

AWARENESS ON ROLE OF LASERS IN COSMETIC DENTISTRY AMONG DENTAL UNDERGRADUATES

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ABSTRACT:

The aim of the study was to evaluate the awareness on the role of Lasers in dentistry among dental undergraduates. LASER- Light Amplification By Stimulated Emission of Radiation. After successful usage of lasers in the medicinal field, it is possible for laser application in dentistry. Lasers play a major role in apicectomy, surgeries, operative dentistry, etc.. Lasers are utilized in all controls of dentistry and the administration of lasers is to delicate hard tissue in regular procedure as an essential instrument. The present study is a cross sectional survey conducted among 100 dental students to analyse their efficacy of online teaching. A self administered questionnaire was prepared with 15 questions and was circulated among dental students through google forms. Survey conducted and 1st year undergraduate students are more aware of laser technologies in dentistry when compared to others. 57% of students reported that they are aware that use of laser technology will reduce the use of anaesthesia. 60% of students reported that they need theoretical and practical laser education. 57% of students reported that they are aware about the role of lasers in pain management. This study concludes that most of the participants have knowledge and awareness of lasers in dentistry.

Keywords: Laser technology; Laser treatment; Pain management.

INTRODUCTION:

LASER- Light Amplification By Stimulated Emission of Radiation. After successful usage of lasers in the medicinal field, it is possible for laser application in dentistry. Lasers play a major role in apicectomy, surgeries, operative dentistry, etc.. Lasers are utilized in all controls of dentistry and the administration of lasers is to delicate hard tissue in regular procedure as an essential instrument (Stabholz, Sahar-Helft and Moshonov, 2016). The interaction of laser energy with the pigmented portion of bacteria found in the oral cavity contributes to the reduction of bacterial count at the surgical site (Mercer, 1996). Although pain may be removed by local anesthesia, fear of needles and of noise and vibration of mechanical preparation remains discomfort (Midda and Renton-Harper, 1991).

The advantage of laser use is the practice of the psychological effects of patients that gives a greater confidence in the minds of patients and now lasers become the doctor's latest sophisticated equipment for

the treatments. Lasers are used in light scalps relatively for deep thin cuts. Previous study concluded that there is a need to educate and train dental professionals regarding dental lasers to utilize this new technology to its full potential in future(Dederich and Bushick, 2004). Another study said that lasers have been introduced in dentistry as an alternative to conventional knife surgery(Garget *al.*, 2015). With the use of digital dentistry, the intraoral conditions can be transferred. Laser 3D scanning technology utilizes either a laser line to scan, or a single laser spot.

Lasers can be used for the diagnosis of periodontal disease. Dental implants are an excellent choice for replacing missing teeth, and dentists feel laser is a smart choice for your dental implant surgery. The use of lasers to remove ceramic veneers degrades the water bonding interface in the resin cement with hydrolysis. Cellulitis is caused due to bacterial infection and can be treated by cosmetic laser technology. The amount of gingival retraction and restoration to baseline resulting from use of gingival retraction cords or diode laser technique which is similar. Depending on the type of lasers dental hygiene can use a variety of lasers procedures including treatment of painful ulcers. The main aim of the study is to evaluate the awareness on the role of Lasers in dentistry among dental undergraduates.

MATERIALS AND METHODS:

Study design

A cross sectional study was conducted from April to May 2020 through an online survey among Undergraduate dental college students of private dental institutions. Approval was obtained from the institutional review board. The survey was conducted among 100 dental students. Self administered questionnaires of 15 closed ended questions were proposed and distributed among dental students through online based survey forms “ Google forms”. The questionnaire contained questions on demographic details also. Self administrated questionnaire was prepared.

Inclusion Criteria: All undergraduate dental college students of private dental institutions who were willing to participate were included.

Exclusion Criteria: Undergraduate dental college students of private dental institutions who were not willing to participate were excluded.

