

# Assessment of Knowledge of Final Year Undergraduate Dental Students about Lasers and their Use in Pediatric Dentistry

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## ABSTRACT

**Aims and objectives:** This study aims to assess the knowledge and awareness of undergraduate final year dental students regarding the applications of lasers in pediatric dentistry and the need for introducing theoretical and practical classes in their curriculum.

**Methodology:** A cross-sectional survey was conducted among 106 fourth year dental students of an institute in Faridabad. A self-administered questionnaire consisting of 19 questions related to general knowledge and applications of lasers in pediatric dentistry and about its safety aspects was given to the students, and responses were analyzed to obtain the results.

**Results:** About 99% of participants knew what laser is and 93.4% of the respondents knew about its applications in pediatric dentistry; however, in-depth knowledge of students regarding soft and hard tissue procedures and its use in cavity and crown preparation was below satisfactory. Awareness about safety and hazards was also inadequate.

**Conclusion:** Considering many applications and possible advantages of increasing cooperation in pediatric patients, lasers should be incorporated both in theory and practical in the undergraduate curriculum of pediatric dentistry.

**Keywords:** Awareness, Dental students, Knowledge, Lasers, Pediatric dentistry.

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## INTRODUCTION

Novel technologies are developing in various aspects of dental practice and have changed the traditional treatment approaches, which require that the students and staffs of various dental institutions, as well as the practitioners, receive the necessary knowledge.<sup>1</sup> Dental laser is one of the major developments in the modern era of dentistry.<sup>2</sup>

Acronym LASER is an expression for light amplification by stimulated emission of radiation. The laser was first introduced in 1959 by Gordon Gould, a Columbia University graduate student. The concept and principles of lasers were extended in 1917 when physicist Albert Einstein described the theory of stimulated emission which was given by Neil Bohr.<sup>3</sup>

An American of Hughes Aircraft corporation, Theodore Maiman in 1960 discerned the stimulated emission in the visible range of the spectrum by utilizing an excited synthetic ruby rod and developed the first working laser.<sup>4</sup> Later in 1964, the CO<sub>2</sub> laser was developed by Patel at Bell Laboratories.<sup>5</sup> However, after a long time of investigations and new developments in laser technology first clinical applications in the field of dentistry was performed in oral surgery in the 1980s for soft tissue lesion.

Since then no branch of dentistry has been left untouched by the use of lasers as it has a wide range of implementations including hard tissue to soft tissue procedures. The laser technology is now being expeditiously used for painless and bloodless treatment delivery in various fields of dentistry. This rapid advancement in this field has developed a lacuna in the knowledge and practice of lasers among dental students.<sup>6</sup>

This study aims to assess the knowledge and awareness of undergraduate final year students regarding the applications of lasers in pediatric dentistry and the need for introducing theoretical and practical classes in their curriculum.

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## METHODOLOGY

The data for the study was collected by doing a cross-sectional survey among fourth year dental students of an institute in Faridabad. A total of 106 students studying in fourth year of undergraduate curriculum were selected for the study. A self-administered questionnaire was distributed and the students were asked to give their responses. The study was undertaken at the end of the academic session before the final professional exams of the students to ensure complete coverage of the whole curriculum in all the clinical branches of dentistry.

The questionnaire was prepared after a substantial literature search, and the investigators shortlisted 19 questions related to general knowledge and applications of lasers in pediatric dentistry and about its safety aspects. The questionnaire was reviewed for its content, clarity, and adequacy of questions by the faculty of the department. The data was tabulated and statistically analyzed to obtain the results. The data was coded and entered in Google

forms and the results were expressed in descriptive analysis, that is, frequency and percentage using MedCalc Statistical Software version 16.8 (MedCalc Software bvba, Ostend, Belgium; <https://www.medcalc.org>; 2016).

## RESULTS

Out of 120 students, 106 came up with the responses giving the response rate of 88.33%. Out of 106, 91 (85.84%) were females and 15 (14.15%) were males. About 99% (105) of participants knew what laser is and 93.4% (99) of the respondents knew about its applications in pediatric dentistry (Fig. 1).

