

Assessment of Knowledge and Awareness of Forensic Odontology amongst Dental Students and Interns.

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Conflicts of Interest: Nil

Abstract

Aims and Objectives: To assess the knowledge and awareness of forensic odontology amongst dental students and interns.

Materials and methods: A Google form- based e-questionnaire consisting of 20 questions was circulated amongst a sample size of 301.

Results: Despite majority of the population being aware of the term forensic odontology, 75.4% of them were of the opinion that their current knowledge on the subject is inadequate.

Conclusion: The present study shows the willingness of the participants on increasing their depth of knowledge in forensic odontology and thus, more emphasis needs to be placed on the subject.

Keywords: Forensic, Dental Students, Dentists, Odontology.

Introduction

A society is built when a group of individuals come together; thus, it is the responsibility of the former to respect and allow every person to own their unique identity. In events of a mass disaster or in cases of criminal activities wherein it is vital to identify the deceased, malefactor or victim, assistance from trained

professionals becomes essential. These specialists who provide evidence in court in cases of malpractice or mass calamities are called forensic specialists. Forensic science is the study and application of scientific evaluation of evidence for legal purposes. Forensic odontology, alternatively known as forensic dentistry is a part of this vast branch ^[1]. As defined by Keiser- Neilson, 'Forensic dentistry is the branch of forensic medicine which deals with the proper handling, examination and presentation of dental evidence in the best interest of justice ^[2].

The Dental Council of India advocated forensic odontology to be taught under Oral Pathology and Microbiology for undergraduate students in 2007 ^[3]. Studies have been conducted to assess, awareness and practice of forensic odontology in the past 10 years, the statistical analyses of which revealed that the awareness of forensic odontology is still inadequate amongst dental students and practitioners. This study was conducted to assess the knowledge and awareness of the same amongst undergraduate and postgraduate dental pupils and interns, emphasizing on the rational applications of forensic odontology.

Materials and Methods

a. Study design and sample

A self-administered, structured survey form (questionnaire) consisting of 20 close-ended questions were circulated as a Google form.

The inclusion criteria for this study involved III-year and IV-year undergraduate students, interns and postgraduate students since they have some exposure to the subject in their curriculum in III B. D. S.

I-year and II-year undergraduate students are exempt from the study since they are not exposed to the subject at all during these years.

b. Questionnaire

The questionnaire (**Table 1**) consisted of questions that could be sub-categorized to assess the following (**Table 2**):

Qualification	III BDS IV BDS Interns Postgraduate
Aware of the term forensic odontology	Yes No
Source of knowledge	Text books Internet Newspapers Television, Radio Workshops Others
Is forensic odontology a part of your curriculum?	Yes No Don't know
Most accurate method of personal identification	Visual Examination Physical examination Finger prints Configuration, number and morphology of teeth DNA assessment Blood investigations

Age determination by examining teeth	Occlusal Wear Sequence of eruption in the oral cavity Stages of tooth and root development via radiographs All of the above
Most accurate method of gender identification	Dental examination. Skeletal examination DNA examination
Aware of amelogyphics	Yes No
Aware of bite mark patterns	Yes No
Identification of bite marks can be assessed on	Human tissue Inanimate objects Food stuff All of the above
Aware that lip prints can be used to identify an individual's traits	Yes No
Is forensic odontology useful in person identification in mass disasters	Yes No Don't know
How would you recognize physical abuse?	Physical injuries Bite marks Behavioural changes All of the above Not sure
Is forensic odontology useful in identifying criminals	Yes No Don't know
Aware that dentists can testify in court as an expert witness	Yes No
Do you think you need to know forensic odontology in detail for practice?	Yes No Don't know
Should forensic odontology be taught as a distinct subject in B.D.S?	Yes No Don't know
Aware of any institute providing training in forensic odontology	Yes No

Have you attended any workshop on forensic odontology?	Yes No
Is your current knowledge on forensic odontology adequate?	Yes No Don't know

Table 1: Questionnaire

Knowledge and Awareness	13
Source of information	2
Opinion	4

Table 2: Sub- categorization of the questionnaire.

c. Pre-testing and validating the questionnaire

The questionnaire was pre-validated by circulating the form amongst three post-graduate students, seven III year and two IV-year B. D. S. undergraduate students, three interns and five academicians. They were requested to assess the form on basis of its length, clarity of language, ease of understanding, and the time spent for completing the questionnaire. The Cronbach's alpha value ranged from 0.985 to 0.987 with the value based on standardized items being at 0.986.

Statistical analysis

All the data were expressed as 'frequency distribution and percentage'. The 'Fischer's exact test' was used to assess any association with responses between various questions and responses. For the test, the 'p value' was considered statistically significant when the value was <0.05. The software used was SPSS (Statistical Package for Social Sciences) version 17.

Results

The questionnaire was answered by a total of 301 candidates and were distributed as: III B. D. S.- 10% (n=30), IV B. D. S.- 21.3% (n=64), interns- 58.1% (n=175) and post graduate students- 10.6% (n=32 (Fig 1)). 100% (n=32) of post graduate students were aware of forensic odontology followed by final year students,

interns and third year students at 96.9% (n=62), 96% (n=168) and 90% (n=27) respectively (Fig 2). When questioned about the source of information, the respondents stated that their prime source of gaining knowledge about the subject were from textbooks. The second origin of gaining knowledge was between the internet and others (Fig 3). When questioned if forensic odontology formed a part of the curriculum, the responses in the descending order were yes at 66.1% (n=199), no at 22.6% (n=68) and don't know at 11.3% (n=34). On questioning about the most accurate method of person identification, the responses in ascending order were blood investigations, physical examination, visual examination, dental examination, finger prints and DNA assessment at 0% (n=0), 1.3% (n=4), 5% (n=15), 8.3% (n=25), 12.3% (n=37) and 73.1% (n=220) respectively (Fig 4).

