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Knowledge, Awareness, And Practice Of Teledentistry In Forensic Odontology

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ABSTRACT

Background

Forensic dentistry is a very fascinating and challenging field of dental studies. Many researches and studies have been done on this field which makes it exigent. Teledentistry helps in improving doctor-patient interaction. The aim of the present study is to study the knowledge, awareness, and practice of teledentistry in forensic odontology.

Materials and methods

The study was conducted among dental students. 120 responses were obtained. Data was collected through questionnaires. Data was entered in Microsoft excel sheet after collection and was analysed using SPSS software. Descriptive statistics were expressed by means of number, frequency, and percentage. Chi-square test was used to find the association between age and the number of responses provided by the participants.

Results

In the present study 38.33% of the students reported having heard about teledentistry, p value for which was found to be 0.071. 90.83% reported thinking that teledentistry will help in forensic odontology, p value for which was found to be 0.040.

Discussion

Many studies reported low awareness of teledentistry and its contribution to forensic odontology and other branches. In the present study, it was found that the dental students had knowledge about forensic odontology but lacked awareness of the contribution of teledentistry or its application.

Conclusion

Teledentistry if propagated properly can become a very helpful tool in dentistry. But teledentistry can prove to be helpful not only in forensic odontology but also in other various fields of dentistry improving the treatment methods and betterment of doctor-patient relation.

KEYWORDS Teledentistry; forensic odontology; awareness; knowledge; innovative technique

INTRODUCTION

According to the 2012 World Health Organization (WHO) fact sheet on oral health, "Oral health is essential to general health and quality of life. It is a state of being free from mouth and facial pain, oral and throat cancer, cavity, oral infection, and sores, periodontal (gum) disease, tooth decay, tooth loss and others that limit an individual's capacity in biting, chewing, smiling, speaking, and psychosocial wellbeing"(1). Dentistry has long been considered as face-to-face interaction with the patient, as the actual treatment can't happen remotely in most cases. However, there is huge potential and unmet need in utilizing multi-source data for service management, distant diagnostics and patient follow-up and information purposes.(2) Forensic dentistry is a branch of forensic science that is very exigent and fascinating involving the implementation of dental sciences for identifying deceased individuals through the comparison of ante- and postmortem records. Dental identification has proved to be very crucial in identifying deceased individuals, the law accepted the first such case in 1849 (3).

Forensic odontology is a branch that connects dentistry and the legal profession (4). Tele-technology has received great attention in the past decade in both medical and dental fields with the potential of an easy, fast and safe way to deliver and share health information. Teledentistry is believed to upgrade dental care delivered to patients as well as time management. It facilitates better referral systems on the basis of patient's needs, decision-making, reduced waiting lists and consultation time. Teledentistry could expand dental care to patients in less fortunate areas at a rational cost, down and convenience helping in cutting down the need for traveling and guarantee suitable channeling for referrals (5).

Forensic odontology envelopes a plethora of subjects like identification of human remains of air traffic accidents, industrial accidents, natural disasters, terrorist attacks, determination of age, gender and ethnic origin, bite marks analysis particularly in case of child abuse and rape victims (6) For unrecognizable deceased victims, collection of odontological means depend greatly on the comparison of AM and PM dental records. Cases, where the victim has attempted to defend themselves from the perpetrator, might have prevalent bite marks. These bite marks either on a

living individual, or cadaver can lead to the suspect or the desired result (7). The field of forensic odontology will have a lot of benefits from teledentistry. But due to the lack of proper awareness, the idea of teledentistry isn't that widespread in India yet. Teledentistry can also be a helpful tool in other fields of dentistry. It can help to improve doctor-patient interaction. It cuts down the time taken for multiple opinions by various specialists and thus works out more economically for the patient and the doctor. Early detection and prevention of carious lesions or lesions of soft tissue is possible through teledentistry (8). The teledentistry system also can provide a unique way to deliver long-distance clinical training and continuation of education. Video conferencing and Internet technologies allow low-cost, real-time interactive, two-way communication between instructors and trainees, making long-distance education more virtual and affordable (9). In parallel, other technologies influenced and enabled innovations in digital dentistry, often at a remarkable pace. Our team has extensive knowledge and research experience that has translated into high quality publications.

(10)(11),(12),(13),(14),(15),(16),(17),(18),(19),(20),(21),(22),(23),(24),(25),(26),(27),(28),(29),(30). The aim of the present study is to study the knowledge, awareness, and practice of teledentistry in forensic odontology.

MATERIALS AND METHOD

STUDY POPULATION

This study was conducted with 120 dental students residing at various institutions after getting approval from SRB Saveetha Dental College. These samples were collected on the basis of random sampling. Inclusion criteria were the students of various dental colleges. Exclusion criteria were anyone who wasn't a dental student or was mentally challenged with terminal diseases and systemic co-morbidities.

DATA COLLECTION

Data collection through a questionnaire. A questionnaire containing 10 questions was prepared and circulated to dental students. 120 responses were received. All the received responses were tabulated and were analyzed using SPSS software version 23 and were represented graphically. The statistical analysis used is the Chi-square test in SPSS. Approval obtained from the SRB Committee of Saveetha Dental College

The questionnaire comprised a series of questions including their demographic characteristics like age and gender. The other questions are as follows:

1) Have you heard about teledentistry?

2) How is teledentistry practiced?

3) Advantages of teledentistry include?

4) Uses of teledentistry in various branches of dentistry?

5) Are you aware of forensic dentistry?

6) Do you agree forensic odontology can be very useful for legal justice?

7) Do you think dental records are useful in identifying the deceased and crime suspect?

8) Do you think teledentistry is unable to go widespread because?

9) Do you think teledentistry will help in Forensic odontology?

10) Would you like to learn about teledentistry?

RESULTS

In the present study, Figure 12 shows the bar graph representing the association between age and whether they have heard about teledentistry. Majority of 18 year olds reported to be aware of teledentistry. Pearson's chi-square test shows p value as 0.071, (p>0.05). Hence it is statistically not significant. Figure 13 shows the bar graph representing the association between age and whether they know how teledentistry is practiced. Majority said that they think teledentistry is practiced through telecommunication services, data security, and video conferencing. Pearson's chi-square test shows p value is 0.046, (p<0.05). Hence it is a statistically significant difference. The bar graph in Figure 14, represents the association between age and whether they know the advantages of teledentistry. Majority said that they think being low cost is an advantage of teledentistry. Pearson's chi-square test shows p-value is 0.000, (p<0.05). Hence it is statistically significant.

The bar graph in Figure 15, represents the association between age and whether they know the uses of teledentistry in various branches of dentistry. The majority knew that teledentistry is practiced in all three fields. Pearson's chi-square test shows p-value is 0.245, (p>0.05). Hence it is statistically not significant. Figure 16 shows the bar graph representing the association between age and whether they are aware of forensic odontology. The majority said they were quite aware of forensic odontology. Pearson's chi-square test shows p-value is 0.046, (p<0.05). Hence it is a statistically significant difference. The bar graph in Figure 17, represents the association between age and whether they agree forensic odontology can be very useful for legal justice. The majority agreed that forensic odontology can be very useful for legal justice. Pearson's chi-square test shows p-value is 0.162, (p>0.05). Hence it is statistically not significant.

