Knowledge and Awareness about Forensic Entomology in India among Dental Students

Taanya Imtiaz, Abirami Arthanari*

Department of Forensic Odontology, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India

ABSTRACT

Introduction: Forensic science deals with various branches, which involve the identification of the dead and also reveals the suspect of the crime. Thus a branch of forensic science is forensic entomology, which is a study that deals with insects and arthropods in a criminal investigation. Insects are used to estimate PMI-post-mortem interval because of the reproductive stage taking place in the dead and decayed corpse. Thus the aim of this study is to investigate the awareness and knowledge about forensic entomology among dental students.

Materials and methods: Detailed questionnaire was created with questions about forensic entomology and was circulated to 100 dental undergraduate students through Google forms. The collected data was analysed using chi-square analysis in SPSS software.

Results: 83.3% of the dental students are aware about forensic entomology and 73.3% of the dental students are aware that it's a study of the insects which is helpful in forensic investigations to determine the PMI. Are aware that PMI helps to determine and estimate the time of the deceased. 63.3% of them are aware that forensic entomology is linked with forensic odontology.

Conclusion: Thus the present study concludes that the awareness and knowledge about forensic entomology among dental students is above average, and the various aspects of forensic entomology are well known by the second year students than the first year students.

Key words: Forensic entomology, Insects, Awareness, PMI, Dental students, Eco-friendly, Innovative technology

Corresponding author: Abirami Arthanari

e-mail✉: abiramia.sdc@saveetha.com

INTRODUCTION

Forensic science deals with various branches, which involve the identification of the dead and also reveals the suspect of the crime. Thus a branch of forensic science is forensic entomology, which is a study that deals with insects and arthropods in a criminal investigation. The application of forensic entomology in forensic science is to identify the time and place of death [1]. The most commonly involved insects in forensic entomology are blowflies, maggots, and beetles. The molecular DNA level of studying these insects reveals the suspect of the criminal case, location of death, and changes made in the position of the corpse [2]. Investigation at the molecular

level of the deceased gives an exceptional view to the crime cases [3].

Insects are used to estimate PMI- post-mortem interval because of the reproductive stage taking place in the dead and decayed corpse [4]. Post-mortem interval reveals the time between the death of the person till the finding of the corpse. It is highly applicable and useful in crime branches to have an accurate plan of the crime taken place [5]. Mainly the larval stages of the insects give a clear view of identifying the crime time and location. The insects and arthropods play a crucial part in determining the crime theme in history. Flies are possibly the first most attracted insects to corpses and dead remains, blow files are the most relevant flies used in forensic entomology to estimate the PMI which was mentioned in the late 19th century [6].

The wide applicative ranges of forensic entomology in forensic investigations have helped to evaluate the anatomy of different insects [7]. The further investigation of the corpse gives accurate findings that relate the atmosphere and temperature of the crime scene taken place, by the basic information sourced the involvement

of the insects is studied to find the exact motion of the crime scene [8]. It is important for a forensic deontologist to be aware about forensic entomology and other aspects related to it as there are cases involving the application of insects and other arthropods in recent investigations. So dentistry and forensic entomology are quite related, and it is important to know about the various aspects of forensic investigations in forensic odontology. And there should be appropriate understanding about the taxonomy which is an important tool for every forensic field expert [9].

Though recent times there is advancement in technologies, there are less previous studies on the exploration of forensic entomology in crime investigations [10]. More studies are required to gain more basic knowledge about the uses of forensic entomology in other fields. Studies can be influenced to associate with forensic entomology which might be helpful in more than one speciality. Our team has extensive knowledge and research experience that has translate into high quality publications [11-30]. Thus the aim of this study is to investigate the awareness and knowledge about forensic entomology among dental students.

MATERIALS AND METHODS

Study setting: A standardised questionnaire was created on the basis of assessing the knowledge and attitude of dental students about forensic entomology and its application.

Ethical approval: The questionnaire was then circulated to 100 dental preclinical undergraduate students through online platforms with the help of Google forms. The questions were based on the knowledge about forensic entomology in dentistry and its related aspects.

Pros: Different knowledge aspects about the topic among dental students, economical and effective way of creating awareness as well as analysing knowledge about forensic odontology, instant data collection and faster conclusive method to obtain information and statistics are the pros of the present study.

