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Research Report

The knowledge level of students at the Faculty of Dental Medicine, Universitas Airlangga regarding the forensic odontology field

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ABSTRACT

Background: Forensic odontology is a field concerned with the use of dental evidence to identify the age, race, gender of victims and suspects in mass disasters, abuse, and organized crime. General dentists are required to have basic knowledge and expertise in forensic dentistry. Aspiring dentists in dental professional education must demonstrate mastery in both medical and dental sciences, which is a requirement to fulfill the dentist competency standard. Forensic dentistry supports preclinical and clinical skills in both basic and applied dentistry. Therefore, research is necessary to determine the level of knowledge of undergraduate dental students, dental professional education students, and dental specialist program students regarding the field of forensic odontology. Information about the level of knowledge was obtained by using a questionnaire that inquired about the content of the material measured. In this study, the research subjects were undergraduate dental students, dental professional education students, and dental specialist program students at the Faculty of Dental Medicine, Universitas Airlangga. **Purpose:** Analyze the level of knowledge of students at the Faculty of Dental Medicine, Universitas Airlangga, regarding the field of forensic odontology. **Methods:** This study is an analytical observational study with a cross-sectional research design. This study used Google Forms for data collection with closed questionnaires. **Results:** According to the results of this study, a significant majority of respondents, specifically 83.3%, demonstrated a level of knowledge in the good category. **Conclusion:** the Faculty of Dental Medicine, Universitas Airlangga students had knowledge levels in a good category regarding the field of forensic odontology.

Keywords: forensic odontology; knowledge level; knowledge assessment; dental education; medicine

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INTRODUCTION

According to the Federation Dentaire Internationale (FDI), forensic odontology is a branch of dentistry that focuses on the analysis and examination of dental evidence for legal purposes. It entails the proper evaluation and handling of dental findings to ensure accurate presentation in the pursuit of justice. Additionally, the American Society of Forensic Odontology defines forensic odontology as the application of dental expertise in legal matters, specifically the use of dental evidence to serve justice. Forensic odontology is a field that combines dentistry and the legal profession with the aim of helping in the identification of individuals who are difficult to visually recognize due to accidents or disasters.[1,2]

The identification of victims of mass disasters is a crucial function of the odontology forensic field, which employs medical record data or antemortem records acquired from general dentists.[3] Forensic odontology is a field concerned with the use of dental evidence to identify victims and suspects in mass disasters, abuse, and organized crime. Forensic odontology seeks to identify individuals using several parameters, such as age, ancestry, and gender.[4]

Several studies have been conducted to investigate the knowledge and attitudes of individuals, including both dental students and dentists, regarding the field of forensic odontology. In 2020, Shoro et al. (2020) conducted research to examine the level of awareness and importance of forensic odontology among dentists and dental students at dental institutes in Pakistan. They discovered that while dental faculty members have some basic knowledge of forensic odontology, the majority of them are unfamiliar with its inclusion as a syllabus in the dental undergraduate curriculum, as well as the availability of forensic

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odontologists. Additionally, the students showed positive attitudes toward recording and maintaining dental records. However, they still demonstrated a lack of knowledge about the methods and duration used to maintain dental records.[5] Akram et al. (2019) conducted research on the knowledge, awareness, and practice of forensic odontology among dental practitioners in Karachi. The research found adequate levels of knowledge and awareness, with an average percentage of less than 65%. However, they did not implement this knowledge and awareness in clinical practice, leading to a significant shortage of trained forensic odontologists.[6] This study may represent the current level of general knowledge among dental practitioners in the field of forensic odontology. Two previous studies by Shoro et al. (2020) and Akram et al. (2019) concluded that having extensive knowledge about the overview of lessons covered in the field of forensic odontology is crucial for dental students and dentists. This knowledge is particularly valuable because it pertains to the collection and storage of forensic evidence.[6,7]

General dentists are required to have basic knowledge and expertise in forensic dentistry.[7] Aspiring dentists in dental professional education must demonstrate mastery in both medical and dental sciences, which is a requirement to fulfil the dentist competency standard. Furthermore, forensic dentistry supports preclinical and clinical skills in both basic and applied dentistry.[8,9]

Based on the explanation above, it is necessary to conduct research to determine the level of knowledge of undergraduate dental students, dental professional education students, and dental specialist program students regarding the forensic odontology field. Information about the level of knowledge was obtained by using a questionnaire that inquired about the content of the material measured. In this study, the research subjects were undergraduate dental students, dental professional education students, and dental specialist program students at the Faculty of Dental Medicine, Universitas Airlangga. The purpose of this study is to analyze the knowledge level of students at the Faculty of Dental Medicine, Universitas Airlangga, regarding the field of forensic odontology.

