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USE OF LOW LEVEL LASER THERAPY IN POSTENDODONTIC PAIN- A CLINICAL STUDY

Balram Choudhary[1], Akshay Raj Goyal*[2] and Himanshu Sharma[3]

[1]Assistant Professor, Jawahar Lal Nehru Medical College, Ajmer, Rajasthan.
[2]BDS, MDS(Dept of Conservative Dentistry & Endodontics).
[3]BDS, MDS Senior Lecture, Dept of Conservative & Endodontics, Index Dental College, Indore.

***Corresponding Author: Akshay Raj Goyal**
BDS, MDS(Dept of Conservative Dentistry & Endodontics).

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ABSTRACT

Aims: The aim was to evaluate postendodontic treatment pain with and without the use of LLL. **Material & Method:** 30 patients with demand for endodontic treatment on their upper canine were included in the study. Patients had no history of medical complications, or systemic diseases. All patients were randomly divided into two groups (n = 15). Endodontic treatment were performed in a single visit. First group was the laser group, after biomechanical preparation patients were treated with LLL, application was done through root canal and to the buccal and lingual mucosa overlying the apices of the target tooth. Exposure time was 80 s. In the second group, patients received placebo. Intensity of post treatment pain was recorded using visual analog scale at 4, 8, 24, and 72 h. **Statistical Analysis Used:** Observed results were statistically analyzed using Mann–Whitney U‑test. **Results:** There was a significant difference between both the groups in favor of LLLT group. **Conclusions:** LLLT has been shown to be effective, noninvasive and nonpharmacological approach for the reduction of postendodontic treatment pain, periodontal infection, periapical and wound healing.

INTRODUCTION

Lasers are devices that amplify or increase the intensity of light to produce highly directional, high‑intensity beam that typically has a very pure frequency or wavelength. The laser light, when reduced in its energy output to a low‑level, may be utilized for tissue healing and repair, cutting as in surgery, shrinking tumors, unblocking clogged arteries, eradicating infections and other therapeutic purposes. For bringing about health enhancement, the application of these beams of light is called "LLLT".[1]

These lasers are nonthermal. The exact mechanism of its effect is unknown, it is theorized that due to the low absorption by human skin the LLL light can penetrate deeply into the tissues where it may have a photobiostimulation effect.[2]

Due to their various beneficial properties, these types of lasers are now being introduced to the field of dentistry, especially in the field of endodontics, they are useful for early endodontic diagnosis; photodynamic inactivation of the microorganism in canal and managing inflammation and pain during and after endodontic therapy has been completed. The purpose of this study was to evaluate the pain reduction effect of LLLT after endodontic treatment of maxillary canine.

MATERIAL AND METHODS

30 patients with age 18-25 years were selected for the study with chief complaint of pain in the upper maxillary canine were included in the study, protocols for indications of single‑visit root canal therapy were followed in patient selection, and informed consent was obtained prior to the treatment. In addition, the patients had to stop using any antibiotics or analgesics during a week before the treatment.

Endodontic treatments were performed in a single‑visit. After access opening and radiographic determination of working length, a standard bio‑mechanical preparation of the canals was done with rotary ProTaper NiTi (Dentsply, Maillefer) files equivalent to number 25-30 depending on anatomical features of the roots.

Root canals were obturated using lateral compaction technique and AH plus sealer (Dentsply). Occlusal contacts with opposing teeth were eliminated for all treated teeth. No procedural error (i.e. perforation, transportation, missed canal) was accepted for teeth entering the survey. All patients were randomly selected and divided into two groups (n = 15). First group was the laser group, after biomechanical preparation patients

were treated with LLLT. Application of the laser probe was done through root canal and to the buccal and lingual mucosae [Figure 1b] overlying the apices of the target tooth. Total exposure time for each tooth was 80 s. The laser unit used in this study was a pulsed diode laser (Quanta Pulse Lllt, Milta Dent ‐.Physio Quanta, France) [Figure 2] with a wavelength of 800 nm. In the second group, patients received placebo without laser. Patients were explained about the study done, and a printed visual analogue scale [Figure 3] was given to "take home" and record the intensity of posttreatment pain at intervals of 4, 8 and 24, the reading at 72 h was taken by the operator as the patient was re‐called for permanent postobturation restoration. Any of the patients taking analgesics after the treatment were excluded from the study.

