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Determinants of the Knowledge of Forensic Odontology Among Dentists in Makassar City, Indonesia: a cross-sectional study

By

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Abstract

Background

Dentists must have sufficient knowledge of forensic odontology as they have an important role in identifying victims in a disaster or violent crime incident. This research aimed to analyze the determinants of the knowledge of dentists in Makassar City, Indonesia regarding forensic odontology.

Methodology

A questionnaire was distributed among to 142 dentists in Makassar City, Indonesia. Data were analyzed using descriptive analysis and inferential analysis in the form of bivariate and multivariate logistic regression with a significant p value of less than 0.05.

Results

The results of this research indicated that 59.9% (n=85) respondents had high knowledge of forensic odontology with good category. Based on bivariate logistic regression analysis, it showed that updated information on forensic odontology (OR=4.401, 95%CI=1.690-11,466) was significantly associated with increased knowledge (p-value=0.002). Similarly, based on multivariate logistic regression analysis, it showed that updated information on forensic odontology (OR=4,468, 95%CI=1,687-11,835) was significantly associated with an increase in knowledge (p-value=0.003).

Conclusions

Dentists' level of knowledge regarding forensic odontology in Makassar City is in the good category. Dentists who update information on forensic odontology are four times more likely to have knowledge of forensic odontology and it is significantly associated with increased knowledge.

Keywords: Forensic odontology, Dentist, Knowledge, Disaster

Introduction

Odontology refers to the study of teeth. Based on the case, the Federation Dentaire International (FDI) defines forensic odontology as a branch of dentistry dealing with the examination and evaluation of dental evidence findings used for court purposes. Forensic odontology,based on the Australian Society of Forensic Odontology Inc, is defined as a branch of dentistry that applies dental science as evidence for legal purposes. Itconsists of the recognition, documentation, interpretation and presentation of dental evidence or findings.[1,2]

In Indonesia, if there is a criminal of persecution, it requires a valid evidence. In Article 184 of the Criminal Procedure Code, valid evidence is witness testimony, expert testimony, letters, instructions, and statements from the defendant. Furthermore, expert testimony is explained in article 133 paragraph 1 of the Criminal Procedure Code which states that a victim of a crime suspected of having an incident constitutes a criminal offense is authorized to submit a request for expert information to a judicial medical expert or a doctor and/or other expert.[3] Based on this regulation, it shows that a dentist has an important role in court as an expert witness.

Disaster and accidents currently often occur in Indonesia. Based on the Center for Research on the Epidemiology of Disasters (CRED) report, almost half of the total deaths (4,535 out of 10,733) from disasters worldwide came from Indonesia.[4] The bodies of victims as a result of disasters are sometimes not found in intact form so they can't be recognized. Teeth are tools that can be used in the identification of human remains because teeth are the hardest tissue of the human body that is most resistant to damage, even when compared to bone, especially when exposed to heat. Besides, teeth also have a unique anatomy from each individual, thus, they can be used for human identification.[5]

In mass disasters with thousands of victims, dental records are the most important records used for victim identification. Every dentist has responsibility to keep dental records in good condition and fill them out accurately.[6,7] This has been regulated in the Law of the Republic of Indonesia No. 29 of 2004 concerning Medical Practice Article 46 which states that every dentist in carrying out his practice is obliged to make and complete a patient's medical record.[8] For the storage of dental records, it is regulated in the Minister of Health Regulation Number 269 of 2008 article 8 stated that the medical records of patients in hospitals must be kept for a period of 5 (five) years. Meanwhile, medical records at non-hospital health care facilities must be kept for a period of 2 (two) years from the last date the patient was treated.[9]

Dentists must have awareness and knowledge of forensic odontology because they can contribute to the identification of victims in a disaster or crime incident. A research in

India reported that 75% of Indian dentists were not confident in handling cases related to forensic odontology and showed inadequate knowledge of forensic odontology.[10] Currently, there are only 19 forensic odontology specialists in Indonesia and two of them are in Makassar City.[11] Considering the fact of the importance of the role of dentists in forensic odontology, this research was conducted to analyze the determinants of the knowledge of dentists in Makassar City regarding forensic odontology.

Methodology

Study design and sampling

This research was a cross sectional study through an online questionnaire using a google form link because it wasduring COVID-19 pandemic situation. We invited all dentists who werelisted as members of the Indonesian Dentist Association of Makassar city of 834 people to participate in this research.[11] Convenience sampling was conducted to select a sample with a sample size calculated using the Lemeshow formula and the number of samples obtained was 142.[12]

Research Instrument and Data Collection

The instrument used in this research was a questionnaire adapted from the research of Nazir MA, 2019 and Sharma, 2015.[13,14] The researcher reviewed the initial draft of the questionnaire and then tested the validity and reliability with a Cronbach's alpha value of 0.705. The final questionnaire consisted of two parts. The first part was a question about the characteristics of the sample and the second part is a knowledge section which consists of 10 questions. Each participant was contacted via whatsapp and after getting approval, the google form link was sent.

