



**KNOWLEDGE, AWARENESS AND PRACTICE OF
DENTAL LASERS AMONG HOUSE SURGEONS
IN SOUTH INDIA**

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ABSTRACT:

AIM: To assess the knowledge, Awareness, and practice of dental lasers among house surgeons in South India.

Materials and Methods: A cross-sectional, self-modified, validated questionnaire-based, survey was conducted among house surgeons belonging to various colleges in South India. A total of 501 participants completed the questionnaire. Google Form link was generated and circulated. Data were imported in Microsoft Excel (Version 2016) format. The data was analysed using *SPSS* Statistics for Windows, version 25.0 (*SPSS* Inc., Chicago, Ill., USA).

Inferential statistics were performed using the Chi-square test. Categorical variables were described using frequency and percentages.

Results: Only 12.7 % of the respondents had received any formal training before the use lasers. Most of the participants had insufficient knowledge regarding the applications of laser in dentistry. Students' knowledge of the uses of dental laser in periodontics, oral surgery, and operative dentistry was better than their knowledge in Orthodontics

Conclusion: The survey's findings indicate that students pursuing dentistry need to be educated and trained on dental lasers by doing so they can make the most of this cutting-edge technology in the future.

Keywords: Dental lasers, knowledge, awareness, laser application, Dental education, Survey.

INTRODUCTION

The development of laser technology since Albert Einstein's 1917 presentation of the concept of stimulated emission. Today, laser technology is having a big impact on our lives. The care and wellbeing of patients are greatly benefited by its developments in medicine and dentistry. Laser dentistry, however, didn't become widely used until 1990. Since then, lasers have been utilised in all dental specialties to treat both soft and hard tissues, either as a stand-alone procedure or as an addition to more traditional methods. Lasers can be roughly categorised into two groups based on their therapeutic applications: soft-tissue lasers and hard-tissue lasers. Co₂, diode, and neodymium lasers make up the majority of soft-tissue lasers; they are mostly used to treat gingival and periodontal tissue. The use of erbium hard-tissue lasers in apicectomy, and operational dentistry is significant.

In orthodontic practice, lasers have many common applications, including acceleration of tooth movement, bone remodeling, enamel etching prior to bonding, debonding of ceramic brackets and pain reduction after orthodontic force and prevention of enamel demineralization.

It is essential to have a thorough understanding of a variety of laser-related topics, including laser physics, various delivery systems, available wavelengths and the range of applications for each wavelength, precise clinical technique, laser safety, potential side effects, and sterilisation and disinfection protocols, among others, in order for lasers to be successfully integrated into dental offices.

Due to developments in laser dentistry, a paradigm shift in dentistry is anticipated in the upcoming years. Clinicians must have proper training in order for this to occur. In 2014, Al-Jobair et al. carried out a survey to gauge Saudi Arabian undergraduate students' knowledge of dental lasers. In spite of a sharp rise in laser usage, India has not seen the implementation of such a survey. The purpose of this survey was to evaluate the awareness, perspective, and understanding of house surgeons across India regarding the various applications of lasers. The results of this poll may be used to determine whether future training for students needs to be given more emphasis.

METHODOLOGY

A cross-sectional, self-modified, validated questionnaire-based, web-based nationwide survey was conducted among the house surgeons.. A proportionate random sampling technique was chosen. College selection was done randomly and the approach was made through social media groups and email conversations. The sample size of 500 was calculated based on the empirical data by using G Power software (Version 3.1.9.7). A total of 501 interns participated in the study. The Institutional Ethics Boardclearance was obtained and the study follows Helsinki Ethics Code 2014.

A Google Form link was generated and circulated through known contacts, considered to be the state representative for data collection among the colleges of South India. The questionnaire contained 19 questions which include both close-ended and self-administered questions. The following Knowledge level scoring system were used, 0-50% -Poor level of knowledge,51-70%intermediate knowledge and 71-100% as good and high level knowledge. Data were exported in Microsoft Excel (Version 2016) format and analyzed using SPSS Statistics for Windows, version 25.0 (SPSS Inc., Chicago, Ill., USA).