Cons: Least knowledge towards the topic because of lack of awareness and less sample size were the major cons of the present study.

Data collection: Then the data was collected in an excel sheet which was exported to SPSS version 22.0 software. And the results were analysed and graphically represented.

Dependent and independent variables: The dependent variables are the knowledge and awareness about forensic entomology. The independent variable is sex and age.

RESULTS

The responses collected from the survey filled by the dental students of Chennai, Tamilnadu were 100 in total. The responses were then analysed using chi-square

analysis in SPSS software, 83.3% of the dental students are aware about the term forensic odontology, and the rest 16.6% of them are not aware of the term, shown in Figure 1. The knowledge about what is meant by forensic entomology was evaluated in Figure 2, 73.3% of the dental students are aware that it's a study of insects and the rest 26.6% of them are not aware of it.

Figure 3 shows the knowledge about what is PMI, 56.6% of them are aware that PMI helps to determine and estimate the time of the deceased, 30% of the students have no idea about PMI is in general and the rest 13.3% of them are not aware.

Figure 4 shows the awareness of the dental students about PMI in forensic entomology, in which 56.7% of them are not aware about PMI and the rest 43.3% of the students are aware that PMI is related to forensic entomology in crime investigations. PMI also helps in determining the location of the death, 35% of them are aware that PMI also helps in finding the location of the crime scene, but majority (65%) of the students are not aware how they are interrelated to each other.

40% of the dental students believe blow flies, maggots and beetles are involved in forensic entomology, 30% of them are aware that blow flies are commonly used, 16.6% of them think maggots are commonly used (pink) and the rest 13.3% of them think its beetles are the most commonly involved insects in forensic entomology, shown in Figure 5. The awareness about the relation between forensic entomology and forensic odontology was assessed, 63.3% of them are aware that forensic entomology is linked with forensic odontology, and the rest 36.6% of them are not aware of the interrelation represented in Figure 6. 70% of the students are not
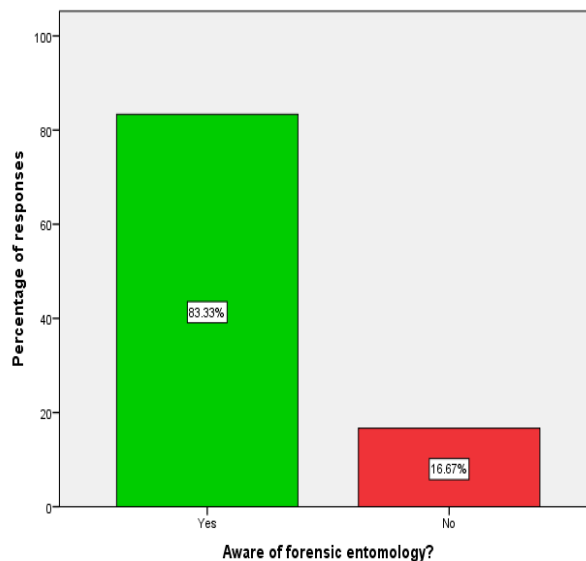

Figure 1: The graph represents the awareness about forensic entomology. The X-axis represents the awareness about forensic entomology and the Y-axis represents the percentage of responses, in which 83.3% of the dental students are aware about forensic entomology (green) and the rest 16.6% of them are not aware of it (red).
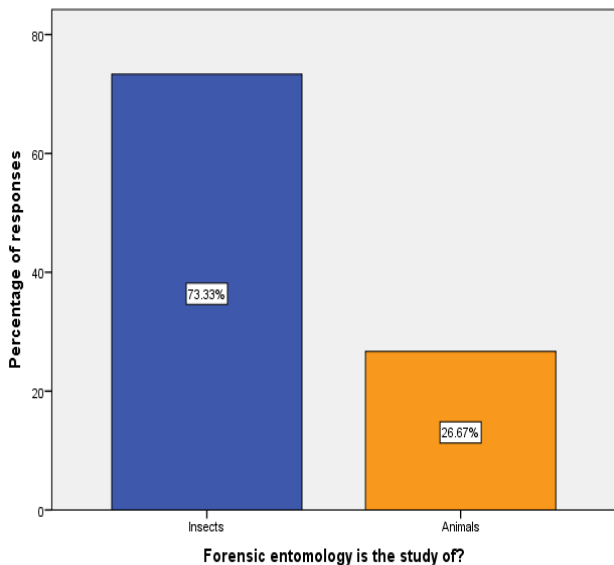
Figure 2: The graph represents the knowledge about forensic entomology among dental students The X-axis represents the awareness about forensic entomology and Y-axis represents the percentage of responses, in where 73.3% of the dental students are aware that forensic entomology is the study of insects (blue) and the rest 26.6% of them are not aware of it (orange).