Ethical Considerations: Returning the filled questionnaire was considered as implicit consent with no need for signing a written consent. Ethical approval for the study is obtained from the Institutional Review Board (IRB) .

Study Methods:Self administered questionnaire of 15 close ended questions was prepared and it was distributed among undergraduate dental college students of private dental institutions through online survey forms “GOOGLE FORMS”. Demographic details were also included in the questionnaire.

Data Quality Assurance: The collected data were checked regularly for clarity, competence, consistency, accuracy and validity. The required correction was made on questionnaires, and invalid questionnaires were deleted before the actual collection of data.

Statistical Analysis: Data was analysed with SPSS version (22.0), this statistical analysis was chosen from a careful review of previous literature where authors used such software for the analysis(Duraisamy *et al.*, 2019)(Ganapathy *et al.*, 2016)(Ranganathan, Ganapathy and Jain, 2017)(Ashok and Suvitha, 2016)(Ajay *et al.*, 2017). Descriptive statistics as number and percent were calculated to summarise qualitative data. Chi square test was used to analyze and compare the education level of students and their knowledge on the role of lasers in dentistry. The confidence level was 95% and of statistical significance $P < 0.05$. Finally, the result was presented by using bar charts and frequency tables.

RESULTS AND DISCUSSION:

The survey was conducted among dental students. The survey was responded by 58% of first year students, 19% of second year students and 23% of third year students. 75% of the respondents were male and 25% were female.

[Fig 1] 75% of students responded that they are aware of laser technology in dentistry. 1st year undergraduate students maximum responded yes-35%. Reason is the knowledge about lasers is a primary in education. Pearson chi square test showed P value of 0.000 showing statistically significant. [Fig 2] 52% responded that they know about the hard and soft tissue lasers. Mostly 1st year students are those who responded yes-28%. Reason is their education level may bought their knowledge about hard and soft tissue lasers. Pearson chi square test showed P value of 0.025 which is statistically significant. Ishikawa et al,1998 has similar findings(Ishikawa and Arakawa, 1998). [Fig 3] Only 35% of students reported yes that they had a practice of dental laser practice experience. And here also mostly 1st undergraduates responded yes-20%. Pearson chi square test showed P value of 0.726 is statistically not significant. Meyer TD et al, 2004 showed similar findings(Myers and Sulewski, 2004). [Fig 4] 52% of students responded yes that they had undergone a laser treatment in their lifetime. 1st year are the most responded groups of yes-28%. Reason may be they have not undergone any situation for laser treatment and there may be no need. Pearson chi square test showed P value of 0.351 is statistically not significant. Al-Jobair A et al, 2014 had similar findings. No previous article with opposite findings were found(Al-Jobair, 2014).

[Fig 5] 57% responded that they are aware that lasers can reduce use of anesthesia. Also the first year responded the more yes-33%. Reason is their education level may provide these knowledge about laser use. Pearson chi square test showed P value of 0.144 is statistically not significant. No previous article was found(Shih *et al.*, 2005).[Fig 6] 60% of students responded yes that they need theoretical and practical laser education. 1st years mostly responded to the question yes-31%. Reason will be they may feel that they are lacking the knowledge and practical use of lasers. Pearson chi square test showed a P value of 0.143 is statistically significant. Coluzzi DJ< 2002 has similar findings(Coluzzi and Parker, 2017). No previous article with opposite findings was found. [Fig 7] 49% of students responded that lack of knowledge and 51% responded that the price of laser units are the reason for the lack of use of dental lasers. And 1st years are the most responded group yes-29%. Reason will be they experience this type of reason in their lifetime. Pearson chi square test showed 0.467 which is statistically not significant. Iacopono AM, 2007 has a similar finding(Iacopino, 2007). No previous article with opposite findings were found. [Fig 8] 65% responded yes that laser treatment has side effects on hard tissues. 1st years responded the most yes-39%. Reason may be their education level provided knowledge about this or they may have experience. Pearson chi square test showed P value of 0.621 which is statistically not significant. Wigdor H, 1997 have similar findings(Wigdor, 1997). No previous article with opposite findings.