83.7% (n=252) of the study population agreed that occlusal wear, sequence of tooth eruption and stages of tooth and root development were significant in identifying the age of an individual by examining teeth, of which the highest was by post graduate students at 90.6% (n=29) followed by IV B. D. S. students at 85.9% (n=55) (Fig 5). The feedback for the most accurate method of person identification in the descending order was DNA examination, skeletal examination and dental examination at 69.1% (n=208), 23.6% (n=71) and 7.3% (n=22) respectively (Fig 6). 40.8% (n=121) of the population were aware of amelogyphics while 59.2% (n=180) were unaware of the same (Fig 7). Conversely 91.7% (n=276) of them answered that they were aware of bite marks while 8.3% (n=25) differed with respect to the same (Fig 8). 92% (n=277) of the subjects cumulatively agreed that human tissue, inanimate objects and food stuffs, all three were useful for identifying bite marks (Fig 9). 76.4% (n=230) stated that lip prints were useful in identifying an individual's traits (Fig 10). Despite 82.7%

(n=249) of the study population were aware that forensic dentistry is useful in identifying the deceased in events of mass disasters and natural calamities, 12.3% (n=37) did not have an opinion on the same (Fig 11). 80.1% (n=241) agree that bite marks, physical injuries and behavioral changes can be equally significant in distinguishing physical abuse. However, 4.3% (n=13) were unsure if any of the above-mentioned criteria were useful in pinpointing the same (Fig 12). 74.1% (n=223) of the respondents agreed that forensic odontology was useful in recognizing criminals, while 20.3% (n=61) were unaware of the same. 5.6% (n=17) said no and the p value was significant at 0.027 (Fig 13).

The percentage of the study group who were aware that dentists can testify in court was 93.4 (n=281) or above (Fig 14). 79.7% (n=240) answered that they need to know forensic odontology in detail for practice (Fig 15). 77.7% (n=234) of the candidates opined affirmatively that forensic dentistry should be taught as a distinct subject. The p value was statistically significant at 0.021 (Fig 16). 74.1% (n=223) and 87.4% (n=263) of the population answered in the negative when they were asked if they knew of any institute that taught forensic odontology (Fig 17) and if they had attended any workshop of forensic dentistry respectively (Fig 18). 75.4% (n=227) of the subjects were in favor of the fact that their current knowledge on our topic of study is inadequate, while 14.6% (n=44) stated that they are satisfied with their current level of awareness 10% (n=30) were unaware of the same (Fig 19).