RESULTS

Observed results were statistically analyzed using Mann–Whitney U‐test. Statistically, significant difference in pain reduction was observed in LLLT group at 4 and 8 h. However, there was no statistically significant difference in pain reduction among the two groups at end of 24 and 72 h [Table 1].

DISCUSSION

Low‐level lasers (LLL) refers to the use of red‐beam or near‐infrared lasers with a wavelength between 600 and 1000 nm power from 5 to 500 mW. In contrast, lasers used in surgery typically use 300 W.[1] These lasers are non thermal. Although the exact mechanism of its effect is unknown, it is theorized that due to the low absorption by human skin the laser light can penetrate deeply into the tissues where it has a photobiostimulation effect.

The therapy performed with such lasers is often called "low‐level laser therapy" (LLLT) and the lasers are called "therapeutic lasers." Light in infra‐red spectrum at specific wavelength penetrates the tissue and is absorbed where the light energy is converted into bio‐chemical energy, restoring normal cell function.

Currently, LLLT is practiced as part of physical therapy in many parts of the world. In fact, light therapy is one of the oldest therapeutic methods used by humans (historically as solar therapy by Egyptians, later as ultraviolet therapy for which Nils Finsen won the Nobel Prize in 1904).[4]

Low‐level laser therapy may reduce pain related to inflammation by lowering, in a dose‐dependent manner, levels of prostaglandin E2, prostaglandin‐endoperoxide synthase 2, interleukin 1‐beta, tumor necrosis factor‐alpha, the cellular influx of neutrophilgranulocytes, oxidative stress, edema, and bleeding. The appropriate dose appears to be between 0.3 and 19 J/cm2.[5]

Other theory proposed is the "Neural inhibition as a mechanism of pain relief,"" which is widely accepted. In a study done it was found that conduction velocity was considerably reduced.[6]

This study compared the immediate postoperative pain reduction using LLLT due to healing of periapical wound or inflammation caused after biomechanical preparation of root canal.

There are various factor that elicit post obturation pain such as the existence of preoperative pain, infection, retreatment, intracanal medications, and physical and chemical damage to periapical tissue.[7] Studies have shown that pain experienced after single‐visit endodontic treatment is less compared to multiple visits endodontic treatment[7,8] some studies also say that two visit endodontic treatment effectively reduced pain.[9]

The patients after single‐visit endodontic treatment, however are said to experience higher frequency of pain and swelling and tend to take analgesics for relief.[10] In this study posttreatment pain was shown to be significantly reduced following laser therapy at 4, 8, 24, and 72 h after single‐visit endodontic treatment compared with the placebo group. The transmission of laser through tissue is high wavelength specific, and is optimal in the optical range of 500-1200 nm.[11]

Low‐level laser are used for reduction of dentinal hypersensitivity. Gershman has shown that dentinal hypersensitivity can be successfully treated with LLLT. It acts on the biostimulation because of the increase in production of mitochondrial adenosine triphosphate, increasing the threshold of the free nerve endings, providing an analgesic effect due to an increase ofb‐endorphine in the cephalorrhachidian liquid. The reduction of pain occurs because of the inhibition of the cycloozygenase enzyme, which suspends the conversion of the arachidonic acid into prostaglandin.[12] The laser also increases the formation of secondary dentin by theodontoblasts, by process of biostimulation.[4] LLLT is also used for photo‐disinfection of root canals[13] and on placement of implants,[14] treating in the treatment of temporomandibular joint disorders,[15] reducing pain induced by orthodontic forces.[16] In a statisticalmeta‐analysis study to determine the overall treatment effects of laser phototherapy on tissue repair and pain relief it was concluded that laser phototherapyis a highly effective therapeutic armamentarium for tissue repair and pain relief.[17] The result of this study corresponds to the observations and conclusions of previous studies. In this study all the patients were selected on the basis that satisfy the protocols for indications of single‐visit root canal therapy, except, teeth with large periapical pathology or sinus were excluded, arch in which tooth is present, and age of the patient was not taken into consideration.

CONCLUSION

In this study, pain reduction was statistically significant in LLLT group at 4 and 8 h, but no statistically significant difference was found in pain reduction among the two groups at end of 24 and 72 h. More LLLT studies in the field of endodontics will reveal the chances of success of this non pharmacological approach for management of postendodontic treatment pain.

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