

# Awareness and Knowledge of Dentists about Laser Technique Used in Endodontic Disinfection

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## Abstract:

**Aim :** The aim of this study is to evaluate the dentist's knowledge and awareness and treatment protocols in laser techniques used in endodontic disinfection.

**Background:** The search for new devices and technologies for endodontic procedures always has been challenging. With the development of thinner and more flexible and durable laser fibres, laser application in endodontics have increased. Since laser devices are relatively costly, access to them is limited. The purpose of this paper is to summarise laser application in endodontics, including their use as disinfection of root canals.

**Methodology:** A cross sectional study was conducted among the dental practitioners in chennai city. A survey of 15 questions were given and were asked to fill in the same. About 53 respondents participated.

**Result:** From the study conducted, it can be concluded that, 94.3% of the respondents find laser training useful, but not many are aware of the techniques used in lasers and its action in infected canals of the tooth.

**Keywords:** laser, irrigants, wavelengths, root canal

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## INTRODUCTION :

LASER' is an acronym for Light Amplification by Stimulated Emission of Radiation. Laser lights are man made and are single photon wavelength.(1) Lasing is a process that occurs due to excitation of atom that is stimulated to emit a photon. This excitation of photon generates monochromatic, coherent and collimated form of light.(2)

This laser light has ample amount of uses in medical field. Laser therapies are medical treatments which uses focused light. The wavelength of the light can be adjusted according to requirement of the procedure done.

In medical field, laser light allows the operators to work at high levels of precision by focusing on a small area, damaging less of the surrounding tissues.(1)When this laser light is focused on a tissue, the tissue reflect, scatter or transmits it to the surrounding tissues.(2)

Application of laser techniques in dentistry has many uses. In dentistry, lasers used can be classified by several types and methods. Based on the medium used, it can be classified as gas laser and solid laser. Based on tissue applicability, can be classified as hard tissue laser and soft tissue laser.

The major problem in treatment of infected root canals and periapical healing is the pathogenic bacteria. The aim of endodontic treatment is to eliminate such pathogenic

bacteria. Because of the complex structure of root canal system, the complete elimination of microorganisms still presents a major challenge and enables resistance to irrigation and mechanical cleaning of root canals.

Bacteria also produce biofilm that represents safe habitat against antibiotics.Existing treatment procedures include mechanical treatment with rotary files accompanied by chemical cleaning and irrigation. Irrigation is done with irrigants, i.e sodium hypochlorite (NaOCl) or chlorhexidiene.(7)

To remove smear layer and disinfect canals are the main objective of cleaning and shaping. Today, use of laser to remove smear layer and to disinfect root canals has increasingly attracted the attentions. Till now different lasers such as CO<sub>2</sub>, Nd:YAG, Er:YAG, Er,Cr:YSGG are being used to eliminate debris and also smear removal from the infected canals. (5)

The search for new devices and technologies for endodontic procedure always has been challenging. With development of thinner, more flexible and durable laser fibres, laser application in endodontics have increased.

Since, laser devices are relatively costly, access to them is limited. The purpose of this paper is to summarise laser application in endodontics, including their use as disinfection in root canals.

**MATERIALS AND METHODS:**

A cross sectional study was conducted among the dental practitioners in Chennai city. This study aimed at evaluation of the dental professional's knowledge and how aware they are about use of lasers in endodontic treatment. This cross sectional study was based on a questionnaire on uses of laser techniques in endodontic disinfection, awareness and knowledge on the same among the dental practitioners.

About 53 respondents participated in this study. The participants were randomly selected and following their consent, the questionnaire was given to them and the relevant data were extracted from the questionnaire and subjected to analysis.

The questionnaire is attached below.