Figure 3: The graph represents the knowledge about Post Mortem Interval in forensic entomology among dental students. The X-axis represents the awareness about PMI and Y-axis represents the percentage of responses, in where 56.6% of the dental students are aware about PMI (green), 30% of the students have no idea about PMI helps in time estimation of the deceased (yellow) and the rest 13.3% of them are not aware of it (red).

aware of forensic endotoxicology and its relation to forensic entomology, and the rest 30% are aware of it.

DISCUSSION

The results were collected and analysed using SPSS software and found that the graph in   Figure 1 represents the awareness about forensic entomology in where 83.3% of the dental students are aware about forensic entomology and the rest 16.6% of them are not aware of it and chi square test was performed to obtain p value and was 0.089 which is greater than 0.05 and is
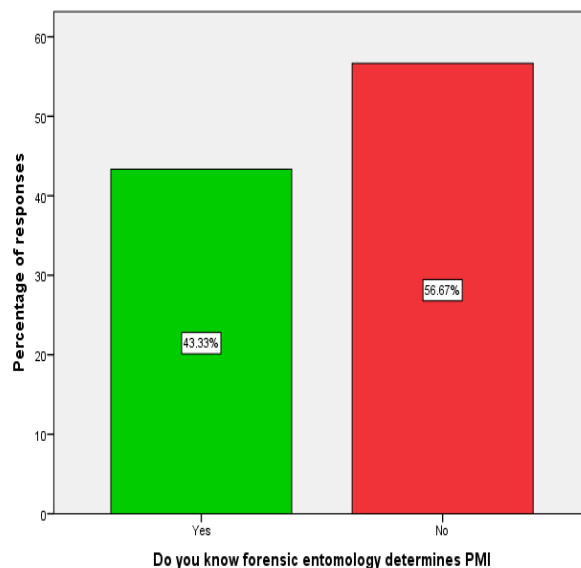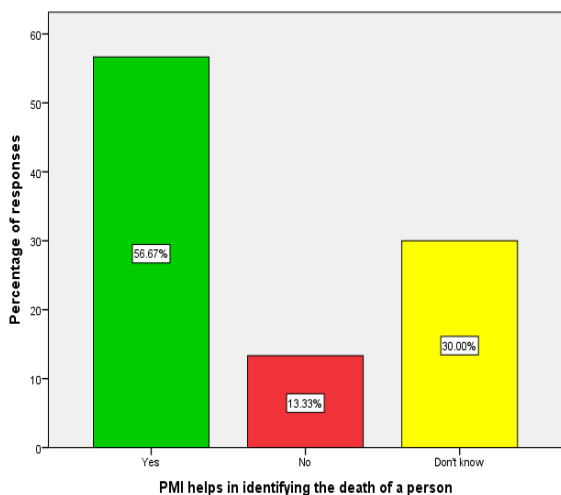

Figure 4: The graph represents the knowledge about the association between PMI- Post mortem interval and forensic entomology among dental students. The X-axis represents the awareness about forensic entomology and PMI, and Y-axis represents the percentage of responses, in which 43.3% of the dental students are aware about PMI in forensic entomology (green) and the majorities 56.6% of them are not aware of it (red).
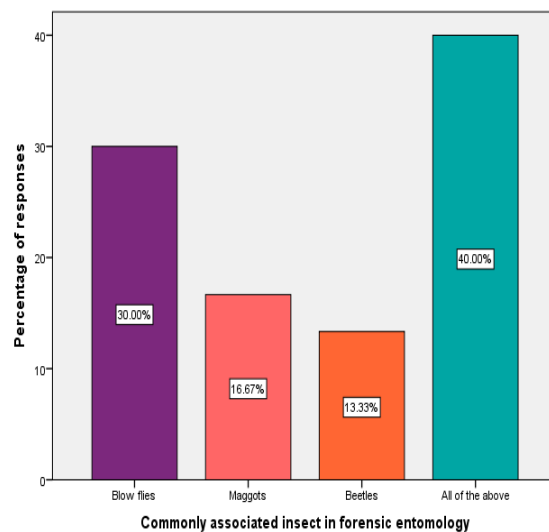

