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Application of soft tissue laser in the management of recurrent aphthous stomatitis: A placebo controlled study

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Abstract---Aphthous ulcers are relatively common pathology and are very painful, so in order to facilitate the relief in pain and healing of these ulcers application of LLT has been done in the present study. The purpose of this study was to assess the efficacy of Low Level Laser Therapy in the treatment of recurrent aphthous ulcers. 30 patients of both sexes and all age groups with two recurrent aphthous ulcers were included in the study. One ulcer in each subject was subjected to Low Level Laser Therapy as study group and one ulcer in each subject was considered for the Sham Control group. The Student's t-test was used for statistical evaluation of the data. The study group (LLLT) showed a statistically significant reduction in pain as compared to the sham controlled group. Complete resolution of the ulcers in the study group was observed to be 4.7 ± 1.2 days and control group was 8.4 ± 2.6 days. On comparison with the sham group, the complete healing time for the study group (LLLT) was found to be highly

significant, with a p value of <0.001. Out of the 30 patients who were included in the study, 28 patients showed complete relief from pain immediately post the LLLT application. Based on the findings of the present study, it can be concluded that LLLT is an effective modality for the treatment of aphthous ulcers. Not only does LLLT reduce the healing time, it also provides immediate pain relief.

Keywords---low level laser, aphthous ulcer, biostimulation.

Introduction

Aphthous ulcers, commonly known as canker sores, are the most common, recurrent lesions that affect the oral cavity. As many as 5-66% of the population may be affected by these ulcerations.¹ The lesions of aphthous ulcers are characterized by recurrent bouts of single or multiple rounded, shallow, painful oral ulcers which may occur at intervals of few days to a few months. Aphthous ulcers usually present with grey-white pseudo membranes which are enveloped by thin erythematous halos.² Local trauma, genetic factors, nutritional deficiencies, viral and bacterial infections, and immune or endocrine disturbances have all been implicated as etiological factors of frequent oral ulcerations. In a subset of patients, no etiology can be identified and a diagnosis of exclusion must be made; such cases are referred to as recurrent aphthous stomatitis (RAS). At least 40% of RAS patients have a vague familial history of RAS (30). The role of heredity is the best-defined underlying cause of RAS (6). Children with RAS-positive parents have a 90% chance of developing RAS. When patients have a positive family history of RAS, they tend to develop RAS at an early age. At least 40% of RAS patients have a vague familial history of RAS (30). The role of heredity is the best-defined underlying cause of RAS (6). Children with RAS-positive parents have a 90% chance of developing RAS. When patients have a positive family history of RAS, they tend to develop RAS at an early age. At least 40% of RAS patients have a vague familial history of RAS (30). The role of heredity is the best-defined underlying cause of RAS (6). Children with RAS-positive parents have a 90% chance of developing RAS. When patients have a positive family history of RAS, they tend to develop RAS at an early age. RAS is the most frequent cause of ulcers on the oral mucosa. It affects 5% to 25% of the general population, although prevalence may vary from 5% to 60% depending on the study and on the population assessed, the diagnostic criteria applied, and environmental factors.³ Due to the indeterminate etiology of these lesions, it is often difficult to find a definitive cure and current treatment options are aimed towards ameliorating the symptoms. Current treatment options include topical analgesic and anesthetic agents, corticosteroids, antibiotics, multivitamins, cauterization, LASER ablation and a variety of combined therapies.⁴ Lasers are heat producing devices converting electromagnetic energy into thermal energy. The characteristic of a laser depends on its wavelength (WL), and wavelength affects both the clinical applications and design of laser. The WL used in medicine and dentistry generally range from 193 to 10600 nm, representing a broad spectrum from ultraviolet to the far infra-red range.⁵ The typical power output for a low level laser device which is used for this therapy is in the order of 0.1 - 0.6 Watts.⁶

Materials and Methods

The present study was conducted in the Department of Oral Medicine and Radiology, Shree Banke Bihari Dental College and Research Centre, Ghaziabad. The study group comprised of a total of 30 individuals, with clinically diagnosed Recurrent Aphthous Stomatitis. After obtaining the ethical clearance for the present study the informed consents were taken from all the subjects included in the study. Patients having 2 or more painful minor aphthous ulcers were included in the study. Patients already undergoing therapy for aphthous ulcers or with chronic non healing ulcers and who were not willing to participate were excluded from the study. One ulcer in each subject was subjected to Low Level Laser Therapy as Study group and one ulcer in each subject was considered for the Sham Control group.