MATERIALS AND METHODS

This study is an analytic observational study with a cross-sectional research design. This study used Google Forms as a data collection medium with closed questionnaires. The study population consisted of first-year undergraduate dental students (class of 2022), second-year undergraduate dental students (class of 2021), third-year undergraduate dental students (class of 2020), final-year undergraduate dental students (class of 2019), dental professional education students (2017-2018), and dental specialist program students at the Faculty of Dental Medicine, Universitas Airlangga. The research sample consisted of undergraduate dental students, dental professional education students, and dental specialist program students at the Faculty of Dental Medicine, Universitas Airlangga. In addition, the proportional random sampling technique was used to take samples. This study was conducted following ethical guidelines and approved by the Ethics Committee of the Faculty of Dental Medicine Universitas Airlangga, with the ethical clearance number 797/HRECC.FODM/X/2022.

The dependent variable in this study was the knowledge level of students at the Faculty of Dental Medicine, Universitas Airlangga, regarding the field of forensic odontology. Moreover, the independent variable was the education level being pursued at the Faculty of Dental Medicine, Universitas Airlangga, encompassing an undergraduate degree in dental medicine, dental professional education, and dental specialist program students. Additionally, the tools and materials used in this study were Google Forms (Google LLC, Mountain View, CA, US), a laptop, Microsoft Office Excel 2019 (Microsoft Corporation, Redmond, WA, USA), and Statistical Package for the Social Sciences (SPSS) version 25 (IBM Corp., Armonk, NY, USA).

The steps for data collection and analysis are as follows: 1) Planned the design or type of questionnaire distributed to respondents. 2) Arranged questions on the questionnaire. 3) Distributed questionnaires to respondents who were willing to become research samples according to the criteria. 4) Respondents were required to use an email account to fill out the Google Form questionnaire. 5) Respondents were required to fill out the informed consent form when completing the questionnaire. 6) The questionnaire results were checked to identify any data that required correction. 7) Data analysis was carried out on the questionnaire results, and conclusions were drawn.

The questionnaire used for collecting research data underwent testing to ensure its validity and reliability. Additionally, Pearson Correlation Product Moment was used to conduct the validity test of this questionnaire. The collected data was initially tested for normality using the Kolmogorov-Smirnov test due to the sample size exceeding 50. Furthermore, a data homogeneity test was carried out using Levene's Test to determine the homogeneity of the data. If the p-value is > 0.05, it indicates that the data is homogeneous. Moreover, a non-parametric analysis was carried out using ordinal data scales. The Kruskal-Wallis test was employed to test the ratio differences with the Mann-Whitney follow-up test. This non-parametric test was conducted to determine differences in the level of knowledge of each sample group.

RESULTS

Respondents in this study were students at the Faculty of Dental Medicine, Universitas Airlangga, with an undergraduate degree in dental medicine, dental professional education, and dental specialist programs. Table 1 provide the data on the education level of the respondent.

Arikunto (2013) categorized the level of knowledge based on its value as follows[6]: Good knowledge was

defined as having a knowledge value ≥ 70, while sufficient knowledge was described as having a knowledge value of 40–69, and less knowledge was defined as having a knowledge value < 40. Most students at the Faculty of Dental Medicine, Universitas Airlangga, had a good level of knowledge about forensic odontology. Table 2 presents data on the knowledge level of students at the Faculty of Dental Medicine, Universitas Airlangga.

The categorization of participation in forensic odontology lectures was determined by whether or not the respondent had taken or attended a forensic odontology course. Table 3 presents the respondents' participation in forensic odontology lectures.

According to the data in the Table 3, all undergraduate dental students in the class of 2022 have never taken a forensic odontology course. Undergraduate dental students in the class of 2022, 2021, 2020, 2019, dental professional dental specialist program students have taken a forensic odontology course.

Table 1. Educational Level of Students at the Faculty of Dental Medicine, Universitas Airlangga

Educational Level	Respondent (n)
Undergraduate class of 2022	44
Undergraduate class of 2021	45
Undergraduate class of 2020	45
Undergraduate class of 2019	64
Professional	81
Specialist	44
Total	323

Table 2. Knowledge level of students at the Faculty of Dental Medicine, Universitas Airlangga, regarding Forensic Odontology field.