Most of the students were aware of the soft and hard tissue usage of laser, but the knowledge was not very adequate. A large number of students were aware regarding the use of lasers for frenectomy 95 (89.6%) and gingivectomy 89 (84%) in the soft tissue procedures; however, the knowledge seemed to be insufficient regarding lingual frenectomy, that is, ankyloglossia 36 (34%). Knowledge regarding the hard tissue procedures appeared to be inadequate as shown in the graph (Fig. 2). The concept regarding the soft and hard tissue procedure was also not clear among students as 49 (46.2%) respondents opted for caries excavation and 27 (25.5%) chose alveolar ridge augmentation in soft tissue procedures and 11 (10.5%) students opted for pocket disinfection as a hard tissue procedure. Only 46 (43.8%) students were aware that lasers can be used for cavity and crown preparations as well (Fig. 3).

Regarding laser safety and precautions, the knowledge was satisfactory as 91 (87.5%) students were aware that lasers are safe to use and 92 (86.8%) students knew that it should be used with several precautionary measures. Also, 93 (87.7%) students were aware that these precautionary measures are required for everyone involved during the operating procedure. The majority 87 (83.7%) of the students knew that protective eyewear are required while using lasers while only a few had knowledge about other measures of safety like tissue protection, thyroid collar, use of high-volume suction (Fig. 4). About the possible contraindications of the use of lasers, the knowledge of the students was not adequate. The majority 77 (72.6%) of them knew about the cardiac pacemaker as the possible contraindication but not so much with other medical conditions as indicated in the graph (Fig. 5). Majority of the students were aware of the health hazards with the use of lasers like ocular, respiratory, combustion hazards (Fig. 6). Only a few did

not have adequate knowledge regarding this. Advantages and disadvantages of laser therapy were known to maximum number of students. Maximum number of students believed that use of

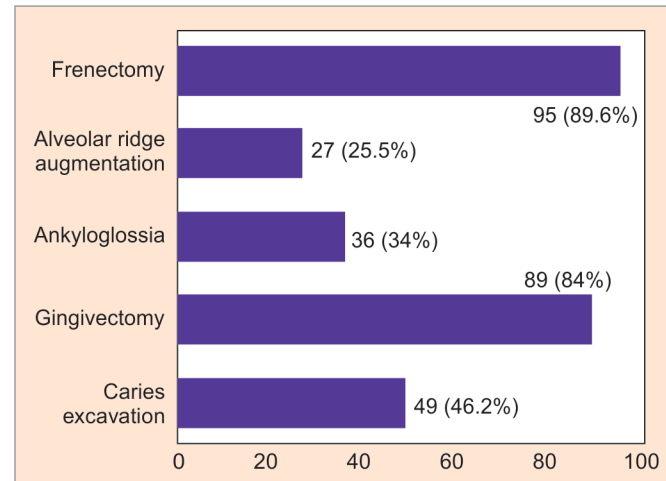


Fig. 2: Soft tissue procedures that are done with lasers in pediatric dentistry

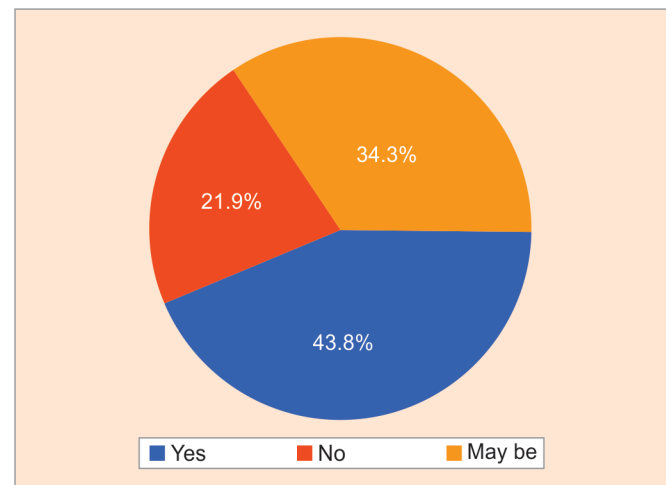


Fig. 3: Knowledge regarding application of lasers for cavity and crown preparation