Methodology

Pre-procedural evaluations were conducted for the following parameters in each ulcer:

- Pain - using Visual Analogue Scale (VAS) consisting of 10 scale pain measurements marked from 1 to 10, with "1" being least pain and "10" being the most severe imaginable unbearable pain.
- Size of the ulcer - using a periodontal probe. Two ulcers with maximum size or 'long axis diameter' (measured by periodontal probe) would be considered, one of which would be randomly considered in the Study group and the other in the Sham Control group.

One of the ulcers was randomly allocated to be treated with LLLT. The Laser unit was set at an output power of 0.8 Watts and a wavelength of 980 nm. The treatment consisted of single sitting consisting of four sessions of low level laser applications, each session lasting about 45 seconds, each session with a gap of about 30-60 seconds, for a total laser application time of about 3 minutes. The application of the Laser was done in the non-contact mode with a distance of 2-3 mm between the Laser tip and the ulcer surface. The laser beam was applied in a continuous sweeping, circular motion, 30-60 seconds gap was given after each session. For the ulcers which was included in the Sham Control group, the same technique was followed without actually activating the Laser unit. The pain scores (using VAS) and sizes of the lesions were evaluated immediately post the laser applications, at one day, two days and three days follow up (figure 1-3).



Figure 1. Armamentarium



Figure 2. PRE-OP (Study Group)

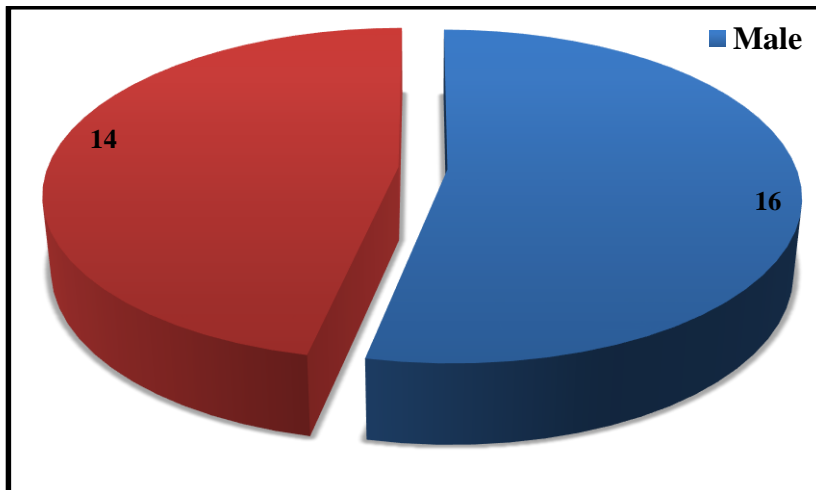


Figure 3. POST-OP

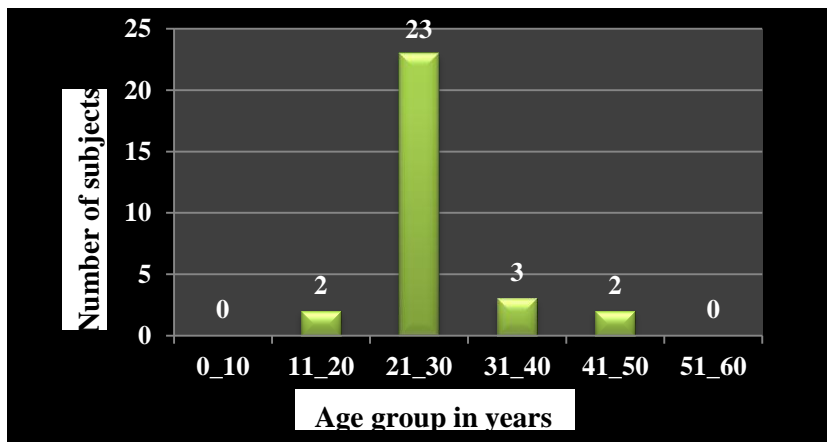
Statistical analysis and results

The data was entered onto computer for analysis using Statistical Package for Social Science (SPSS) Version 23 for Windows. The results of the present study indicated that LLLT was successful in reducing the pain intensity. The differences in the mean VAS score among study group and control group immediately post-