The bar graph in Figure 18, represents the association between age and whether they know dental records are useful in identifying the deceased and crime suspect. The majority knew that dental records are useful in identifying the deceased and crime suspect. Pearson's chi-square test shows p-value is 0.266, (p>0.05). Hence it is statistically not significant. The bar graph in Figure 19, represents the association between age and why they think teledentistry is unable to go widespread. The majority said that low awareness is the reason teledentistry is unable to go widespread. Pearson's chi-square test shows p-value is 0.829, (p>0.05). Hence it is statistically significant. The bar graph in Figure 20, represents the association between age and whether they think teledentistry will help in forensic odontology. The majority said teledentistry will help in forensic odontology. Pearson's chi-square test shows p value is 0.040, (p<0.05). Hence it is statistically significant. The bar graph in Figure 21, represents the association between age and whether they would like to learn about teledentistry. The majority said they would like to learn about teledentistry. Pearson's chi-square test shows p value is 0.377, (p>0.05). Hence it is statistically not significant.
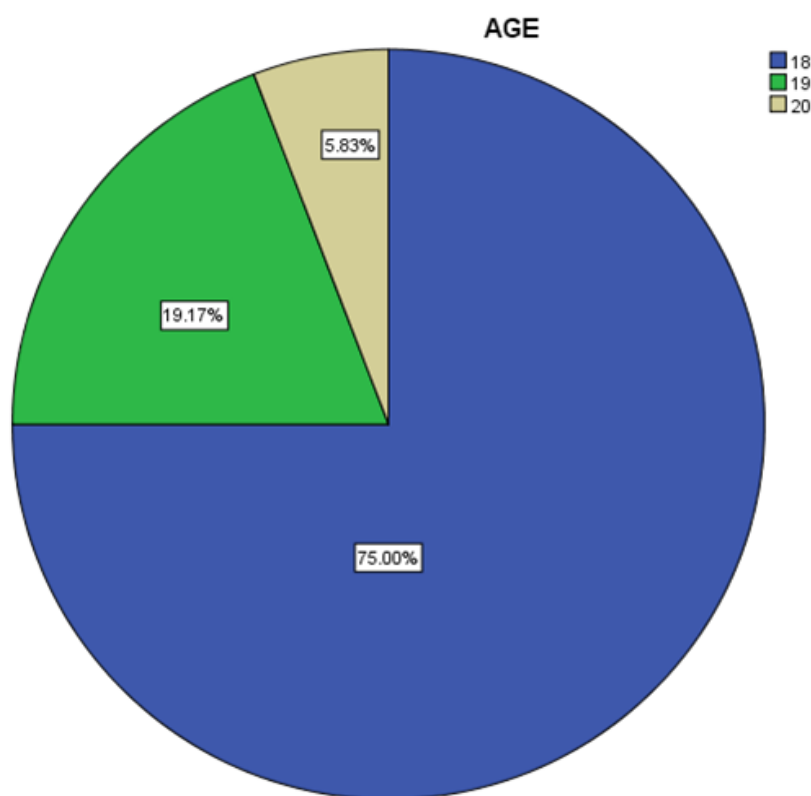

Figure 1: Shows the distribution of age of the participants. Blue, green, and beige colours represent 18 year olds (75%), 19 year olds (19.17%) , and 20 years (5.83%) of the participants respectively. Majority of the participants are 18 years old.
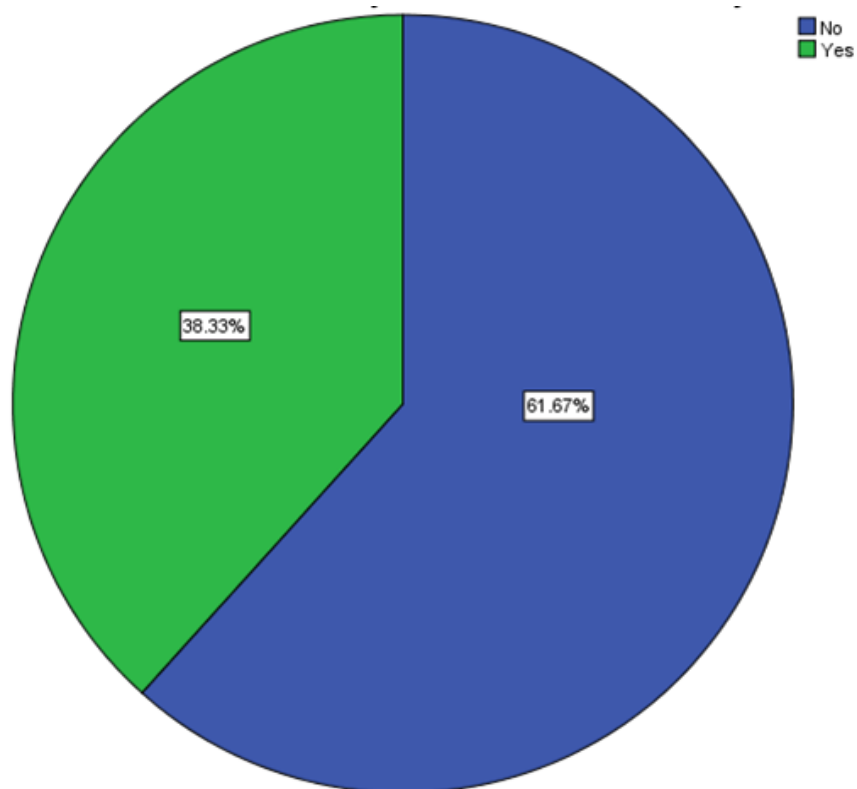
Figure 2: Shows the distribution of responses on whether they have heard about teledentistry. Blue and green colours represent the responses No (61.67%) and Yes (38.33%) respectively. Majority of participants have not heard about telemedicine.
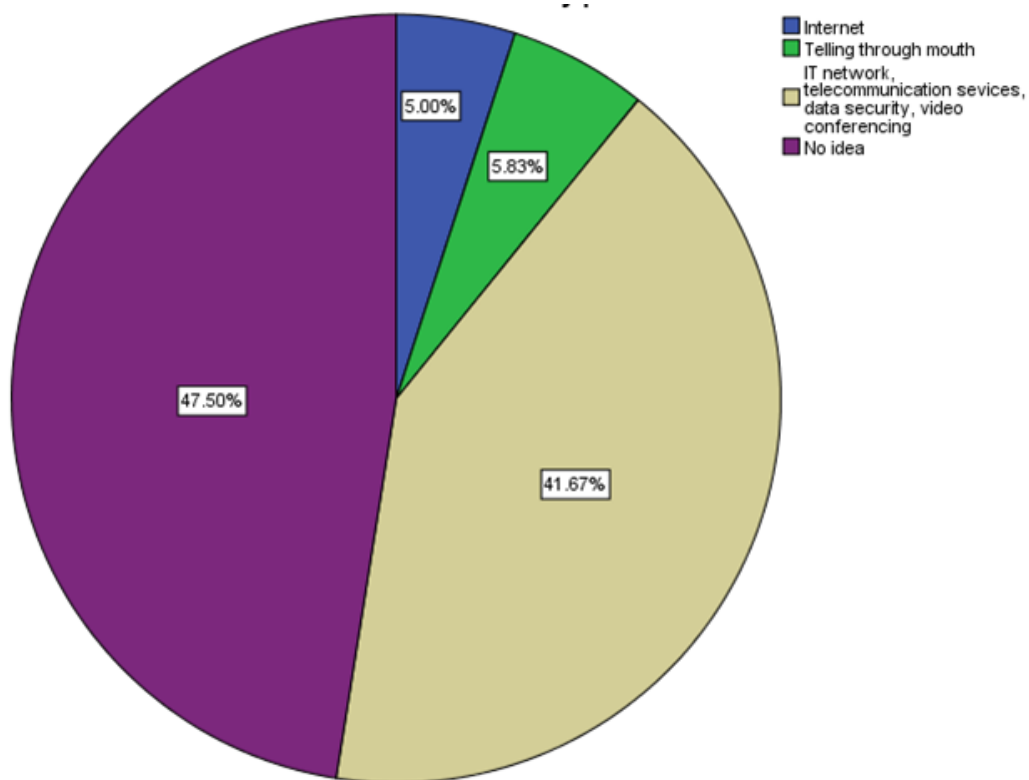
Figure 3: Shows the distribution of responses on whether they know how teledentistry is practiced. Blue, green, beige, and purple colours represents the responses through 'internet' (5%), 'telling through mouth' (5.83%), telecommunication services, data security , video conferencing' (41.67%), and 'no idea' (47.50%) respectively implying that the majority of participants have no idea of how teledentistry is practiced.