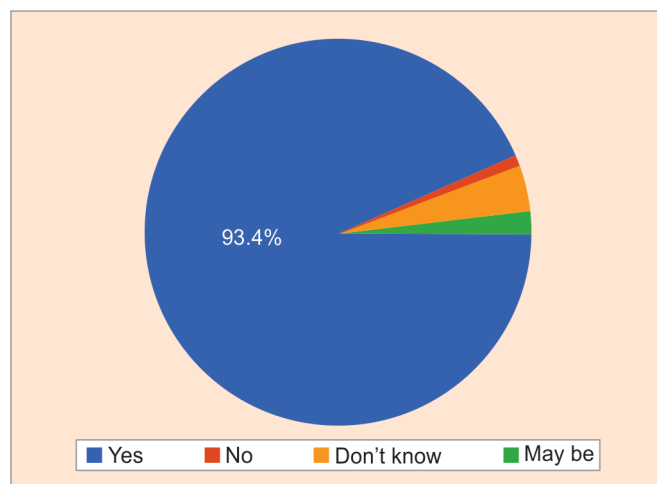


Fig. 1: Knowledge about application of lasers in pediatric dentistry

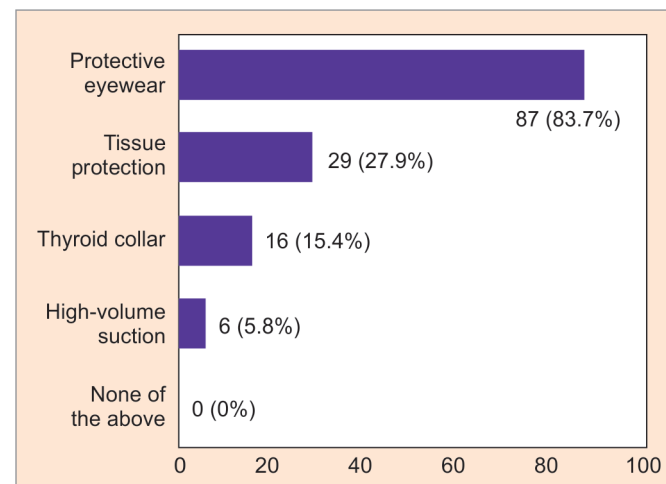


Fig. 4: Knowledge regarding safety measures required for lasers

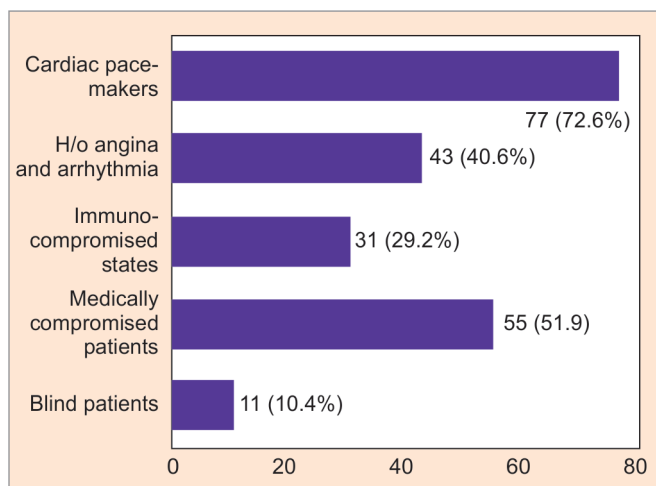


Fig. 5: Knowledge regarding contraindications of using lasers

lasers would be more advantageous in treating pediatric patients and thus wanted lasers to be included in the curriculum to widen their knowledge.