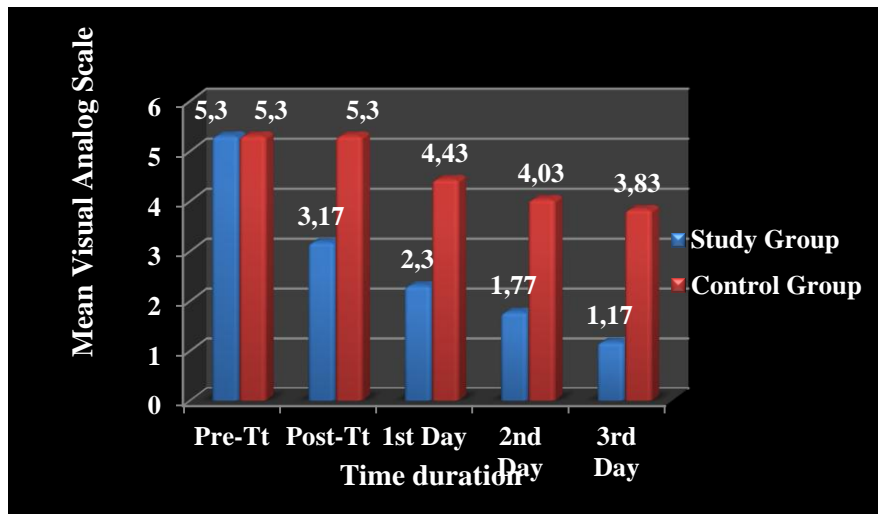
treatment, 1st day post-treatment, 2nd day post-treatment and 3rd day post-treatment were statistically significant 3.17 ± 1.26 vs 5.3 ± 1.44 ($P < 0.05$); 2.3 ± 1.62 vs 4.43 ± 1.63 ($P < 0.01$); 1.77 ± 1.66 vs 4.03 ± 1.45 ($P < 0.01$) and 1.17 ± 1.44 vs 3.83 ± 1.64 ($P < 0.001$) respectively. Also, the results of the present study indicated that LLLT was successful in reducing the size of the ulcers. The differences in the mean reduction in the size of the ulcers (in mm) among study group and control group immediately post-treatment, 1st day post-treatment, 2nd day post-treatment and 3rd day post-operative were statistically significant 3.4 ± 1.22 vs 3.63 ± 1.37 ($P < 0.05$); 2.6 ± 1.01 vs 3.2 ± 1.55 ($P < 0.01$); 1.93 ± 0.98 vs 2.86 ± 1.41 ($P < 0.01$) and 0.96 ± 0.89 vs 2.76 ± 1.38 ($P < 0.001$) respectively. The difference in the mean duration of complete remission of the ulcers among study group (4.7 ± 1.2 days) and control group (8.4 ± 2.6 days) was highly significant ($p < 0.001$) (table 1-2 & graph 1-4).



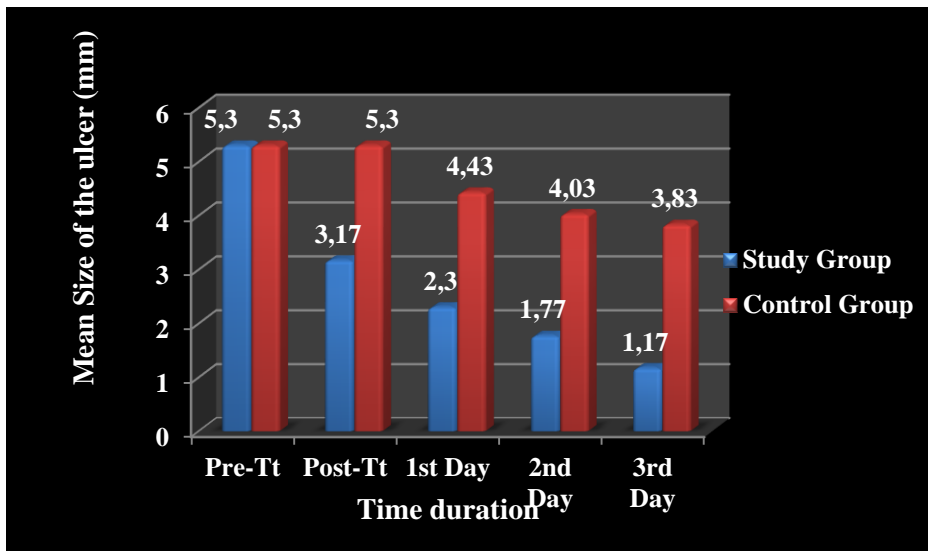
Graph 1. Gender distribution of the subjects in the study