Figure 4: Shows the distribution of responses on whether they know what are the advantages of teledentistry. Blue, green, beige, purple, and yellow colours represents the responses 'low cost' (26.6%), 'simple infrastructure' (6.67%), 'accessible of rural population'(2.50%), 'all of the above'(13.33%), and 'no idea' (50.83%) respectively implying that majority of them have no idea about the advantages of teledentistry.
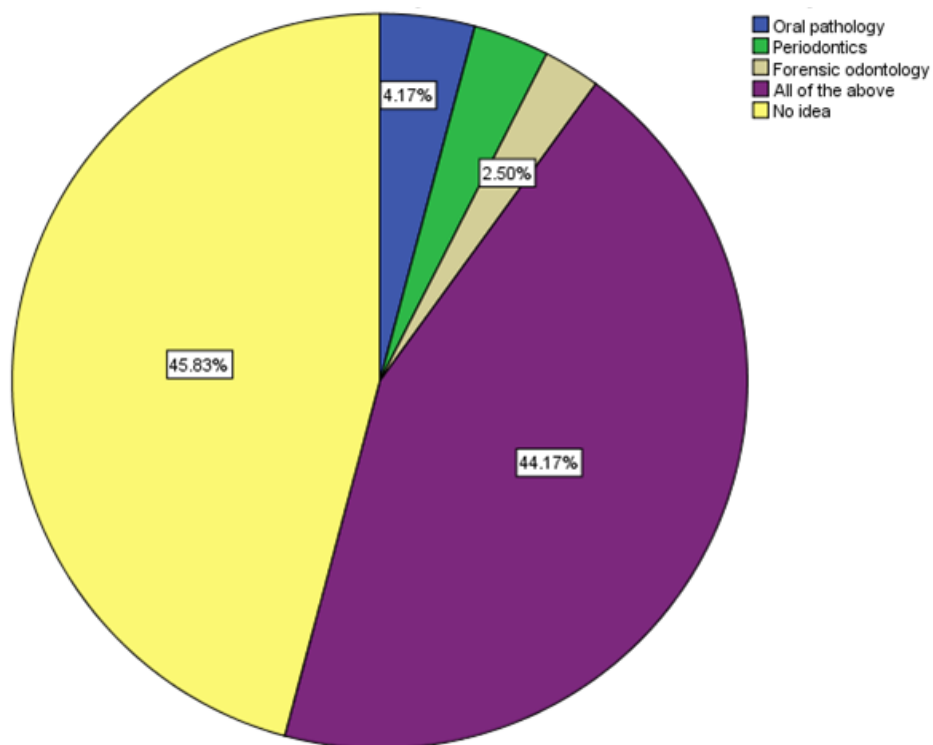
Figure 5: Shows the distribution of responses on whether they know the uses of teledentistry in various branches of dentistry. Blue, green, beige, purple, and yellow colours represents the responses oral pathology (4.17%), periodontics (3.33%), forensic odontology (2.50%), all of the above (44.17%), and no idea (45.83%) respectively implying that majority of the participants are not aware of uses of teledentistry in various branches of dentistry.
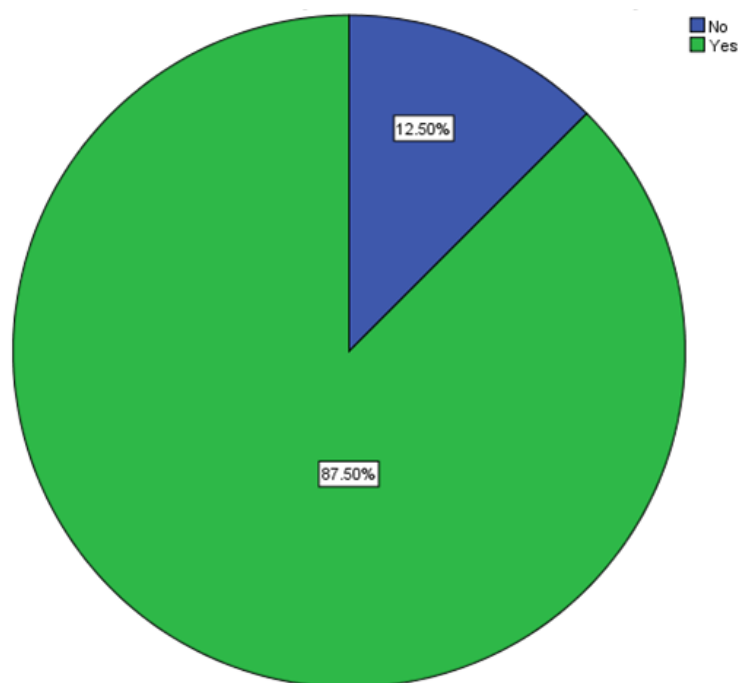
Figure 6: Shows the distribution of responses on whether they are aware of forensic dentistry. Blue and green colours represent the responses no (12.50%) and Yes (67.50%) respectively. Majority of the participants are aware of forensic dentistry.
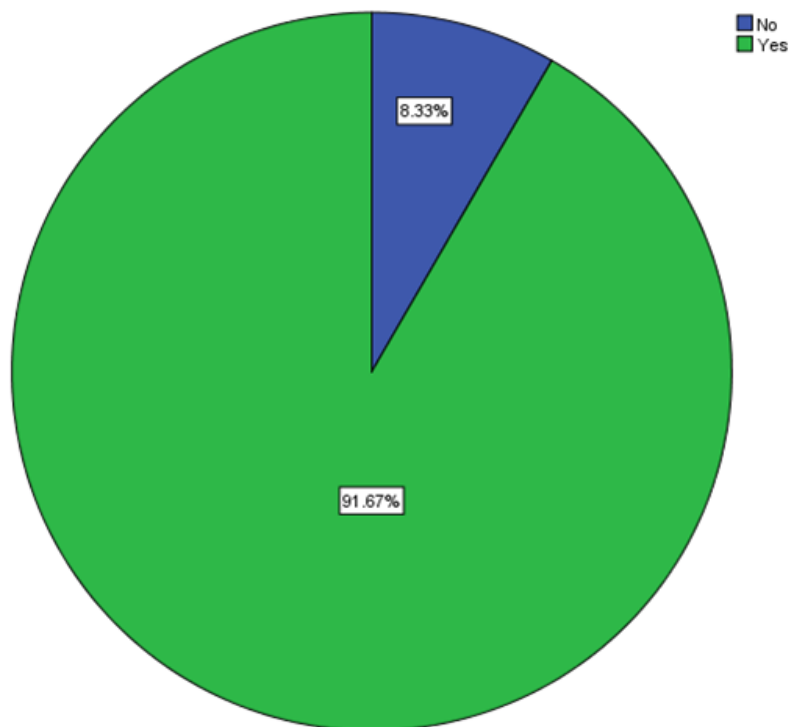
Figure 7: Shows the distribution of responses on whether they agreed forensic odontology can be very useful for legal justice. Blue and green colour represents the responses no (8.33%) and Yes (91.67%) respectively implying that majority of the participants agreed that forensic odontology can be used for legal justice.
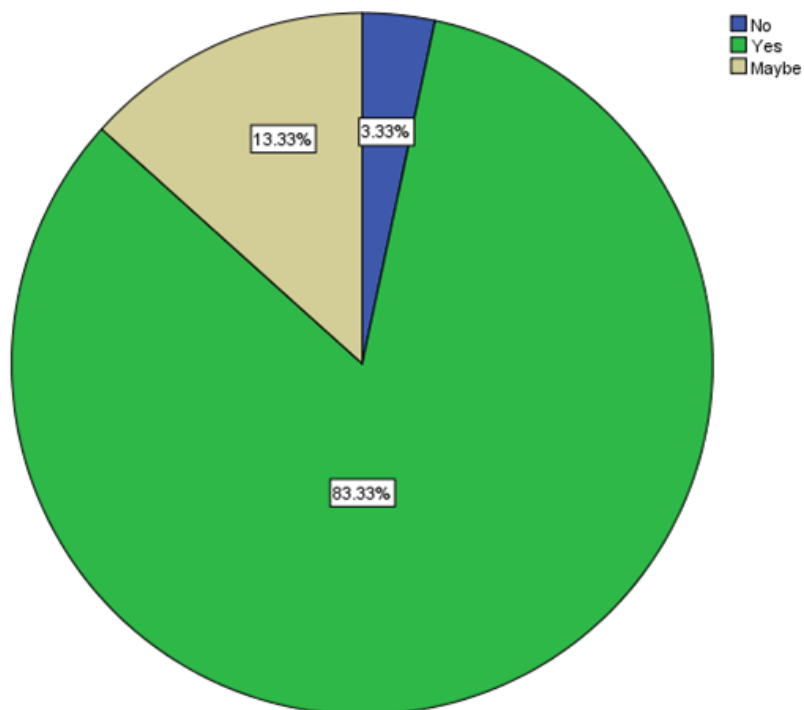
Figure 8: Shows the distribution of responses on whether they think dental records are useful in identifying the deceased and crime suspects. Blue, green and beige colours represent the responses no (3.33%), Yes (83.33%), and Maybe (13.33%) respectively. Majority of the participants think that dental records are useful in identifying the deceased and crime suspects.