[Fig 9]65% responded yes that they agree that laser application is an esthetic procedure. 1st years responded the more yes - 35%. Reason will be their education level or may be heard of this type of laser treatment used. Pearson chi square test showed a P value of 0.498 is statistically not significant. No similar articles and opposite articles were found. [Fig 10]57% of students responded that they are aware about the role of lasers in pain management. Here also 1st years responded maximum yes - 31%. Reason, they may experience less pain during laser treatment or their level of education may provide this knowledge. Pearson chi square test p value of 0.519 is statistically not significant. Walsh LJ, 2003 have similar findings(Walsh, 2003). No previous article with opposite findings were found. [Fig 11]59% of students responded that they are aware of hard tissue used. 1st years responded the more yes-31%. Reason will be their education level may provide the knowledge of the type of laser used for hard tissue. Cernavin I et al, 1994 have similar findings. No articles with opposite findings were found. Pearson chi square test showed P value of 0.380 is statistically not significant.

The present research has origins from previous studies, where the investigators involved in studies which based on clinical reports, interventional studies(Arigaet *al.*, 2018)(Jyothiet *al.*, 2017)(Ashok *et al.*, 2014)(Venugopalanet *al.*, 2014) in vitro studies(Duraisamyet *al.*, 2019)(Ganapathyet *al.*,

2016)(Ranganathan, Ganapathy and Jain, 2017)(Ajay *et al.*, 2017) and systematic reviews(Ariga *et al.*, 2018)(Selvan and Ganapathy, 2016)(Subasree, Murthykumar and Dhanraj, 2016)(Vijayalakshmi and Ganapathy, 2016)(Ganapathy, Kannan and Venugopalan, 2017)(Kannan and Venugopalan, 2018)(Basha, Ganapathy and Venugopalan, 2018). The study consists of small sample sizes. The questionnaire was general and it is not specific. It is not distributed widely. It is only distributed to a selected population. By conducting expanded study with more participants we can educate well and bring a practice in use of lasers with dental students.

CONCLUSION:

This study concludes that most of the participants have good knowledge and awareness of lasers in dentistry. Even though there is good knowledge about lasers and its uses in dentistry the laser dentistry practice is less due to the high cost of the equipment, and lack of clinical skills etc. Educational programmes can include topics on laser dentistry, with practical sessions and explanations of different types of equipment, can improve the clinical skills of the students and clinicians.

AUTHOR CONTRIBUTION:

Author 1 (HemanthRagav N V), carried out the study by collecting data and drafted the manuscript after performing the necessary statistical analysis. Author 2 (Dr. L. KeerthiSasanka) aided in conception of the topic, has participated in the study design, statistical analysis and has supervised in preparation of the manuscript. Author 3 (Dr. ArchanaSanthanam) has participated in the study design and has coordinated in developing the manuscript. All the authors have discussed the results among themselves and contributed to the final manuscript.

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CONFLICTS OF INTEREST:

None declared

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LEGENDS

FIGURES

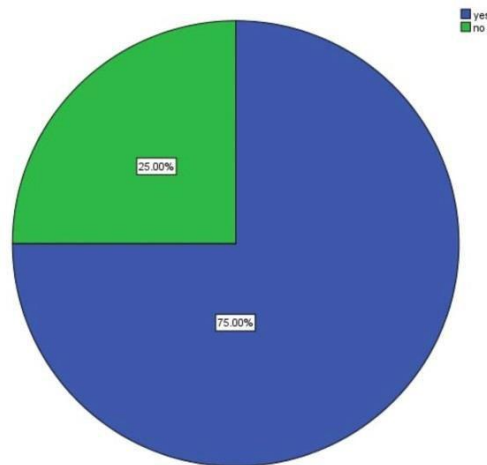


Figure 1: Pie chart representing the awareness of laser technology in dentistry, response obtained for yes(blue) and no(green). 75% of the study population responded that they are aware of laser technology in dentistry, whereas the remaining 25% were not aware of laser technology.