Data Analysis

Data were analyzed using descriptive analysis to describe the characteristics of each research variable. The total knowledge score was 10 with a range of 0 to 10. Dentists with a knowledge score above 50% were considered to have good knowledge, while those with a score below 50% were considered to have poor knowledge. Furthermore, Inferential analysis was used to test the effect between the independent variable (characteristics of the sample) and the dependent variable (knowledge) using logistic regression test. The independent variable was considered to be related to the dependent variable if the p-value <0.05. Statistical analysis was performed using SPSS software version 22.0.

Results

A total of 142 dentists completed the questionnaire. 107 samples (75.4%) were women. In addition, based on qualifications, the majority (84.5%) had general dentist qualifications. Based on the duration of storing dental records (medical records), it showed that the length of storage time was less than 2 years of 23 medical records (16.2%), while the storage time was more than or equal to 2 years of 119 medical records (83.8%). A detailed description of the characteristics of the research sample is presented in Table 1.

Table 1 *Distribution of Sample Characteristics (N = 142)*

Variable	N	%
Gender		
Male	35	246%
Female	107	75.4%
Qualification		
Specialist	22	15.5%
General dentist	120	84.5%
Duration of maintenance of dental records		
<2 years	23	16.2%
≥2 years	119	83.8%
Training of forensic odontology in undergraduate program		
Yes	125	88%
No	17	22%
Updating information of forensic odontology		
Yes	35	24.6%
No	107	75.4%

Table 2 explains the answers to each question the knowledge variable. It showed that all samples (100%) kept dental records (medical records) of patients at work. For the question items regarding the level of adequate knowledge, analysis of bite mark patterns, experience as a witness in court, and the ability to handle forensic odontology cases, majority answered no or interpreted inadequate knowledge about it.

Table 2 *Distribution of responses to the knowledge*

No	Questions	Yes		No	
		N	%	N	%
1	Do you maintain dental records in your clinic?	142	100%	0	0
2	Do you maintain dental cast patient?	106	74.6	35	25.4
3	Do you know the relevance of dental records in recognising the dead and accused criminal?	126	88.7	16	11.3
4	Do you know that you can present forensic dental evidence in the court as an expert witness?	123	86.6	19	13.4
5	Do you think your present knowledge level/ awareness about forensic dentistry is adequate?	23	16.2	119	83.8
6	Do you think you have a crucial role in identifying deceased in the incident of mass fatality?	118	83.1	24	16.9
7	Do you have knowledge about bite mark patterns of teeth?	51	35.9	91	64.1
8	Had you been called by authority/court for forensic evidence related?	3	2.1	139	97.9
9	Are you confident in handling forensic dentistry-related cases?	41	28.9	101	71.1
10	Can you estimate the dental age of an individual by examining the teeth?	101	71.1	41	28.9

Of 142 dentists, the majority (59.9%) had a good level of knowledge and 40.1% had less knowledge. In this case the frequency of knowledge, in the good category is more than the knowledge in the less category (table 3).

Table 3 *Distribution of samples based on the level of knowledge (N = 142)*

Level of knowledge	N (%)
Less	57 (40.1%)
Good	85 (59.9%)
Total	142 (100%)

Based on table 4, it shows the results of bivariate analysis on each variable with knowledge, the analysis was carried out using logistic regression analysis on each of the two variables. The relation between updated information on forensic dentistry and knowledge shows that the OR value was 4.402 (95% CI=1.690–11,466). This showed that those who updated information on forensic dentistry have a knowledge opportunity of 4.402 times greater than those who did not update information with a p value of 0.002.

Table 4: *Bivariate analysis between knowledge of forensic odontology and sample characteristics*

Variable	OR (95% CI)	*p-value*
Gender		
Male	1.958 (0.857 – 4.477)	0.111
Female		
Qualification		
Specialist	1.038 (0.412 – 2.619)	0.936
General dentist		
Duration of maintenance of dental records		
<2 years	1.052 (0.422 – 2.623)	0.914
≥2 years		
Training of forensic odontology in undergraduate program	1.379 (0.498 – 3.815)	0.536
Yes		
No		
Updating information of forensic odontology		
Yes	4.402 (1.690 – 11.466)	0.002*
No		

p* value: significant at <0.05

Table 5 shows the multivariate analysis on all variables with knowledge, the analysis was carried out using binary logistic regression analysis on all independent variables. The relationship between updated information on forensic dentistry and knowledge shows that the OR value is 4.468 (95% CI=1.687–11.835). This shows that updating information on forensic dentistry has a knowledge opportunity of 4.468 times greater than not updating information with a p value of 0.003.

