

Determination Of the Knowledge Awareness and The Application of Dental Lasers Among the Dental Graduates - A Questionnaire Based Study

Debarun David¹, Priya Lochana Gajendran², Karthikeyan Murthykumar³, Dhanraj Ganapathy^{4*}

¹Graduate Student, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai – 600077, Email: debarundavid24@gmail.com

²Department of Periodontics, Saveetha dental college and hospital, Saveetha institute of Medical and Technical Sciences, 162, Poonamallee High Road, Velappanchavadi, Chennai – 600077, Email : priyalochana.87@gmail.com

³Senior Lecturer, Department of Periodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai 600077, Tamil Nadu, India, Email : karthikeyanmurthykumar@gmail.com

⁴Professor & Head, Department of Prosthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai 600077, Tamil Nadu, India, Email : dhanrajganapathy@yahoo.co.in

Abstract

Aim: The aim of this study was to determine dental laser education and knowledge among dental graduates in Tamil Nadu.

Methodology: This cross-sectional questionnaire based study included general dental practitioners and specialists from various fields, academicians and students. The study was during the period of January to March 2020. The self-administered questionnaire consisted of questions pertaining to laser education and knowledge of dental laser applications sent randomly to 100 participants.

Results: In the light of the study presented above we can conclude that majority of the PG participants were aware of the concept of laser education than UG that indicated that awareness has to be created among such UG students through survey and other modes of information it also shows that majority of 79% males were more aware than the rest of females. It was also observed among the age groups 23-25 the participants had the highest awareness and a majority of 32.67% of these participants had an interest in dental laser education this shows that the number of participants that are interested is not satisfactory hence, such surveys must be carried out more often to until advanced awareness regarding dental laser education as it is the future of dentistry in the upcoming era.

Conclusion: This study strongly concluded there must be Dental curriculum teaching at least 3-4 hrs about the application and implementation. In this technological era, an exponential usage in lasers should be made possible by reducing its production costs with high standards. It shows that the majority of 79% males were more aware than the rest of females. It was also observed among the age groups 23-25 the participants had the highest awareness and a majority of 32.67% of these participants had an interest in dental laser education.

Keywords: awareness, innovation, knowledge, laser, periodontal surgery

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INTRODUCTION

Advances in all aspects of science and technology continue to occur at an exponential rate and have changed the traditional approaches which require that students and practitioners receive the necessary knowledge(1) Dental laser is one of the most significant developments of modern dentistry. Laser dentistry has superseded many traditional dentistry practices, making treatments more precise, less painful, minimally invasive and less destructive. Thus, to gain the fundamental knowledge of laser therapy is important for all training practitioners(2)

The use of lasers is one of these hallmark technologies that enables dentists to work faster, more precisely and more efficiently (3)Laser is an acronym for Light Amplification by Stimulated Emission of Radiation(4) Lasers work on the principle of stimulated emission theory proposed by Albert Einstein in 1917 based on the concept of spontaneous stimulated emission theory which was postulated by Neil Bohr in early 1900s. Traditionally, lasers have been classified according to the physical construction of laser.(eg: gas, liquid, solid state or semiconductor diode), the type of medium which undergoes lasing (eg: Erbium: Yttrium Aluminium Garnet) (Er: YAG) and the degree of hazard to the Skin or eyes(5)

In hard tissue application, the laser is used for caries detection, bleaching, restorative removal and curing, cavity preparation and for treatment of dentinal hypersensitivity(6) In soft tissue application, laser is used for incision, excision, ablation, wound

healing, removal of hyperplastic tissue to uncovering of impacted or partially erupted tooth, photodynamic therapy for malignancies, photo stimulation of herpetic lesion. Use of the laser proved to be an effective tool to increase efficiency, specificity, ease, and cost and comfort of the dental treatment.

To practice laser safely and effectively in different disciplines of dentistry, it is essential to have a good knowledge of laser physics, laser operation, different types of laser, and which type of laser is appropriate for each case(7–9)Due to the rapid evolution of lasers in dentistry, many students lack practical and theoretical knowledge in this field. Xiang (10) said that most new practitioners are tempted to use only those technologies in their daily practice with which they have worked and learned about during their dental training. (1)Hence, the dental students should be well trained to use these new technologies. Our team has extensive knowledge and research experience that has translated into high quality publications (11–23),(24–28) (29) (30). The aim of this study was to determine dental laser education and knowledge among dental graduates.

