Subjective acceptance and pain perception of Er:YAG laser therapy in children

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_Introduction

Many people report fear of pain as their chief reason for not seeking dental care, furthermore dental anxiety may lead to avoidance of dental care, increasing the risk of caries development and oral diseases.[1] It is a multidimensional complex phenomenon, and no one single variable can exclusively account for its development.[2]

Several studies have shown that fear of drill is a principal cause of dental anxiety among children.[3, 4] They identify a number of specific stimuli in a dental setting among which the restorative dentistry procedures deliver most potent triggers for their dental anxiety such as the sight of the anesthetic needle and the sight, sound, smell and vibration of dental handpiece and rotary dental drill, pain associated with dental treatment.[5-9] It has been suggested that reducing these stress-triggers is an effective procedure for managing anxious patients.[2, 10]

For this reason, anxious patients who must undergo restorative procedures are often managed using the "4S" rule or the so called "4S" principle. It is based on removing four of the major primary sensory triggers for dental anxiety when in the dental setting—sight (air turbine drill, needles), sounds (drilling), sensations (high frequency vibrations—the annoyance factor), smells, and it is used in conjunction with other measures and alternative methods to mitigate anxious behaviors and their consequences.[2]

A range of approaches can be used and they can be mixed and matched to meet the particular needs of a situation. Laser therapy in pediatric dentistry is a therapy of choice for its known advantages, especially for the safety of its use and for its gentle approach with patients.[11] It has been in use for carious removal in anxious patients for more than 20 years.[10] Dental laser treatment reduces the need for injected local anesthesia and obtains very low to null likelihood of odontoblastic pain and the annoyance factor during carious removal. There is no smell or there is dentine ablation vapor in case of inadequate suction during cavity preparation, while the dominant physical sensation is popping (shock waves) and ablation sound. This new technology offers to the pediatric dentists, new possibilities to change completely the restorative treatments.

Considering the difficulty of reducing dental anxiety in children, this study seeks to evaluate the subjective laser therapy acceptance and tolerance as an alternative method for dental tissue therapy in children, using an Erbium:YAG 2,940 nm (LiteTouch™ by Syneron Dental Lasers) and checking the impact of laser on their perception of pain.

_Material and methods

The study was conducted on 45 six- to twelve-year-old children (mean age = 7.42±1.35 years). A convenience sample of children was randomly selected from patients treated at the Department of Pediatric Dentistry in Faculty of Dental Medicine, Medical University – Plovdiv, Bulgaria during the period May to December 2013.

The inclusion criteria were:
- children aged six to twelve years;
- signed informed consent form from the parent;
- native language of the child—Bulgarian;
- presence of one or more dentine carious lesions without pulp involvement or pain; the cavities were matched according to the tooth type (primary or permanent; premolar or molar), cavity type (Black's classification) and cavity depth (D3 threshold, WHO system).

A total of 45 teeth were prepared without anesthesia, using an Er:YAG laser 2,940 nm (LiteTouch™ by Syneron Dental Lasers). Parameters and operative mode used for these hard tissue therapies are reported in Table 1. After cavity preparation and before restoration of the treated tooth, each patient completed a questionnaire to evaluate the subjective acceptance of laser therapy concerning the major primary stress triggers. Children were asked to rate the anxiety provoked by the sight and sound of the laser handpiece, the smell, taste, vibration sensation and discomfort of suction during the laser preparation and to integrate the degree of their pain.

Because children under eight years old are unlikely to be reliable in recalling their pain perception during treatment[12], the universal pain assessment tool was used (Fig. 1). It is a self-report instrument that comprises Wong-Baker Faces Rating Scale—a row of six representative images (icons) ranging from "No hurt" to "Hurts as much as you can imagine"[13] in combination with a visual analogue scale of 0 to 10. There are six levels of pain quality and intensity marked by word descriptors. Each child was asked to point to the icon or choose the number which most closely depicted its pain during dental treatment (Fig. 2).

	Enamel	Dentin
Watt	4.0	2.0
Hz	20	20
mJ	200	100

Tab. 1_Hard tissue dental setting

The data obtained were tabulated and subjected to statistical analysis. SPSS 19.0 was used for data analyses. The level for statistical significance was set at $p < 0.05$.

_Results

All the cases of restorative dentistry were performed without anesthesia and patients completed questionnaires. Graphic 1 shows the distribution of the results concerning the investigated triggers for dental anxiety during laser cavity preparation. The most anxiety provoking items were smell (67.7 %) which is statistically different from all items ($p < 0.01$). The second factor reported as anxiety provoking one was taste (42.2 %). Only one patient reported vibration sensation during cavity preparation using the LiteTouch Er:YAG laser (2.2 %) which is statistically different from the triggers "taste", "suction" and "smell" ($p < 0.01$).

The analysis of pain indicated that 33.3 % of children felt no pain at all with laser preparation, 37.8 % reported "Hurts little bit" (level 2) and 26.7 % reported moderate pain level. Only one patient reported severe pain perception on the used pain assessment tool (Graph. 2).