Graph 2. Age distribution of the subjects in the study



Graph 3. Visual Analogue Scale (VAS) Score for pain



Graph 4. Reduction in the Size of the Ulcer

Table 1
Comparison of VAS Score in the Study and Control Groups

Duration	Mean ±SD		Probability of "t"	P value	Significance
	Control	Study			
Pre-treatment	5.3±1.44	5.3±1.44	0.0000	P=0.00	Not Significant
Immediately post-treatment	5.3±1.44	3.17±1.26	0.0036	P<0.05	Significant
1 st day post treatment	4.43±1.63	2.3±1.62	0.0028	P<0.01	Very Significant

2 nd day post treatment	4.03±1.45	1.77±1.66	0.0023	P<0.01	Very Significant
3 rd day post treatment	3.83±1.64	1.17±1.44	0.0002	P<0.001	Highly Significant

Table 2
Comparison of reduction in the size of ulcer

Duration	Mean ±SD		Probability of "t"	P value	Significance
	Control	Study			
Pre-treatment	3.63±1.37	3.4±1.22	0.0000	P=0.00	Not Significant
Immediately post-treatment	3.63±1.37	3.4±1.22	0.0066	P<0.05	Significant
1 st day post treatment	3.2±1.55	2.6±1.01	0.0031	P<0.01	Very Significant
2 nd day post treatment	2.86±1.41	1.93±0.98	0.0017	P<0.01	Very Significant
3 rd day post treatment	2.76±1.38	0.96±0.89	0.0001	P<0.001	Highly Significant

Discussion

Another blind clinical trial was conducted by Basirat M et al (2012), Study included 12 patients with minor RAS, patients were treated using diode laser, 660 nm at 3J/cm² in a continuous mode. The results were compared with control group and it was reported that LLLT can decrease the time of pain relief in patients with aphthous ulcers. In a study done by Zand N et al (2012), it was shown that the conduction of nerve fibers was clearly inhibited by using low power lasers.¹ In this study, the authors suggested that the inhibition of nerve conduction which was caused by LLLT was not due to a permanent damage which was caused to the nerve, but that it was due to a reversible conformational change in the voltage-gated Na-K channels, much like local anaesthesia. Our results were at par with results of the study conducted by Prasad SR et al (2013) on 25 patients with minor recurrent aphthous stomatitis, ulcers treated with a single session of carbon dioxide laser and a placebo.² Pain scores in the laser group were significantly reduced immediately after treatment (0.68 ± 0.6). In contrast, the placebo group showed little difference in pain scores between pretreatment (8.08 ± 0.70). In the laser group, significant improvements in healing times were observed (4.08 ± 0.81 vs. 7.84 ± 0.90 days; P < .001). In our study the difference in improvement of VAS score among study and control group was highly significant (p<0.001). Our results were consistent with study conducted by Aggarwal H et al (2014) showed that there was complete resolution of the ulcers in the active group in 3.05 ± 1.10 days as compared to 8.90 ± 2.45 days in the sham control group.³ In the study done by Albrektson M, Hedström L, Bergh H (2014) showed that VAS rating decreased (day 0 until day 2) from 84.7 to 31.5 (LLLT) and from 81.7 to 76.1 (placebo) (P < .0001).⁴ LLLT also relieved the difficulty of drinking, eating, and brushing teeth. LLLT reduced the pain and the inconvenience of eating, drinking, and brushing teeth for patients with RAS,

