

A look into Forensic Odontology: Knowledge and Awareness among Dental Students of AIMST University, Malaysia

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Abstract

Objective: To evaluate the knowledge, awareness and necessity of forensic odontology among the students of AIMSTU university. *Materials and Methods:* A cross-sectional, institution-based survey was conducted among 200 undergraduate clinical years, dental students. Simple random sampling was done. Each participant was given a questionnaire. The questionnaire consisted of a set of 15 questions. Questions comprised of both yes or no and multiple choices. The answers received were tabulated and statistically analyzed. *Results:* All the participants were aware of forensic odontology, a branch in dentistry, yet overall results in current study shows only 52% graded as good, 39.5% of students as fair and 8.5% were graded as poor, depending on the number of correct answers. 78% of respondent's feel the knowledge they attain is very less regarding the subject and therefore wants it to be incorporated in the syllabus. Whereas only 67% of students wish to attend the seminars and workshops related to forensic odontology. *Conclusion:* 13 dental schools in Malaysia but none of them are offering this course; hence Forensic odontology must be introduced into the BDS curriculum efficiently as a separate subject so that the students get aware and familiar with the required knowledge. Thus the nation needs more of these qualified forensic odontologists.

Keywords: Awareness; Undergraduate Dental Students; Forensic Odontology; Knowledge; Malaysian BDS Curriculum; Survey.

Introduction

Forensic odontology is gradually establishing itself as an important science in medico-legal cases since late 19th century, this may be due to the increase in mass disasters consequent to civil war, acts of terrorism and genocide where severe mutilation or burning of bodies may happen. Disaster response and management has always been one of the biggest challenges to a community [1]. Identifying victims involved in disasters not only has religious and personal reasons attached to it, but it also has an important socio-legal influence [2].

Keiser-Neilson defined forensic odontology as the branch of forensic medicine which deals with the proper handling, examination and presentation of dental evidence in the best interest of justice [3].

Human dentition is considered as hard tissue analog to the fingerprints. It is almost as unique to an individual as fingerprints. In addition, forensic odontology is made possible in identifying bodies after disasters and tragedies because dental hard tissues are extremely resistant to fire and are usually remains after an extended period of burial [4]. One of the earliest recorded cases of human identification using dental evidence dates back to the period of Emperor Nero. Around 66AD, Nero's love interest Sabina was killed by his wife's soldiers who identified the head of the victim by recognizing a black anterior tooth [5].

This fascinating branch of forensic science has been used widely throughout the years and has been giving such successful results. One of them was the identification of the body of 8-year-old Nurin Jazlin Jazimin who went missing in August 2007 in Wangsa Maju, Kuala Lumpur and was found dead in a gym bag a month after. Forensic investigators suggested physical and sexual abuse, 2 rounds of DNA test and a dental record from her school showed a 95% probability match [6].

The American Board of Forensic Odontology (ABFO) was founded in 1976 to identify and certify

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dental experts involved in Forensic Odontology [7]. Dental clinicians, as other healthcare workers, are at the forefront in detecting signs of violence appearing on their patients. Although forensic odontology is becoming more established, it is still considered as something “fresh” among the dental fraternity in Malaysia. By the year of 2013, there were 6 (5 forensic odontologists in Malaysia and another one was in training in Belgium). These odontologists are working at various places including Ministry of Defense, Ministry of Higher Education and Ministry of Health [8]. Educationally, forensic odontology has not been implemented in any universities in Northern Malaysia and no prominent info of forensic odontology studies in other parts of the country. Hence most of the clinicians are unaware of the criteria of abusive injuries, and the reporting mechanisms which ensure a correct response by the concerned authorities.

The demand on pursuing dentistry in higher education has been increasing in Malaysia. Evidently youngsters are showing more interest in dentistry and its branches, this provides more possibilities and opportunities to branch into numbers of specialties, including forensic odontology and thus makes it mandatory to introduce in our curriculum.

Keeping this as the background, this study was undertaken to analyze and assess the awareness about forensic odontology among the dental students in AIMST University, who represent a part of Malaysia.