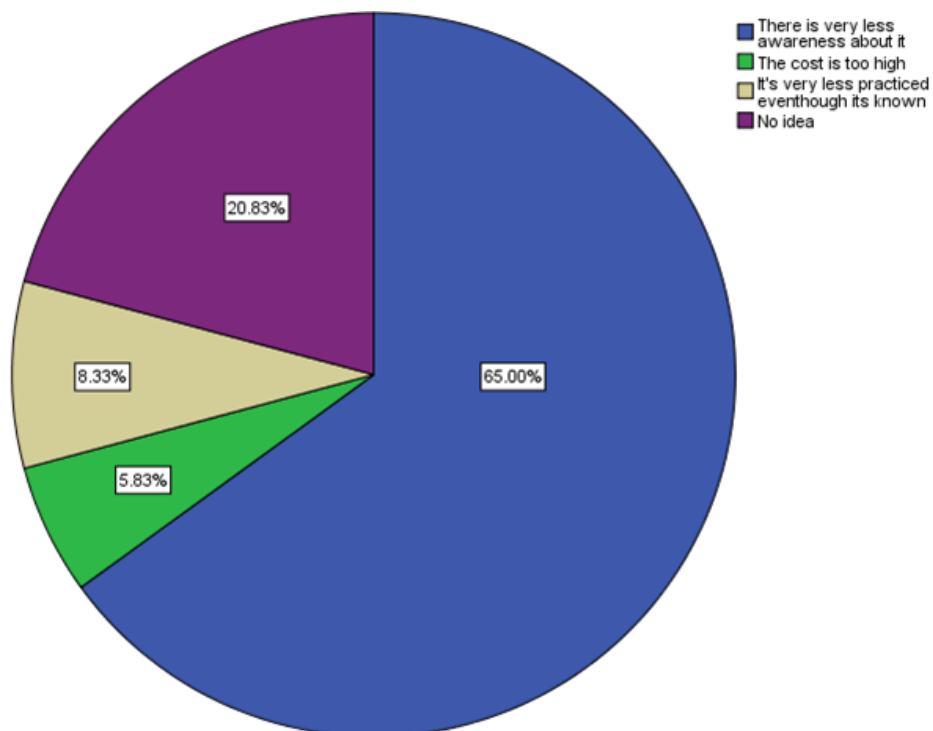
Figure 9: Shows the distribution of responses on why they think teledentistry is unable to go widespread. Blue, green, beige, and purple colours represent the responses 'there is very less awareness about it' (65%), 'the cost is too high' (5.83%), 'it's very less practiced even though it's known' (8.33%), and 'no idea'(20.83%) respectively implying that majority of the participants consider that there is very less awareness about teledentistry.
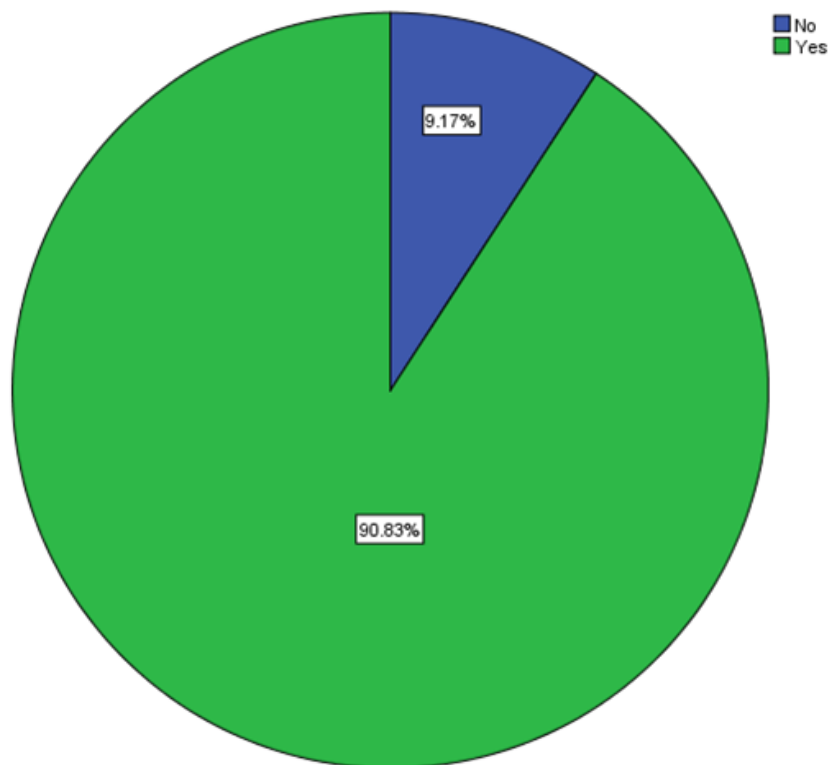
Figure 10: Shows the distribution of responses if you think teledentistry will help in forensic odontology. Blue and green colours represent the responses no (9.17%) and yes (90.83%) respectively. Majority of the participants think that teledentistry will help in forensic odontology.
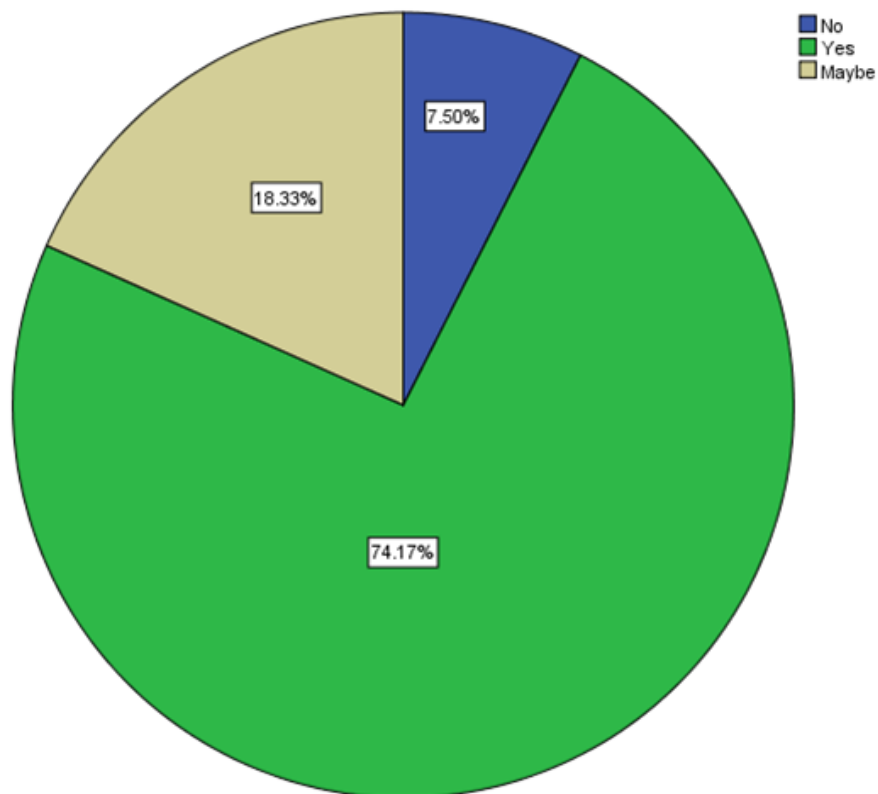
Figure 11: Shows the distribution of responses on whether they would like to learn about teledentistry. Blue, green and beige colours represent the responses no (7.50%), yes (74.17%), and maybe (18.33%) respectively implying that majority of the participants would like to learn about teledentistry.
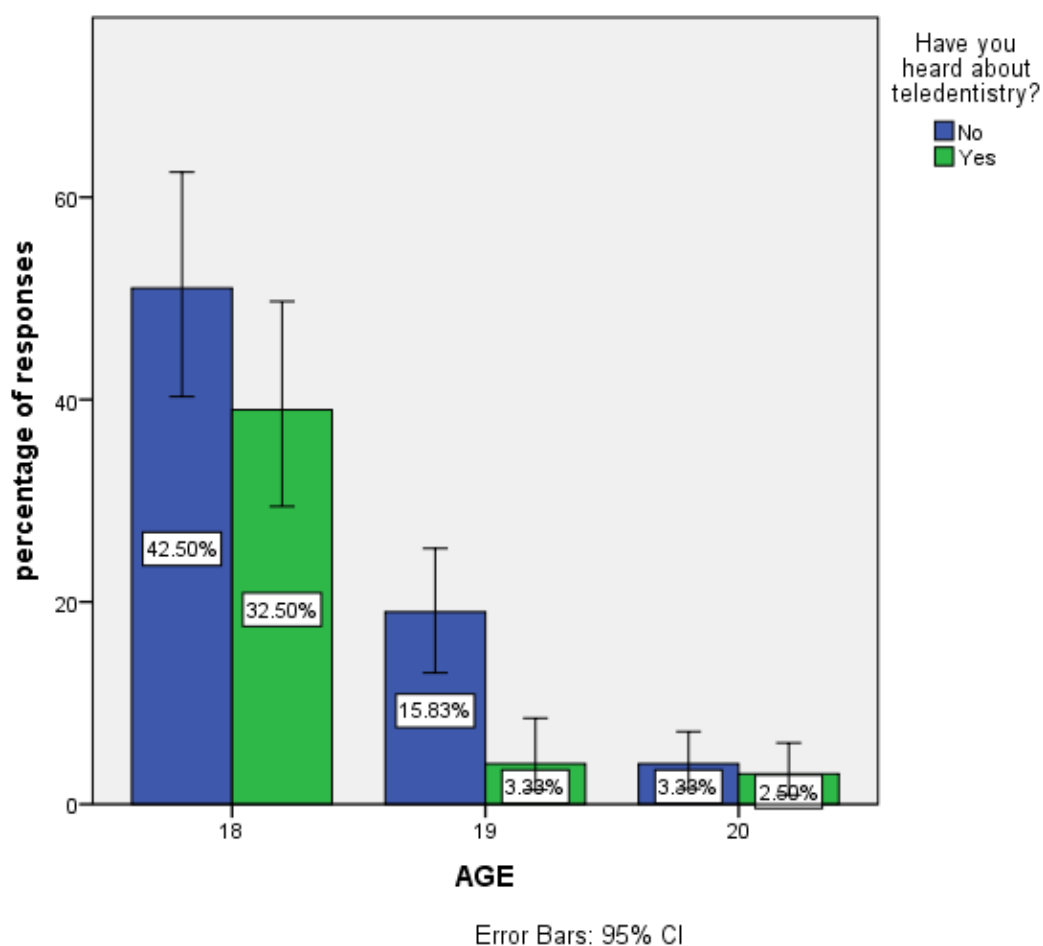
Figure 12: The bar graph represents the association between age and whether they have heard about teledentistry. X-axis represents the age and the Y-axis represents the percentage. Blue (no) and green (yes) respectively. Pearson's chi-square test shows p value is 0.071, (p>0.05). Hence it is statistically not significant. Majority of 18 year olds have not heard about teledentistry.
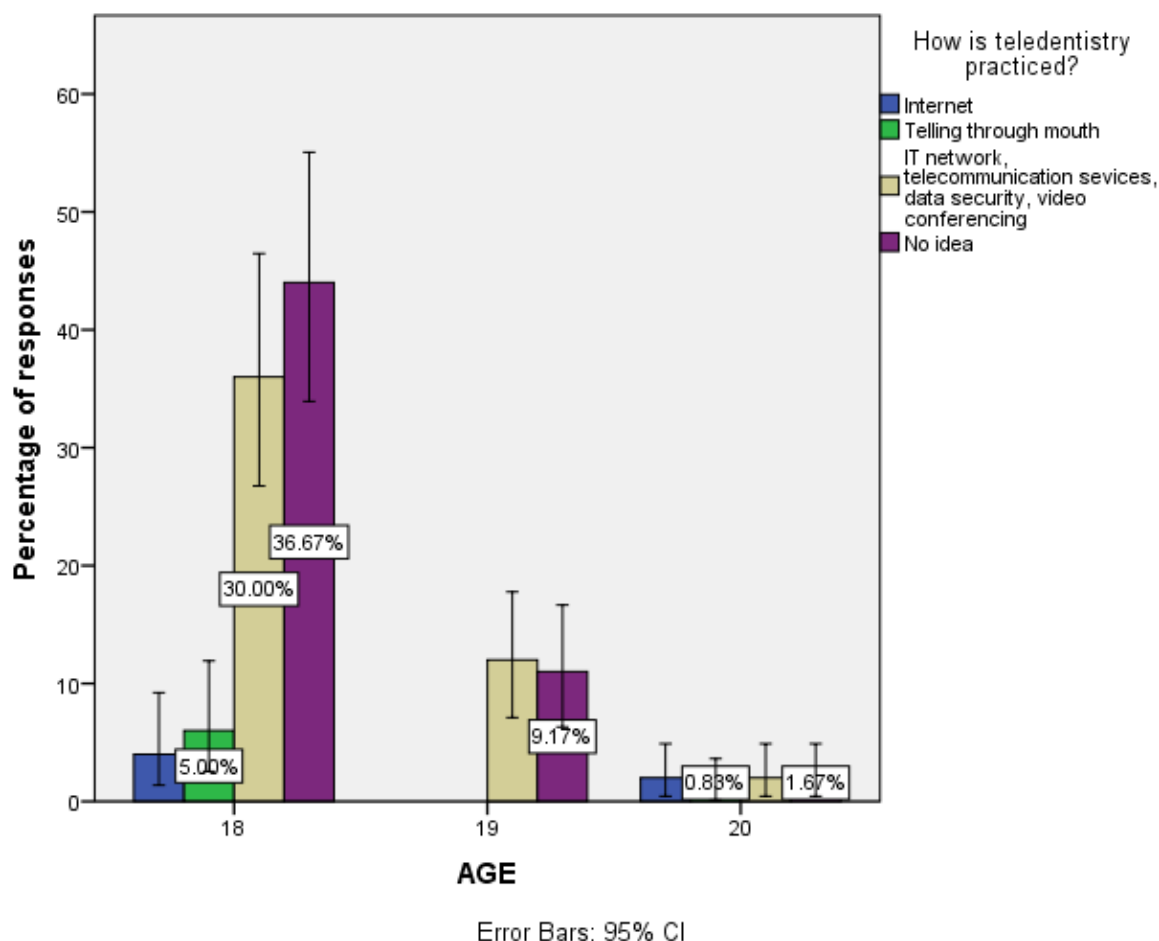
Figure 13: The bar graph represents the association between age and whether they know how teledentistry is practiced. The X-axis represents the age and Y-axis represents the percentage. Blue, green, beige, and purple represent the responses through 'internet', 'telling through the mouth', 'IT network, telecommunication services, data security, video conferencing, and 'no idea' respectively. Pearson's chi-square test shows p-value is 0.046, ($p<0.05$). Hence it is statistically significant. Majority of participants had no idea how teledentistry is practiced while many suggested telecommunication, internet, and video conferencing to be a mode.
