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Laser In Dentistry- Awareness among Dental Students in Patna Eastern India - A Cross Sectional Survey

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Abstract

Introduction: Laser technology started with albert Einstein in the early 1900s.The modern-day science and technologies are making their way into all aspects of dental practice and have changed the traditional approaches of treatment, which require that students and practitioners receive the necessary knowledge. So, the aim of the study was to assess the awareness regarding lasers in dentistry among dental students in Patna Eastern India.

Methodology: A descriptive cross-sectional study was conducted among all available dental students of Buddha Institute of dental sciences and hospital. A simple random sampling method was employed. A close-ended questionnaire containing 16 items pertaining to the demographic details, dental laser Knowledge was used. Informed consent and ethical clearance were obtained from all participating subjects. Analysis was performed by using Chi-square test with p value < 0.05 as statistically significant

Result: out of 200 study samples 31.5% were males and 68.5% were females, among which 17% ,32.5% 25.5%, 25% were third years, final years, interns and postgraduates respectively. Most of the dental student (95.5%) reported that they were aware about the dental lasers. It was also found that the main reason for lack of use of dental laser was insufficient knowledge according to 67.6% of the third-year students while lack of clinical experience was mentioned by final year students 36.9%

whereas according to interns and post graduate students it was the price of the laser unit.

Conclusion: It is found that Postgraduate dental professionals were having more awareness regarding dental lasers and its uses.

Keywords: Dental Laser, Dental Laser Education, Awareness.

Introduction

New science and technologies are already making their way into all aspects of dental practice and have changed the traditional approaches, which require that students and practitioners receive the necessary knowledge[1]. The use of lasers is one of these hallmark technologies that enables dentist to work faster, more precisely and more efficiently[2]. Conventional methods of cavity preparation with low and high-speed hand pieces involve noise, uncomfortable vibrations and stress for patients. These disadvantages have led to a search for new techniques as possible alternatives for dental hard and soft tissue removal[3].Different laser devices and different wavelengths opened various treatment options for diverse indications. Laser Dentistry is not assigned to a one field, and as a result the arch was extended from Conservative Dentistry over the Oral and Facial Surgery throughout Paediatric Dentistry. In addition to its uses in hard tissue preparation (bone and tooth preparation) and soft tissue surgery, laser treatment in combination with composite or glass ionomer restorations, or in the treatment of hypersensitive teeth are examples of different application areas[4-6]. Furthermore, laser is important in canal disinfection and in behaviour management in Paediatric Dentistry. Experts say that technological innovation will ultimately improve and broaden access to dental care, allowing for same day care that translates to fewer office visits, making a healthy smile more affordable. *"The future is coming, and it will be amazing"*[7-8] In view of the increasing availability of new technologies in dental practices and the need for more education and training, this survey was conducted to assess the awareness regarding dental laser among dental students in Patna.

Objectives

- To assess the awareness regarding dental lasers among the dental students.
- To compare the association if any regarding awareness among the study subjects

Methodology

The present descriptive cross-sectional study was conducted among dental students from Buddha Institute of Dental Sciences and Hospital in Patna, Bihar. Informed consent was obtained from the participants before the distribution of questionnaire. The proposed study was reviewed by the Ethical committee of Buddha Institute of Dental Sciences and Hospital, Patna and necessary clearance were obtained. Data was obtained from Buddha Institute of Dental Sciences and Hospital in Patna, Bihar. Dental students of undergraduates (third, final year, Interns) and postgraduates were included in the study. Considering the population size as 400, *power of the study* as 80% and a *design effect* of 1. A sample size of 166 was derived. However, an additional 20% were included in the study (n = 198, rounded off to 200) to compensate for potential refusals. Hence using simple random sampling 200 dental students was the final sample size. Students present on the day of survey were included in the survey. Whereas students not willing to participate in the survey were excluded. The *study design* used in the study is a descriptive Cross-Sectional study. The duration of the study was of 2 months, July - August 2019.The data was collected using close ended, self-administered questionnaire which was given to the dental students who participated in the study. The information collected by the questionnaire included the demographic details such as