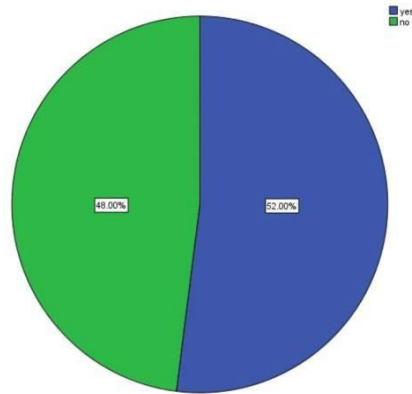


Figure 2: Pie chart representing the frequency distribution of whether they are aware of hard and soft tissue lasers, response obtained for yes(blue) and no(green). 52% of the study population reported that they are aware of hard and soft tissue lasers, whereas the remaining 48% responded that they are not aware of hard and soft tissue lasers.

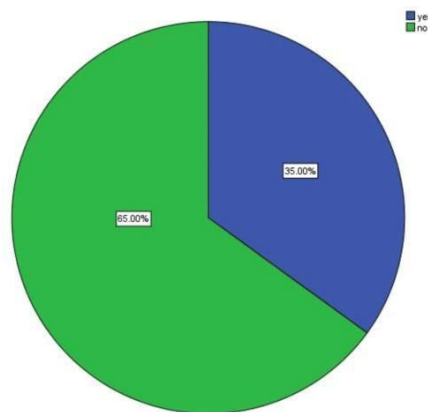


Figure 3: Pie chart representing the frequency distribution of whether they had a laser practice experience, response obtained for yes(blue) and no(green). 35% of the students responded that they have a laser practice experience, whereas the remaining 65% of the students responded that they don't have any laser practice experience.

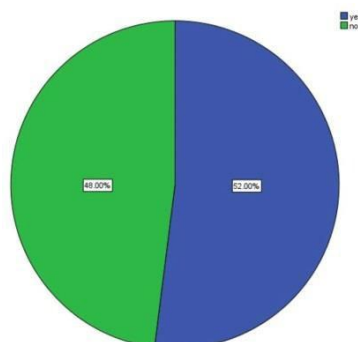


Figure 4: Pie chart representing the frequency distribution of whether they had undergone a laser treatment in their lifetime, response obtained for yes(blue) and no(green). 52% of the study population reported that they had undergone laser treatment in their lifetime, whereas the remaining 48% responded that they had never undergone a laser treatment in their lifetime.

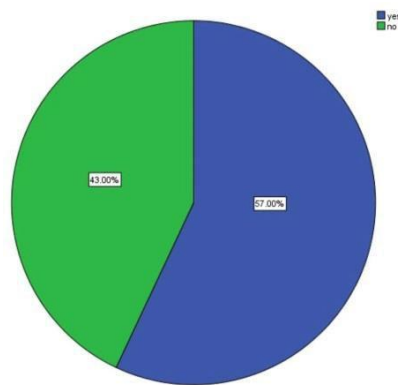


Figure 5: Pie chart representing the awareness of use of laser technology will reduce the administration of anaesthesia, response obtained for yes(blue) and no(green). 57% of the study population responded that they are aware that use of laser technology will reduce the administration of anaesthesia and the remaining 43% of the students are not aware.

