



THE EFFECTIVENESS OF NEW NOVEL METHODS ON THE BACTERIAL LOAD IN ENDODONTICS IN THE ROOT CANAL DISINFECTION: IN VIVO STUDY

Dentistry

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ABSTRACT

Use of laser in dentistry is an approved modality of treatment in various specialties including endodontics. Aim of the study is to compare the disinfecting potential of the chemical method with diode laser & combination of the two after rotary method of bio mechanical preparation. **Materials and Methods:** Patients were selected from the department of Conservative & Endodontics who were clinically and radio graphically diagnosed cases of peri-apical disease. In both media, percentage of bacterial reduction was analyzed. Patients were selected and divided them in to 3 groups. The patients were grouped. In Group A, diode laser was used on five patients and in Group B, chlorhexidine was applied on five patient, Group C comprises of five patients with application of chlorhexidine combining disinfected with diode laser Percentage of bacterial growth reduction was assessed. Percentage of bacterial reduction was analyzed with the ANOVA table **Results:** The P-value (0.000) for Samples indicates that there is sufficient evidence that not all the means of samples are equal when $\alpha=0.05$ and in order to explore the differences among the means of the samples, it was found that the multiple comparison results were having similar means with regard to group A group B and Group C. It was noted that the mean of group C was significantly higher than from the means of group A and B. **Conclusion:** In the study, it showed that application of either Diode laser or Chlorhexidine a bring considerable reduction in the bacterial colony. It was observed that the synergic effect of Diode laser combined with chlorhexidine was found to be very effective.

KEYWORDS

INTRODUCTION

Currently, root canal therapy mainly comprise of disinfecting the canal space by utilizing a combination of mechanical removal of tissue and chemical decontamination. The use of lasers in aiding root canal disinfection is more promising than in root canal biomechanical preparation. For disinfection, laser energy can be used directly or can be combined with a photosensitive chemical that, when bound to microorganisms, may be activated by low-energy laser light to essentially kill the microorganism.

The advantages of using the laser, however, are balanced by several significant disadvantages. Root canal spaces are rarely straight and more often are curved in at least two dimensions. Root canal instruments used to clean the space throughout its length can be curved to follow the curvatures in a tooth root. In contrast, laser light will travel on a straight path; laser probes should be fabricated in a way that the laser light emerges laterally, uniformly interacting with the root canal wall.[2,3] The interactions involved between laser energy and the tissue can cause a rise in temperature. The increased temperature can char the canal space, damaging it to the point that the tooth may be lost. The increased temperatures also may extend to the outer surfaces of the tooth, damaging the soft tissue that connects the tooth to the surrounding bone. If the temperature is high enough, the bone surrounding the tooth may also be irreversibly injured, adversely affecting the entire area, which can result in ankylosis.[3] Moreover, cycles of melting and re-solidification of the radicular wall dentin apparently have no positive effect on clinical outcomes.[4,5]

The use of lasers as an aid in disinfection has been researched extensively in the last few years. Currently, there exists, a body of evidence for in vitro studies on the antibacterial efficacy of high-power laser.[3,6] However, their effects on the clinical outcomes of root canal therapy are not known at this point. While the FDA has approved diode laser as an adjunct for removal of pulp tissue in a pulpotomy procedure and apicoectomy, more research is required to develop laser energy for use in nonsurgical endodontics so that it is equal, if not superior, to present treatment modalities. Until that research is complete, patients should ask about the use of lasers in root canal treatment, especially in light of the high success rate of nonlaser procedures carried out by those trained to perform them.[7-9]

