic dentistry during their undergraduate program. Regarding the practice of forensic dentistry, only 10% of the participants handled cases of forensic dentistry. Less than 5% appeared in courts to provide evidence related to forensic dentistry cases. Regarding records keeping, 88.6% indicated that they are maintaining dental records for different duration. No forensic dentistry education was described to be the most common cause not to maintain dental records. In comparison, statistically significant differences between private and government practitioners were found with regard to investigation of bite mark patterns and maintaining dental records.

Conclusions: Knowledge and practice of forensic dentistry was inadequate among dental practitioners in the Eastern Province, Saudi Arabia. Statistically significant differences between governmental and private dentists were found with regard to investigation of bite mark patterns and maintaining dental records. The most common barrier to maintaining the dental records was the lack of forensic dentistry education.

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Introduction:

Forensic dentistry involves the evaluation of injuries to the oral cavity as a result of trauma, accidents, abuse, crimes and calamities, and helps in the investigation of criminal, civil and medicolegal cases (Al Sheddi & Al Asiri, 2014). This also helps in the recognition of dead individuals by comparing ante and postmortem dental records (Nagarajappa, 2014). We can use teeth to estimate the age of the deceased individuals especially children (Devadiga, 2014). The teeth are one of the human remains that together with different oral habits provide an oral environment as fingerprint unique to each individual which is particularly useful in the identification of deceased individuals (Nagarajappa, 2014). The first case of identification of an individual using dentition was in India in 1191 where a dead king was recognized by his false anterior teeth (Sharma, 2015).

Patient dental records are important documents related to the history of patient, clinical examination, management and prognosis of disease, which can be presented as evidence in the court of law (Charangowda, 2010). It is legal and ethical responsibility of dentists to maintain dental records in their clinics (Devadiga, 2014). Dental practitioners can play an effective role in forensic odontology by maintaining securely retained dental records. Maintaining ante-mortem records can help recognize human remains (Sharma, 2015). The dramatic increase in the road accidents, violence, crimes and causalities make the maintenance of dental records very important in clinical practice (Nagarajappa, 2014). According to the Indian Dental Association, dental records should be maintained for five years to protect the practitioner against medicolegal issues (Sharma, 2015). The National Health Service (NHS) recommends that dental records be maintained for about 11 years in case of children and adults in England (Devadiga, 2014).

A study conducted in Riyadh, Saudi Arabia, by Al Sheddi et al. (2015) on 248 dentists, reported that 44% of the dentists maintained dental records for unlimited time and 25.8% for a specific period. Up to 42.9% of them received no undergraduate forensic odontology education, and 95% did not obtain post-graduate training. Sharma et al. (2015) revealed that only 11% general dentists and 23% specialist dental practitioners maintained dental records in their clinics. About 98.4% of general dentists and 90% of specialist dental practitioners said that their knowledge regarding forensic odontology was inadequate, and majority of them did not know the significance of maintaining dental records for forensic purpose. Al-Azri et al. (2015) showed that dentists were aware of forensic odontology applications (mean score 4.58/6), and majority of respondents (80.7%) thought that the records would be helpful in medicolegal cases. However, increased workload, lack of time and limited storage space were identified as the barriers to keeping accurate and complete dental records. The results acquired by Harchandani et al. (2014) showed 70% of the dental practitioners maintaining dental records in their clinics/workplaces. On the other hand, Nagarajappa et al. (2014) found that only 12.2% of the participants kept dental records for more than three years.
Given the importance of maintaining dental records for forensic purposes, data about the awareness of dentists about forensic odontology is sparse in Saudi Arabia. No study was conducted to explore the differences in the knowledge and practice of forensic dentistry between private and governmental dental practitioners in the country.

The objectives of this study are to evaluate the knowledge and practice of forensic dentistry among dental practitioners in the Eastern Province, Saudi Arabia, compare the knowledge and practice of forensic dentistry between governmental and private dental practitioners and identify the barriers to maintaining patients' dental records.

Materials and methods:

Cross-sectional, descriptive study was conducted and a sample of 323 dentists was calculated. The estimation of sample was based on the total number of dentists working in the Eastern province (population size), 95% confidence interval, anticipated frequency of outcome in the population and design effect (Schaeffer, Mendenhall & Ott, 1990). The sample calculations yielded a sample size of 323 dentists and the number was increased to 350 to compensate for non-response, missing information and data entry errors.