## DISCUSSION

The laser technology was initially used in the field of medicine for rapid diagnosis and to render efficient treatments to the patients. Subsequently, researchers attempted to employ it for dental purposes due to its unique characteristics.<sup>7</sup> Since then, the use of lasers has become an integral part of contemporary dentistry as it is based on minimally invasive procedures causing less pain, sound, and vibration.<sup>8</sup>

Managing a pediatric dental patient with laser is more favorable than conventional techniques as it is less fearful to the child and parental acceptance is also better.<sup>9</sup> Using laser for various invasive dental procedures render the child more cooperative and it also enhances the treatment outcome.<sup>10</sup> However, proper knowledge and adequate practical skills are necessary to utilize the recent technologies. In our study, 99.1% students were aware about lasers but the in-depth knowledge about this subject was missing, especially in the field of pediatric dentistry which was also similar to the results seen by Damodar et al.<sup>11</sup>

The assessment of knowledge regarding basic laser physics, type of lasers, and laser operating parameters such as wavelengths, power, emission mode was not done as the main focus was to evaluate students' knowledge regarding its applications in pediatric dentistry, advantages, disadvantages, safety protocols, and the hazards associated with it.

Most of the students were unaware about few of the hard and soft tissue procedures which can be done with the help of lasers like cavity and crown preparation,<sup>12</sup> pulp capping, alveolar ridge augmentation, ankyloglossia.<sup>4</sup> They were also unclear about the basic concepts behind it. This is in accordance to the study done by Al Jobair et al. at King Saud University.<sup>2</sup> According to a study done by Gökçe et al.<sup>12</sup> to probe the possibility of use of ER:YAG lasers for full coverage restorations it was seen that tooth preparation took more time with the use of lasers as compared to conventional drill. Most of the students were not aware of the applications of lasers in pediatric dentistry like pulpotomy, pulpectomy. This was similar to the study done by Kotlow et al.<sup>13</sup>

Students had adequate knowledge about the safety measures to be used for lasers like protective glasses; however, complete

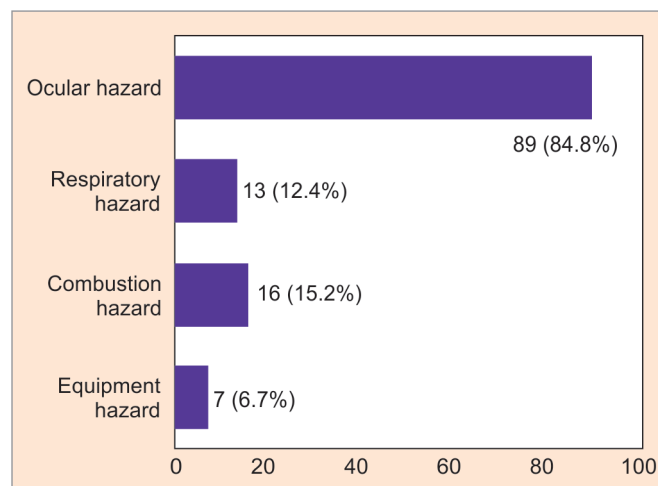


Fig. 6: Knowledge about hazards of lasers

knowledge about all of the precautions was not clear to them like high volume suction, thyroid collar, tissue protection. In context to hazards, most of them were familiar with ocular hazards but were unaware about the rest. Educating students regarding the safety and health hazards of lasers is necessary as they are going to become future practitioners.

In a survey done by Yadav et al.<sup>6</sup> on knowledge and practices of dental lasers among dental professionals in India, lasers are still not being used while practicing orthodontics, endodontics, and pediatric dentistry. Education in colleges is the whole sole source of gaining knowledge and refining skills for students; hence, it needs to be considered as a part of undergraduate teaching.

Maximum numbers of students were willing to enhance their knowledge regarding lasers as evident with the fact that the majority of the study population wanted lasers to be included in their undergraduate curriculum which was in accordance with most of the studies done in India.<sup>2,6,9</sup>

## CONCLUSION

Since lasers are an upcoming branch in pediatric dentistry and its applications are far and wide, creating awareness about this field right from the undergraduate level is very important. In India, according to the Dental Council of India inclusion of lasers is mandatory in periodontics for the undergraduate level. However, in pediatric dentistry, considering its many applications and possible advantages of increasing cooperation in pediatric patients, lasers should be incorporated both in theory and practical in the undergraduate curriculum of pediatric dentistry.

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