Materials And Methodology

This cross-sectional questionnaire based study included general dental practitioners and specialists from various fields, academicians and students(interns and post graduates) of various dental colleges in Chennai. Dentists who do not practice are not included, subjects not willing to participate were not included in the study. Ethical clearance was obtained from the Institutional Ethics Committee, Saveetha University. Sample size was calculated as 100 as per the study done by Sengupta et al. in 2014. A self-administered pretested questionnaire 2021 April to June 2021. A self-administered questionnaire consisting of 15 questions was given to the dental students who participated in the study. The information collected by the questionnaire included demographic details such as gender and year of education and questions to assess dental laser education and knowledge.

The responses were coded and entered into Microsoft Excel and analyzed using IBM SPSS statistics 20.0 (IBM Corporation, Armonk, NY, USA). Descriptive and inferential statistical analyses were carried out in the present study. Results on categorical measurements were presented in number (%). Level of significance was fixed at $P = 0.05$ and any value ≤ 0.05 was considered to be statistically significant. Chi-square analysis was used to find the significance of study parameters on categorical scale.

Results

A total of 100 participants have been included in the study in the age group of 18 to 30 years.

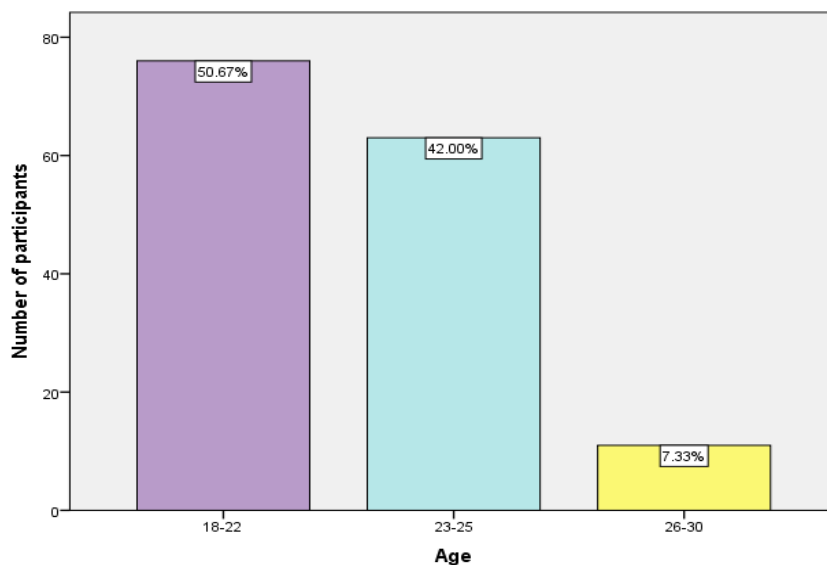


Figure 1: Bar graph represents the age group of patients who had participated in the study. Majority of the participants(50.67%)were in the age group of 18 to 22 years and around 7.3% belonged to age group of 30 years.