The private and governmental sector dentists working in urban and rural areas of the Eastern province were invited to participate in the study. Dental students and dental interns were not included in the study. A list of dentists working in the province was collected and equal number of private and government dentists were randomly selected using MS Excel 2010.

Data was collected by self-administered questionnaire. Information obtained through literature review was used to draft initial version of the questionnaire (Al Sheddi, & Al Asiri, 2015; Al-Azri, Harford, & James, 2015;Harchandani et al., 2014; Nagarajappa, 2014; Sharma, 2015). Subsequently, the questionnaire was reviewed by the dental public health professionals to improve its validity. Pilot test of the final draft of the questionnaire involved 17 practicing dentists. The piloting helped determine acceptability of the questionnaire, improve its reliability, estimate the time required to administer the questionnaire and assess feasibility in conducting the research project (Radhakrishna, 2007). The administration of pilot tested questionnaire started in the February and ended in March 2016. Three visits made to ensure good response rate.

There are four sections in the questionnaires. The first section inquires respondents about the demographic data including years of clinical experience, place and type of job, and nationality. There are about ten questions in the second section, which seek to get information about knowledge of dentists about forensic dentistry. The third section includes six questions about the practice of forensic dentistry such as handling forensic cases, providing evidence in the court, and maintaining dental records. The questions about the barriers to maintaining dental records are sought in the last section of the questionnaire.

The participants of the study were informed about the purpose and objective of the research and informed consents was obtained from them. The confidentiality and privacy of participants were maintained during the administration of questionnaire, data analysis and interpretation of the results.

Data was entered in Statistical Package for Social Sciences (Version 22.0, SPSS Inc., Chicago, IL). Simple descriptive statistical analyses was performed to calculate means, standard deviations and frequency distributions. Accordingly, tables and figures were generated to display various variables of the study. Inferential statistical analyses involved using Pearson's Chi-square test and comparing proportions of various categorical variables between private and governmental dentists. Statistical significance was determined at p-value less than 0.05.

Results:

A total of 234 participants completed and returned the survey (the response rate is 72.5%). Male participants (60.7%) were more than female (39.3%). On the other hand, Saudi respondents were less than non-Saudi with the ratio of 1:1.5. Almost, half of the respondents were general practitioners (47.9%) followed by specialist (38.0%) then consultants (14.1%). Approximately, equal numbers of private (N=128) and governmental (N=106) dental practitioners took part in the study. The mean years of clinical experience was 10.45±7.85 (range from 0-39)
Table 2 shows details about the knowledge of forensic dentistry. Lack of knowledge was evident in different aspects of forensic dentistry. 74.7% considered themselves to have inadequate knowledge about forensic dentistry and only 23.1% updated their knowledge about forensic dentistry, with Internet being the most common method of updating the knowledge followed by books then scientific journals (as illustrated in chart 3). More than two-thirds of the participants have not been trained in forensic dentistry during their undergraduate program. In contrast, majority of dentists were aware of the significance of maintaining dental records in forensic dentistry and capable to estimate dental age. Furthermore, 64.5% were able to investigate bite mark patterns and 53.4 percent knew that they could work as experts to provide forensic dental evidence in courts. 80.3% reported not having established protocols for the management of suspected cases of child abuse.

Regarding the practice of forensic dentistry, table 3 shows a very low level of forensic dentistry practice among the participants. Only 11.5% handled cases of forensic dentistry and 1.7% participated as members of forensic team in Ministry Of Health. Less than 5% appeared in courts to provide evidence related to forensic dentistry cases. Regarding records keeping, 88.5% indicated that they are maintaining dental records for different duration. The most frequently maintained records are patient's information sheets, radiographs and medical history form. The lowest percentage (42.70%) was given to the maintenance of dental photographs and investigation reports (as shown in chart 1).

Chart 2 shows the barriers to maintain dental records. No forensic dentistry education was described to be the most common cause not to maintain dental records (58.1%) followed by lack refresher courses (41.9%) and increasing workload (41.0%). In contrast, lack of computer facilities took the lowest percentage (26.50%).