gender and year of education and questions to assess dental laser education and knowledge. The questionnaire was reviewed for content, clarity and bias. The content validity was assessed by a panel of four experts of dental educators. The purpose was to depict those items with a high degree of agreement among experts. *Kappa correlation coefficient* was used to quantify the concordance between experts for each item. The Kappa values thus obtained were *0.96.* The panel of experts recommended modifying the wording of some questions. To assess the reliability of questions, similar questions were grouped, and *Cronbach's alpha* was calculated. The correlations between the items ranged from *0.84 to 0.94*. All the questions were retained with a slight modification in the wordings of few questions as per the expert's recommendations. The final questionnaire comprised of 16 questions related to dental awareness. All the students were pre informed about the survey. The data is collected using a close-ended questionnaire. The study was done in the working hours of the dental colleges to get the maximum response. In the questionnaire form, the respondents were informed about the aim of the study as well as the fact that participation in the study was totally voluntary and anonymous. The data so obtained was compiled systematically. A master table was prepared in MS Excel worksheet and the total data was subdivided and distributed meaningfully and presented as individual tables along with graphs, under the guidance of statistician. The means and standard deviations of the measurements per group were used for statistical analysis (SPSS 22.00 for windows; SPSS inc, Chicago, USA. Analysis/comparision was performed by using Chi-square test with p value < 0.05 as statistically significant.

Results

The present study was conducted among a total of 200 available dental students in Buddha Institute of Dental Sciences and Hospital. Patna, of which 31.5% were males and the rest 63.5% were females**.** A majority 32.5% belonged to final year students followed by intern (25.5%) and post graduates (25%) and a least of 17% belonged to third year B.D.S students.

When knowledge on dental laser awareness was evaluated, an overall 95.5% of the subjects were aware of it. Interns and Post graduates were fully aware of it (100%), while final year and third year BDS were 96.9% and 79.4% respectively. When the results were compared statistically, it was found to be significant with p value <0.01. In response to question like, what dental lasers are, an overall 91% of the subjects were aware of it. All the postgraduate students (100%) were aware of it, followed by Interns with 96.1% and Final year and 3-year BDS students with 95.4% and 61.8% respectively. When the results were compared statistically, it was found to be significant with p value <0.01. An overall 67% of the subjects had used or seen laser equipment. Post graduate students (84%) were more aware or had used laser equipment when compared to interns or under graduates. When the results were compared statistically, it was found to be highly significant with p value <0.001. Regarding lasers and dental caries prevention and detection, 87.5% of the total subjects were aware of its importance. Post graduates had better awareness with 98%, followed by final years and inters with 84.6% and 84.3% respectively. When the results were compared statistically, it was found to be not statistically significant with p value <0.15. An overall 97.5% felt the need for health education. All the PG and interns 100% felt that dental laser education was necessary for the better practise and patient satisfaction. followed by third year 97.1 % than final year 95.4 %, felt the need of more dental laser education in the study curriculum and when these findings was compared

statistically it was found to be *insignificant p value* = 0.39**.** **(Table 1)**

Regarding the awareness about various types of dental lasers used in dentistry, an overall 77.5% were aware of some type of dental lasers used in dentistry. The most common laser used was diode lasers with 27%. An overall 43% were aware of most of the lasers used in dentistry. Post graduate's students (92%) had better awareness regarding this. When the results were compared statistically among different year of studies, it was found to be highly significant with p value <0.007. **(Table 2)**

Talking about the awareness about the use of dental lasers in the oral cavity i.e. on hard and soft tissues), it was found that 72% were aware that it can be used both on hard and soft tissues. While 21% said that it can be used only on soft tissue and 3.5% said that it can be used only on hard tissues. When the results were compared statistically among different years of studies, it was found to be significant with p value <0.01. **(Table 3)**

Concerning the knowledge about the harmful effects of dental laser on patients, an overall 88% were aware of its ill effects. 72.5% were aware of multiple ill effects while haemostasis and decontamination were seen with 7% each respectively and ablation was seen among 1.5%. When the results were compared statistically among different years of studies, it was found to be highly significant with p value <0.001. **(Table 4)**

When reasons for not using dental laser were evaluated, a majority of the subjects (34%) said that the price of the laser unit was the main reason. Followed by 26.5% who said lack of clinical experience was the 2nd most common reason and lack of knowledge (27%) and lack of patients opting for laser (12.5%) were the other justification given by the study samples. When the results were compared statistically among different years of studies, it was found to be significant with p value <0.01. **(Table 5)**

List of Tables

Table 1: Comparison of **Positive Response** in relation to following questions among the study groups