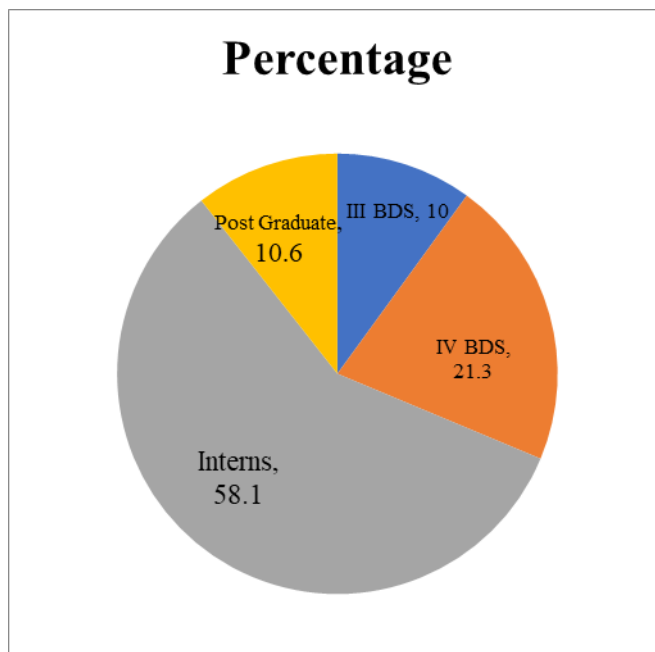


Fig 1: Percentage distribution of participants

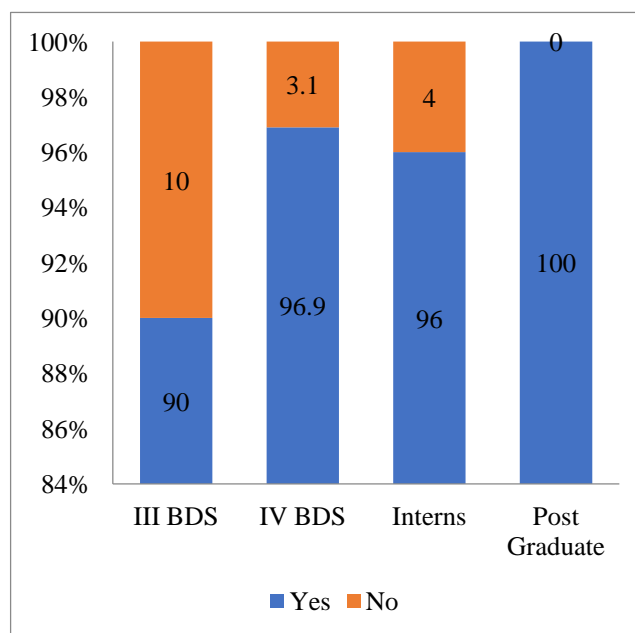


Fig 2: Awareness of forensic odontology

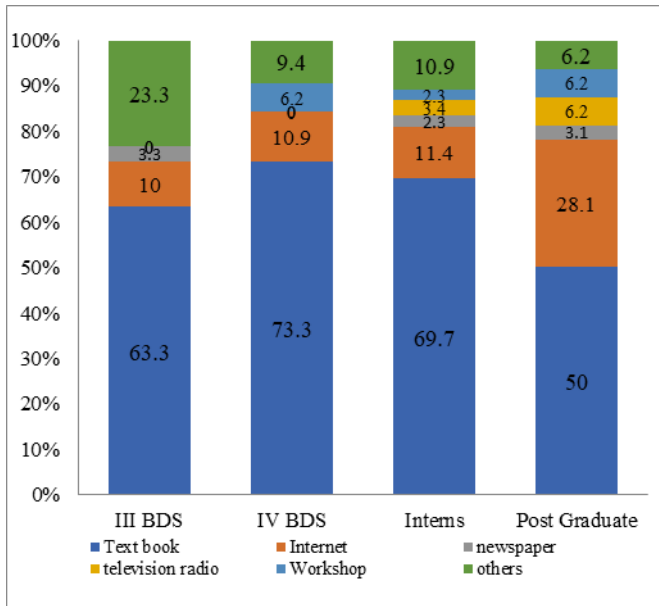


Fig 3: Source of knowledge on forensic odontology

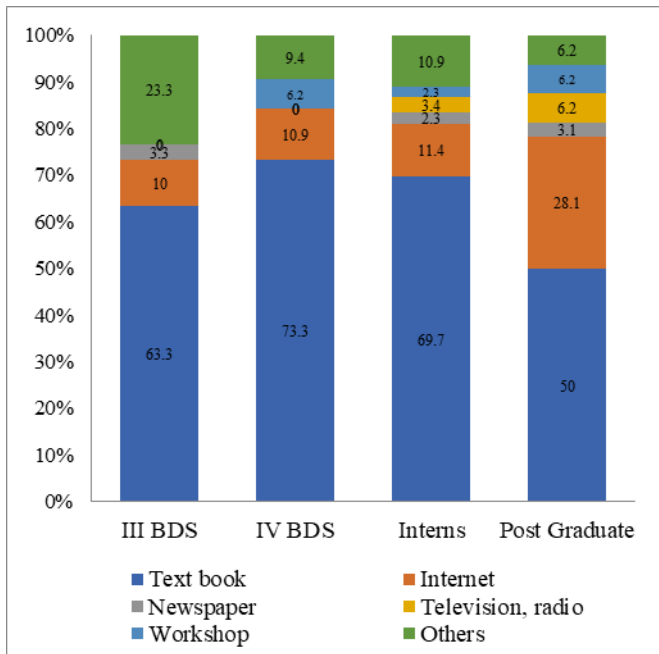


Fig 4: Most accurate method of personal identification