Materials and Methods

A cross sectional study was conducted using a structured questionnaire. The sample consists of 200 subjects randomly from year three, year four and year five dental students studying in AIMST University, Bedong, Malaysia. A questionnaire consisted of 15 questions, in which question number 1 to 13 were to evaluate the respondents’ knowledge and awareness, which included questions on age estimation methods, lip prints, child abuse and bite marks. Question 14 and question 15 assessed their interest in including forensic odontology in the syllabus and their interest in attending any forensic seminar or workshops.

All available and willing participants were given the questionnaire and asked to respond to each item in the questionnaire by choosing the most appropriate option. Confidentiality of the participants was assured.

Questionnaire

1. Do you know anything about Forensic Odontology?
 - a. Yes
 - b. No
2. Which of the following are the roles of Forensic Odontology?
 - a. Human identification
 - b. Mass fatality incidence
 - c. Bite mark analysis
 - d. Domestic violence
 - e. Child abuse
 - f. All the above
3. Which of the following do you think can be used in Forensic Odontology in identification?
 - a. Dental professionals recording
 - b. Radiographs
 - c. Study models
 - d. Clinical photographs
 - e. All of the above
4. Which of the following methods do you think is the most accurate method in identifying an individual?
 - a. Visual identification
 - b. DNA comparison
 - c. Verification from identity card or passport
 - d. Don’t know
5. Do you know the importance of keeping dental records in identifying the deceased and crime suspects?
 - a. Yes
 - b. No
6. What should you do when you notice signs and symptoms of child abuse?
 - a. Child counseling
 - b. Confront the parents
 - c. Neglect
 - d. Reporting to the concern authorities
 - e. Don’t know
7. How do you identify physical child abuse?
 - a. Physical injuries (unexplained bruises/ burns/scars)
 - b. Developmental delays in acquisition of speech/motor skills

- c. Poor hygiene
 - d. Torn underclothes
 - e. Don't know
8. Do you know how to estimate the age and gender of an individual by only conducting teeth examination?
 - a. Yes
 - b. No
 9. Do you know that dental hard tissue are extremely resistant to fire and can remains even after an extended period of burial?
 - a. Yes
 - b. No
 10. Do you know that different race have their characteristic dentition?
 - a. Yes
 - b. No
 11. Do you know anything about bite pattern of teeth?
 - a. Yes
 - b. No
 12. Are you aware that lip prints (Cheiloscropy) can be used for presenting dental evidence?
 - a. Yes
 - b. No
 13. Do you know that you can be a witness in the court to present dental evidence?
 - a. Yes
 - b. No
 14. Are you interested to attend any forensic seminars and workshops if conducted?
 - a. Yes
 - b. No
 15. Do you think Aimst Dental Faculty should include Forensic Odontology in the dental education syllabus?
 - a. Yes
 - b. No

According to number of questions answered correctly, their level of knowledge is classified into 3 different groups as below.

Number of questions answered correctly	Level of knowledge
1-5	Poor
6-9	Fair
10-13	Good

The data thus collected were recovered to statistical analysis. Descriptive statistics were applied for data analysis.

Results

Study participants comprised 200 dental students of dental institution (70 students from year 3, 78 students from year 4, and 52 students from year 5).

1. Do you know anything about Forensic Odontology?

57% of the participants claimed to know something about forensic odontology while 43% admitted to not know anything about forensic odontology. This shows that the distribution is almost equal but as an institution producing dental practitioners to be faced with all kind of possibilities in their working life, the result of awareness towards forensic odontology is considered insufficient and should be improved.

2. Which of the following are the roles of Forensic Odontology?

In current study about 124 participants out of 200 (62%) of students managed to identify the roles of Forensic Odontology, nearly 56 participants (28%) answered that human identification is the role of forensic odontology. Whereas 3 students (1.5%) answered mass fatality incidence, 13 (6.5%) answered bite mark analysis and only 2 participants (1%) chose domestic violence and child abuse as the roles of forensic odontology (Figure 1).