Table5: *Multivariate analysis between knowledge of forensic odontology and sample characteristics*

Variable	OR (95% CI)	*p-value*
Gender		
Male	1.877 (0.782 – 4.504)	0.159
Female		
Qualification		
Specialist	1.104 (0.408 – 2.987)	0.846
General dentist		
Duration of maintenance of dental records		
<2 years	1.166 (0.441 – 3.084)	0.757
≥2 years		
Training of forensic odontology in undergraduate program	1.355 (0.457 – 4.019)	0.584
Yes		
No		
Updating information of forensic odontology		
Yes	4.468 (1.687 – 11.835)	0.003*
No		

p* value: significant at <0.05

Discussion

This research aimed to determine the level of knowledge of dentists in Makassar City regarding forensic odontology and to find out what factors influence their level of knowledge. In this survey, all samples stated that they kept dental records of patients in their place of work. This was in line with previous research explaining that all samples also kept dental records where they clinic.[2]

Dental records has to include all diagnostic information, clinical findings, treatments performed, laboratory results, and dental impressions of all patients and must be properly recorded and stored. In this study, the majority of samples kept dental impressions of patients where they worked and this is in line with previous studies.[1,15] Yet, it contradicts to a study conducted in India in 2014 stated that only a few samples retained impressions of the patient's teeth.

As a dentist, has an important role in the process of identifying teeth by providing ante-mortem data in the form of dental records to be matched with postmortem dental data. In addition, dental records also function to protect legal interests for patients, hospitals, dentists, and other health workers.[2,16] Therefore, dental records must be stored properly and filled out correctly in accordance with applicable regulations. Thus, when they are needed for a court interest, they can be used to protect patients, doctors, and hospitals.[17,18]

Dentists as health workers who have expertise in the field of teeth and mouth can assist investigators in examinations as expert witnesses in court to provide true and good information and opinions, according to their field of expertise. Dentists have duty to provide expert information if there is a request or a call from the party authorized to handle the case.[13,19] In this survey, the majority know that they can be expert witnesses in court, this is in line with research conducted in Pakistan.[20] However this was different from a study conducted in India which says that few people know that they can be expert witnesses in court.[13]

Besides functioning as an identification of corpses, teeth can also be used to identify criminal cases through bite marks or bite mark patterns. Bites between individuals have their own characteristics, depending on the width and arch of the jaw, the position of the teeth and wear and tear on the incisal parts of the teeth.[21] In this survey, the majority of the answers, they did not know how to analyze bite mark patterns. This was different from research in Chennai in 2012.[13]

A dentist, in addition to having a background knowledge of general dentistry, they must also have basic knowledge of forensic odontology, such as dead body identification methods, analysis of bite mark patterns, and knowing the importance of storing and filling dental records properly. In table 3, the average level of knowledge of dentists regarding forensic odontology was categorized in the good category. Research conducted in Australia also showed the same results.[1] On the other hand, inadequate knowledge was reported in a research conducted in Chennai, India.[10]

Dentists need to always be up-to-date of the latest developments in science and technology, especially in the field of dentistry. Dentists can update knowledge through various learning resources, such as books, journals, seminars, conferences, and use information available on the internet to stay up-to-date with new research and knowledge.[22] This research found that there was a significant relation between updating information on forensic odontology and level of knowledge. Dentists who updated information were four times more likely to have good knowledge than those who never updated their knowledge. These results are in line with previous research conducted in Saudi Arabia.[14] This finding emphasized the importance of encouraging dentists to use various existing knowledge sources to continuously update their knowledge.

Conclusions

Based on the results of the research, the level of knowledge about forensic odontology at dentists in Makassar City is in good category. Factors that affect dentists'level of knowledge are updating information regarding forensic odontology. Dentists who update information on forensic odontology are four times more likely to have better knowledge of forensic odontology. This finding is emphasise the importance of encouraging dentists to use various existing knowledge sources to support and improve their knowledge.

Competing interest

The authors declare that they have no competing interests.

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Authors' contributions

FHA and EE conceptualized and designed the study. MY and FHAperformed the literature review and formulated the questionnaire. ND and RP collected all the data and contributed to the analysis of the data. FHA, EE, and MY prepared the first draft of the

manuscript. RP and ND reviewed and edited the final draft of the manuscript. All authors read and approved the final manuscript.

Ethic approval and consent to participate

This study was approved by the Health Research Ethics Committee of the Faculty of Dentistry Hasanuddin University with the protocol number #UH 17120431 and letter number 0029 / PL.09 / KEPK FKG-RSGM UNHAS / 2021. Written informed consent was obtained from the participants before including them in the study.

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