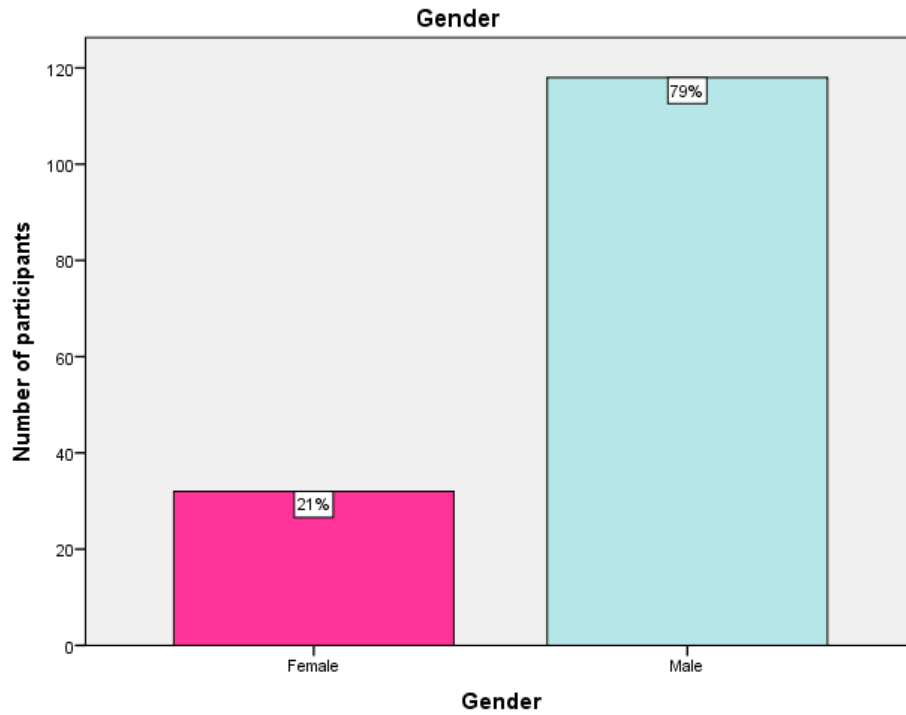


Figure 2: Bar graph represents the gender distribution of the participants who attempted the survey. Majority of participants were 79% males and the rest were 21% females.

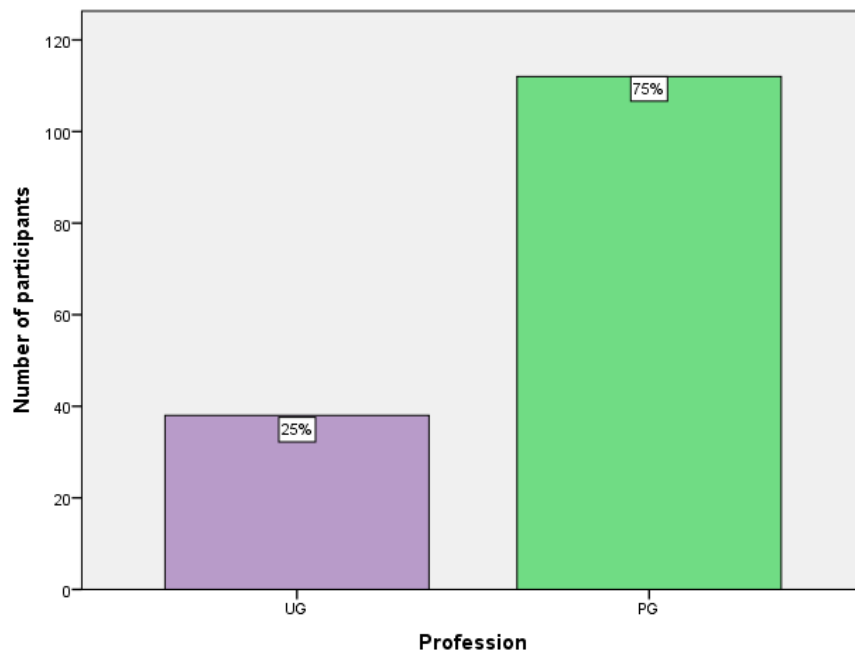


Figure 3: Bar graph represents the profession of the participants who attempted the survey. Majority of the participants were 75% PG students and the rest were 25% UG students.