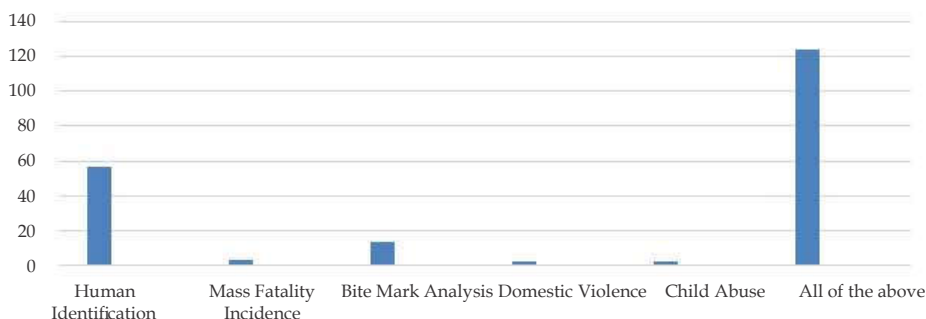


Fig. 1: Bar chart showing roles of forensic odontology as answered by respondents

3. Which of the following do you think can be used in Forensic Odontology in identification?

80.5% of the total number of participants could recognize the correct methods of Forensic Odontology in identification of an individual (Figure 2). 10 chose radiographs (5%), 3 chose study models (1.5%), and only 2 chose clinical photographs (1%)

4. Which of the following methods do you think is the most accurate method in identifying an individual?

Ninety three (93)% of them recognized DNA comparison is the most accurate method used to identify a person. Surprisingly, 10 admitted

that they do not know the most accurate method (Figure 3).

5. Do you know the importance of keeping dental records in identifying the deceased and crime suspects?

Ninety two (92)% knew the importance of keeping records while the remaining 8% do not know about it.

6. What should you do when you notice signs and symptoms of child abuse?

One hundred seventy nine (179) participants (89.5%) knew that they should report to the concern

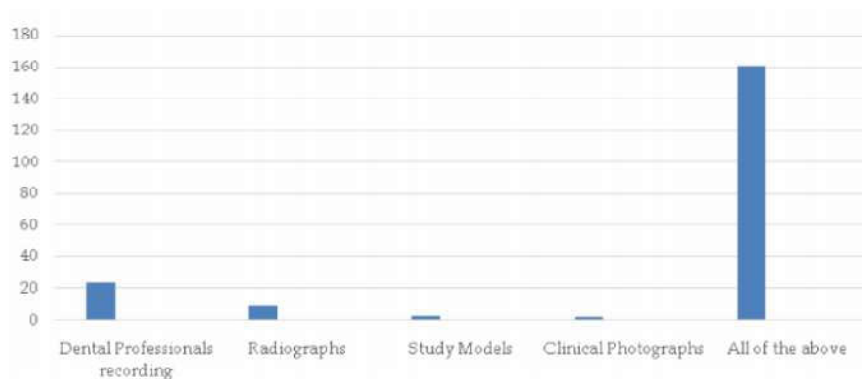


Fig. 2: Bar chart showing modes of identification methods used in forensic odontology as answered by respondents

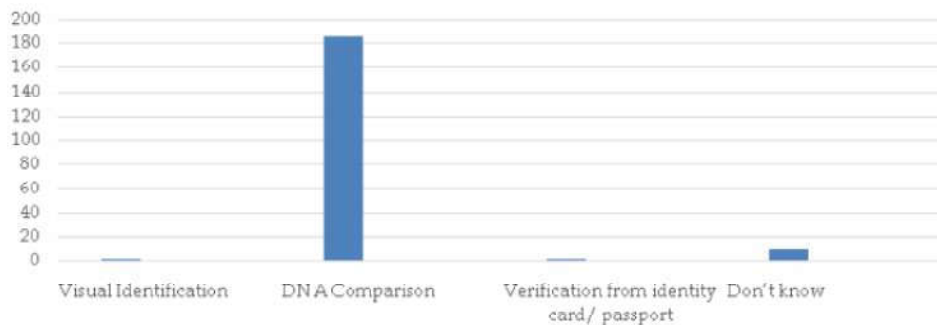


Fig. 3: Bar chart showing accurate methods to identify an individual as answered by respondents