RESULTS

A total of 501 interns participated in the study. The first section gathered data on demographic information about the participants, which revealed male and female involvement rates were nearly equal at 49.3% and 50.7%, respectively as depicted in (Table 1).

In the second section, we sought to assess the interns' knowledge of several specialties as well as their knowledge and awareness of the use of lasers. The participants exhibited high

knowledge that lasers can be used for both hard and soft (86%). In the field of operative dentistry, participants scored highly on knowledge of filling cavities (74.7%), curing composite (68%) and utilising a laser to whiten teeth (57.3%). while, as observed in, there was insufficient knowledge regarding both caries prevention (38%) and detection (44.7%) (Table -2)

An evaluation of the Oral surgical procedures knowledge of the interns found that they had intermediate understanding of bone recontouring (58.7%), treating vascular lesions (58.7%), and using a laser to arrest bleeding (68%). Yet, they revealed by inadequate understanding of the use of laser to avoid suturing (49.3%) and to reduce swelling (46.75%), (Table 3)

In the field of Periodontics, the interns had a great grasp of the use of lasers in frenectomy (92%) gingivectomy (90%) and crown lengthening (72%), but only a fair comprehension of the use of lasers in calculus removal (36.7%) and pocket disinfecting (42%),(Table 4)

In the field of Orthodontics , the intern's knowledge of orthodontics was limited with regard to the use of lasers to accelerate tooth movement (24%), condition the enamel (34%), and expose impacted teeth (51.3%). However, the intern had intermediate knowledge of ceramic bracket debonding (53%), and exposure of impacted teeth (51.3%).,(Table 5)

The focus of the next section, was on the interns' knowledge of general laser practise, and it was found that they had rudimentary understanding of the selection of lasers for hard and soft tissue procedures (30.7%), radiation exposure (46.7%), and the negative consequences of lasers (49.3%).(Table 6),(Graph-1)

Further, the interns expressed a strong desire to learn more about the subject of laser dentistry (96%), expressed a wish that it was covered in their course work (97.3%), and stated a need for hands-on training with lasers (94%), while only a very small percentage had received any laser training (12.7%). (Table 6).

In the final section, the interns' reasons for choosing or not selecting laser were assessed. It was found that only a small percentage of them had utilised laser (16%) and that almost half (52.3%) said they had not done so because it was too expensive.

The distribution of responses to a higher laser exposure is depicted in (Graph 2). Interns had more knowledge of composite curing, dentine desensitisation, and tooth whitening in operative dentistry. Interns in periodontics were more knowledgeable about frenectomy, gingivectomy,

and crown lengthening procedures. When it comes to stopping bleeding during oral surgery, they are more skilled.

As seen by the distribution responses to decreased laser exposure illustrated in (Graph 3). Interns had limited expertise of treating periodontal pockets, removing calculus, doing away with suturing, and minimising swelling, enhancing tooth movement and conditioning of the enamel in orthodontics.

TABLE -1 DEMOGRAPHIC DETAILS OF THE PARTICIPANTS

Demographic details		Frequency	Percent
Gender	Male	74	49.3
	Female	76	50.7

TABLE -2 KNOWLEDGE ABOUT LASER IN OPERATIVE DENTISTRY

Knowledge about laser in operative dentistry		Frequency	Percent
1. Dental Laser can be used for	Soft tissue	15	10
	Hard tissue	3	2
	Both	129	86
	Not aware	3	2
2. Are you aware about the following applications of dental lasers in Operative dentistry? [Caries prevention]	Yes	57	38
	No	93	62
2. Are you aware about the following applications of dental lasers in Operative dentistry? [Caries Detection]	Yes	67	44.7
	No	83	55.3
2. Are you aware about the following applications of dental lasers in Operative dentistry? [Caries Removal]	Yes	112	74.7
	No	38	25.3
2. Are you aware about the following applications of dental lasers in Operative dentistry? [Composite Curing]	Yes	103	68.7
	No	47	31.3
2. Are you aware about the following applications of dental lasers in Operative dentistry? [Dentin Desensitization]	Yes	86	57.3
	No	64	42.7

2. Are you aware about the following applications of dental lasers in Operative dentistry? [Whitening of teeth]	Yes	93	62
	No	57	38