In comparison, statistically significant differences were found between private and government practitioners with regard to investigation of bite mark patterns and maintaining dental records (as shown in table 4,5)

Discussion:

Forensic dentistry is important in solving some law cases such as identification of deaths and abuse cases. Dental tissues can resist difficult situations and it can be a good source for DNA (Preethiet al 2011). In addition, Dental records including but not limited to radiographs, photographs, and dental casts can be highly valuable in the field of FD. For that, knowledge and good record keeping practices is essential not only for forensic dentists, but for all health practitioners.

Current study was conducted to assess knowledge and practice of FD among the practicing dentists in Eastern Saudi Arabia. The results indicated that the majority of the participating dentists in this study are aware of the significance of forensic dentistry. But they do not have adequate knowledge and do not update their knowledge about forensic dentistry. As a result of this, only minority of the participants were handling cases of forensic dentistry and few are members of forensic team in MOH. The dentists indicated that this could be because they have not been exposed to forensic education.

On our study the majority of the dental participants (82.9%) were aware of the significance of FD, and about (88.5%) of dentists maintained dental records. Similarly, Narendra, 2014 showed that (80%) of dental practitioners were aware of the significance of FD. Nagarajappa et al, 2014 reported that (93.9%) of dental practitioners maintained dental records.

Al- Azri, 2015 reported that (21.1%) of dental practitioners had training in FD and increased workload is the most common barrier to maintaining dental records, while our study found that (30.3%) of the participants had training in FD and lack of education about FD is the most common barrier. Present study found (11.5%) of dentists handle forensic dentistry cases. Similarly, only (4.3%) of dentists handled such cases in Riyadh, Saudi Arabia (Manal, 2015).

The reasons behind low knowledge of forensic dentistry could be summarized as the lack of education and training in this field during undergraduate programs, also most of the seminars, lectures and courses in our area do not give an attention or opportunity to this field. The low practice rate of forensic dentistry also could be attributed to the negligence of this field from the courts in our area because they are more focusing and depending on forensic medicine, also lack of the training centers and the investigatory equipment which needed for the practice of this field could be addressed as a contributing factor.

The limitations of the current study include that the data were collected through a self-administered questionnaires, which can result in over or under estimation. The response rate was another issue, because dentists were busy and difficult to approach them. Lack of knowledge about the importance of FD could contribute to the limited response rate. Our questionnaire was asking about the knowledge related to forensic dentistry in general without testing the participant skills.

A standardized computerized system for patients record keeping including patient personal information, medical and dental history, dental radiographs, dental photographs casts and bite marks should be established. The universities should give more attention to this field by integrating theoretical and practical courses of forensic dentistry in the undergraduate courses. Also, the ministry of health should establish (commission, board, and committee) that specialized in forensic dentistry in which it can train and provide seminars and lectures about this field. Courts should accredit this field as a source of supporting evidence and ask for it when needed. Future studies should include other provinces of the Kingdom and may be other countries for generalizability.

Conclusion:

In conclusion, knowledge and practice of forensic dentistry was inadequate among dental practitioners in the Eastern Province, Saudi Arabia. Statistically significant differences between governmental and private dentists were found with regard to investigation of bite marks patterns and maintaining dental records. The most common barrier to maintaining dental records was the lack of forensic dentistry education. Training in forensic dentistry in the undergraduate program and providing more continuing education seminars should be considered to address this deficiency.

Table 1: Personal information of the participants.

Variable	N (%)
Gender	
Male	142 (60.7)
Female	92 (39.3)
Nationality	
Saudi	91 (38.9)
Non-Saudi	143 (61.1)
Qualification	
General dentist	112 (47.9)
Specialist	89 (38.0)
Consultant	33 (14.1)
Type of job	
Governmental	106 (45.3)
Private	128 (54.7)

Table 2: Knowledge about forensic dentistry.