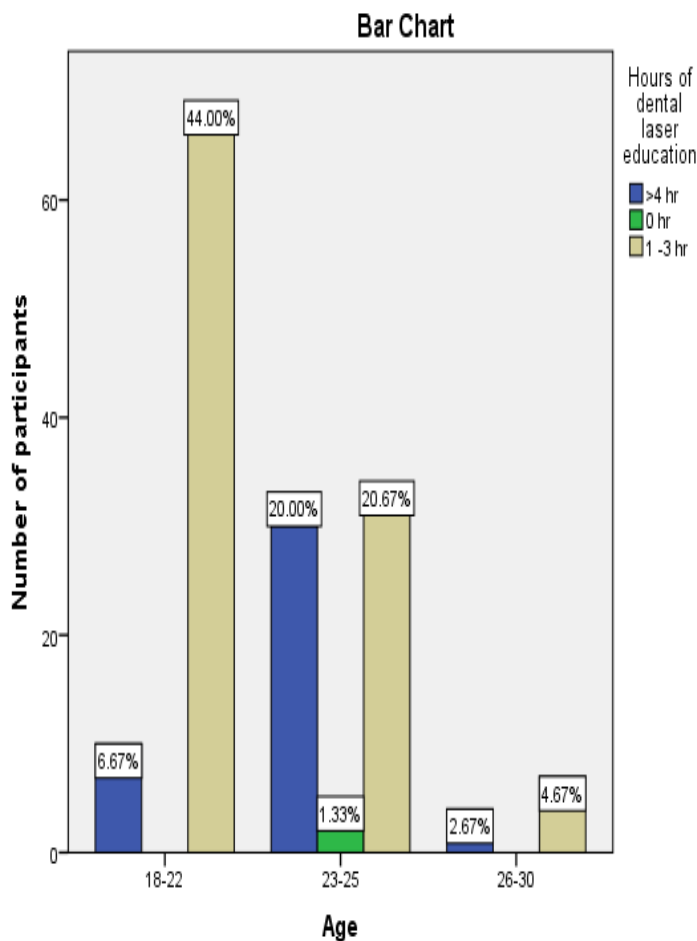


Figure 4: Bar chart represents the association between the hours of laser education, the age group and the response of the participants to whether they were aware of the hours of dental laser education used among the dental students. The blue bar represents more than 4 hours, the yellow bar represents 1-2 hours and green bar represents 0 hours. Results showed that among the 18-28 age groups of participants, 6.67% of them opted for 1-3 hours, and the majority of 44% voted more than 4 hours. Among the 23-25 age group, 1.3% voted for 0 hours and a majority of 20.67% voted for 1-3 hours. Among the age group 26-30, 2.67% of them opted 1-3 hours and 4.46% voted for more than 4 hours. This shows least awareness among the age group 26-30 age group of participants. The Chi square analysis was done and the association was found to be statistically significant since the p-value was 0.047 ($p < 0.05$).

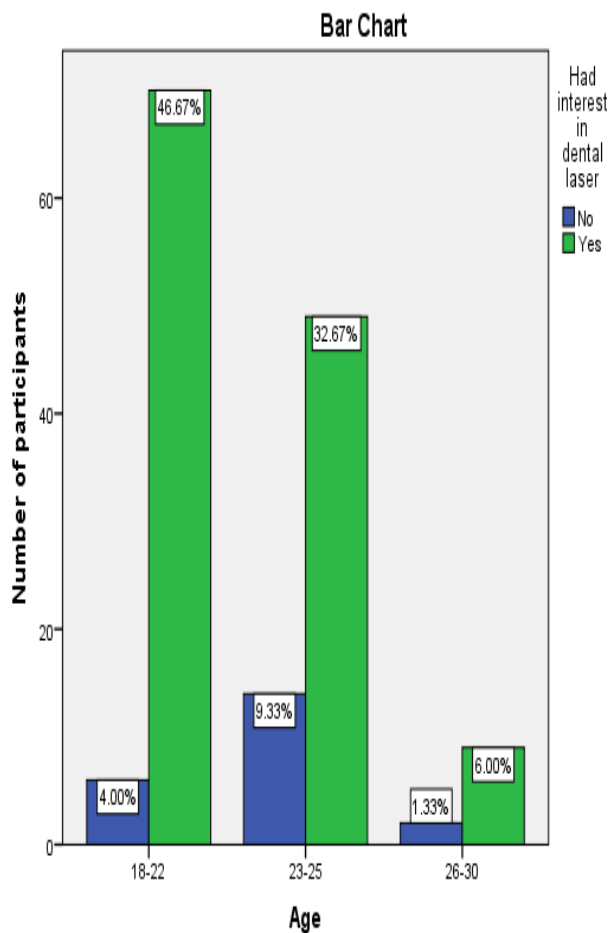


Figure 5: Bar chart represents association between the age group and the response of the participants to whether they were interested in dental laser education used among the dental students. The blue bar represents NO and green bar represents YES. Results showed that among the 18-28 age groups of participants, 4% of them opted NO and the majority of 46.67% voted more than 4 hours. Among the 23-25 age group, 9.33% voted for NO and a majority of 32.67% voted for YES. Among the age group 26-30, 1.33% of them opted NO and 6% voted for YES. This shows least interest among the age group 26-30 age group of participants. The results were not statistically significant (Chi square test P value 0.051)