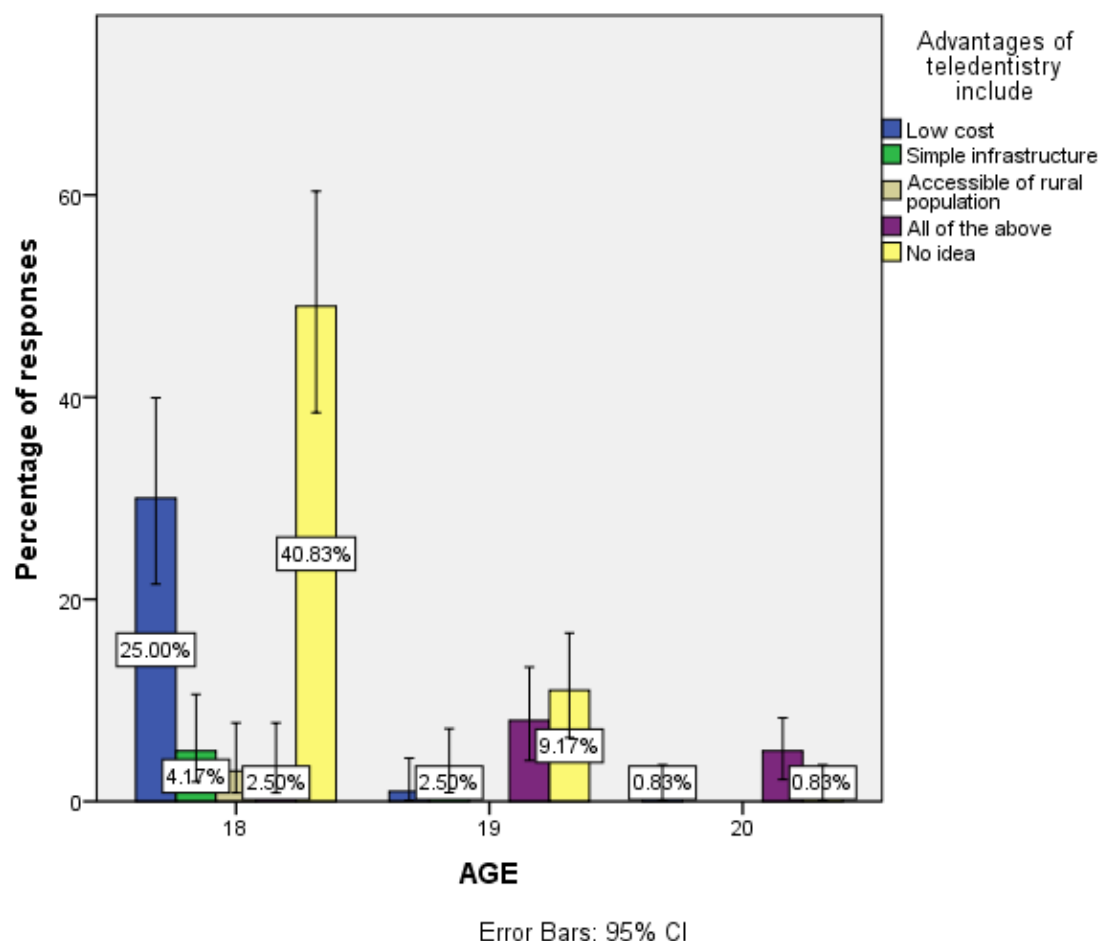
Figure 14: The bar graph represents the association between age and whether they know the advantages of teledentistry. The X-axis represents the age and Y-axis represents the percentage. Blue, green, beige, purple, and yellow represent the responses 'low cost', 'simple infrastructure', 'accessible to the rural population', 'all of the above, and 'no idea' respectively. Pearson's chi-square test shows p-value is 0.000, (p<0.05). Hence it is statistically significant. Majority of the participants of 18 years of age had no idea about the advantage of teledentistry.
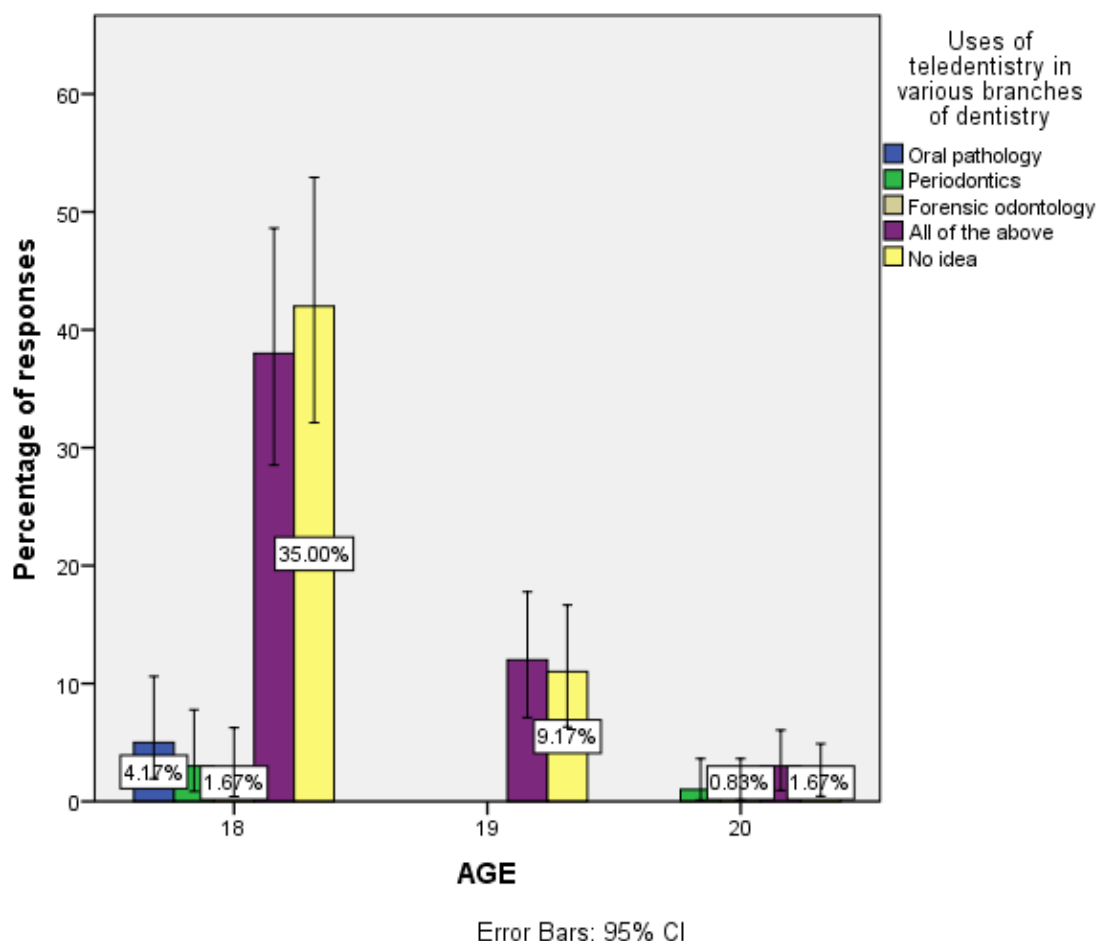
Figure 15: The bar graph represents the association between age and whether they know the uses of teledentistry in various branches of dentistry. The X-axis represents the age and Y-axis represents the percentage. Blue, green, beige, purple, and yellow represent the responses 'low cost', 'simple infrastructure', 'accessible to the rural population', 'all of the above, and 'no idea' respectively. Pearson's chi-square test shows p-value is 0.245, (p>0.05). Hence it is statistically not significant. Majority of participants of 18 years age had no idea on the uses of teledentistry in various branches of dentistry.
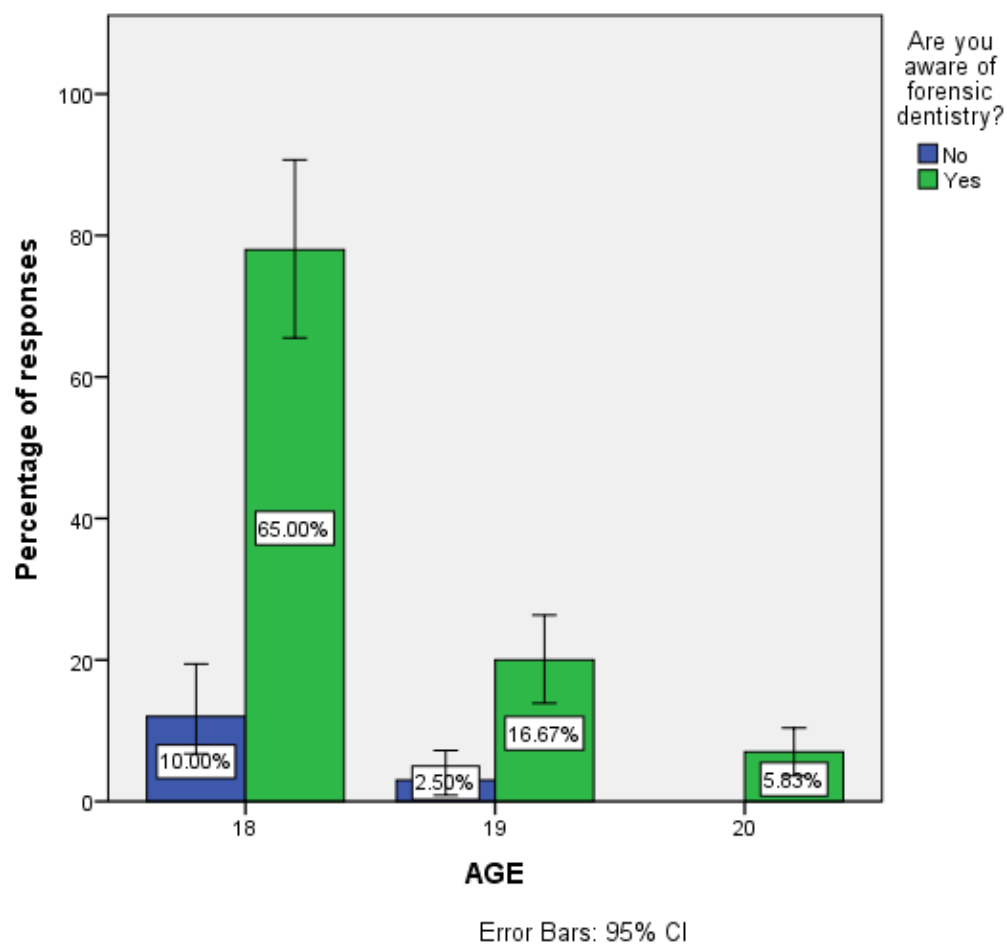
Figure 16: The bar graph represents the association between age and whether they are aware of forensic odontology. The X-axis represents the age and Y-axis represents the percentage. Blue (no) and green (yes). Pearson's chi-square test shows p-value as 0.588, (p>0.05). Hence it is statistically not significant. Majority of participants of 18 years age were aware of forensic dentistry.