Figure 5: The graph represents the awareness about the most commonly associated insect in forensic entomology. The X-axis represents the awareness about insects in forensic entomology and Y-axis represents the percentage of responses in where 40% of the dental students believe blow flies, maggots and beetles are involved in forensic entomology (teal), 30% of them are aware that blow flies are commonly used (purple), 16.6% of them think maggots are commonly used (pink) and the rest 13.3% of them think its beetles (coral).

not statistically significant shown in Figure 7. Surveys to the related topics were not conducted in the past, but forensic entomology is considered to be an effective tool in forensic dentistry [31].

Forensic entomology is a scientific study of the invasions of different insects and arthropods [1, 31]. So, in
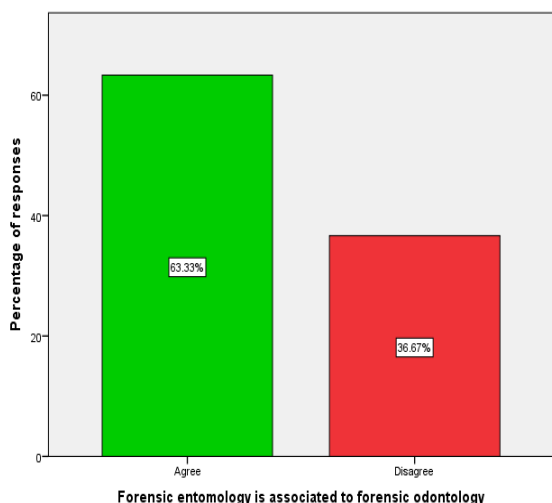
Figure 6: The graph represents the awareness about the relation between forensic entomology and forensic odontology. The X-axis represents the awareness about forensic entomology and forensic odontology and, Y-axis represents the percentage of responses, in which 63.3% of the dental students are aware about forensic entomology (green) and the rest 36.6% of them are not aware of it (red).
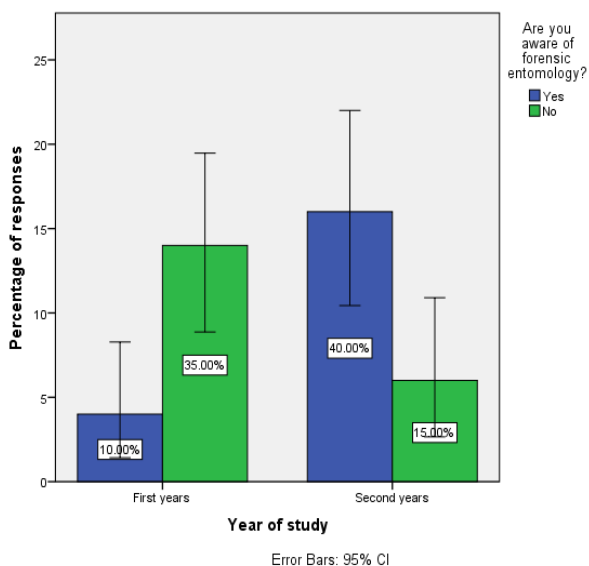

Figure 7: The graph represents the association between the first and second year dental students with the awareness of forensic entomology. X-axis represents the second and first year dental undergraduates and Y-axis represents the percentage of responses of which blue indicates the students who are aware about forensic entomology and the green indicates the students who are not aware of it. Majority of the second year students (40%) are more aware about forensic entomology and its purpose than the first year students. However there is no significant statistical difference (p value- 0.089> 0.05 and it is insignificant).