compared with placebo. Suter VGA, Sjölund S, Bornstein MM (2017) studied the use of lasers (CO₂ laser, Nd:YAG laser and diode laser) to relieve symptoms and promote healing of RAS is a therapeutic option.⁸ More studies for laser applications are necessary to demonstrate superiority over topical pharmaceutical treatment and to recommend a specific laser type, wavelength, power output and applied energy (ablative versus photobiomodulation). Our results further prove the claims of a study conducted by Ghali HGH, Abdulhamed BS (2022) In this randomized, controlled, clinical study, LLLT using Diode LASER causes reduction in pain intensity due to RAUs, thereby reducing morbidity.¹⁴ There is also reduction in the diameter and healing time of the ulcer as compared to Anginovag spray medication and the control group.

Conclusion

Based on the findings of the present study, it can be concluded that LLLT is an effective modality for the treatment of aphthous ulcers. Not only does LLLT reduce the healing time, it also provides immediate pain relief. Since aphthous ulcers are sometimes recurring lesions, further studies are warranted to evaluate the effects on recurrence of these lesions and the effect that LLLT may produce.

References

1. Zand N, Fateh M, Ataie-Fashtami L, Djavaid GE, Fatemi S-M, Shirkavand A. Promoting wound healing in minor recurrent aphthous stomatitis by non-thermal, non-ablative CO₂ laser therapy: a pilot study. *Photomed Laser Surg* 2012;30:719–23.
2. Prasad S, Pai A. Assessment of immediate pain relief with laser treatment in recurrent aphthous stomatitis. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2013;116:189–93.
3. Aggarwal H, Singh MP, Nahar P, Mathur H, Gv S. Efficacy of low-level laser therapy in treatment of recurrent aphthous ulcers - a sham controlled, split mouth follow up study. *J Clin Diagn Res.* 2014;8(2):218–221.
4. Albrektson M, Hedström L, Bergh H. Recurrent aphthous stomatitis and pain management with low-level laser therapy: a randomized controlled trial. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2014;117:590–4.
5. Tarakji B, Gazal G, Al-Maweri SA, Azzeghaiby SN, Alaizari N. Guideline for the diagnosis and treatment of recurrent aphthous stomatitis for dental practitioners. *J Int Oral Health.* 2015;7(5):74–80.
6. Najeeb S a Khurshid Z, Zohaib S et al. Management of recurrent aphthous ulcers using low-level lasers: A systematic review. *Medicina* 2016;52:263–268.
7. Edgar NR, Saleh D, Miller RA. Recurrent Aphthous Stomatitis: A Review. *J Clin Aesthet Dermatol.* 2017;10(3):26–36.
8. Suter VGA, Sjölund S, Bornstein MM. Effect of laser on pain relief and wound healing of recurrent aphthous sto-matitis: a systematic review. *Lasers Med Sci.* 2017;32: 953-963.
9. Akerzoul N, Chbicheb S. Low laser therapy as an effective treatment of recurrent aphtous ulcers: a clinical case reporting two locations. *Pan Afr Med J.* 2018;30:205.
10. Gupta SK, Janqam H, Sharma N (2018) *Study and Applications of Laser Light. Res J Opt Photonics* 2018;2:2.

11. Lemes CHJ, da Rosa WLO, Sonogo CL, Lemes BJ, Moraes RR, da Silva AF. Does laser therapy improve the wound healing process after tooth extraction? A systematic review. *Wound Repair Regen.* 2019;27:102-113.
12. Alam N , Khan M .Low Level Laser Therapy for Non-Invasive Dental applications: A Review, *international journal of engineering research & technology (ijert)* 2020 Vol. 09.
13. Han M,Fang H,Li Li Q, Cao Y et al. Effectiveness of Laser Therapy in the Management of Recurrent Aphthous Stomatitis: A Systematic Review. Hindawi Publishing Corporation. *Scientifica* 2016;12:1-7.
14. Ghali HGH, Abdulhamed BS. Treatment of recurrent minor aphthous stomatitis using diode laser (940 nm). *Popul Ther Clin Pharmacol* 2022;28(2):e99-e112.