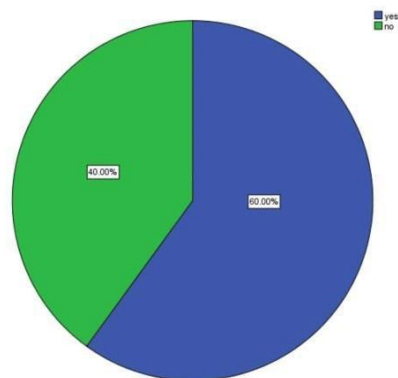


Figure 6: Pie chart representing the frequency distribution of theoretical needs and practical laser education, response obtained for yes(blue) and no(green). 60% of the study population felt that they need theoretical and practical laser education, whereas the remaining 40% of the students responded that they don't need theoretical and practical laser education.

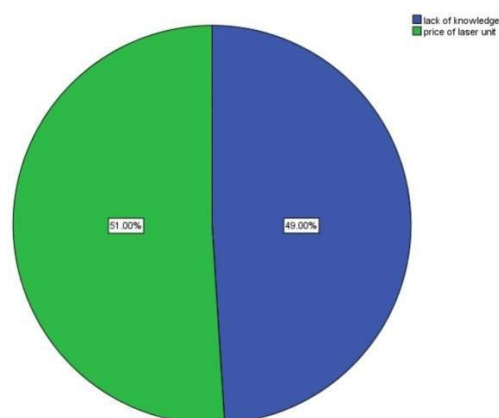


Figure 7: Pie chart representing the frequency distribution of the reason for the lack of use of dental lasers, response obtained for lack of knowledge(blue) and price of the laser unit(green). 49% the students responded that lack of knowledge is the main reason for the lack of use of dental lasers and the remaining 51% responded that the price of the laser unit is the main reason for the lack of use of dental lasers.

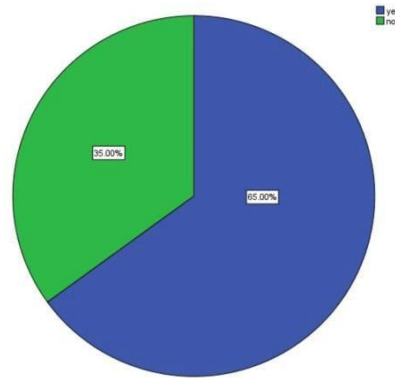


Figure 8: Pie chart representing the awareness of laser treatment have side effects on healthy tissue, response obtained for yes(blue) and no(green). 65% of the study population responded that they are aware that the laser treatment has side effects on healthy tissue, whereas the remaining 35% of students were not aware.

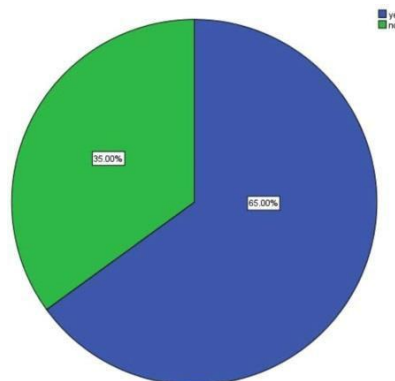


Figure 9: Pie chart representing the frequency distribution of their knowledge of lasers in aesthetic procedures, response obtained for yes(blue) and no(green). 65% of the study population responded that they felt laser application is used in aesthetic procedures, whereas the remaining 35% of the students didn't feel that laser application for aesthetic procedures.

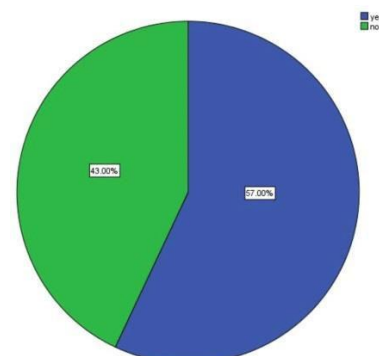


Figure 10: Pie chart representing the awareness of the role of lasers in pain management, response obtained for yes(blue) and no(green). 57% of the study population responded that they are aware about the role of lasers in pain management, whereas the remaining 43% of students responded that they are not aware.