Question	3rd Year N (%)	Final Year N (%)	Interns N (%)	PGN (%)	Overall (Out Of 200 Subjects)	Chi Square	P Value
Are you aware that lasers are used in dentistry?	27 79.4%	63 96.9%	51 100%	50 100%	191 (95.5%)	22.68	<0.01*
Do you know what dental laser is?	21 61.8%	62 95.4%	49 96.1%	50 100%	182 (91%)	43.56	<0.01*
Do you have interest in dental laser?	33 97.1%	63 96.9%	51 100%	50 100%	197 (98.5%)	3.11	0.38
Have you ever used/seen any laser equipment's?	12 35.3%	48 73.8%	32 62.7%	42 84%	134 (67%)	28.11	0.001*
Can lasers be used in	28	55	43	49	175	13.25	0.15

dental caries prevention and detection?	82.4%	84.6%	84.3%	98%	(87.5%)		
Do you feel the need of more dental laser education?	33 97.1%	62 95.4%	51 100%	50 100%	195 (97.5%)	9.43	0.39

*: statistically significant

Table 2: Comparison of different types of dental laser knowledge among the study groups

Type	3rd year n (%)	Final year n (%)	Interns n (%)	Post Graduates n (%)	Chi square	p value
Co_2	2 (5.9%)	5 7.7%	1 2.0%	0	118.85	<0.01*
Diode	7 20.6%	35 53.8%	9 17.6%	3 6.0%		
Er: Cr: YSGG	0	0	1 2.0%	0		
Er:YAG	0	0	1 2.0%	0		
Nd:YAG	0	0	0	1 2.0%		
Argon	1 2.9%	1 1.5%	2 3.9%	0 0.0%		
All of the above	5 14.7%	10 15.4%	25 49.0%	46 92.0%		
None	19 55.9%	14 21.5%	12 23.5%	0		

***: statistically significant**

Table 3: Comparison of awareness regarding use of dental laser on particular site in the oral cavity among the study groups.

Type	3rd year	Final year	Interns	PG	TOTAL	Chi square	p value
Hard Tissue	3 8.8%	3 4.6%	0 0.0%	1 2.0%	7 3.5%	35.09	<0.01*
Soft Tissue	13 38.2%	14 21.5%	9 17.6%	6 12.0%	42 21.0%		

Both	13 38.2%	47 72.3%	41 80.4%	43 86.0%	144 72%		
None	5 14.7%	1 1.5%	1 2.0%	0 0.0%	7 3.5%		

***: statistically significant**

Table 4: Comparison of awareness regarding effect of dental laser among the study groups

Type	3rd year	Final year	Interns	PG	Total	Chi square	p value
Hemostasis	1 2.9%	3 4.6%	9 17.6%	1 2.0%	14 7.0%	33.63	0.001*
Ablation	2 5.9%	0 0.0%	1 2.0%	0 0.0%	3 1.5%		
Decontamination	5 14.7%	4 6.2%	0 0.0%	5 10.0%	14 7.0%		
All of the above	18 52.9%	49 75.4%	37 72.5%	41 82.0%	145 72.5%		
None of the above	8 23.5%	9 13.8%	4 7.8%	3 6.0%	24 12.0%		

***: statistically significant**

Table 5: Comparison of the main reason for lack of use of dental lasers among the study group.

Type	3rd year	Final year	Interns	PG	**TOTAL**	Chi square	p value
Lack of knowledge	23 67.6%	8 12.3%	11 21.6%	12 24.0%	**54** **27.0%**	45.88	<0.01*
Lack of clinical experience	4 11.8%	24 36.9%	11 21.6%	14 28.0%	**53** **26.5%**		
Lack of patient opting for laser	3 8.8%	13 20.0%	4 7.8%	5 10.0%	**25** **12.5%**		
Price of laser unit	4 11.8%	20 30.8%	25 49.0%	19 38.0%	**68** **34.0%**		

***: statistically significant**

Discussion

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. 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.[9]

In the present study, 95.5% of the study subjects were aware that lasers are used in dentistry. 91% participants knew what dental laser was. This finding is comparable to a study conducted by Bordea et al.[10] which reported that 94.98% of the study participants knew what dental laser was. It is also comparable to a study conducted by Jayashree and Radhika[11] which reported that 78% students knew what laser was, but only 2% had previous dental laser experience. In response to questions like awareness of lasers use in dentistry, out of all the study subjects surprisingly only 67% of the subjects had ever used/seen any laser equipment's. Postgraduate students gave maximum positive response i.e. 100%, followed by interns, final year and third year students. This reflects that inadequate knowledge in dental laser and its application was directly related to insufficient education. In addition, this result reveals that dental students are dependent on the education and practise they have in the college as a source for their knowledge, such as other dental students in different country.