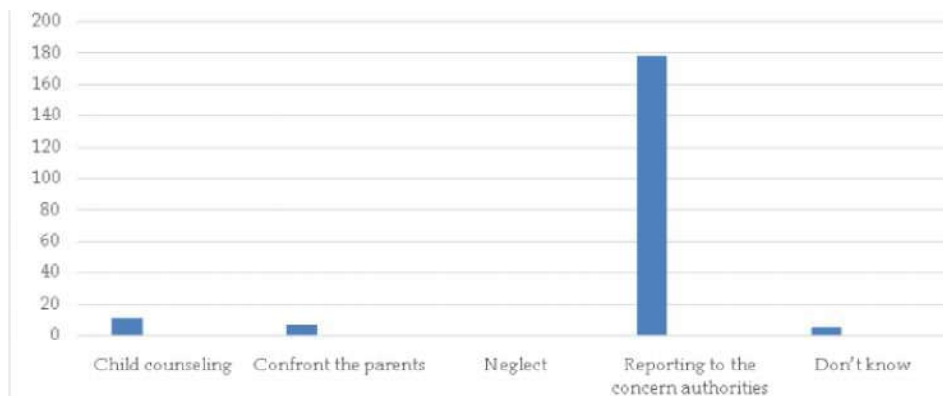


Fig. 4: Bar chart showing means of reporting during child abuse as answered by respondents

authorities, whereas 10 answered child counseling (5%), 6 chose to confront the parents (3%), and 5 (2.5%) have no idea what they should do (fig 4).

7. How do you identify physical child abuse?

One Hundred eighty eight (188) participants (94%) answered identifying physical abused child through physical injuries, 6 answered developmental delays, 2 answered torn underclothes and 4 do not know how to identify physical child abuse (Figure 5).

8. Do you know how to estimate the age and gender of an individual by only conducting teeth examination?

Seventy (70)% of the participants (141 out of 200) knew how to apply their knowledge on the estimation of age and gender of an individual while the remaining 30% do not know how (Figure 6).

9. Do you know that dental hard tissue are extremely resistant to fire and can remains even after an extended period of burial?

Eighty four (84)% of the participants (169 out of 200) knew that dental hard tissues are extremely resistant to fire and can remain even after an extended period of burial. On the contrary, 16% of the participants were unaware of this fact (Figure 7).

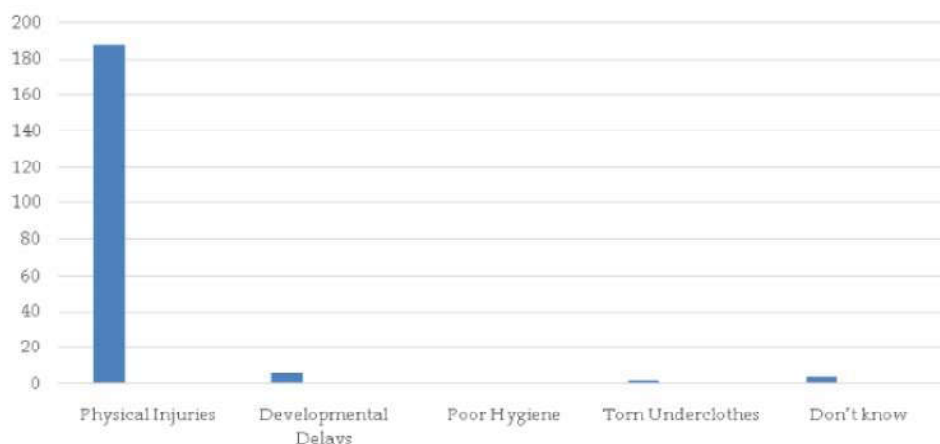


Fig. 5: Bar chart showing identifying methods of child abuse as answered by respondents