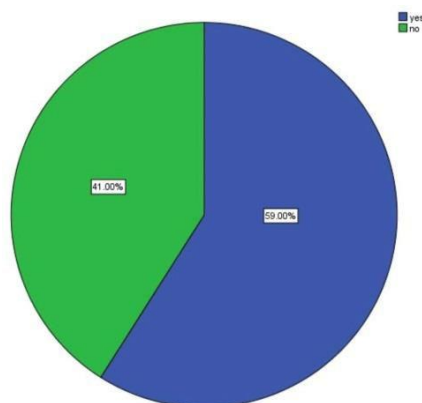


Figure 10: Pie chart representing the awareness of which type of laser can be used for hard tissue procedures, response obtained for yes(blue) and no(green). 59% of the study population responded that they are aware of which type of laser can be used for hard tissue procedures, whereas the remaining 41% of the students were not aware.

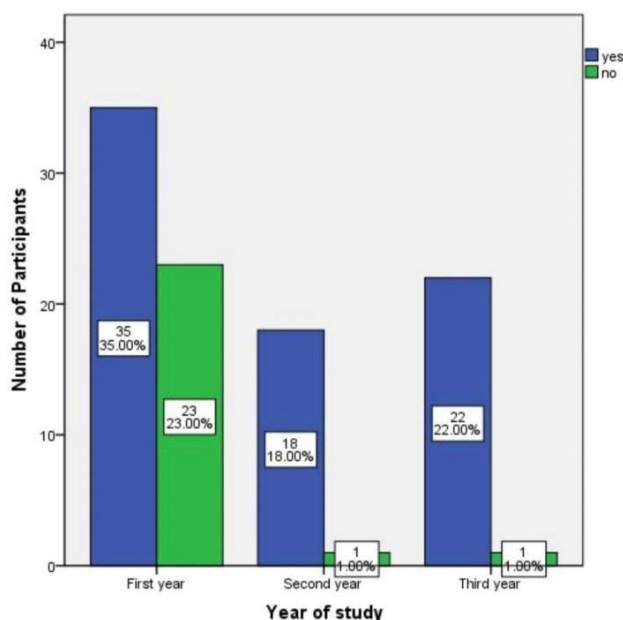


Figure 11: Bar chart representing the association between the year of study and awareness about the laser technology in dentistry. X axis represents the year of study and Y axis represents the number of respondents obtained, blue represents yes and green represents no. Out of 75% of responses for yes, 35% students were 1st year, 18% students were 2nd years and 22% of students were 3rd years. The 1st year students were more aware about laser technology in dentistry than second and third years. Pearson chi square test was done. Pearson chi square value: 15.823, p value 0.000(<0.5) which is statistically significant.

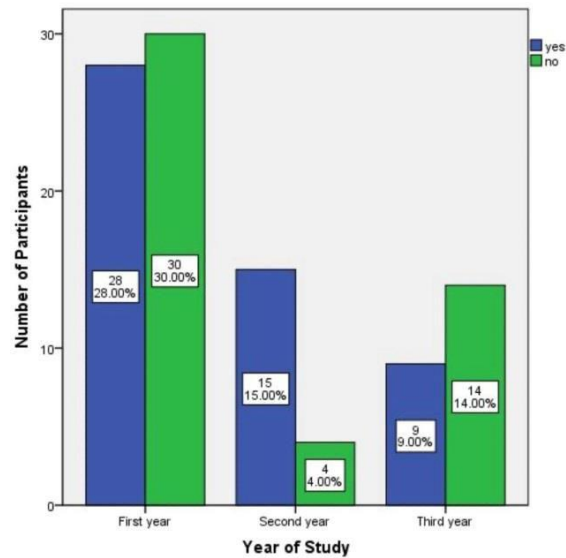


Figure 12: Bar chart represents the association between the year of study and their familiarity with the hard and soft tissue lasers. X axis represents the year of study and Y axis represents the number of respondents obtained, blue represents yes and green represents no. Student’s year of study is significantly associated with the awareness of hard and soft tissue lasers. Among 52% of the students, 28% were 1st years, 15% were 2nd year and 9% were 3rd year. Hence, first year students were more aware about the hard and soft tissue lasers. Pearson chi square test was done. Pearson chi square value: 7.376, p value: 0.025(<0.05) which is statistically significant.