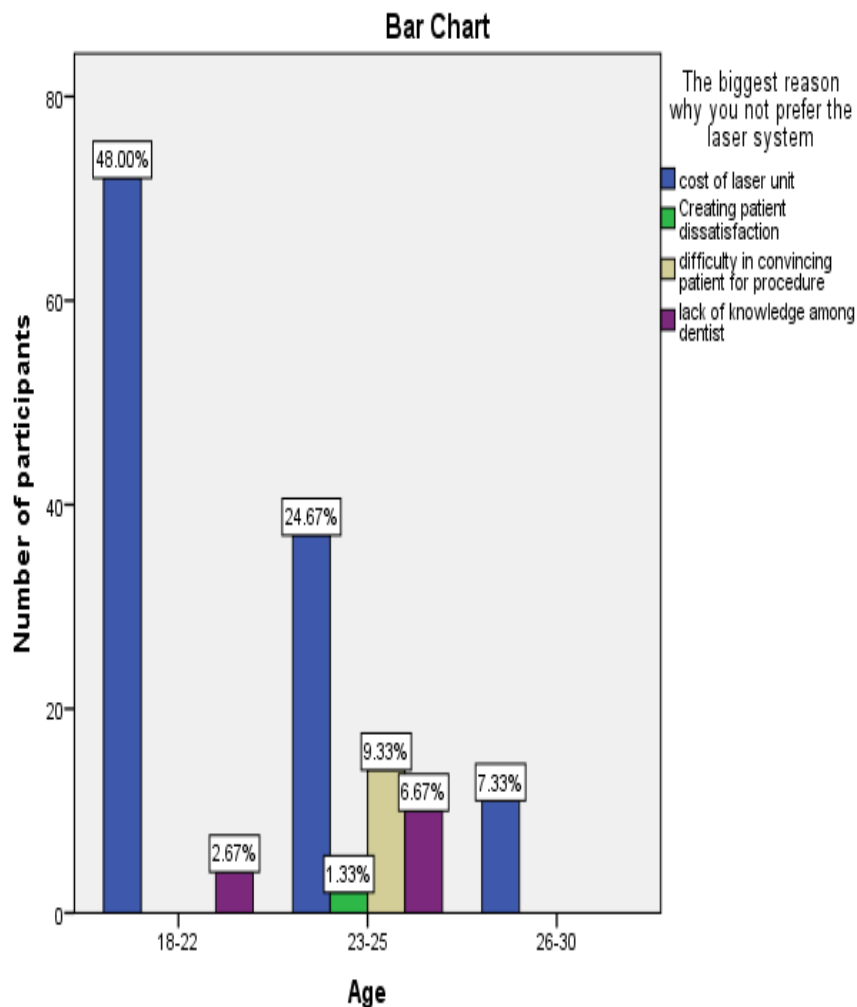


Figure 6: Bar Graph correlation between the age group and the response of the participants to determine the biggest reason why they don't prefer the laser system. The blue bar represents 'cost of laser unit', the yellow bar represents 'difficulty in convincing patients for procedure', green bar represents 'creation of patient dissatisfaction' and purple bar represents 'lack of knowledge among dentists'. Results showed that among the 18-28 age groups of participants, the majority 48% of them opted for 'cost of laser unit', and the rest of 2.67% voted 'lack of knowledge among dentists'. Among the 23-25 age group, 24.67% of the majority voted for 0 hours and the remaining 6.67% voted for 'lack of knowledge among dentists'. Among the age group 26-30, only 7.33% responded 'cost of laser unit'. The Chi square analysis was done and the association was found to be statistically significant, p-value being 0.027 ($p < 0.05$).