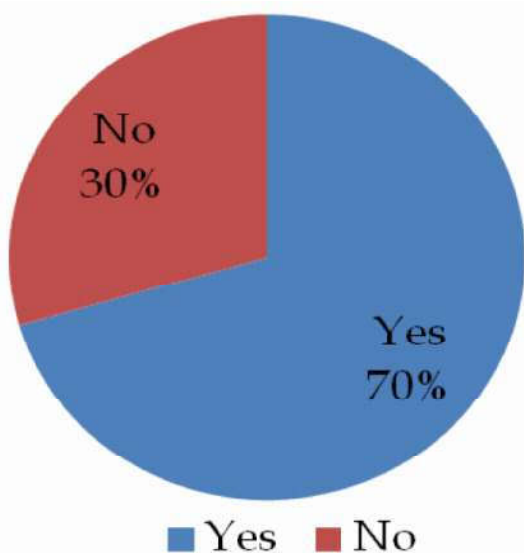


Fig. 6: Graph showing age estimating methods as answered by respondents

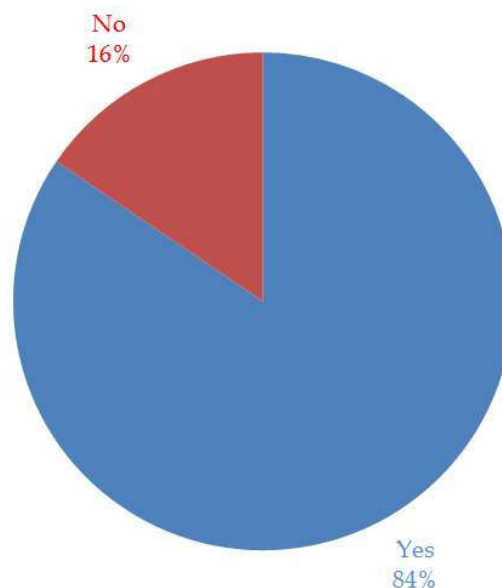


Fig. 7: Graph showing respondents response in knowing the resistant factor of hard tissue

10. Do you know that different race have their characteristic dentition?

The fact that different race have their own characteristic dentition was known by only 60% of participants, while 40% were unaware of this fact (Figure 8).

11. Do you know anything about bite pattern of teeth?

Bite pattern was known to only 57% of them, whereas 43% had no idea about it (Figure 9).

12. Are you aware that lip prints (Cheiloscopy) can be used for presenting dental evidence?

Fifty eight (58)% of the participants are not aware that lip prints can be used for presenting dental evidence and only 42% were aware of it (Figure 10).

13. Do you know that you can be a witness in the court to present dental evidence?

Positively 76% of the participants knew that dentists can be a witness in the court to present dental evidence. However, the remaining 24% did not know about this matter.

14. Are you interested to attend any forensic seminars and workshops if conducted?

Sixty Seven (67)% are interested to attend forensic seminar or workshops. The remaining 33% participants on the other hand, are not interested in attending any forensic seminar or workshops (Figure 11).

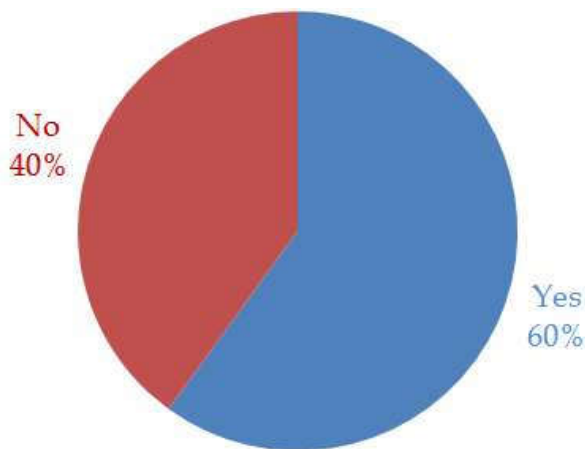


Fig. 8: Graph showing different race with their own characteristic dentition as answered by respondents