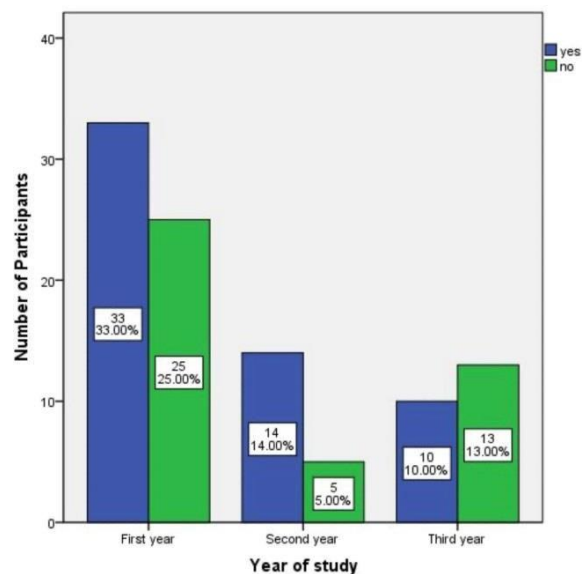


Figure 13: Bar chart represents the association the year of study and awareness about the use of laser technology will reduce the use of anaesthesia. X axis represents the year of study and Y axis represents the number of respondents, blue represents yes and green represents no.. Out of 57% of responses for yes, 33% of the students were 1st years, 14% of the students were 2nd years and 10% were third years. Hence first year students are more aware that the use of lasers will reduce the administration of anaesthesia. Pearson chi square test was done. Pearson chi square value: 3.874, p value: 0.144(>0.05) hence statistically not significant.

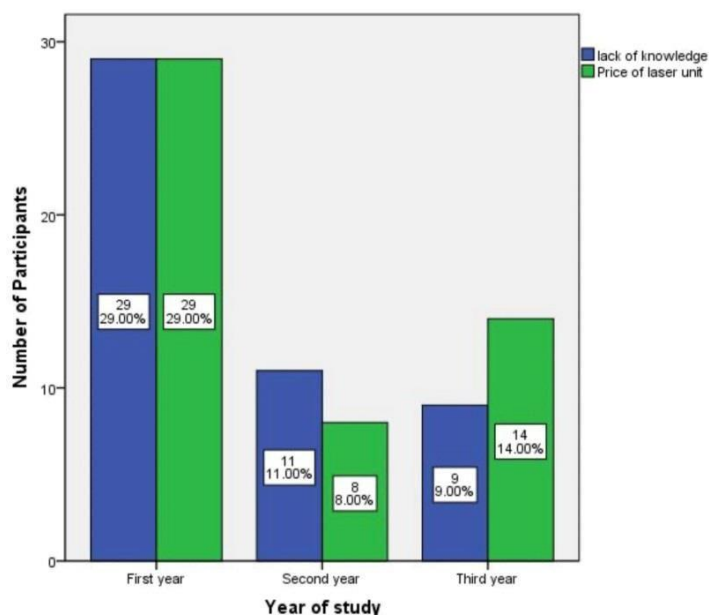


Figure 14: Bar chart represents the association between the year of study and the main reason for the lack of use of dental lasers. X axis represents the year of study and Y axis represents the number of respondents obtained for lack of knowledge(blue) and price of laser unit(green). . Out of 49% of the responses for lack of knowledge, 29% of the students were 1st years, 11% were 2nd years and 9% were third years. Student’s year of study was not significantly associated with awareness for lack of use of dental lasers. Hence first year students were the most who felt lack of knowledge is the main reason for lack of use of dental lasers. Pearson chi square test was done. Pearson chi value:1.521, p value 0.467(>0.05) hence statistically not significant