Respondent Knowledge Level	Total	
	n	%
Good	269	83.3
Sufficient	45	13.9
Less	9	2.8

Table 4 presents respondents' knowledge level of forensic odontology based on their level of education. Undergraduate dental students in the class of 2022, 2021, 2020, 2019, dental professional dental specialist program students had a good knowledge.

Table 5 presents respondents' knowledge level about forensic odontology based on their participation in forensic odontology lectures. According to the data in the Table 5, the majority of respondents who had received a forensic odontology course had a good knowledge level. Furthermore, the majority of respondents who had never taken a forensic odontology course also had a good knowledge level.

Based on the results of the study, 293 respondents, most of them sought information about forensic odontology from sources other than lectures, the majority of respondents sought information about forensic odontology via the internet, followed by movies/TV shows, books or magazines, and webinars.

Table 6 reveals that most respondents correctly answered question 14: "DVI stands for Disaster Victim Identification." In contrast, the majority of respondents (24.8%) answered incorrectly to the question regarding the form and its color used to record information when a victim is identified after death. In question number 14, the majority of respondents who answered correctly were in dental professional education, namely 58 people (71.6%). In addition, undergraduate dental students in the class of 2022 provided the most incorrect answers to question number 2, accounting for 9 respondents (20.4%).

Based on the results of the Kruskall-Wallis test, the results obtained significant values ($p < 0.05$), there were differences between groups. A follow-up test using the Mann-Whitney test was conducted to further investigate the location of significant differences within each group. The following Table 7 shows the series of Mann-Whitney test results .

Table 3. Forensic Odontology lecture participation by education level

Educational Level	Forensic Odontology Participation			
	Never Attended		Had Attended	
	n	%	n	%
Undergraduate class of 2022	44	13.6	0	0
Undergraduate class of 2021	0	0	45	13-9
Undergraduate class of 2020	0	0	45	13.9
Undergraduate class of 2019	0	0	81	25.1
Professional	0	0	64	19.9
Specialist	5	1.5	39	12.1

Table 4. Knowledge level of students at the Faculty of Dental Medicine, Universitas Airlangga, based on their education level

Education Level	Knowledge Level					
	Good		Sufficient		Less	
	n	%	n	%	n	%
Undergraduate class of 2022	22	50	17	38.6	5	11.4
Undergraduate class of 2021	38	84.4	7	15.6	0	0
Undergraduate class of 2020	41	91.2	2	4.4	2	4.4
Undergraduate class of 2019	75	92.6	5	6.2	1	1.2
Professional	60	93.8	3	5	1	1.2
Specialist	33	75	11	25	0	0

The Mann-Whitney test results (Table 7) indicate a significant difference if the p value is < 0.05, and no significant difference if the p value is > 0.05. Moreover, according to the Mann-Whitney test results, there was a significant difference between the educational levels of the undergraduate class of 2022 and the undergraduate class of 2021, the undergraduate class of 2020, the undergraduate class of 2019, dental professional education, and dental specialist programs ($p < 0.05$). Furthermore, there was a significant difference between the undergraduate class of 2021 and dental professional education ($p < 0.05$). Moreover, there was a significant difference between dental professional education and the dental specialist program ($p < 0.05$). In addition, there was no significant difference in the other groups ($p > 0.05$).

DISCUSSION

The questionnaire encompasses a range of topics, such as dental identification, forensic anthropology, bitemark analysis, age estimation, sex determination, and disaster victim identification (DVI). The students at the Faculty of Dental Medicine, Universitas Airlangga, received sufficient education about forensic odontology and received the information well, which is why their levels of knowledge were in a good category.

Bipin et al. (2020), who examined preclinical students' awareness and knowledge of forensic odontology at several private dental institutions, found that the majority had a good level of knowledge. Several factors contributed to the study's knowledge level, including structured and

Table 5. Knowledge level of students at the Faculty of Dental Medicine, Universitas Airlangga University, based on their forensic odontology lecture participation.

Lecture Participation	Knowledge Level					
	Good		Sufficient		Less	
	n	%	n	%	n	%
Had Attended	249	77.1	26	7.6	4	1.4
Never Attended	25	6.8	19	5.4	5	1.6

Table 6. Results of questionnaire answers categorized by the questionnaire number.