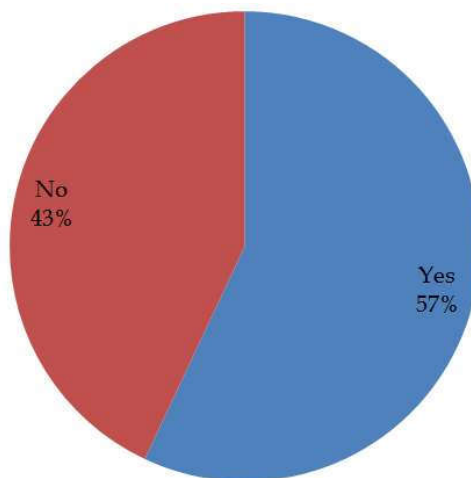


Fig. 9: Graph showing knowledge of respondents on bite marks

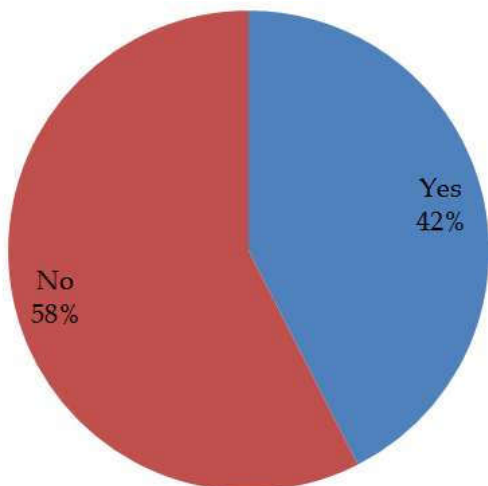


Fig. 10: Graph showing knowledge of respondents on lip prints

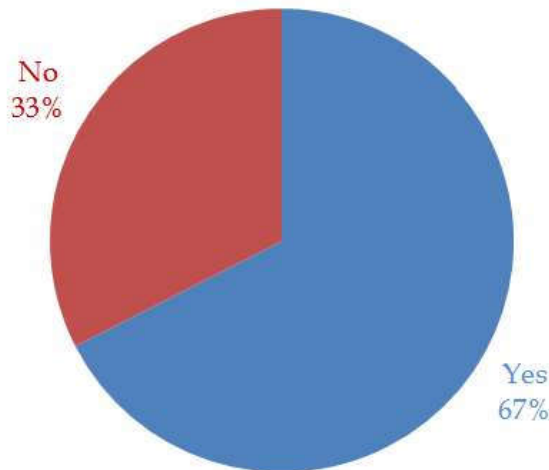


Fig. 11: Graph showing willingness of respondents to attend seminars/workshops on forensic odontology

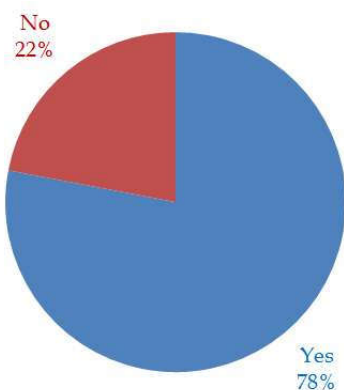


Fig. 12: Graph showing willingness of respondents to include forensic odontology in BDS curriculum.

15. Do you think AIMST Dental Faculty should include Forensic Odontology in the dental education syllabus?

Seventy eight (78)% of the respondents wish to include forensic odontology in the syllabus while 22% think otherwise (Figure 12).

Discussion

Forensic odontology utilizes the dentist's knowledge to serve the judicial system. It has become a developing science and is of great importance to society. The practice of forensic odontology has gained importance in a number of developed countries across the world. However in Malaysia, this field has already been introduced but it is not a well-established subject yet [9]. However, it still considered as something 'fresh' among the dental fraternity in Malaysia. Considering the present status/literature of knowledge of forensic odontology among students, it becomes one of the necessary requisite to train and educate the students, to change their perceptions towards forensic odontology. Hence the present study was undertaken to evaluate the awareness, knowledge and interest of forensic odontology among the clinical year dental students in AIMST University.

In our survey, the questionnaire was design with 15 questions in which question number 1 to question number 13 are to evaluate the respondents' knowledge and awareness, while question number 14 and number 15 are to evaluate their interest towards the subject.

Though all the clinical year dental students' already undergone theoretical classes on tooth morphology and eruption sequence in the first 2 years of dental school, it was surprising to see that 29.5% of the respondents did not know how to

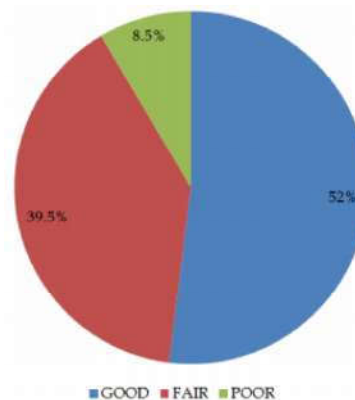


Fig. 13: Overall knowledge and awareness of respondents on forensic odontology

estimate the dental age by examining the teeth. As compared to one of the study [10], in which 76.5% of the subjects claim to have not undergone a formal training in dental evidence, and 37.5% of the dental students did not know how to estimate the dental age. The reasons for this could be multifarious, either their inexperience or lack of basic knowledge or lack of training.