TABLE -3 KNOWLEDGE ABOUT LASER IN ORAL SURGERY

Knowledge about laser in oral surgery		Frequency	Percent
3. Are you aware about the following applications of dental lasers in Oral Surgery? [Bone Recontouring]	Yes	88	58.7
	No	62	41.3
3. Are you aware about the following applications of dental lasers in Oral Surgery? [Surgical treatment of vascular lesions]	Yes	88	58.7
	No	62	41.3
3. Are you aware about the following applications of dental lasers in Oral Surgery? [Reduce swelling]	Yes	70	46.7
	No	80	53.3
3. Are you aware about the following applications of dental lasers in Oral Surgery? [Arrest bleeding]	Yes	102	68
	No	48	32
3. Are you aware about the following applications of dental lasers in Oral Surgery? [Eliminate suturing]	Yes	74	49.3
	No	76	50.7

TABLE -4 KNOWLEDGE ABOUT LASER IN PERIODONTICS

Knowledge about laser in periodontics		Frequency	Percent
4. Are you aware about the following applications of dental lasers in Periodontics? [Frenectomy]	Yes	139	92.7
	No	11	7.3
4. Are you aware about the following applications of dental lasers in Periodontics? [Gingivectomy]	Yes	136	90.7
	No	14	9.3
4. Are you aware about the following applications of dental lasers in Periodontics? [Crown lengthening]	Yes	109	72.7
	No	41	27.3
4. Are you aware about the following applications of dental lasers in Periodontics? [Calculus removal]	Yes	55	36.7
	No	95	63.3
4. Are you aware about the following applications of dental lasers in Periodontics? [Pocket Disinfection]	Yes	64	42.7
	No	86	57.3

TABLE-5 KNOWLEDGE ABOUT LASER IN ORTHODONTICS

Knowledge about laser in orthodontics		Frequency	Percent
5. Are you aware about the following applications of dental lasers in Orthodontics? [Accelerating tooth movement]	Yes	36	24
	No	114	76

5. Are you aware about the following applications of dental lasers in Orthodontics? [Enamel conditioning]	Yes	52	34.7
	No	98	65.3
5. Are you aware about the following applications of dental lasers in Orthodontics? [Ceramic bracket debonding]	Yes	80	53.3
	No	70	46.7
5. Are you aware about the following applications of dental lasers in Orthodontics? [Exposure of impacted teeth]	Yes	77	51.3
	No	73	48.7