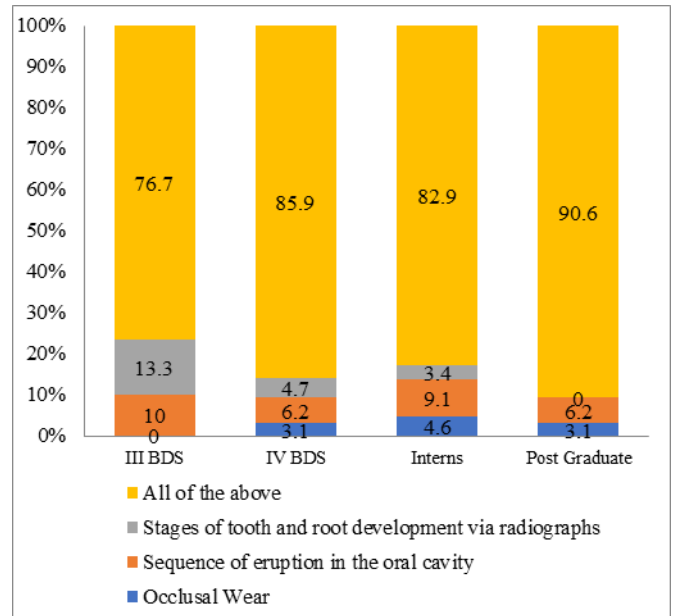


Fig 5: Determination of individual by examination of teeth

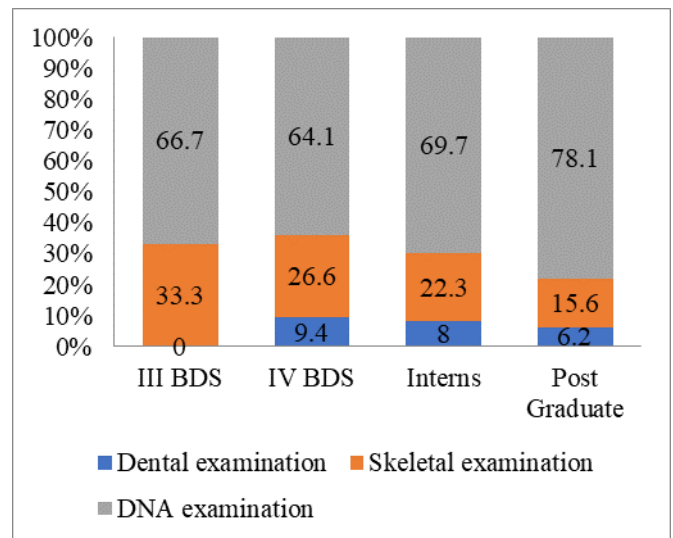


Fig 6: Most accurate method of gender identification

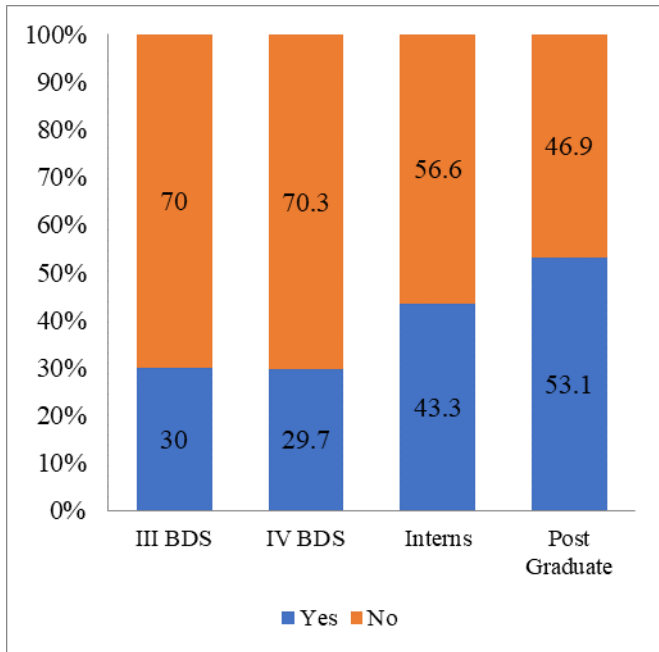


Fig 7: Awareness of amelogyphics

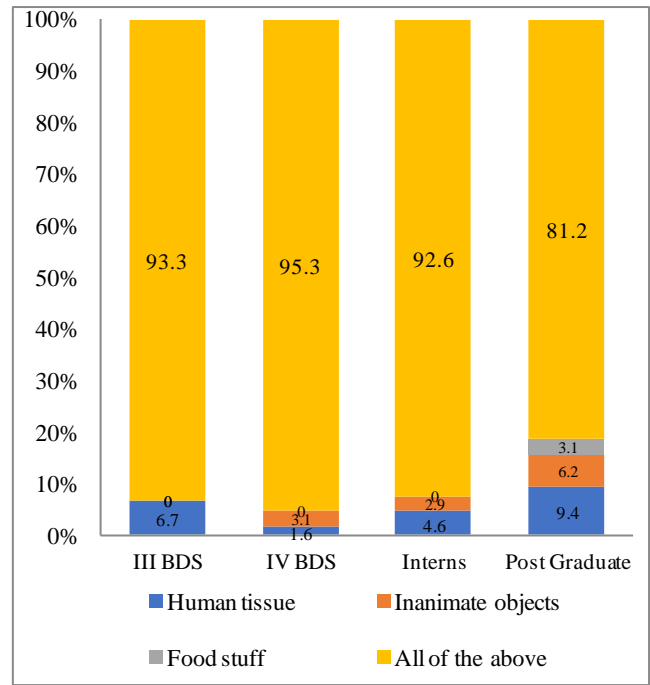


Fig 9: Assessment of bite marks