Questionnaire Number	Correct Answers		Incorrect Answers	
	n	%	n	%
1	245	75.8	78	24.2
2	243	75.2	80	24.8
3	274	84.8	49	15.2
4	300	92.8	23	7.2
5	263	81.4	70	18.6
6	290	89.7	33	10.3
7	278	86.1	45	13.9
8	297	91.9	26	8.1
9	283	87.6	40	12.4
10	296	91.6	27	8.4
11	265	82	58	18
12	300	92.8	23	7.2
13	277	85.7	46	14.3
14	305	94.4	18	5.6
15	282	87.3	41	12.7
16	291	90.1	32	9.1
17	279	86.3	44	13.7
18	260	80.5	63	19.5
19	261	80.8	62	19.2
20	262	81.1	61	18.9

Table 7. Results of the Mann-Whitney Test on the Knowledge Level of Students at the Faculty of Dental Medicine, Universitas Airlangga

	Undergraduate class of 2022	Undergraduate class of 2021	Undergraduate class of 2020	Undergraduate class of 2019	Professional	Specialist
Undergraduate class of 2022	-	0.001*	0.000*	0.000*	0.000*	0.000*
Undergraduate class of 2021	0.001	-	0.344	0.053	0.008*	0.801
Undergraduate class of 2020	0.000	0.344	-	0.457	0.156	0.708
Undergraduate class of 2019	0.000	0.052	0.456	-	0.452	0.137
Professional	0.000	0.008	0.156	0.452	-	0.000*
Specialist	0.000	0.801	0.708	0.137	0.000*	-

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formal training, detailed studies, and the inclusion of forensic odontology in the curriculum.[10] This aligns with Farag's (2023) studies, which state that higher levels of education impact knowledge and practices.[11] The formal education that students get regarding forensic odontology is generally available in the learning curriculum, but a study from Abdul (2019), 97.5% of the participants revealed that forensic dentistry was not included as part of the curriculum in undergraduate and postgraduate dental courses.[12] To validate Farag (2023), this study also examined students' participation in forensic odontology lectures and its effect on their level of knowledge.

According to the results of this study, undergraduate dental students in classes 2019, 2020, and 2021, as well as dental professional education students, all participated in a forensic odontology lecture. Based on the curriculum of the Faculty of Dental Medicine, Universitas Airlangga, education regarding forensic odontology is obtained in the third semester of the undergraduate study period. Therefore, in this case, undergraduate dental students in the class of 2022 who have recently completed their first semester have not participated in a forensic odontology lecture. Students have not participated in a forensic odontology lecture because not all dental specialist program students are undergraduate students who have graduated from the Faculty of Dental Medicine, Universitas Airlangga. Therefore, whether other universities have a forensic odontology curriculum or employ similar lecture methods is uncertain.

According to Thorndike's theory, it is called the connectionism theory. Connectionism theory states that learning is the formation of a relationship between stimulus and response, and repetition of experiences will increase the emergence of correct responses.[13] Some students may possess a sufficient level of knowledge and provide incorrect answers as a result of inadequate information acquisition. Moreover, varying knowledge acquisition methods and differences in personal knowledge can also contribute to this problem. The level of knowledge in the less category was due to a lack of student awareness regarding forensic odontology's important goals and the dentists' role in assisting the identification process. According to Abdul et al. (2019) and Ali et al. (2016), a lack of formal training and the absence of forensic odontology in the curriculum in several countries contribute to the low level of knowledge among students.[12,14] Indonesia, on the other hand, has incorporated forensic odontology into its curriculum through seminars, workshops, and formal training on the subject. In their research, Sujatha et al. (2018) found that the knowledge level of most students was in the poor category, even though forensic odontology already existed in their country, India.[15] The study concluded that teaching methods and materials were still not optimal for forming students' curiosity and interest.

Students from various educational levels who participated in the lecture had a good level of knowledge. These results indicate that participation in a forensic odontology lecture affected the level of knowledge. This is in line with the research by Abdul et al. (2019), which revealed that undergraduate students who received less formal training and study materials but did not receive the forensic odontology curriculum had an inadequate or insufficient level of knowledge. On the other hand, postgraduate students who received formal training and education in forensic odontology had sufficient knowledge.[12] In addition, Ali et al. (2016) conducted research on the knowledge and behaviour of students at Dow University of Health Sciences, which discovered that the research participants lacked sufficient knowledge of forensic odontology because the majority did not receive formal forensic odontology education in their curriculum. Only a few dental specialist program students had received this education.[14]

Students who have never participated in a forensic odontology course, such as those in the class of 2022, also demonstrated a good level of knowledge. While most students correctly answered most questions. Students' high interest in forensic odontology may result in a level of knowledge that falls into the good category. Interest tends to change a person's behaviour when seeking information. This study, according to Dorota et al. (2013), shows that most students are unfamiliar with forensic dentistry. Conversely, 96% expressed interest in the topic and wanted to engage in optional sessions and labs. The level of knowledge increases as one obtains more information.[16]