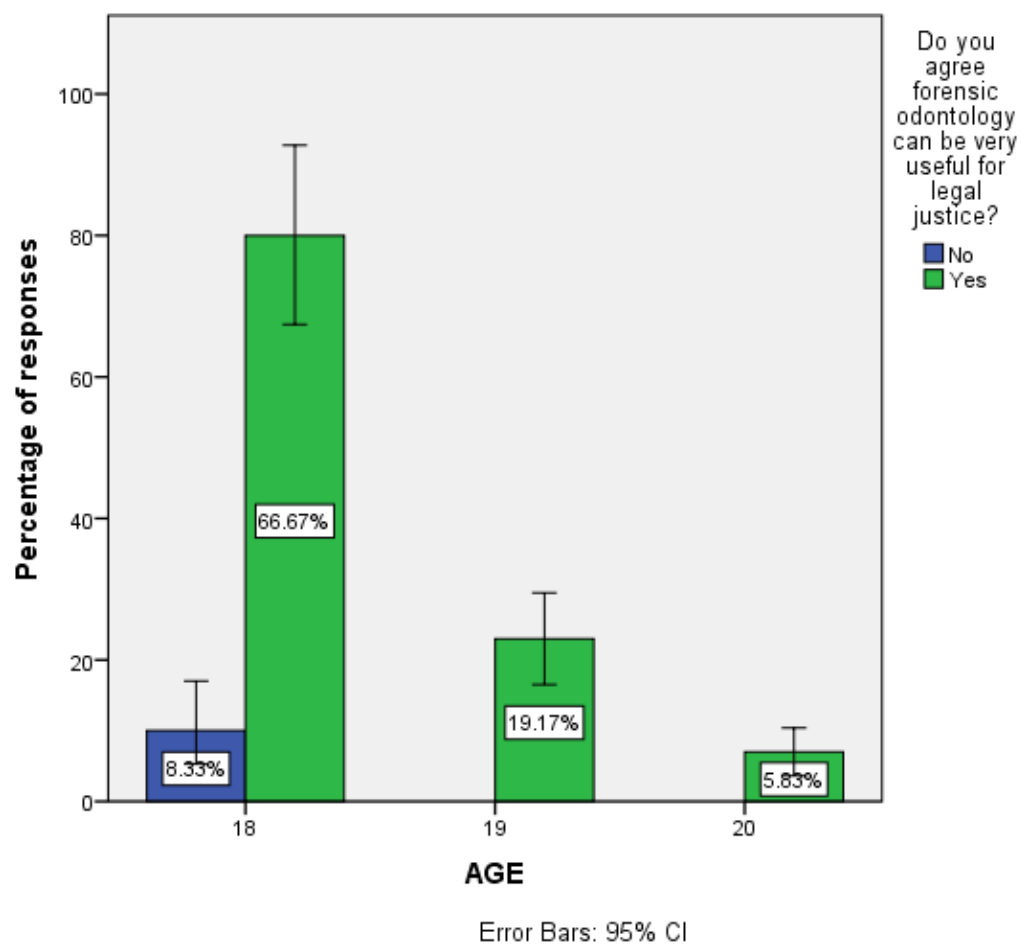**Figure 17:** The bar graph represents the association between age and whether they agree forensic odontology can be very useful for legal justice. The X-axis represents the age and Y-axis represents the percentage. Blue (no) and green (yes). Pearson's chi-square test shows p-value is 0.162, (p>0.05). Hence it is statistically not significant. Majority agreed that forensic odontology can be useful for legal justice.