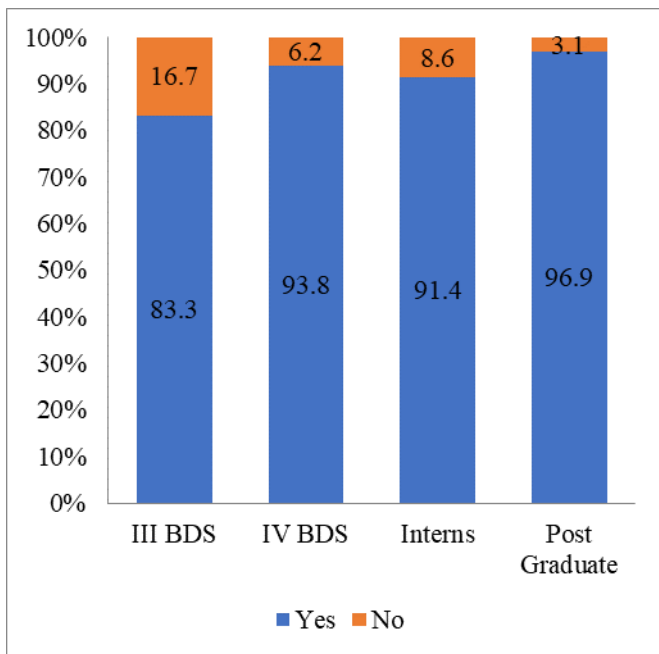


Fig 8: Awareness of bite mark patterns

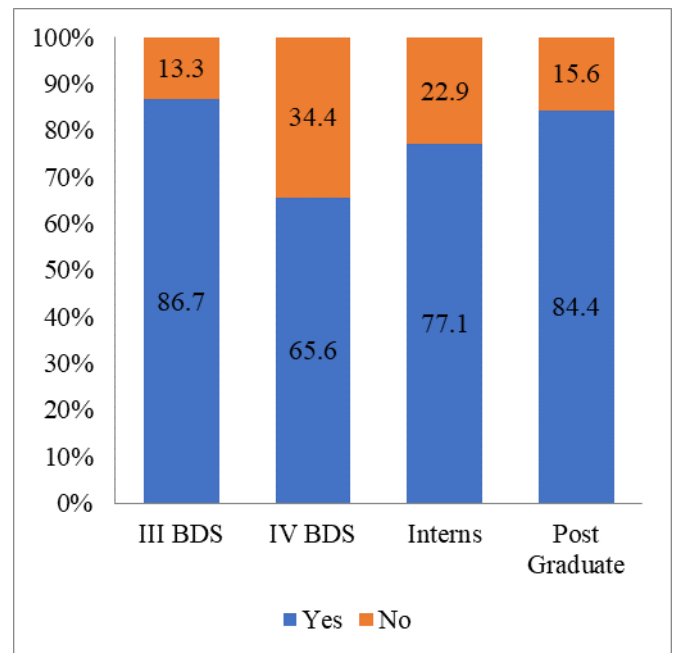


Fig 10: Proficiency of lip prints in personality determination

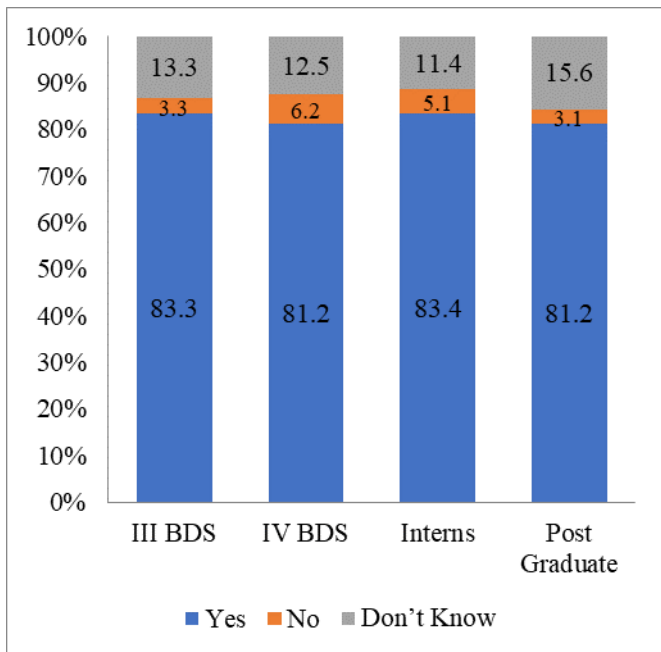


Fig 11: Efficiency of forensic odontology in personal identification in mass disasters and natural calamities