QUESTIONS:
1. Do you know about the use of laser in endodontics?
2. Do you feel laser program training is useful?
3. Do you feel the effectiveness of laser activated irrigation is better than passive ultrasonic irrigation?
4. Will laser disinfection in periapical lesion bring about better outcome compared to conventional modalities?
5. Do you believe laser should be only used in retreatment cases or on regular basis?
6. Does laser cause Dissemination of bacteria during disinfection?
7. Use of laser cause increase in temperature. Will that cause deleterious effect to the tooth?
8. Can photo-activated disinfection be used as a supplement to instrumentation/irrigation of canals?
9. Does laser's effect extend to inaccessible areas, such as external biofilm at the root apex?
10. Does laser require humid root canal for irradiation technique?
11. Which among the following is effective in removal of debris of smear layer?
12. Can laser bring about better repair of fistula in the chin due to periapical lesion around the apex of the tooth/teeth?
13. Can laser used for disinfection cause eventual damage of periapical area, particularly when roots are close to anatomical relations such as mental foramen, or maxillary sinus?
14. Can laser disinfect only the –main canal, lateral canal, both?
15. Have you heard about PIPS in endodontic disinfection?

**TABLE:1**

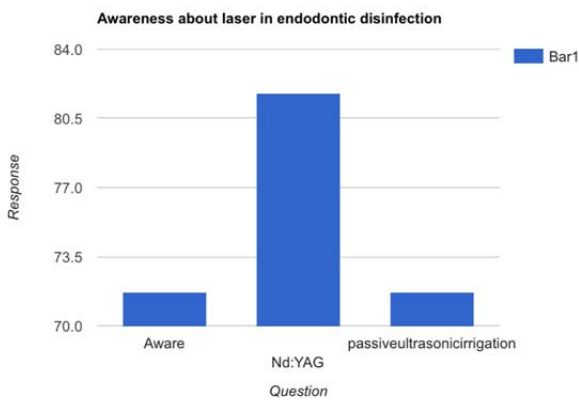
QUESTIONS:
1. Do you know about the use of laser in endodontics?
2. Do you feel laser program training is useful?
3. Do you feel the effectiveness of laser activated irrigation is better than passive ultrasonic irrigation?
4. Will laser disinfection in periapical lesion bring about better outcome compared to conventional modalities?
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6. Does laser cause Dissemination of bacteria during disinfection?
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14. Can laser disinfect only the –main canal, lateral canal, both?
15. Have you heard about PIPS in endodontic disinfection?

**TABLE :2**

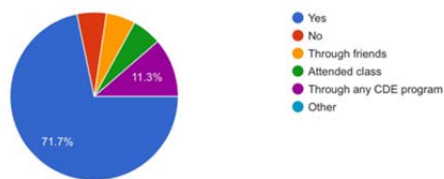
RESPONSE :(YES)	
1.	71.7%
2.	94.3%
3.	28.3%
4.	38.5%
5.	34%
6.	32.7%
7.	46.9%
8.	72.9%
9.	60.4%
10.	66.7%
11.	81.8% (nd:YAG)
12.	64.3%
13.	52.4%
14.	36.7% (main canal)
15.	82.7%

TABLE:3

RESULT:

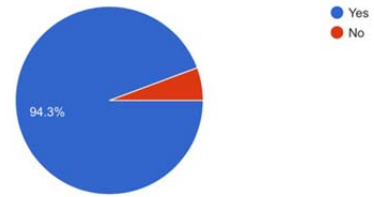


Do you know about the use of laser in endodontics (53 responses)



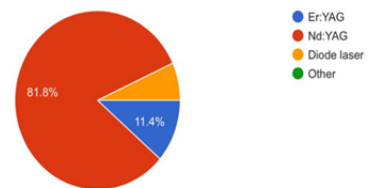
From the study conducted, it can be summarised that about 71.7% of the respondents seem to have known about the use of lasers in endodontics.

Do you feel laser program training is useful? (53 responses)



94.3% of the respondents find laser program training to be useful, as it allows the dentists to use it in their treatment.

Which among the following is effective in removal of debris of smear layer (44 responses)

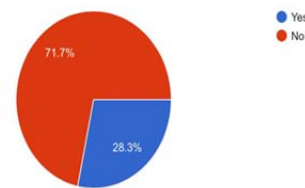


Effective in removal of debris of smear layer was found to be Nd: YAG. 81.8% have agreed on it

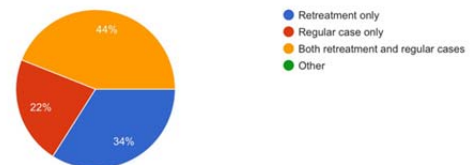
About 38.8% of the respondents say that laser can disinfect both main canal and lateral canal.