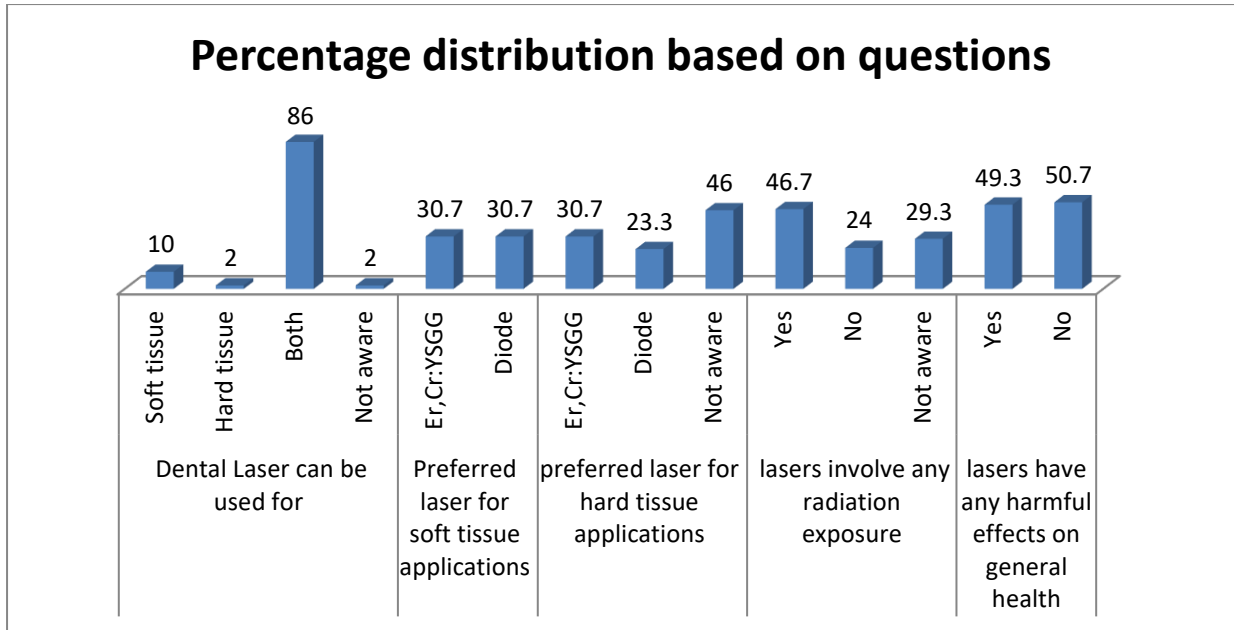
TABLE -6 PRACTICES ABOUT LASER IN DENTISTRY

Practices about laser in dentistry		Frequency	Percent
6. Which is the most preferred laser for soft tissue applications in dentistry?	Er,Cr:YSGG	46	30.7
	Diode	46	30.7
	Not aware	58	38.7
7. Which is the most preferred laser for hard tissue applications in dentistry?	Er,Cr:YSGG	46	30.7
	Diode	35	23.3
	Not aware	69	46
8. Do lasers involve any radiation exposure?	Yes	70	46.7
	No	36	24
	Not aware	44	29.3
9. Do lasers have any harmful effects on general health?	Yes	74	49.3
	No	76	50.7
	Total	150	100
If yes, please specify	I'm 2t sure but I am concluding it has some sort of harmful effects	1	0.7
	Laser will have a harmful effect on the body	1	0.7
	Mild skin burns	1	0.7
	Ntg	1	0.7
	Radiation effects	1	0.7
	Skin burns	1	0.7
	Skin burns and may cause irreversible injury to e1	1	0.7
12. Dental lasers require extensive clinical training and it is difficult to use in routine clinical practice?	Yes	98	65.3
	No	35	23.3
	Not aware	17	11.3
13. Are you willing to undertake specific training/ classes on dental laser?	Yes	141	94
	No	2	1.3
	Not aware	7	4.7

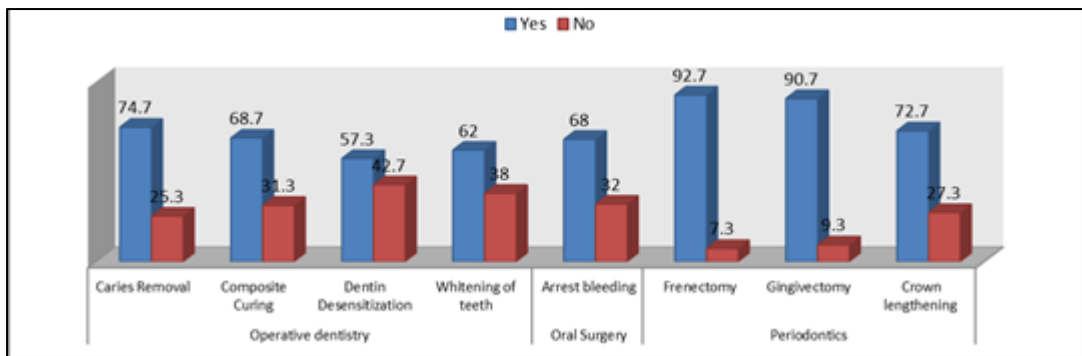
14. Do you think there is a need to include more clinical and theoretical training about lasers in BDS syllabus?	Yes	146	97.3
	No	4	2.7
15. Are you interested in practicing laser dentistry?	Yes	144	96
	No	3	2
	Not aware	3	2
16. Have you undergone any training to practice laser dentistry?	Yes	19	12.7
	No	131	87.3