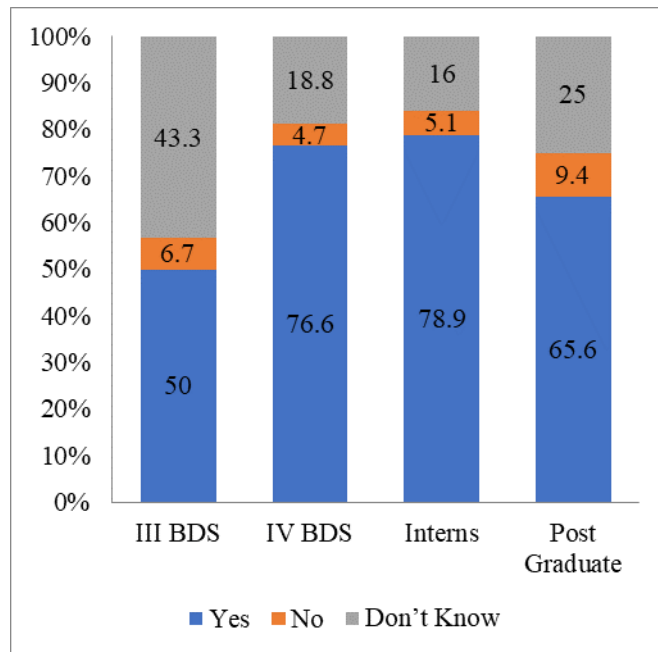


Fig 13: Efficiency of forensic dentistry in identifying criminals

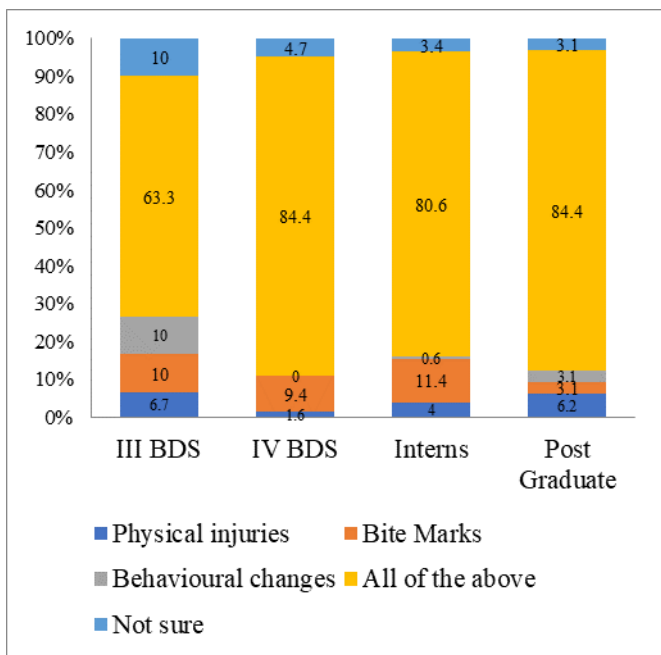


Fig 12: Recognition of physical abuse

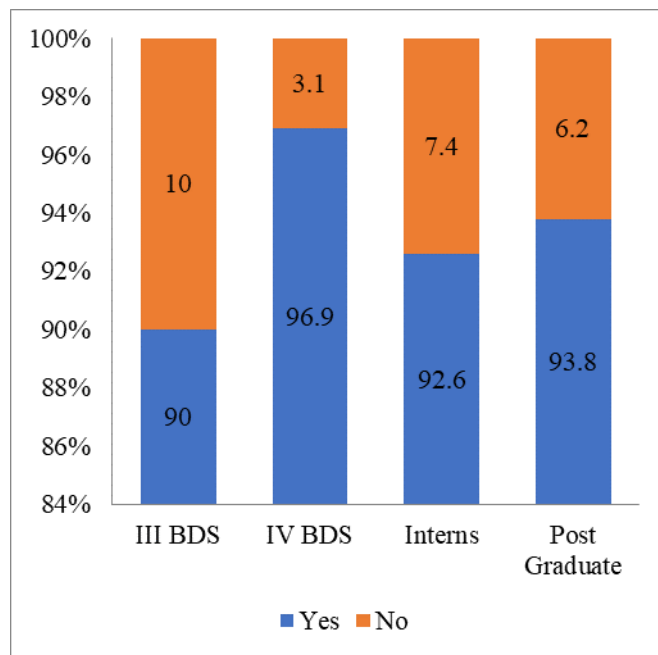


Fig 14: Awareness about dentists testifying as an expert witness in court

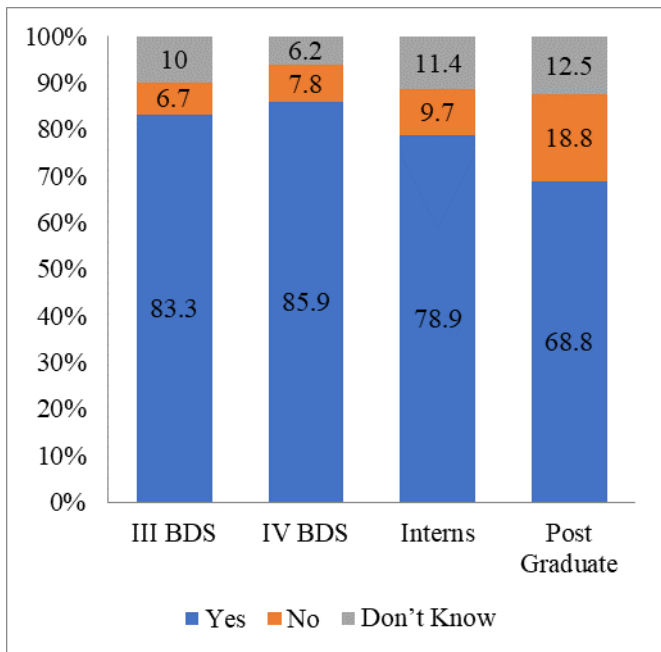


Fig 15: Opinion on need of detailed knowledge on forensic deontology for practice

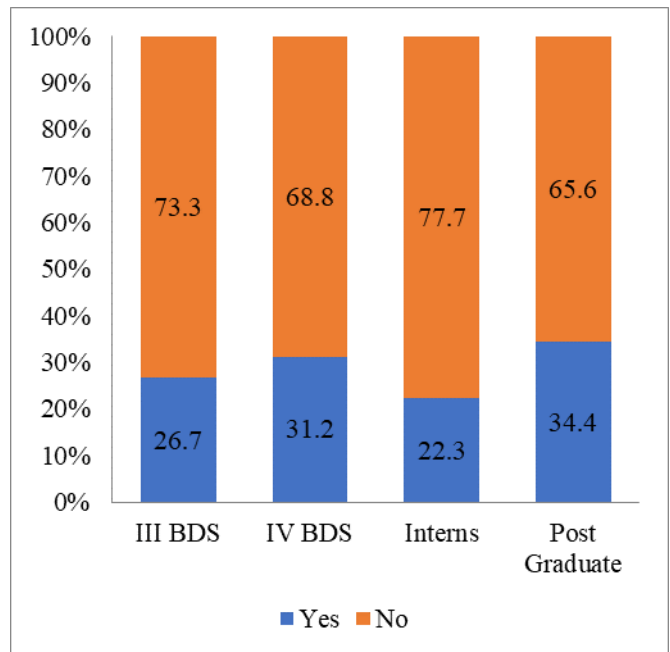


Fig 17: Awareness on any university providing formal training in forensic odontology