RHannah et al. [11], stated 93% of the participants were aware that a dentist can present forensic dental records as evidence in court. Compared to our study, where only 76% of the participants knew that dentists can be a witness in the court to present dental evidence and the remaining 24% did not know about this matter. Krishan et al. [12]. has suggested that forensic odontologists are involved in assisting the law enforcing agencies in proper presentation of the dental evidence collected from the scene of crime or mass fatality incidents. Therefore it is important to stress on the significance of keeping dental records and keeping it up-to-date

In our study 93% of them recognized DNA comparison is the most accurate method used to identify a person, which was more compared to Duraimurugan. S et al. [13], where only 78.6% people reported that DNA, finger prints and teeth can be used to identify the individuals. Whereas another study [11] stated awareness of the teeth as a source of DNA was among 88% of students. Dental tissues can withstand environmental attacks and still retain its original structure. This property makes it an excellent source of DNA. Amplified DNA can be compared with antemortem samples, such as blood, hair, clothes, cervical smear, and biopsy [14].

Child abuse presents as a serious social problem with global dimensions. All cases of child abuse

should be detected as early as possible. A study [15] showed 44.2% of the participants, when they come across a child with signs and symptoms of abuse inform it to NGOs, 33.8% inform to the police, and 22% inform to the parents. In our study 89.5% knew that they should report to the concern authorities, whereas 10 answered child counseling (5%), 6 chose to confront the parents (3%), and 5 (2.5%) had no idea what they should do.

A study [13] reports only 50.8% students considered lip prints are study of chelioscopy and 35.4% don't know about the chelioscopy. Current study shows 58% of the participants were unaware that lip prints can be used for presenting dental evidence and only 42% were aware of it. The idea of using lip print for identification was first suggested by Le Moyne Snyder in the year 1950 [16]. However, there are types of patterns that are more dominant in male and female hence the importance of cheiloscopy in determining the gender of an individual [17].

According to Duraimurugan. S et al. [13], 45.1% of people reported that human tissue, food particles and inanimate objects are used in bite mark analysis. Our study Bite pattern was known to only 57% of them, whereas 43% had no idea about it. Human bite mark analysis is by far the most demanding and complicated part of forensic dentistry. Bite marks on a live body also have different characteristics from those on a dead body, so a forensic dentist might be able to assist with things like time of attack and/or time of death [18].

Some of the studies [4,19] show that knowledge and attitude about forensic odontology was partly adequate among dental students, whereas some studies [20,21] state inadequate knowledge, poor attitude, and lack of practice pertaining to record keeping or clinical knowledge of forensic odontology prevailing among the dental practitioners and dental students.

This study helps us to come to a consensus that the knowledge of forensic odontology among the dental students is not adequate. Overall only 52% were graded as good, 39.5% were graded as fair and only 8.5% were graded as poor (Figure 13). Only 52% of the students were good, which means they answered most of the questions right which still accounts to poor knowledge among the rest. Ideally a dental student is considered to know more about the subject and the expectancy of the study was at least 90% and more. Hence, results conclude that the knowledge of forensic odontology among the dental students of AIMST University is not adequate. This could be attributed to the lack of offered university

course (forensic odontology); Inadequate exposure in the field of forensic dentistry and lack of practical exposure to forensic cases in Universities. With crime rates at its maximum these days, the students can make a career in forensic odontology. As in AIMST University itself, majority of the respondents were interested in attending seminars and workshops related to this field and 67.5% agree that it should be included in syllabus of dental education.

Conclusion

Never before has forensic odontology been thrust into the mainstream, an often misunderstood and neglected part of the vast field of dentistry [22].

A total of six forensic odontologists in Malaysia are trained and qualified from foreign countries, with only six of them against 31.7 million of Malaysian population [8,23]. There are currently 13 dental schools in Malaysia but none of them are offering this course, hence the concern ministries should propose the implementation of forensic odontology education to facilitate justice to cases that crucially require their expertise. Therefore the nation needs more of these qualified forensic odontologists.

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