Variable	N (%)
Awareness of the significance of maintaining dental records in forensic dentistry	194 (82.9)
Knowledge to estimate dental age	201 (85.9)
Investigation of bite mark patterns	151 (64.5)
Working as expert to provide forensic dental evidence in court	125 (53.4)
Identification of domestic violence	134 (57.3)
Identification of child abuse	152 (65.0)
Protocol for the management of child abuse	46 (19.7)
Adequate knowledge about forensic dentistry	59 (25.2)
Undergraduate training in forensic dentistry	71 (30.3)
Updating knowledge about forensic dentistry	54 (23.1)

Table 3: Practice of forensic dentistry.

Variable	N (%)
Handling cases of forensic dentistry	27 (11.5)
Member of forensic team in MOH	4 (1.7)
Appearing in court to provide evidence	10 (4.3)
Regulatory requirement to maintain records	160 (68.4)
Maintaining dental records in the clinic	207 (88.5)
Duration of maintaining dental records	
Less than 2 years	47 (20.1)
3-5 years	64 (27.4)
7 to 9 years	46 (19.7)
More than 9 years	77 (32.9)

Chart 1: Dental Records Maintained by Dentists.

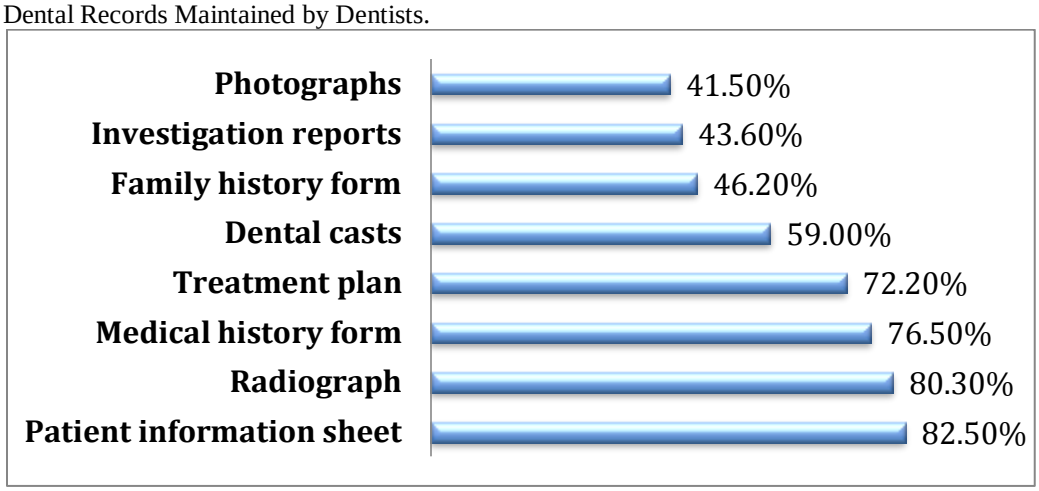

Chart 2: Barriers to maintaining dental records.