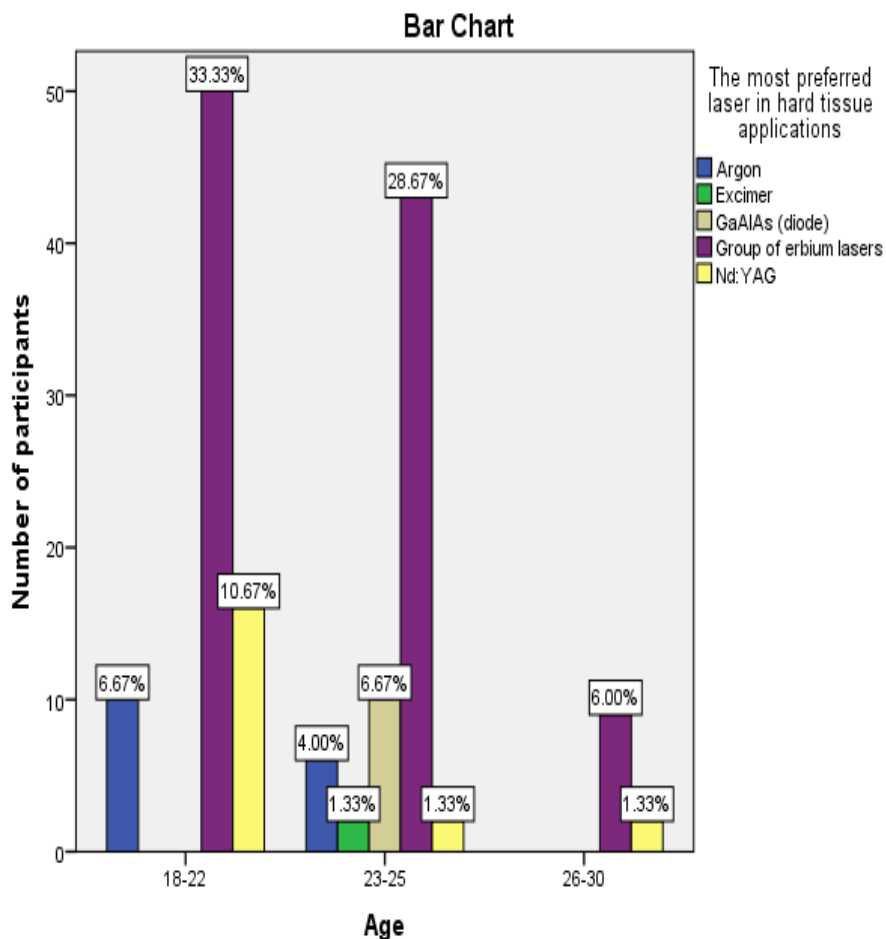


Figure 7: Bar Graph correlation between the age group and the response to the most preferred laser in hard tissue application. The blue bar represents 'argon', the green bar represents 'Excimer', brown bar represents GaAIAs (diode) and purple bar represents 'group of erbium laser' and yellow bar represents Nd.YAG. Results showed that among the 18-28 age groups of participants, the majority 33.33% of them opted for 'group of erbium laser', and the rest of 6.67% voted 'argon'. Among the 23-25 age group, 28.67% majority voted for 'group of erbium laser' and the rest 1.33% voted for Nd.YAG. Among the age group 26-30, only a majority of 6% responded to the 'group of erbium laser'. The Chi square analysis was done and the association was found to be statistically significant, p-value being 0.46 ($p < 0.05$).

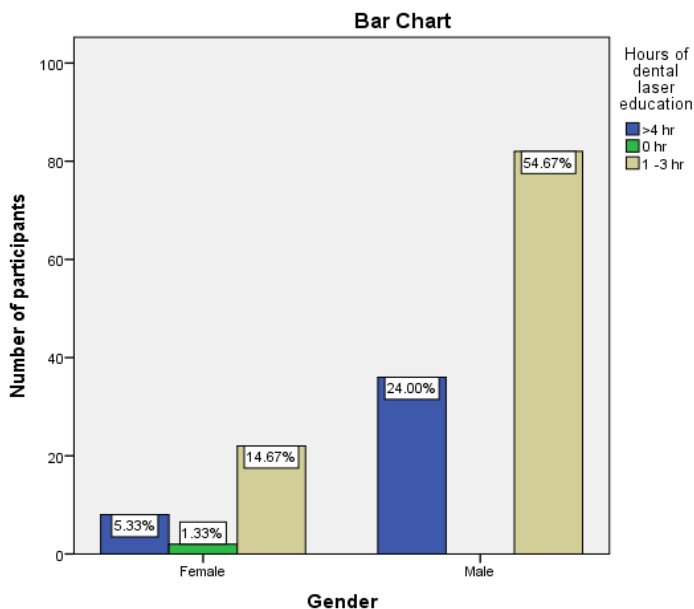


Figure 8: Bar chart represents correlation between the gender and the response of the participants to whether they were aware of the hours of dental laser education used among the dental students. The blue bar represents more than 4 hours, the yellow bar represents 1-2 hours and green bar represents 0 hours. Results showed that among the genders of participants, Majority of males 54.67% opted for 1-3 hours, and the rest of 24% voted for more than 4 hours. Among the females, the majority of 14.67% voted for 1-3 hours and the rest of 1.33% voted for 0 hours. The results were not statistically significant (Chi square test P value 0.051)

