Turkish Journal of Physiotherapy and Rehabilitation; 32(3)
ISSN 2651-4451 | e-ISSN 2651-446X

EFFICIENCY OF LIGHT AMPLIFICATION BY STIMULATED EMISSION OF RADIATION (LASER) IN TMJ DISORDERS: AN ORIGINAL RESEARCH

DR SHAIKH AFZALUDDIN HUSSAIN[1], DR. VIJAY KUMAR YADAV[2], DR. TALWADE PRIYANKA[3], DR. SAURABH SHEKHAR[4], DR. ABHISHEK GUPTA[5], DR. SHIAD SALIM[6], DR. RAHUL VC TIWARI[7].

[1]Associate Professor, Dept. Of Anatomy, SSR Medical College, Belle Rive, Mauritius. dr.afzaluddin@gmail.com
[2]Post graduate student, Dept. of Oral Medicine and radiology, Hazaribag college of dental sciences and hospital, Hazaribag, Jharkhand. vijaydentist259@gmail.com
[3]Assistant prof. Dept of Pediatrics and Preventive Dentistry, JSS Dental college and Hospital. JSSAHER, Mysore. talwadepriyanka@gmail.com
[4]Lecturer, Oral pathology, AIMST University, Bedong, Kedah, Malaysia. saurabhshekhar2001@gmail.com
[5]Assistant Professor, Department of Oral Medicine and Radiology, Chitwan Medical college, Bharatpur, Chitwan, Nepal, 44207. abhishek.gupta@cmc.edu.np
[6]Reader, Dept. of Oral & MaxilloFacial Surgery, PMS college of dental science and research, Thiruvananthapuram, Kerala. shiadslm36@gmail.com
[7]OMFS, FOGS, (MHA), PhD Scholar, Dept of OMFS, Narsinhbhai Patel Dental College and Hospital, Sankalchand Patel University, Visnagar, Gujarat, 384315. drrahulvctiwari@gmail.com

ABSTRACT

Introduction: The aim of this paper was to evaluate the efficacy of a Laser therapy in patients with Temporomandibular Disorders (TMD) using a low level lasers.

Material and methods: A sample of 20 patients with a chief complaint of pain was divided into myogenous and arthrogenous groups. The sample was also divided on the basis of the treatment rendered: real versus placebo treatment. An 830 nm Ga-AI-As Laser device with a energy power of 4 joules was used (OMNILASE, LASERDYNE PTY LTD.) in three treatment sessions. To evaluate the effectiveness of laser treatment, a Visual Analogue Scale (VAS) was used for pain and active range of motion (AROM) was used to measure changes in mandibular function.

Results: We observed an improvement in pain only for the myogenous pain patients (p 0.02). For the arthrogenous pain patients, real laser treatment resulted in an improvement in Total Vertical Opening (TVO) ($p<0.05$), Protrusive excursion (PROT} ($p<0.02$) and Left lateral excursion (LATLEF} ($p<0.02$). The placebo control group showed improvement in TVO and PROT for those patients having myogenous pain and LATLEF for those patients having arthrogenous pain.

Conclusion: LASER being non-invasive and harmless features of this modality, more research is suggested, using higher power and increased frequency of laser applications.

Key words: LASER, TMJ Disorders, Original Study.

I. INTRODUCTION

Low Level Laser Therapy (LLLT) is used for a variety of conditions, including wound healing, management of some neuropathic disorders, pain relief and therapy for some musculoskeletal disorders. The most common LLLT currently used includes the helium-neon laser and infrared lasers or gallium-aluminum- arsenide.[1-5] Previous studies demonstrated that a rapid decrease of intra- articular inflammation in the TMJs after infrared laser application. Parameters of clinical evaluation were maximum mouth opening and subjective pain. However, the author also stressed the importance of using occlusal appliance therapy concomitantly to stabilize the mandible during the treatment to achieve optimal results.[6-10] When meta-analyses were performed, a study showed that positive outcomes of LLLT to manage pain are more frequently reported by better designed (double-blind) studies.[5,11] On the other hand, Gam, et al.[12] analyzed twenty three LLLT studies and concluded that LLLT is not effective in musculoskeletal syndromes. As shown in the above studies, double-blind studies are more appropriate when a new therapeutic modality is being tested. The best advantage of continuing the testing of laser devices for TMD management is the non-invasive and harmless characteristics. In this study, we evaluate a low laser device featuring a reliable energy output assessment has been tested in a double-blind placebo trial.[13-15]

II. MATERIAL AND METHODS

We conducted a prospective clinical trial with 20 subjects diagnosed with TMD. Patients presenting with any other health conditions were excluded. We selected the subjects based on a standardized and complete clinical examination, including masticatory and cervical muscle palpation, palpation of lateral and posterior aspects of the TMJ, measurements of the active range of motion (AROM), and joint noises. In accordance with their diagnoses, subjects were divided into arthrogenous (10 patients) and myogenous pain patients (10 patients). The response to palpation was classified as follows: “0” (no pain); “1” (mild pain); “2” (moderate pain); and “3”(severe pain). Myogenous pain patients constituted a group of ten patients diagnosed with masticatory muscle myalgia without TMJ pain.