Figure 18: The bar graph represents the association between age and whether they know dental records are useful in identifying the deceased and crime suspect. The X-axis represents the age and Y-axis represents the percentage. Blue (no), green (yes), and beige (maybe). Pearson's chi-square test shows p-value as 0.266, (p>0.05). Hence it is statistically not significant. Majority of the participants of 18 years age thought that dental records were useful for identifying the deceased and crime suspects.

Figure 19: The bar graph represents the association between age and why they think teledentistry is unable to go widespread. The X-axis represents the age and Y-axis represents the percentage. Blue (there is very little awareness about it), green (the cost is too high), beige (it's very less practice even though it's known), and purple (no idea). Pearson's chi-square test shows p value as 0.829, (p>0.05). Hence it is statistically not significant. Majority thought teledentistry is unable to be widespread because there is very less awareness about it.

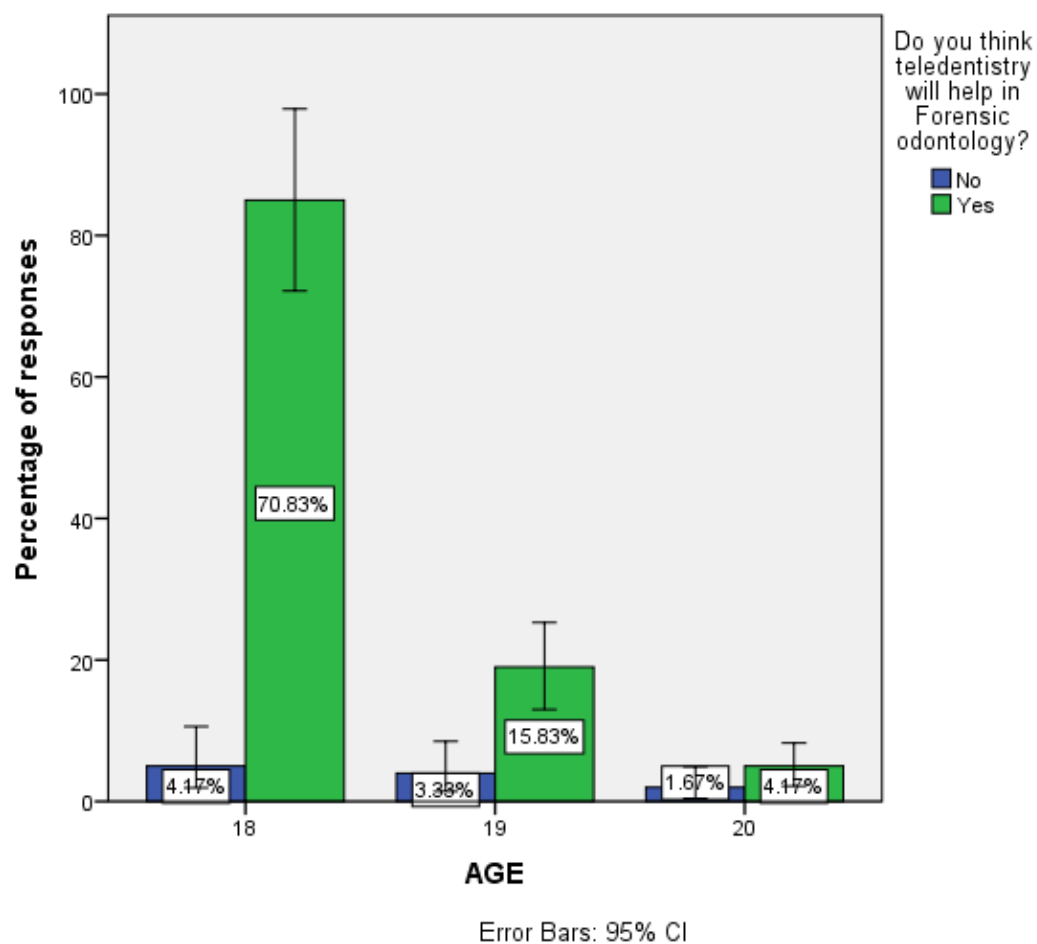**Figure 20:** The bar graph represents the association between age and whether they think teledentistry will help in forensic odontology. The X-axis represents the age and Y-axis represents the percentage. Blue (no) and green (yes). Pearson's chi-square test shows p value as 0.040, (p<0.05). Hence it is statistically significant. Majority agreed that teledentistry will help in forensic odontology.
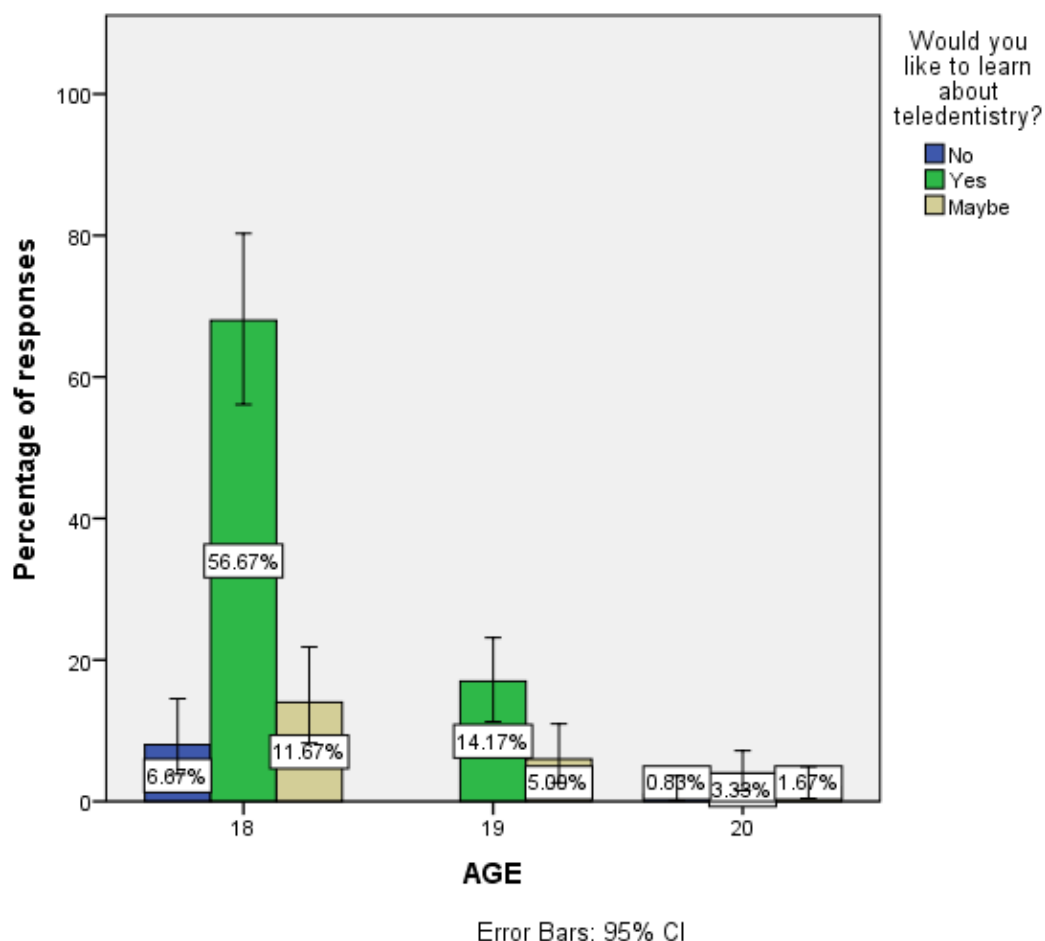
Figure 21: The bar graph represents the association between age and whether they would like to learn about teledentistry. The X-axis represents the age and Y-axis represents the percentage. Blue (no), green (yes), and beige (maybe) respectively. Pearon's chi-square test shows p value as 0.377, (p>0.05). Hence it is statistically not significant. Majority said they would like to learn about teledentistry.