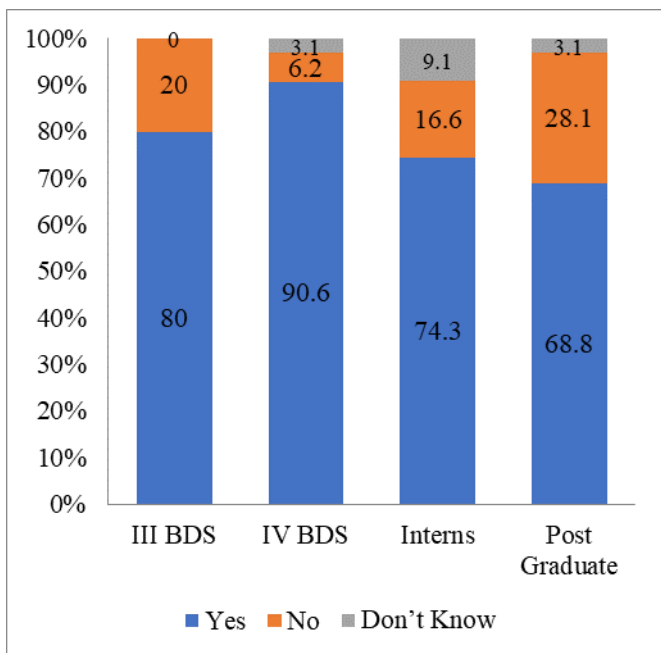


Fig 16: Opinion if forensic odontology should be taught as a distinct subject in B. D. S.

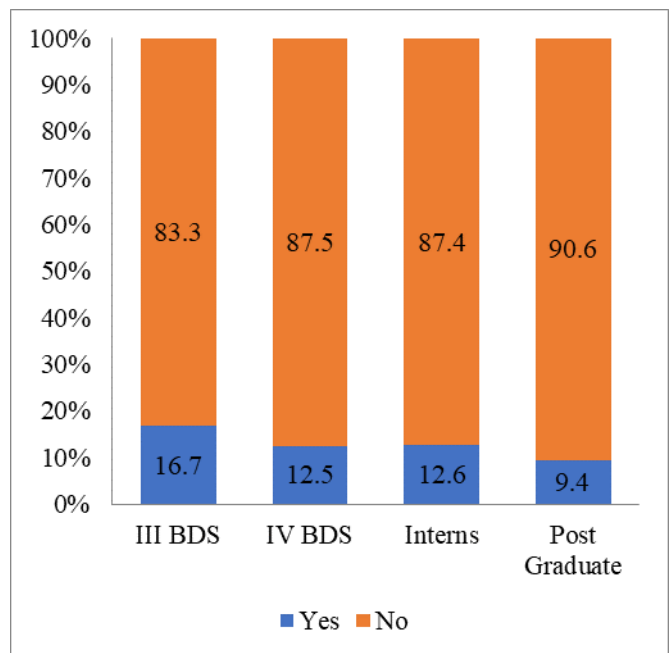


Fig 18: Participation in workshop on forensic dentistry

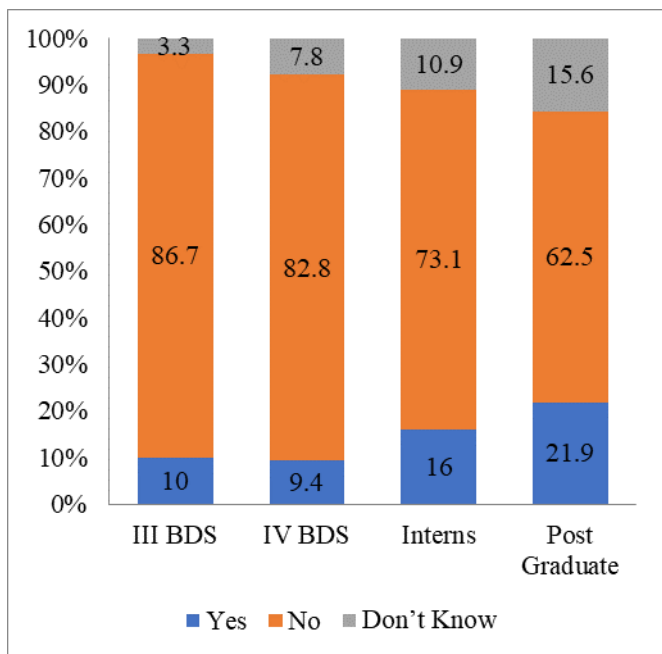


Fig 19: Opinion on adequacy of current knowledge on forensic odontology

Discussion

Forensic odontology is a significant branch in well developed nations of the world; however, in India, the subject is yet to earn its recognition [4]. Even though legal practitioners are aware of the importance of forensic odontology in sorting judicial issues, the instances where a dentist's opinion has been considered have been very rare [4, 5]. Despite forensic odontology being implemented as a subject by the Dental Council of India, literature review shows that current knowledge and awareness on the subject is still inadequate [2, 6, 7]. It also states the need to train students adequately in order to practice forensic odontology efficiently. However, prior to acquisition of appropriate training, we need to understand the roadblocks and inadequacies with respect to the field. Bearing this in mind, we conducted a survey to assess the knowledge and awareness of forensic dentistry amongst under and post graduate students and interns.

In our current study, post graduate students performed better than the rest of the study population with regards to the knowledge and awareness of forensic odontology.