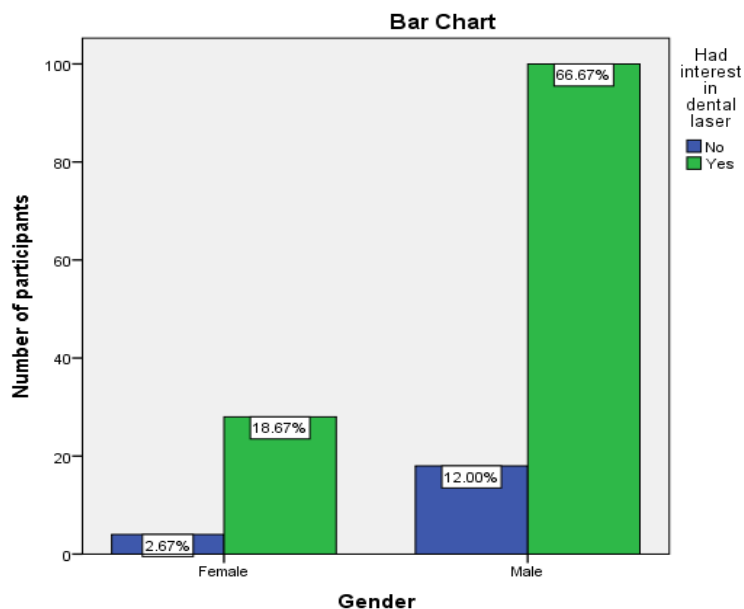


Figure 9: Bar chart represents correlation between the gender and the response of the participants to whether they were interested in dental laser education used among the dental students. The blue bar represents NO and green bar represents YES. Results showed that among the genders of participants, Majority of males 66.67% opted for YES, and the rest of 12% voted NO. Among the females, the majority of 18.67% voted for YES and the rest of 2.67% voted for NO. The Chi square analysis was done and the association was found to be statistically significant, p-value being 0.027 (p<0.05).

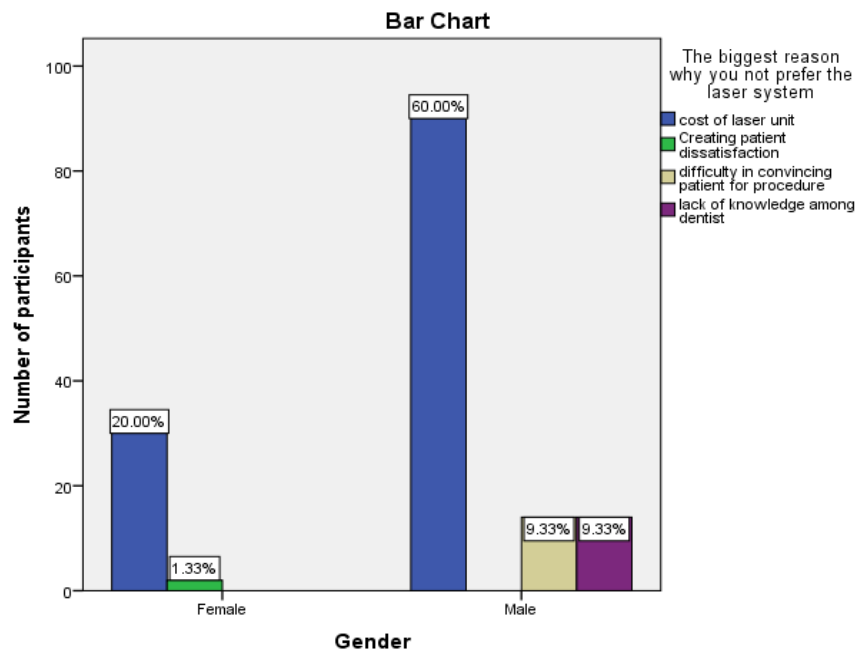


Figure 10: Bar Graph association between the gender and the response of the participants to determine the biggest reason why they don't prefer the laser system. The blue bar represents 'cost of laser unit', the yellow bar represents 'difficulty in convincing patient for procedure', green bar represents 'creation of patient dissatisfaction' and purple bar represents 'lack of knowledge among dentists'. Results showed that among the genders of participants, Majority of males 60% opted for 'cost of laser unit', and the rest of 9.33% voted 'difficulty in convincing patients for the procedure'. Among the females, the majority of 20% voted for 'cost of laser unit' and the rest of 1.33% voted for 'creation of patient dissatisfaction'. The results were not statistically significant (Chi square test P value 0.051) .

Discussion

Dental college is a very important source for dental doctors as they are totally dependent totally on the information provided in their own college. This study provides a general view about dental laser education and knowledge among dentists of the hours of teaching needed in dental laser including both male and female and their preference of choices in their specialities. This survey only assessed some basic knowledge of dentists regarding uses, advantages, effects of laser and preference among dental doctors including postgraduates and undergraduates.