DISCUSSION

In our present study, it was found that the dental students had knowledge about forensic odontology but lacked awareness on the contribution of teledentistry or its application. Many studies have been conducted earlier. In a study conducted by Mamatha Boring et al, among dental professionals, 27.34% of students in the previous study knew about teledentistry while 38.33% of the students in the present study heard about teledentistry(8). Previous literature stated that 93.9% of the study subjects reported that dental records are useful in identifying the deceased and crime suspects while 83.33% study subjects agreed to the same in our present study (3). In another study conducted by Vishal Mehrotra et al, 5% of practitioners had knowledge about forensic odontology while 87.5% of study subjects knew about it in our present study (31).

In a study conducted by Almutairi et al, 35.97% of study subjects knew about forensic odontology, while 87.5% knew about it in the present study(32). 32% in the previous study knew that teledentistry is practiced through telecommunication and video conferences while 30% had an idea about it in our present study (33). In a study conducted by Ramesh Nagarajappa et al, 88.6% study subjects knew that teledentistry is practiced through telecommunication services and video conferences while 30% in our present study knew about the mode (34). License of the teledentistry practice depends greatly on the country definition of teledentistry (35). The study was conducted with a small sample size. A bigger sample size can be considered for a much more insight into the knowledge about teledentistry in forensic odontology.

CONCLUSION

Teledentistry can be a very helpful tool in forensic odontology. Awareness about forensic odontology is good but teledentistry lacks behind due to poor awareness. But teledentistry can prove to be helpful not only in forensic odontology but also other various fields of dentistry improving the treatment methods and betterment of doctor-patient relation.

AUTHORS CONTRIBUTION

Vedha .R. Nair: Literature search, data collection analysis, manuscript drafting.

Dr. Lakshmi T.A: Aided in conception of the topic, has participated in the study design, statistical analysis and has supervised in preparation and final corrections of the manuscript.

Dr. Palati Sindhuja : Data verification, manuscript drafting, preparation of the manuscript.

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CONFLICT OF INTEREST

The authors reported the conflict of interest while performing this study to be nil.

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