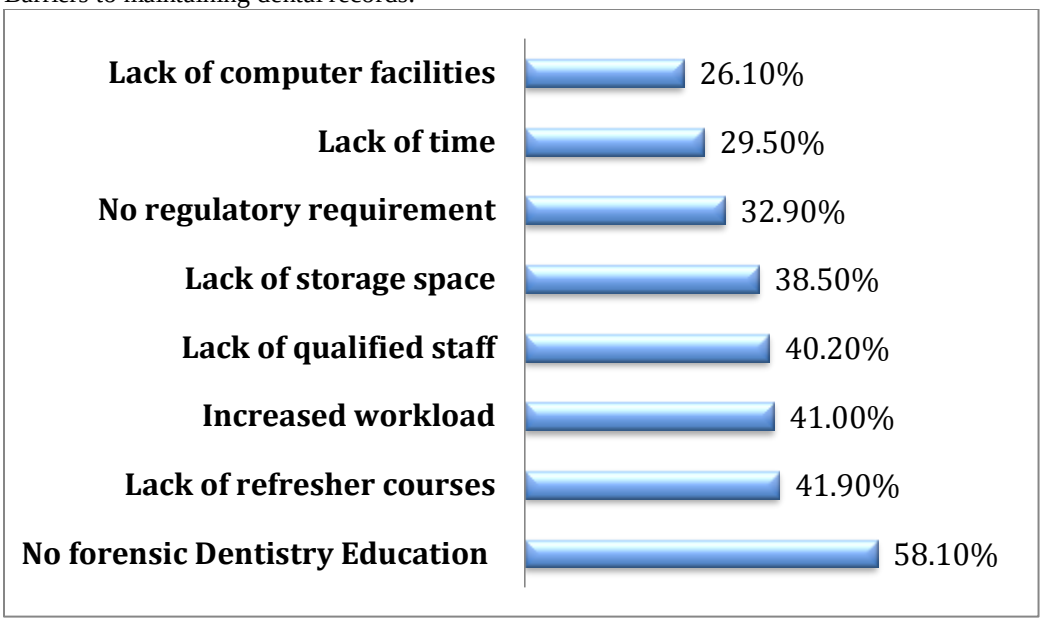

Chart 3: Methods of updating knowledge about forensic dentistry.

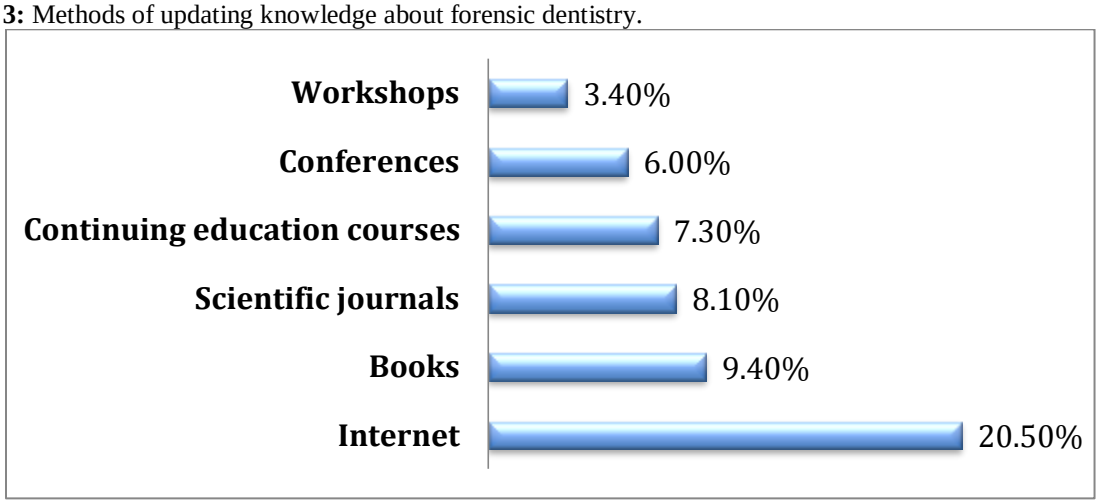

Table 4: Comparison between governmental and private practitioners about the knowledge of forensic dentistry

Variable	Government	Private	P-value
	N (%)	N (%)	
Awareness of the significance of maintaining dental records in forensic dentistry	90 (46.4)	104 (53.6)	0.460
Knowledge to estimate dental age	87 (43.3)	114 (56.7)	0.126
Investigation of bite mark patterns	59 (39.1)	92 (60.9)	0.010
Working as expert to provide forensic dental evidence in court	52 (41.6)	73 (58.4)	0.223
Identification of domestic violence	54 (40.3)	80 (59.7)	0.075
Identification of child abuse	67 (44.1)	85 (55.9)	0.610
Protocol for the management of child abuse	20 (43.5)	26 (56.5)	0.782
Adequate knowledge about forensic dentistry	24 (40.7)	35 (59.3)	0.410
Undergraduate training in forensic dentistry	29 (40.8)	42 (59.2)	0.366
Updating knowledge about forensic dentistry	22 (40.7)	32 (59.3)	0.443

Table 5: Comparison between governmental and private practitioners about the practice of forensic dentistry.

Variable	Government	Private	P-value
	N (%)	N (%)	
Handling cases of forensic dentistry	14 (51.9)	13 (48.1)	0.467
Member of forensic team in MOH	2 (50.0)	2 (50.0)	0.849
Appearing in court to provide evidence	6 (60.0)	4 (40.0)	0.340
Regulatory requirement to maintain records	76 (47.5)	84 (52.5)	0.320
Maintaining dental records in the clinic	88 (42.5)	119 (57.5)	0.018

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