71.7% of the respondents feel passive ultrasonic irrigation to be effective when compared to laser activated irrigation. About 44% of the respondents believe that laser can be used in both retreatment cases and regular cases.

Do you feel the effectiveness of laser activated irrigation is better than passive ultrasonic irrigation (53 responses)



Do you believe laser should be only used in retreatment cases or on regular basis? (50 responses)



**RESULT AND DISCUSSION:**

Effective endodontic treatment requires both physical and chemical agents to remove soft-tissue debris, smear layer, and microorganisms because buildup of debris in the root canal system makes effective cleaning and disinfection. The use of lasers at different wavelengths has been proposed to supplement conventional endodontic cleaning procedures.(3)

From the study conducted, it can be seen that most of the respondents are not much aware of the laser technique that is used in dentistry.

It is seen that, 71.7% of the respondents have seem to know about laser technique that is been used in endodontics. About 11.3% claims to have known it through certain CDE programs and few through friends and few from attending classes and a few responded a no for the question.

About 94.3% find laser program training to be useful. As they can implement it in their procedures.

About 71.7% of the respondents find passive ultrasonic irrigation to be effective. This can be due to the fact that ultrasonic irrigation is more effective than sonic irrigation in the removal of dentine debris from the root canal.(4)

About 67.3% of the respondents say that laser does not cause dissemination of bacteria during infection. This might be due to various wavelengths, generally Nd: YAG which is found to effective in reducing microbial masses in canals.(7)

About 72.9% of the respondents find photo-activated disinfection can be used as a supplement in irrigation of canals. Samiei M, et al have stated that photo dynamic therapy was effective in reducing *E.faecalis*. (6)

About 81.8% of the respondents say Nd: YAG to be effective in removal of debris of smear layer. Zahed Mohammadi, et al have stated Nd:YAG laser irradiation have been found to reduce number of bacterias in the canal, significantly.(2)

The respondents find that laser used in disinfection can cause damage to the periapical area

Particularly when roots are close to anatomical relations such as mental foramen or maxillary sinus. 52.4% of the respondents have agreed to it.

About 82.7% of the respondents seem to have known about PIPS in endodontic disinfection. DiVito E, et al have stated that Photon Induced Photo-acoustic Streaming( PIPS) uses an Erbium 2,940 laser to pulse extremely low energy levels of laser light to generate a photo-acoustic shockwave, which streams irrigants throughout the entire root canal system.8 Using extremely short bursts of peak power, laser energy is directed down into the canal and the action actively pumps the tissue debris out of the canals while cleaning, disinfecting and sterilizing each main canal, lateral canals, dentinal tubules and canal anastomoses to the apex.(8)

About 44% of the respondents say that laser can be used for both retreatment cases and regular cases. 22% of them find lasers to be used in regular cases only and 34% of them find lasers to be used in retreatment cases only.

38.8% of the respondents have said that lasers disinfect both main canal and lateral canal. 24.5% of them say laser disinfects lateral canal only and 36.7% say lasers disinfect main canal only.

Say, about 49% of the respondents find increase in temperature caused by laser will not cause any deleterious effect to the tooth. Penn C, Beninati C have stated that On average, the pulpal temperature of teeth ablated with the Waterlase MD system increased the most (3.56°C). The Midwest High Speed Hand piece caused the lowest average temperature increase (1.57°C), followed by the LightWalker DT system (3.20°C) and the Solea system (3.30°C). (9)

About 64.3% of the respondents have said that laser can bring about better repair of fistula in the chin due to periapical lesion around the root apex of the tooth.

60.4% of the respondents feel lasers can extend to inaccessible areas such as biofilm of root apex of the tooth.

**CONCLUSION :**

From the study conducted, it can be concluded that, 94.3% of the respondents find laser training useful, but not many are aware of the techniques used in lasers and its action in infected canals of the tooth. Hence, it is necessary for the dentists to know the techniques used in lasers so as to implement the same in their practise.

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