Clinical use of dental laser devices is also increasing day by day. Therefore, it is important to find more places for this in the dental education curriculum to teach the importance of laser application in both UGs and PGs. Many dentists reported that they had laser education in oral surgery followed by periodontics, endodontics. Dentistry is not as indifferent to the innovations of the era as it is in many areas. With the advancement of technology and the increased scientific work done, new methods and tools are emerging in routine clinical practice in dentistry. The introduction of lasers represents a big turning point in dentistry, and now, a lot of procedures are performed using different types of lasers. Nowadays, lasers are incorporated into the daily practice(31)

Education given at dental college is most important for a student as it is the main source of knowledge that every student relies on and their understanding of the subject depends on the information provided by their institution. Laser dentistry is one such application and is the need of the hour. A survey was conducted to assess the knowledge regarding lasers and its applications in dentistry. The majority of the dentists were aware of the application of lasers in dentistry; however, a majority of the dentists were of the opinion that lasers were used for only soft tissue procedures, but the diverse application of lasers in the various branches of dentistry is yet to be known to all general practitioners(32)

A vast number of practitioners were aware of the application of lasers in the field of oral surgery and periodontics,(33) as their application for the soft tissue procedures was widely dependent on lasers. With a wide range of advantages of lasers, proper

education and training at undergraduate level would drastically improve the knowledge and awareness of lasers. Production of laser equipment in India with reduced cost would certainly reduce the treatment cost and increase the number of patients opting for laser dental procedures. This in turn will increase the number of dentists procuring laser equipment for their dental practice.(34)

Laser systems existing in dentistry can be transferred in dental canals via fiber optics like Nd:YAG Argon and Diode lasers or by hollow tubes such as CO₂ Er:YAG lasers, and by doing so benefit from biomechanical intra canal cleaning as well as bactericidal ability of laser radiation will be achieved.Nd:YAG was one of the first lasers to be used for canal disinfection(35,36)Er:YAG laser has been considered the most promising for periodontal therapy mainly due to its property to ablate soft and hard tissue without major thermal side effects.

Multiple applications of laser in dentistry were not familiar to dentists as these applications are recently reported in the literature and proved its efficiency. Majority of dentists did not know about the uses of laser in operative dentistry like dentin desensitization.A systematic review on the effectiveness of laser therapy in treating dentine hypersensitivity reported that laser therapy has a slight clinical advantage over topical medicaments in the treatment of dentine hypersensitivity(37)

Most of the dentists felt that the dental laser treatment was as expensive as it may be due to the High cost required to purchase equipment, implement technology and invest in required education¹⁸. Majority of dentists felt that the cost of the laser unit was the biggest deterrent as it may be due to patients' response about cost of laser treatment.(38) Most of the dentists like to have diode type of laser in practice as its most widespread use for soft tissue in medicine and dentistry(7)The clinical applications of laser includes detection of caries and sub gingival calculus, photo thermal bleaching, root canal therapy, low level laser therapy,canal disinfectant(39)

The majority of the dentists were aware of the application of lasers in dentistry; however, a majority of the dentists were of the opinion that lasers were used for only soft tissue procedures, but the diverse application of lasers in the various branches of dentistry is yet to be known to all general practitioners (40)A vast number of practitioners were aware of the application of laser in the field of oral surgery and periodontics as their application for the soft tissue procedures was widely dependent on laser.

With a wide range of advantages of lasers, proper education and training at undergraduate level would drastically improve the knowledge and awareness of lasers(41). Production of laser equipment in India with reduced cost would certainly reduce the treatment cost and increase the number of patients opting for laser dental procedures. This in turn will increase the number of dentists procuring laser equipment for their dental practice.

The limitation of the present study is that it was a cross-sectional study conducted on a small sample; hence, the results cannot be generalized as the teaching patterns differ among various universities across India. The Dental Council of India which is responsible for the maintenance of education standards for the dental degree in India should include dental laser education (theory and practical) in the initial years of BDS curriculum.

Conclusion

Dental laser application systems , being introduced since a decade, have not been used to its full potential. Knowledge and awareness of lasers among dentists still remain questionable due to lack of knowledge in spite of its advantages.

The results of this study show that the majority of the dentists learnt about laser .This indicates that laser education needs to be implemented in UG and PG programs. Even though many dentists are interested in practicing lasers, the major drawback mainly lies in its cost factor. If it is used to its full power, laser can revolutionize dentistry in diagnosis, prevention, and treatment planning, thus providing utmost care to patients. This study strongly concluded there must be Dental curriculum teaching at least 3-4 hours about the application and implementation. In this technological era, an exponential usage in laser should be made possible by reducing its production costs with high standards

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Conflict Of Interests

All the authors declare that there was no conflict of interest in the present study.

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