The groups are divided as:

Group I - myogenous pain patients receiving real treatment;
Group II - arthrogenous pain patients receiving real treatment;
Group III - myogenous pain patients receiving placebo treatment
Group IV - arthrogenous pain patients receiving placebo treatment.

Laser treatment was performed once a week for three consecutive weeks with a Ga-Al-As Low Level Laser with a 830 nm wavelength. For the arthrogenous group, the probe was placed over the lateral joint surface close at a 22 degree angle to allow optimum joint penetration. For the myogenous group, the probe was applied over the most painful muscle spot, detected during muscle palpation. For the control group, the laser device was adjusted with the same time (40 seconds), but without power. Neither the patient nor the examiner was able to differentiate between real or placebo treatment. Each patient was evaluated immediately before and five minutes after the laser treatments. Visual Analogue Scale (VAS) was used to assess the individual level of pain. The objective - the total vertical opening (TVO), right lateral excursion (LATRIG), left lateral excursion (LATLEF), and protrusive excursion (PROT) were measured using a plastic millimeter ruler. Comparison was done keeping the $p<0.05$ as significant.

III. RESULTS

For the myogenous pain patients (Groups I and III), the most painful spot was found in the superficial masseter in seven patients, in the temporalis in two patients and in the deep masseter in one patient. Among those considered arthogenous pain patients (Groups II and IV), three were believed to have an anteriorly displaced disk with reduction, accompanied by capsulitis and synovitis. When performing the analysis within groups, from time I to time 6, significant differences were found ($p<0.05$), as seen in **Table** 1. For Group I, significant differences were detected for the VAS between time 1 (mean 56 mm) and times 4 and time 6 ($p<0.02$). **Table** 2. For Group II, significant differences were detected for TVO between time 1 and time 6 ($p<0.05$), PROT between time l and times 2 and 6 and LATLEF between time 1 and times 5 and 6. For the Group III, for TVO, time l was significantly different from times 4 and 6. When analyzing PROT for this group, significant differences were found between time 1 and times 2, 3, 4 and 6 ($p<0.05$). For Group IV, differences were **found** in LATLEF between time l and time 6. The analysis between groups showed no statistical differences for the variables studied.

Table 1: One-way within Groups ANOVA at Different Times

Group Variable	I "p" sig.	II "p" sig.	III "p" sig.	IV"p" sig.
TVO	0.561	0.035 *	0.024 "	0.098
PROT	0.137	0.020 * 0.013 "	0.003 "	0.282
LATRIG	0.397	0.095	0.410	0.109
LATLEF	0.251	0.159	0.869	0.043 *
VAS	0.014 "	0.159	0.803	0.076

Table 2: VAS Mean Values at Different Times (mm)

TIME	1	2	3	4	5	6
GROUP I	56	30	34	24	38	20
GROUP II	60	38	44	36	42	34
GROUP III	44	46	48	36	42	46
GROUP IV	54	40	40	32	42	30

IV. DISCUSSION

In our study the differences found for VAS in Group I, were is an agreement with previous studies,[10,16,17] where a cumulative effect of laser therapy was believed to be responsible for pain lowering.[18,19] Although not performing a long-term follow-up study, the benefits obtained from the laser therapy reducing pain in this group seemed to occur after second and third sessions, which suggest a gradual improvement. An interesting finding was the difference in VAS between even and odd times, which reflects an immediate response to the laser application, regardless the type of treatment (real or placebo). [20] In this study, TMJ patients showed no improvement using the VAS analysis ($p = 0.095$). This result are similar to the studies of Gam.[12] Heussler, et al. reported no differences between real and placebo groups.[14] It could possibly have occurred as a consequence of the anti- inflammatory effect of the laser therapy as suggested in previous papers. [5,18,19] But why this supposed reduction in inflammation was not reflected in a statistically significant reduction in pain reported for this group has not been explained. Some authors found an improvement in range of motion for arthralgic degenerative joint diseases and improvements in maximum mouth opening for arthrogenous patients. For the placebo groups, when statistical differences were found for TMJ patients, no differences were found in the pain reported. The power of placebo effect has been extensively demonstrated in the treatment of TMD. A good relationship between the patient and the professional, along with the "high tech" appearance of the laser appliance, could possibly explain the improvement in the range of motion.[5,14,19] Although no significant differences were found in the analysis between groups, the VAS value for Group I at time 6 (mean 20.0 mm) represented more than two times that found for Group III (mean 46.0 mm), which could be considered a meaningful clinical finding. We suggest that a larger sample size and long-term follow-up are needed to evaluate the exact effect of the LASER.