Figure 2, the percentage of students with knowledge about forensic entomology among dental students was assessed, in where 73.3% of the dental students are aware about forensic entomology is the study of insects and the rest 26.6% of them are not aware of it and chi square test was performed to obtain p value and was 1.512 which is greater than 0.05 and is not statistically significant shown in Figure 8. Forensic entomology
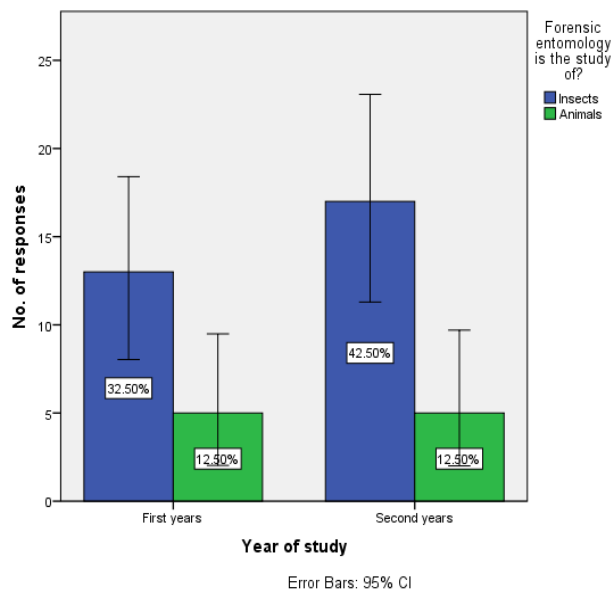

Figure 8: The graph represents the association between the first and second year dental students with the knowledge about what forensic entomology deals with. X-axis represents the second and first year dental undergraduates and Y-axis represents the percentage of responses of which blue indicates the students who are aware about forensic entomology which deals with insects and the green indicates the students who are not aware of it. Majority of the second year students (42.5%) are more aware about forensic entomology and association than the first year students. However, there is no significant statistical difference (p value- 1.51> 0.05 and it is insignificant).
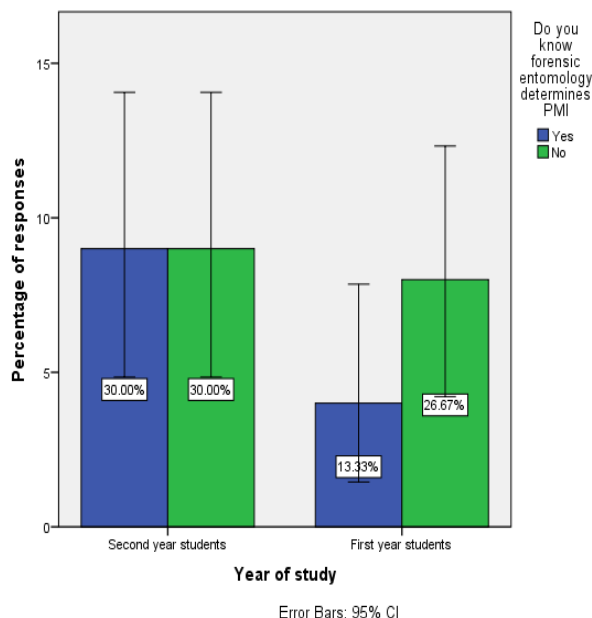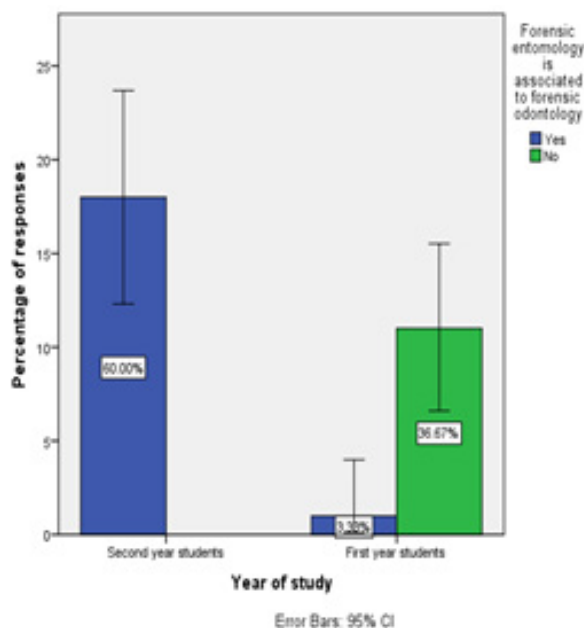

Figure 9: The graph represents the association between the first and second year dental students with the knowledge about the role of PMI in forensic entomology. X-axis represents the second and first year dental undergraduates and Y-axis represents the percentage of responses of which blue indicates the students who are aware about the role of PMI in forensic entomology and the green indicates the students who are not aware of it. Majority of the second year students (30%) are more aware about the role of PMI in forensic entomology than the first year students. However there is no significant statistical difference (p value- 0.127> 0.05 and it is insignificant).