TABLE -7 REASON FOR CHOOSING OR NOT CHOOSING THE DENTAL LASER

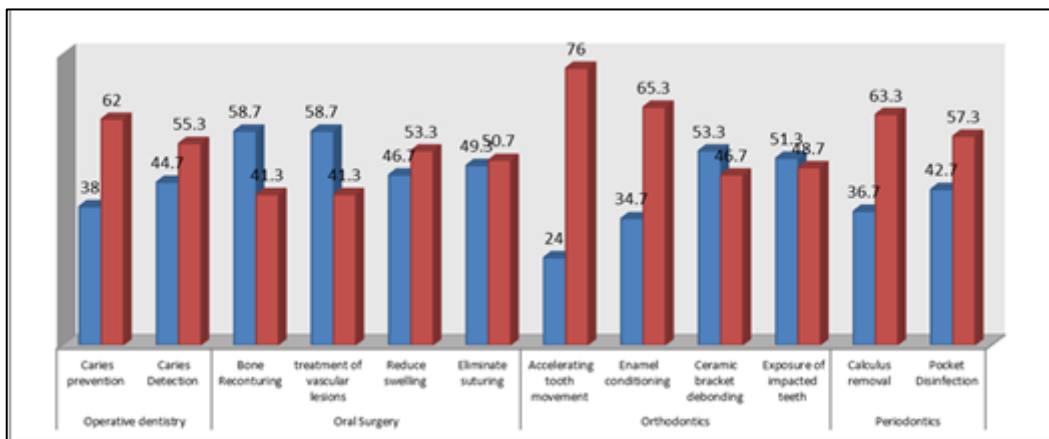
Reason for choosing or not choosing the dental laser			
19. Have you ever used any Laser equipment for dental treatment?	Yes	24	16
	No	126	84
If yes, for what procedure	Aphthous ulcer	1	0.7
	Assisted in excision biopsy	1	0.7
	Depigmentation	3	2
	Frenectomy, Gingivectomy	1	0.7
	Frenectomy, etc	1	0.7
	Gingivectomy	2	1.3
	Ortho Bonding	1	0.7
	Restoration	1	0.7
If no, give your response	Equipment is expensive	79	52.7
	May cause health hazards	24	16
	Too complicated to use	14	9.3



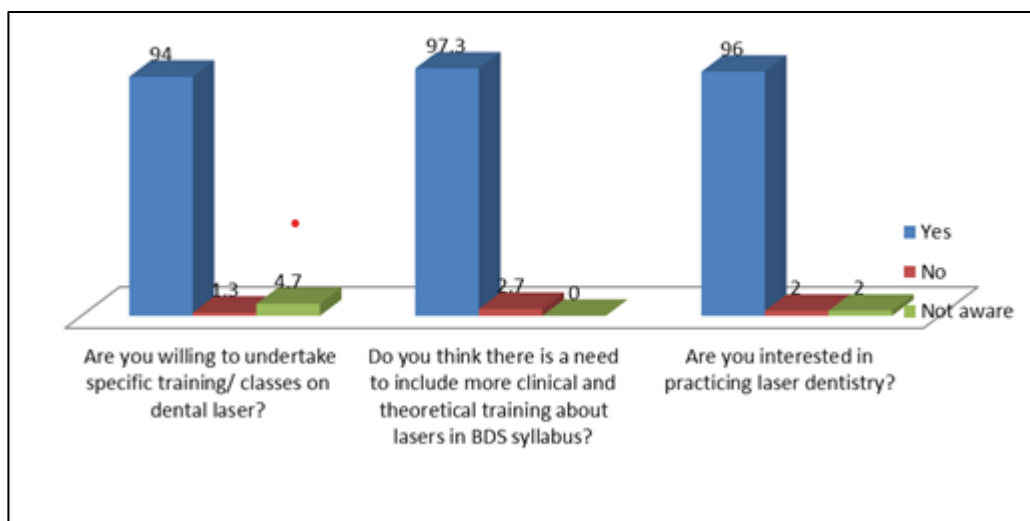
GRAPH -1-PERCENTAGE DISTRIBUTION BASED ON QUESTION



GRAPH -2: THE DISTRIBUTION OF RESPONSES TO A BETTER EXPOSURE TO LASER



GRAPH -3 DISTRIBUTION OF RESPONSE IN LESS EXPOSURE ABOUT LASER



GRAPH-4 PERCEPTION OF NEED REGARDING DENTAL LASER

DISCUSSION

To use the various dental technology in clinical practise, one needs adequate knowledge, education, and awareness. The primary resource that students rely on is education at the level of dental colleges. The current study offers information on interns' training in and knowledge of dental lasers. The survey evaluated respondents' fundamental understanding of the laser and its uses in dentistry.