Similar results were observed in studies conducted by Sushma Rudraswamy et al [6] and Bhakhri et al [7]. Moreover, when questioned about their source of gaining knowledge, postgraduates showed the highest variation. Although most of them received information from textbooks, others stated that they had read articles in the newspaper or had come across cases over the radio or television or had attended workshops. Thus, these people performed better since they are to attend conferences and continuously upgrade their knowledge through CDE programs and scientific journals which contain more updated sources of information. In a study conducted by Bhakhri et al [7], most respondents stated that they prefer to upgrade their knowledge about the subject through the internet, indicating their lack of exposure in academics. The post graduate students were closely followed by interns who also showed a greater frequency in distribution about their source of knowledge. This can be probably justified by their increased eagerness during internship to attend conferences and the encouragement by staff to participate in workshops and CDE programs.

Teeth are extremely resilient in that they can withstand extremely harsh climatic changes and temperature stresses. This makes them an extremely vital source of DNA [8]. The DNA is the master molecule that governs all the characteristic traits of an individual, making it the most accurate source of genetic information of an individual [7, 9]. Personal identification becomes crucial in cases of mass disasters and mass casualties, primarily to inform the family of the deceased. In our study, 73.1% of the respondents were in favor of DNA assessment being the most accurate method of personal and gender identification. This agreed to the study conducted by Harchandani et al, where 65% of the study population stated that DNA assessment is the most accurate method of personal identification [8]. This was contrasted in the

survey that Bhakhri et al, where only 41% preferred DNA examination to be the best method of identifying a person [7].

Bite marks are patterns formed on a different medium caused by contact of teeth along with the medium. They can be assessed on food stuffs, inanimate objects and human tissue [10]. They serve as an important tool in crime scenes in not only identifying the malefactor but also saving the innocent [11]. In our study, 91.7% of the subjects were aware of bite mark patterns. This conceded with the study conducted by Preethi et al [12], where 82% were aware of the significance of bite marks and one by Bhakhri et al [7] where 71.4% of the respondents were aware of bite mark patterns. The lip prints of an individual are as distinct as their fingerprints. Study of these lip prints is called cheiloscopy. This study shows that 76.4% are aware of lip prints being useful in personal identification which is slightly lower (88%) than the statistical analysis obtained from Bhakhri et al's [7] study.

Apart from gender and physical aspects, another crucial factor in person identification is age. Age estimation is a method carried out by anthropologists, archaeologists and forensic scientists [6]. In our study, 83.7% respondents accepted that occlusal wear patter of teeth, their sequence of eruption and assessing root development using radiographs, all three were useful in assessing the age of a person. This contrasted with the statistical analysis obtained from Preethi et al's [12] study where nearly half the subjects did not know how to estimate age by dental examination.

Physical abuse is a criminal activity and can be identified by bite marks, physical injuries and behavioral changes. According to Avon [10], a dentist should be aware of physical abuse that the patient presents with. This abuse could be in the form of lacerations, abrasions or fractures in the head, neck and face region. Radiographic

examination and assessment of bite marks can be used as evidence in court. Thus, a dentist trained in forensic odontology can present as an expert witness in court to testify against criminals. This clearly indicates the significant position that the dentist holds as a forensic expert. Therefore, it is essential for them to know the subject in detail. In the study conducted by Preethi et al [12], 93% of the study subjects did not receive any formal training in collecting and presenting dental evidence whilst in the current study, 79.7% of the sample stated that they would want to know forensic odontology in detail.

The Dental Board of Australia identifies forensic dentistry as one of the 13 registered dental specialties. In addition, the University of British Columbia in Canada as well as the American Academy of Forensic Sciences offer master's and post-doctoral programs in forensic odontology [3]. Our study shows that despite forensic odontology being taught as a distinct forte, 74.1% of the study population is unaware of any institute that provides exclusive training in the same. This is because there are very few institutions in India which provide official training in the subject and the laboratories available are not up to the mark [12]. In the study conducted by Baig et al [2], 63.85% of the study population stated that forensic dentistry is not a part of the curriculum in Pakistan. Even though this contrasted our study, a small percent did disagree that forensic dentistry is not a part of the curriculum in their university. Moreover, some were unaware of the same. This indicates the need for placing emphasis on the subject along with its practical application. This can be reflected in this study as well since 77.7% of the population is of the opinion that forensic odontology should be taught as a distinct subject. About 75% of the study population agree that their current knowledge on the subject is inadequate. Similar results were obtained in the studies conducted by Bhakhri et al [7]

and Rudraswamy et al ^[6]. Thus, it shows that there is very little exposure of forensic odontology. Moreover, 87.4% of the respondents in our study stated that they did not attend any workshop on forensic odontology. In the study by Bhakhri et al ^[7], about 85% of the sample population was ready to attend CDE programs on forensic odontology. Therefore, it is necessary that we increase the awareness of the subject and encourage more delegates to participate in such activities.

Conclusion

From our study, as well as studies conducted in the past, it is noticeable that awareness of forensic odontology is still inadequate amongst dental students and interns. As a result, more emphasis would need to be placed on this field to increase the awareness about the same. The present study was designed as a questionnaire-based study. Therefore, it should be kept in mind that the respondents may not have answered the question meticulously. This is a considerable limitation of the study. Thus, further emphasis needs to be placed on other methods of descriptive study design to increase the awareness of forensic odontology amongst students to enable them to practice the study more effectively. Moreover, interns formed the greatest population of the sample size in our study. Hence, we further emphasize on a larger sample size with more discrete distribution of members in future studies.

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