METHODOLOGY

Patients with clinically and radiographically diagnosed periapical disease were selected randomly from Department of conservative & Endodontics..The study was approved by the ethical committee of University. The patients were grouped. In Group A, diode laser was used on five patients and in Group B, chlorhexidine was applied on five patient, Group C comprises of five patients with application of chlorhexidine combining with the disinfected with diode laser. Patients were selected based on the following inclusion criteria patients who are not having any history of tobacco usage, patients with no systemic disease and with no history of any antibiotics at the time of intervention, patients who are clinically or/and radiographically diagnosed as cases of periapical disease. The patients excluded are patients who are having any sort of periodontal disease with clinically and radiographic changes suggestive of periodontal/combined lesions. In all the cases, preoperative IOPA was taken, and working length was estimated by k-file No-15. Samples were taken from patients, mechanically prepared by sterile Protaper Gold endodontic system by (Dentsply Switzerland). All the pre samples were transferred directly in nutrient media specific for Enterococcus faecalis. Diode laser BIOLASE laser advance (BIOLASE MEGAGEN) with wavelength 970 nm was used. The optic fiber flexible tips of size 200 μ m. used for <1 mm from the working length of individual tooth. The fiber was moved in upward and downward manner for 60 s.

Postoperative samples were collected after rotary preparation and application of laser in group A, chlorhexidine in group B and group C patients with application of chlorhexidine combining with the disinfected with diode laser also Samples were taken with sterile paper point transferred directly to nutrient broth and kept overnight and keep all the samples in Incubator at 37°C for 24 h. The growth was evaluated under spectrophotometer.

RESULTS

The diode laser shows significant reduction in the optical density which shows reduction in the bacterial load in the root canal which requires the root canal treatment. Chlorhexidine also proves as a major disinfectant also shows the significant reduction in microorganisms and combination of laser and chlohexidine in group C shows the

synergistic effect of diode laser and chlorhexidine. The turbidity decreases a lot which shows the effectiveness of combination of the both diode laser and chlorhexidine.

Table 1: Mean of the Individual Patients of the Groups.

PATIENT	Laser	Chloro	Laser & Chloro
1	70.10	81.67	87.67
2	76.97	81.02	89.09
3	77.55	80.11	90.21
4	66.17	81.82	87.99
5	56.60	92.79	95.67

Table 2: Intergroup of the Groups Laser, Chlorhexidine and Laser with Chlorhexidine

Anova: Single Factor				
SUMMARY				
Groups	Count	Sum	Average	Variance
Laser	5	347.3896	69.47792	74.58946
Chloro	5	417.4132	83.48264	27.53814
Laser & Chloro	5	450.63	90.126	10.60268

Table 3 Intercomparison of ANOVA within the Groups.

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1111.016	2	555.508	14.78329	0.000579	3.885294
Within Groups	450.9211	12	37.57676			
Total	1561.937	14				

DISCUSSION

There is a direct relation between disinfection of root canal system and success of endodontic treatments. Laser therapy has shown great promise in removal of the smear layer, bacteria and infection in endodontics. Studies have shown that conventional instrumentation together with irrigant solution shows promising results.[10] Diode laser wavelengths balance between absorption and penetration to bring energy below dentinal surface without tending to damage it. Diode laser energy is able to activate chemical irrigants to increase their bactericidal effects.[11] In the present study combination of chlorhexidine and Diode Laser was more effective than either chlorhexidine or Laser alone, but there is a need to continue the study with higher number of samples and compare with other kinds of laser with different wavelength, power, frequency and treatment time.[10,12] Clinical studies clearly show advantages of laser treatments over currently-used conventional methods and techniques. The most important advantages are improved disinfection efficacy, more effective root canal cleaning, reduction of permeability, reduction of micro-leakage, and elimination of the need to use toxic solvents. According to this study, it was concluded that the reduction of bacteria[12,13] after usage of diode laser and chlorhexidine is found to be significant. The application of diode laser might be an adjunct to conventional endodontic treatment when used in combination with a chlorhexidine solution.[13] Synergic effect of diode laser combined with chlorhexidine is found to be very effective in eradicating microorganisms. Reduction of total number of bacteria after combination of chlorhexidine and laser is significant.

CONCLUSION

In the study it shows that application of either diode laser or chlorhexidine will bring considerable reduction in the bacterial colony and when both are combined chlorhexidine and diode laser shows the synergic effect of diode laser.

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