The present study had 501 participants out of which 49.3% were male and 50.7% were female house surgeons from South Indian dental colleges.

In terms of knowledge and awareness, the use of lasers in numerous areas was assessed. In the field of operative dentistry Participants' knowledge ratings for were good for caries removal (74.7%), composite curing (68%) and laser tooth whitening (57.3%). Nevertheless, they were below average for both caries detection (44.7%) and prevention (38%)—a finding that was consistent with Harini et al. There is a paucity of awareness among interns regarding the usage of Er: YAG and diode lasers for caries prevention and detection respectively.

Research by Alhussain et al¹³. produced findings that were comparable to those of the current study in that interns were knowledgeable about using lasers for surgical treatment of vascular lesions (58%) and to arrest bleeding (68%). They also had poor awareness of how laser therapy may reduce swelling and do away with suturing(46.75%). This demonstrates their lack of understanding of lowlevel laser therapy, which operates on the basis of photobiomodulation.

The findings supported research by Vineeta Gupta and showed that periodontics knowledge was comparatively superior to that of other specialties. The use of lasers in frenectomy (92%) gingivectomy (90%) and crown lengthening (72%) was well known to the interns, while their knowledge of their use in calculus removal (36.7%) and pocket disinfection (42%) in the field of periodontics was only meagre. It demonstrates their inconsistent comprehension of use Er: YAG laser for the calculus removal and diode laser for the disinfection of pockets.

As far as the orthodontics branch is concerned, no studies have specifically addressed the topic. The orthodontic knowledge of interns was fair in the areas of ceramic debonding (53%), experience with impacted teeth (51.3%), but weak in the areas of using lasers to hasten tooth movement (24%), or conditioning the enamel (34%). It demonstrates a lack of consistency in understanding about low-level laser therapy and information on using a laser to etch enamel, which operates on the principle of photoablation.

The survey's most unexpected finding was that respondents knew very little about the choice of laser for hard and soft tissue procedures. Only a reasonable portion of them were aware that lasers pose no radiation risk. Several of the respondents believed that the only person who need protect themselves from laser light when using them is the clinician. however, eye protection is required for the patient and the practitioner. The interns demonstrated a strong eagerness to learn more about lasers. The outcomes agreed with a few other studies.^{13,14}

The contact with the students led to the observation that, over the course of their five year dental programme, students were only exposed to laser awareness instruction for an average of two hours. This knowledge gap is directly tied to a lack of education.

Students' knowledge of the benefits of lasers in terms of reduced bleeding, quick healing, and less pain during treatments was found to be average. On the other hand, little was known about specific laser applications in different dental specialties.

Nevertheless, this is not true for periodontics since students were aware of topics pertaining to periodontal therapy. It appears that this survey revealed a lack of information in students on broad applications of lasers among various disciplines.

There is a significant knowledge gap in orthodontics when it comes to using lasers to speed up tooth movement and condition enamel prior to bonding, however there is some understanding of using lasers to expose impacted teeth and debond ceramic bracket. Therefore, there is a critical need to increase information about how lasers are used in dentistry, especially in orthodontics, given that this field has tremendous promise for the development of clinical practise.

Students' understanding of laser in periodontics may have improved as a result of the fact that laser units are only available and used in that discipline. Yet, there is a pressing need for more information to be engrained about the use of hard tissue lasers and for them to be made accessible in other departments so that students may become more accustomed to their use.

Dental laser manufacturers are expanding daily, and more importantly, a sizable number of patients are insisting on having lasers used throughout their treatments. Perhaps, dental schools can incorporate unique treatment methods into their curricula to boost student understanding of lasers and use the current technology more efficiently.

CONCLUSION

The findings from this research demonstrated that students lacked the necessary laser knowledge and experience across various dental disciplines. By making the course mandatory and supplemented by concrete examples and experiences, undergraduate students should receive adequate teaching in laser dentistry.

Dental students should have the chance to study and use the more recent technologies during their internship since interns will be exposed to clinical practise soon after the dentistry school.

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