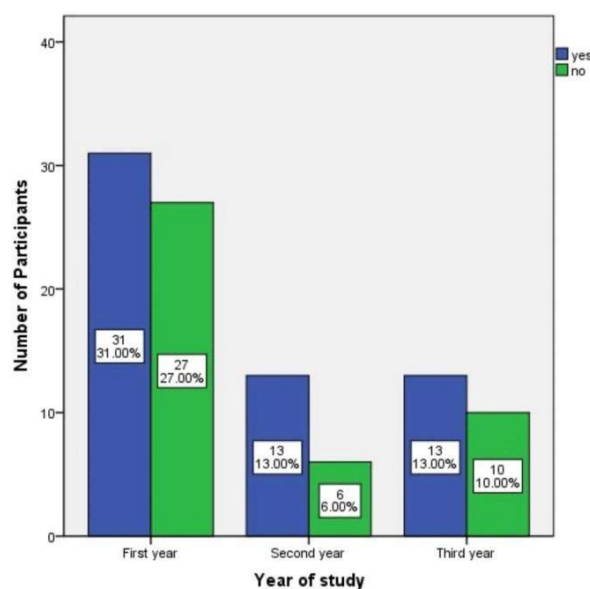


Figure 15: Bar chart represents the association between the year of study and awareness about the role of lasers in pain management. X axis represents the year of study and Y axis represents the number of respondents obtained for yes(blue) and no(green). Out of 57% responses for the for yes, 31% were 1st year students, 13% were second year students and 13% were 3rd year students. First year students are more aware than second and third year students regarding the awareness about the role of lasers in pain management. Pearson chi square test was done, Pearson chi square value: 1.312, p value 0.519(>0.05) hence statistically not significant.

TABLES

S. No	Questionnaire	Choices	Responses
1.	Are you aware of laser technology in dentistry?	<ul style="list-style-type: none"> • Yes • No 	<ul style="list-style-type: none"> • 46% • 54%
2.	Do you know about the Hard and Soft tissue lasers?	<ul style="list-style-type: none"> • Yes • No 	<ul style="list-style-type: none"> • 52% • 48%
3.	Do you have dental laser practice experience?	<ul style="list-style-type: none"> • Yes • No 	<ul style="list-style-type: none"> • 35% • 65%
4.	Have you ever undergone a laser treatment in your lifetime?	<ul style="list-style-type: none"> • Yes • No 	<ul style="list-style-type: none"> • 52% • 48%
5.	Are you aware that the use of laser technology will reduce the use of anaesthesia?	<ul style="list-style-type: none"> • Yes • No 	<ul style="list-style-type: none"> • 57% • 43%
6.	Do you think that theoretical and practical laser education is needed?	<ul style="list-style-type: none"> • Yes • No 	<ul style="list-style-type: none"> • 60% • 40%
7.	What can be the reason for the lack of use of dental lasers?	<ul style="list-style-type: none"> • Lack of Knowledge • Price of Laser Unit 	<ul style="list-style-type: none"> • 49% • 51%
8.	Do you think laser treatment has side effects on the healthy tissue?	<ul style="list-style-type: none"> • Yes • No 	<ul style="list-style-type: none"> • 65% • 35%
9.	Do you agree laser application is esthetic procedures?	<ul style="list-style-type: none"> • Yes • No 	<ul style="list-style-type: none"> • 65% • 35%
10.	Are you aware about the role of lasers in pain management?	<ul style="list-style-type: none"> • Yes • No 	<ul style="list-style-type: none"> • 57% • 43%
11.	Are you aware which type of laser can be used for hard tissue procedures?	<ul style="list-style-type: none"> • Yes • No 	<ul style="list-style-type: none"> • 59% • 41%

Table 1: Table showing frequency of responses