Figure 10: The graph represents the association between the first and second year dental students with the awareness about the relation forensic entomology between forensic odontology. X-axis represents the second and first year dental undergraduates and Y-axis represents the percentage of responses of which blue indicates the students who are aware that forensic entomology is related to forensic odontology and the green indicates the students who are not aware of it. Majority of the second year students (60%) are more aware about forensic entomology associated with forensic odontology than the first year students. However there is no significant statistical difference (p value- 0.919> 0.05 and it is insignificant).

details the explanation of the anatomy of each insect taxonomically which helps in determining the death of the deceased. It also deals with the molecular level of the insects to elaborate the crime scene [32, 33]. This study of science particularly determines the PMI, the Post Mortem Interval. PMI is the time determined since the death of the person [34, 35].

The graph represented in Figure 3 assess the knowledge about Post Mortem Interval in forensic entomology among dental students, in where 56.6% of the dental students are aware about PMI, 30% of the students have no idea about PMI, which helps in time estimation of the deceased and the rest 13.3% of them are not aware of it and chi square test was performed to obtain p value, and was 0.127 which is greater than 0.05 and is not statistically significant shown in Figure 9. PMI is estimated by the forensic entomologist, who plays a massive role in homicide investigations [6]. They determine the role of insects in a homicide investigation; such insects are studied scientifically at molecular levels.

In Figure 4, the graph represents the knowledge about the association between PMI- Post mortem interval and forensic entomology among dental students, in which 43.3% of the dental students are aware about PMI in forensic entomology and the majority 56.6% of them is not aware of it.

The awareness about the most commonly associated

insect in forensic entomology was assessed and represented in Figure 5, in where 40% of the dental students believe blow flies, maggots and beetles are involved in forensic entomology, 30% of them are aware that blow flies are commonly used, 16.6% of them think maggots are commonly used and the rest 13.3% of them think its beetles. Comparative findings state the most commonly associated insect in forensic investigations are blow flies [36]. Forensically blow flies are of great importance [37].

The graph in Figure 6 represents the awareness about the relation between forensic entomology and forensic odontology, in where 63.3% of the dental students are aware about forensic entomology and the rest 36.6% of them are not aware of it and chi square test was performed to obtain p value, and was 0.919 which is greater than 0.05 and is not statistically significant shown in Figure 10. The limitations of the present study were the sample population of only 100 dental undergraduate students. The responses collected may be biased on the knowledge about forensic entomology. Different levels of understanding ability of the participants may also produce slight differences and errors in the study.

According to the present study, the awareness and knowledge about forensic entomology, their action and use in forensic investigations were assessed and were found to be above average. Majority of the students, 83.3% of the dental students are aware about forensic entomology. And more than 73% of the dental students are aware that forensic entomology is the study of insects. Knowledge of the students about other aspects is average. Further studies are needed to create more awareness about the interrelation between forensic entomology and other sourcing fields. More studies should be conducted on exploring this branch of knowledge to gain information about it as it plays an important role in the aspects of any medical expertise.

CONCLUSION

Thus the present study concludes that the awareness and knowledge about forensic entomology among dental students is above average, and the various aspects of forensic entomology are well known by the second year students than the first year students. Students are aware about the term forensic entomology and their purpose, but lack awareness and knowledge about relation with other fields. Further awareness about the practice and attitude about forensic entomology in relation to other technical fields must be created among dental students to improve their knowledge about it.

AUTHORS CONTRIBUTION

Taanya Imtiaz has done the survey preparation and the data collection, statistical analysis and manuscript preparation. Dr. Abirami Arthanari had edited and revised the manuscript of the present study.

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