The laser treatment was carried out with good collaboration of the patients in 91.1% of cases within the first session. The treatment of the other 8.9 % patients was stopped due to lack of accept-

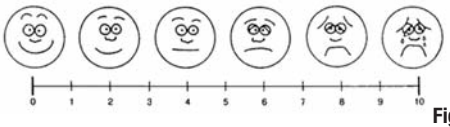
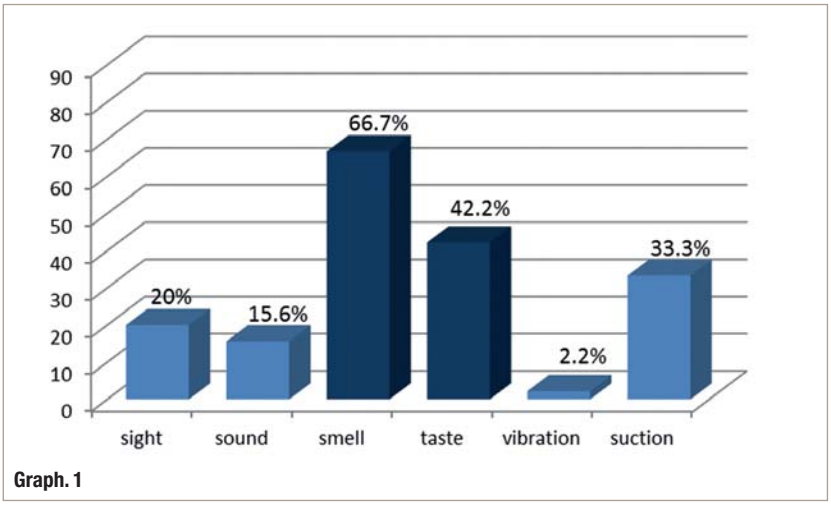


Fig. 1



Fig. 2

Fig. 1_Universal pain assessment tool.
Fig. 2_A child, indicating its pain on the self-report assessment tool.



Graph. 1

Graph. 1_Prevalence of the investigated items in the cohort of participants.

ance of the unfamiliar new technology and uncooperative behavior after placing a sterile cotton pellet and temporary material in the cavity and obturated at the second appointment.

_Discussion

The present study indicates a decrease in three of four stress triggers in "4S" principle. Our results show that the sensation of high frequency vibrations—the annoyance factor for patients is eliminated. It confirms the results of Evans et al.[14], who found that in children over ten years old there is a preference of laser treatment which is perceived as having less vibrations in comparison with the conventional method.

As several studies have shown that fear of drill is a principal cause of dental anxiety among children especially the sight and sound of dental handpiece[3-5, 9], laser therapy as an alternative method for managing anxious patients reduces the effect of these two stress triggers. It is confirmed by the obtained results of our study—less than one-fifth of the children have shown anxiety provoked by the sight and sound of the laser. The results of the present study concerning the anxiety provoked by the noise are in line with the results of a previous study[14], that only few children consider popping sound as a stress trigger.

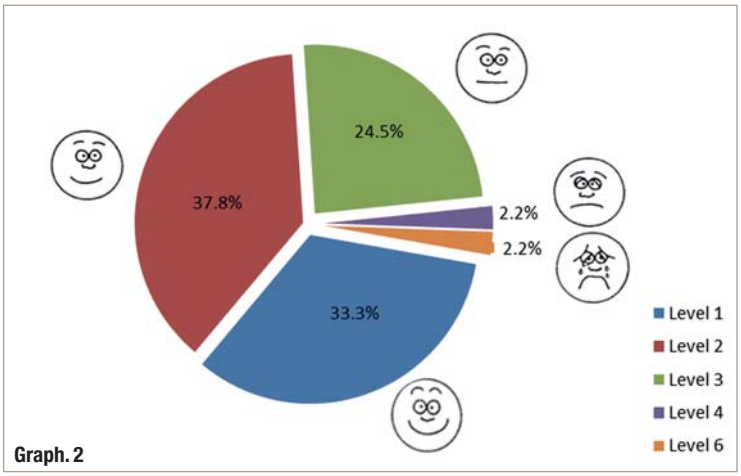
However, one stress trigger in "4S" rule is not reduced. Patients in our study consider smell as the most anxiety provoking factor, followed by the unpleasant taste that are produced during the laser preparation in oral cavity. The adequate suction needed during laser cavity preparation was found to be stressful factor by one third of the studied patients.

The analysis of pain indicates that the scores obtained from 71.1 % of the cases after laser preparation were low (level 1 and 2). They are in line with the results of several researchers.[11,15,16] They show that laser treatment reduces the need of injected local anesthesia and the sight of needle that is considered a specific anxiety provoking stimulus in dental setting. Thus laser therapy is an effective method for managing dental anxiety by influencing one of the stress triggers in "4S" principle.

_Conclusions

Cavity preparation with the LiteTouch Erbium:YAG laser would seem to be an option for anxious patients. It produces less pain and has good level of subjective acceptance registered among patients. The analysis of the obtained results shows that laser therapy in pediatric dentistry is a therapy of choice for managing anxious patients who must undergo restorative treatment._

Editorial note: A list of references is available from the publisher.



Graph. 2

Graph. 2_Distribution of scores on the pain scale used.

_contact laser

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