According to research by Abdul et al. (2019), 75% of respondents source their information about forensic odontology from the Internet, with the remaining 12.5% obtained from books, journals, lectures, and workshops.[12] In the research by Manju et al. (2021), 38% of respondents sourced their information from lectures, followed by the Internet at 38% and books at 19%. The research revealed that internet media served as the primary source of information outside of lectures, as it facilitates quick access to information.[17] However, the information available on the internet is not necessarily accurate. Study Tonsaker et al. (2014) revealed that internet access may enhance patient knowledge, proficiency, and involvement in health-related decision-making. Nonetheless, they underscore that the quality of online health information is inconsistent, and patients' health information literacy differs, potentially resulting in misconceptions or improper use of information.[18]

Furthermore, television and film media provide intriguing pictures because they present audio-visual material. Messages can be conveyed clearly without boring.[19] The sources of information available at the seminar are adequate enough to increase student knowledge because the workshop brings in resource persons who are experts in their fields so that they can describe more clearly how forensic odontology works. Khalifa et al. (2024) recommend that dental colleges have to provide forensic odontology training via workshops, seminars, ongoing educational programs, and practical experience in forensic facilities to augment the knowledge and competencies of graduates.[20]

The results of this study, based on educational level, found that undergraduate dental students from the

2019–2022 class, dental professional education students, and dental specialist program students had a good level of knowledge. However, at each educational level, there are several students whose knowledge falls into the categories of sufficient and less. In the class of 2020, the majority of students correctly answered most questions. It was also found that the majority of incorrect answers among dental specialist program students came from question 9 regarding the use of radiography in forensic odontology. This was due to the long-time gap between receiving a forensic odontology lecture and taking a dental specialist program. These results could also be attributed to a lack of student interest. Students who are interested and eager to expand their knowledge often seek additional information outside of lectures, enabling them to increase their understanding and delve deeper into the subject material.[21]

There were a few students in the class of 2022 who had sufficient knowledge, while others had less. The third semester's forensic odontology curriculum may be a contributing factor. Therefore, it can be concluded that the level of education affects knowledge. This statement aligns with the research of Bipin et al. (2020), who examined the awareness and knowledge of forensic odontology among undergraduate students at several dental institutions.[10] The results showed that students in the fourth and third years had the best knowledge compared to those in the first and second years. In the study of Alsowayigh et al. (2021), final-year students had the highest awareness and knowledge among existing levels of education.[22] Furthermore, Manju et al. (2021) found that 75% of interns achieved very good scores in the KAP assessment (knowledge, attitude, practice), with another 30% achieving the same in the fourth and third years. In addition, first- and second-year students generally had less, sufficient, or good levels of knowledge.[17]

The majority of respondents correctly answered each of the 20 questions that were available in this study. Question number 14, which asks about the meaning of DVI (Disaster Victim Identification), received the most correct answers. The large number of respondents who correctly answered this question may be due to their familiarity with the term DVI, which frequently appears in various sources, such as news. The majority of respondents gave incorrect answers to question number 2, specifically regarding the postmortem and antemortem forms. Most students in the undergraduate class of 2022 provided incorrect answers to the question. This is because undergraduate dental students in the class of 2022 have not received forensic odontology lectures, even though lectures typically provide in-depth information regarding postmortem and antemortem forms.

This research has certain limitations that must be acknowledged when analyzing the results. The cross-sectional approach collects data simultaneously, limiting its capacity to evaluate changes or trends in student's knowledge over time. Secondly, the dependence on self-reported data via questionnaires may have resulted in response bias since individuals might exaggerate their expertise or provide socially acceptable responses. Lastly, participation bias may exist, as students with a heightened interest or expertise in forensic odontology would have been more motivated to engage, distorting the results. These limitations highlight the need for more study to bridge these gaps and enhance the understanding of students' competence in forensic odontology.

From the present study result, it can be concluded that the knowledge level students at the Faculty of Dental Medicine, Universitas Airlangga, possess about forensic odontology falls into the good category. Based on lecture participation, both participating and non-participating students had a good level of knowledge. At all levels of education, the knowledge level of undergraduate dental students in 2019, 2020, and 2021, dental professional education, and dental specialist programs were in a good category. In addition to lectures, students used the Internet, films, TV, books, journals, and seminars as sources of information to enhance their understanding of forensic odontology.

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