Impact Of Low-Level Laser Therapy On Gag Reflex Reduction In Prosthodontic Patients: An In-Vivo Study

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ABSTRACT

This study evaluates the effectiveness of low-level laser therapy (LLLT) in reducing the gag reflex during dental procedures, specifically in prosthodontic patients. The gag reflex is a common challenge in dentistry, particularly during impression making, which can hinder successful treatment. This study focused on the stimulation of the PC6 acupressure point using LLLT to alleviate this reflex. A total of 13 patients were included, with each patient undergoing two impression procedures: one with no stimulation and another after LLLT applied to the PC6 point. Gag reflex severity was assessed using the Dickinson and Fiske Gagging Severity Index (GSI). Results showed a significant reduction in gag reflex severity following LLLT stimulation of the PC6 point, suggesting that LLLT could be a viable, non-invasive treatment for managing the gag reflex in prosthodontic procedures. The findings provide promising evidence for LLLT as an effective adjunct to traditional gag reflex management techniques in dental practice.

INTRODUCTION

The gag reflex is a protective response to prevent foreign objects from entering the throat. However, for some individuals, it can be excessively strong, causing discomfort during dental procedures. This reflex can be triggered either by somatic factors, like touch on sensitive areas in the mouth, or psychogenic factors, such as anxiety or the sight, sound, or smell of dental procedures. A strong gag reflex may hinder basic dental treatments, particularly impression making, and can lead to patient avoidance or the need for sedation.

While various methods, including sedation, distraction, and acupuncture, have been employed to manage the gag reflex, no single strategy has proven universally effective. Acupuncture points like Pericardium 6 (PC6) have shown promise in reducing the gag reflex, with non-invasive alternatives such as laser acupuncture gaining attention. Low-level laser therapy (LLLT) has been reported to reduce gagging by stimulating specific acupuncture points, and several studies suggest its potential in managing dental-related gag reflex. This study aims to evaluate the effectiveness of LLLT in reducing the gag reflex in prosthodontic patients by stimulating the PC6 acupuncture point.

METHODOLOGY

1. **Patient Selection and Case History**

A detailed case history of each patient was recorded, including medical history, prior dental experiences, and specific details regarding their gag reflex. All participants were selected based on the presence of a gag reflex, which was confirmed through a preliminary assessment. Inclusion criteria included individuals requiring prosthodontic treatment, particularly maxillary impression making, and those who exhibited a positive gag reflex during testing.

2. **Assessment of Gag Reflex**

The gag reflex was assessed using the Cranial Nerves IX (Glossopharyngeal) and X (Vagus) stimulating test. To evaluate the presence and intensity of the gag reflex, the mucous membrane of the uvula was stroked with a sterile tongue depressor or the handle of a mouth mirror on both sides. A positive response to the test, indicated by gagging or discomfort, confirmed the presence of a strong gag reflex. Only participants showing a positive response were included in the study.

3. **Gag Reflex Intensity Measurement**

The severity of the gag reflex was measured using the Fiske and Dickinson Gagging Intensity Index (GSI), a well-established scale for evaluating the magnitude of gagging during dental procedures. The GSI was assessed in both groups after the maxillary impression procedure to evaluate the baseline severity of the gag reflex and to determine the effectiveness of the interventions.

4. **Study Design and Grouping**

This study included two groups:

- Group A: Patients who required a maxillary impression and had a positive gag reflex but did not receive any treatment prior to impression making.
- Group B: The same patients who underwent the same procedure, but this time with 30 minutes of stimulation of the PC6 acupressure point using low-level laser therapy (LLLT) prior to the impression making.

Each patient underwent two impression procedures: one without LLLT stimulation and one after the LLLT application, thus acting as their own control group.

5. **Preparation Before Procedure**

To standardize the results and eliminate confounding factors, all patients were instructed to have a light breakfast before coming to the clinic to avoid the influence of hunger or discomfort on the gag reflex. The impressions were taken between 9:00 a.m. and 10:00 a.m. to account for any circadian variations in gag reflex intensity.

6. **Location and Stimulation of PC6 Acupressure Point**

The PC6 acupressure point, also known as Neiguan, was located on the anterior surface of the wrist, three fingers' breadth above the distal skin crease of the wrist joint. It is located between the tendons of the palmaris longus and flexor radialis muscles, where the median nerve passes. This point was chosen due to its known anti-nausea, anti-anxiety, and anti-gagging properties, making it an ideal candidate for managing the gag reflex in dental settings.