V. CONCLUSION

Based on the results reported above and the non-invasive aspect of this modality, treatment with laser therapy should be invigorated.

REFERENCES

1. Fernando S, Hill CM. Walker R: A randomized double blind comparative study of low level laser therapy following surgical extraction of lower third molar teeth. British I Oral Maxillofoc Surgery 1993; 31:170-172
2. Gershman JA, Ruben J, Geban-Eaglemont J: Low level laser therapy for dentinal tmth hypersensi0vity. Austral Dent 1 1994; 39:353-335
3. Basford JR: Low-energy laser treatment of pain and wounds: hype, hope, c3. hokum? Mayo Clin Proc 1986; 61:671-675
4. Kitchen SS, Partridge CI: A review of low level laser therapy. Physiotherapyn 1991 ; 77:161-168
5. Hanssen HJ, Thoroe U: Low power laser biostimulation of chronic orofacial pain. A double-blind placebo controlled cross-over study in 40 patients. pain 1990; 43:169-179
6. Belkin M, Schwartz M: New biological phenomena associated with laser radiation. H///i Phys 1986; 6:687-6P0Z
7. Brunner R, et al.: Application of laser light of low power density. Probl Dermat 1986; 15: Probl Dermat 1-116
8. Beckerman H, et al.: The efficacy of laser therapy for musculoskeletal and skin disorders: a criteria-based meta-analysis of randomized clinical trials. Physical Therapy 1992; 72:483-491
9. Bezuur, NJ, Habets LLMH, Hansson TL: The effect of therapeutic laser treatment on patients with craniomandibular disorders. 7 Croniomeztdi6 Disord 1988; 2:83-86
10. Gray RIM, Quayle AA, Hall CA, Schofield MA: Physiotherapy in the treatment of temporomandibular joint disorders: a comparative study of four treatment methods. British Dent 1 1994; 9:257-261
11. Hansson TL: Infrared laser in the treatment of craniomandibular disorders, arthrogenous pain. J Prosthet Dent 1989; 61:614-617.
12. Gam AN, Thorsen J, Lonnbcrg F: The effect of low-level laser therapy on musculoskeletal pain: a meta-analysis. Pain ;1993: 52:63-66

13. Gray RIM, Davies SJ, Quayle AA: A clinical approach to temporomandibu- lar disorders. 5. A clinical approach to treatment. British Dent 1 1994; 6: l0l- l04
14. Heussler JK, Hinchey G, Margiotta E, Quiwi R, Butler P, Martin I, SMgess AD: A double blind randomized trial of low power laser treatment in rheumatoid arthritis. Ann ARwn Dis 1993; 52:703-706
15. Walker JB, Akhanjee LK, Cooney MM, Goldstein I, Tamayoshi S, Segal- Gidan F: Laser therapy for pain of rheumatoid arthritis. Clinical I Pain 1987; 3:54-59
16. Mezawa S, Iwata K, Naito K, Kamogawa H: The possible analgesic effect of sofi-laser irradiation on heat nociceptors in the cat tongue. Arch orof Biol 1988; 33:693-694
17. Walker J: Relief from chroric pain by low power laser irradiation. Neuroscience Truer 1983; 43:339-344
18. Snyder-Mackler GW, et al.: Effect of helium-neon laser on musculoskeletal trigger points. Physical Therapy 1986; 66:1087-1090
19. Nisha Nandal, Dr. Naveen Nandal, Ms. Neetu Jora. (2021). Perception of Online Learning Among College Students: A Systematic. International Journal of Modern Agriculture, 10(1), 1142 - 1149. Retrieved from http://www.modern-journals.com/index.php/ijma/article/view/1377
20. Waylonis GW, et al.: Chronic myofascial pain: management by low output helium-neon laser therapy. Arch Phys Med Tebbit 1988; 69:1017- 1020
21. Gray RIM, Quayle AA, Hall CA, Schofield MA: Temjxiromandibular pain dysfunction: can electrotherapy help? Physiotherapy 1995; 81:47-51