Furthermore, 22.5% of the subjects did not know about any type of dental lasers while 27% of the study subjects knew about diode laser. 43% of the subjects had heard about the entire mentioned dental laser in the given questionnaire. All these findings are comparable to a study conducted by Swapnil Rangnath Kadam et al[12] in their study reported that all the 150 (100%) participants knew what dental laser was. This finding is also comparable to a study conducted by Bordea et al[10] which reported that 94.98% of the study participants knew what dental laser was. It is also comparable to a study conducted by Jayashree and Radhika AK[11] which reported that 78% students knew what laser was, but only 2% had previous dental laser experience. Diode (23.3%) was the most commonly known dental laser followed by CO2 (22.4%). This is in accordance with the research carried out by Kravitz and Kusnoto[13], who indicated that erbium and diode laser are the two most popular types of lasers that are used in dentistry. All these findings were also in accordance to the study done by Reshma Avhad et al[14] Where 93.6% of the students stated that they had knowledge about dental laser systems; only 6.4% reported that they did not have any information on this subject. All the types of lasers (44.3 %) that are diode, Er: Cr: YSGG, Co2, Er: YAG, Nd: YAG was the most commonly known lasers followed by diode laser (43.5 %). This inadequacy in knowledge is directly related to insufficiency education. Talking about the awareness about the use of dental lasers in the oral cavity i.e. on hard and soft tissues, Dental laser used both on soft as well as hard tissue was acknowledged by 72% of the subjects. Maximum awareness regarding use of dental lasers on hard and soft tissue was reported among postgraduate students followed by interns, final year and third year students. This could be due to the reason that laser units are available at many colleges however, they are only accessible for faculties and postgraduate students. This result was in accordance to the other study done by Reshma Avhad et.al.[14] they found that, most of the students, about 104 (74.3 %) had a knowledge about laser being used for both soft tissue as well as hard tissue.

It was observed that 72.5% of the subjects had an average knowledge about the advantage of in terms of haemostasis, ablation and decontamination impact on the dental tissues while 12% of the subjects think that dental lasers had no impact on dental tissues. Maximum awareness regarding the effect of dental lasers was reported among postgraduate students followed by interns, final year and third year students. This difference was due to The fact being laser are available and implementation by faculties and postgraduates could be the reason for the

improved awareness among postgraduates, interns, final years and third years.

In the present study 27%, 26.5%, 12.5% and 34% of the subjects felt that lack of knowledge, lack of clinical experience, lack of patient opting for laser and price of laser unit respectively were the main reasons for lack of use of dental lasers. Principal reason for lack of use of dental laser was insufficient knowledge according to 67.6% of the 3rd year students, while lack of clinical experience was mentioned by final year students (36.9%) whereas according to interns and PG students, it's the price of laser unit. Swapnil Rangnath Kadam et al[12] in their study showed that lack of clinical experience (35.3%) followed by lack of knowledge (25.1%) were the main reasons for the lack of use of dental lasers. These findings were similar to the ones reported by Bordea et al[10] wherein the students chose the lack of lectures in the field of laser in dentistry associated with the lack of knowledge to be the principal reason for the lack of use of dental lasers. Reshma Avhad et al[14] in their study showed that expensive dental laser treatment (41.7%) followed by lack of knowledge about lasers (39.6%) were the main reasons for the lack of use of dental lasers.

Recommendation

Looking at the benefits of laser use in dentistry services, more referral patients to dentists and dentists need for laser, holding seminars and workshops to provide a theoretical and practical content is important. Dental graduates poor response about specialized knowledge about laser application in dentistry which indicating the weakness of dentists specialized knowledge of the use of lasers in dentistry, Lack of dental community effort to provide training in this field and non-wanting to practice in the field of health and we must doing fundamental actions for recovery this condition, because this method of treatment can meet the health needs of the community with the most convenient methods and least amount of pain, cost and time. In recent years many efforts have been done in our country and other countries by holding seminars, educational and practical workshops about laser application in dentistry to promote the knowledge of dentists.

Conclusion

- The field of dentistry is changing in terms of new technologies; hence, students should stay updated with all the latest technologies in this field.
- The results of this study suggest that the undergraduate dental students had inadequate laser education and insufficient knowledge regarding dental lasers.
- More education about dental lasers should be added to the curriculum of undergraduate program since it is highly essential for students to know about newer technologies and apply it in their practice.

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