7. **Application of Low-Level Laser Therapy (LLLT)**

For Group B, 30 minutes prior to the maxillary impression, LLLT was applied to the PC6 acupressure point. The diode laser was positioned 3-4 mm away from the acupoint with a 1-inch spot size for 1 minute. The laser used had the following parameters: a power output of 0.5 mW, a wavelength of 940 nm, and energy of 4J with a penetration depth of a few millimetres in a defocused continuous mode. This procedure was performed with a 30-minute time gap before the second impression was taken to reinforce the concept of sensory flooding, reducing any bias from previous stimulation.

8. **Evaluation of Results**

After the impressions were made, the severity of the gag reflex in both groups were assessed using the Fiske and Dickinson Gagging Intensity Index (GSI). The responses of patients to the impression procedure, as well as their reported gagging severity, were compared between Group A and Group B to evaluate the effectiveness of LLLT in reducing the gag reflex.

Figure 1: Extra-oral profile

Figure 2: Intra-oral uvula examination

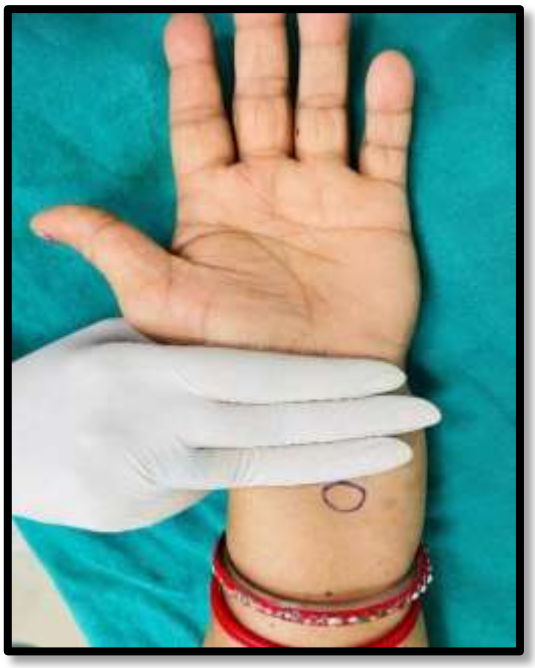

Figure 3: Gag reflex evaluation

Figure 4: PC 6-point identification

Figure 5: Diode laser

Figure 6: Protective glass

Figure 7: PC 6-point stimulation

Figure 8: Impression making after LLLT

Figure 9: Completed maxillary impression

RESULTS

The data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 16. Parametric tests (paired t-test) were used for intra-group comparison, and non-parametric tests (Mann-Whitney U test) were applied for inter-group comparison, with a significance level set at $p \leq 0.05$.

Gag reflex magnitude at various time intervals, were measured using the Dickinson and Fiske Gagging Severity Index. The Wilcoxon Signed-Rank test revealed a significant reduction in gag reflex severity.

Inter-group comparison between Group A (conventional impression without PC6-point stimulation) and Group B (after PC6-point stimulation with low-level laser therapy) was done. The Wilcoxon Signed-Rank test indicated a very significant reduction in the gag reflex in Group B compared to Group A ($p<0.01$).

DISCUSSION

The gag reflex is a protective mechanism that can interfere with dental procedures, particularly during impression making. Factors like anxiety and physical stimuli can trigger exaggerated gagging responses, which complicate dental treatment. Various methods, such as topical anaesthetics and modified instruments, are employed to manage this reflex. Acupuncture, particularly at the PC6 point, has shown potential for reducing nausea and anxiety, with some studies suggesting it may also help manage the gag reflex.

Low-level laser therapy (LLLT), or photo biomodulation, has been used in dentistry to reduce pain, inflammation, and promote healing. It involves applying specific light wavelengths to targeted tissues, stimulating biological changes. Previous studies have shown that LLLT, when used on acupuncture points like PC6, can reduce postoperative nausea and vomiting, suggesting it could be effective for managing the gag reflex.

The present study found that stimulation of the PC6 point with LLLT significantly reduced the gag reflex during impression making. This result aligns with other research suggesting the effectiveness of acupuncture and laser therapy in reducing gagging. The use of LLLT as a non-invasive approach provides a promising alternative to traditional methods of gag reflex management.

However, the study has limitations, including a small sample size and the lack of comparison with other distraction techniques or a placebo group. Further studies with larger sample sizes and longer durations are needed to validate these findings and explore additional acupuncture points and treatment methods for managing the gag reflex.

CONCLUSION

Within the limitation of the study, following conclusions were drawn:

1. There was decrease in magnitude of gag reflex after stimulating PC-6 acupressure point using low-level laser therapy.
2. There was a significant difference in reduction of gag reflex before and after stimulating PC-6 acupressure point using low-level laser therapy ($p<0.05$)

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