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Role of Laser Biostimulation in Treatment of Oral Submucous Fibrosis: A Clinical Trial

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AIM: To evaluate the efficacy of Low Level Laser Therapy (LLLT) in treatment of Oral Submucous Fibrosis (OSMF).

MATERIAL & METHODS: 20 patients with a clinical diagnosis of OSMF were included in the study after informed consents and measurements of mouth opening (mm) and burning sensation (VAS) were made at day 0. Laser biostimulation was performed on right and left cheeks in anterior and posterior bands for 3 cycles of 10 seconds each. They were recalled for follow-up measurements and laser biostimulation at 3rd, 7th and 15th day. The paired t-test was applied for analysing significant differences, if any, using SPSS version 21.0.

RESULTS: In the follow up recordings, generally, there was an increase in mouth opening after LLLT therapy and a significant difference was seen in males ($p=0.04$) as well as the total population ($p=0.02$). Burning sensation (VAS Scale), on day zero was 5.5 ± 1.20 , which was reduced to 3.4 ± 0.84 on the 15th day with a significant difference seen in the entire study population ($p=0.03$).

CONCLUSION: Biostimulation by laser in the treatment of OSMF is a good non-invasive, painless and quick alternative treatment modality for the management of the diseases.

KEYWORDS: Oral Submucous Fibrosis (OSMF), LLLT, Laser Biostimulation

INTRODUCTION

Oral Submucous Fibrosis (OSMF) has a well-known history, as it was known by Sushruta, one on India's great physicians as 'Vidari'.^{1,2} This condition is predominantly found in the Indian subcontinent. Joshi in 1953 was the first person to describe this entity in India.³ Oral Submucous Fibrosis is one of the most poorly understood and unsatisfactorily treated diseases with risk of malignant change in advanced cases of OSMF being 3 to 6%.

JJ Pindborg defined it as "an insidious chronic disease affecting any part of the oral cavity and sometimes the pharynx. Although occasionally preceded by and /or associated with vesicle formation, it is always associated with juxta epithelial inflammatory reaction followed by a fibro elastic change of lamina propria, with epithelial atrophy leading to stiffness of oral mucosa and causing trismus and inability to eat".⁴ The onset of the condition is insidious and the most common initial symptom is burning

sensation experienced on eating spicy hot food or on intake of hot beverages. Early signs are blisters, ulcerations or recurrent stomatitis. Excessive salivation, defective gustatory sensation, regurgitation and nasal resonance are rarely encountered. Restricted tongue movements are seen in advanced cases. The buccal mucosa, retromolar areas, soft palate and lips are commonly affected by OSMF. An occasional involvement of the pharynx and oesophagus is seen in some cases.⁵

There is no definite treatment for this condition. The various treatment modalities are mainly medical, surgical, or a combination of both with conservative/medical modality being the treatment of choice in patients having mild to moderate limitation(s) in opening their mouth. The Conservative, medical line of treatment includes usage of gold,⁶ iodides, hyaluronidase, placental extract, and steroids (hydrocortisone, triamcinolone), iron in the form of supplements

and vitamins.⁷

In patients having marked limitation in opening his/her mouth, or failure to respond to the conservative management leads to surgical treatment of the lesion with dermal graft, tongue flap, nasolabial flap, Split Skin Graft (SSG) followed by Post-operative oral physiotherapy, dietary supplementation and other medications being routinely done in a dental setting.⁸

The word 'LASER' is an acronym for 'Light Amplification by Stimulated Emission of Radiation'. Low-level laser therapy (LLLT) is also known as 'soft laser therapy' or bio-stimulation. The output for a low level laser device which is used for this therapy is in the order of 0.1 - 0.6 watts and is found to be quite effective.⁹ Laser has quite a few advantages as it provides better inflammatory responses with reduced oedema, pain reduction coupled with cellular biostimulation, as compared to current tissue regeneration modalities that present increased pain and inflammatory responses.¹⁰

Based on the above mentioned rationale, the present study was conducted with the aim of assessing the efficacy of LLLT in treatment of Oral Submucous fibrosis among patients visiting a dental setting in Greater Noida. The parameters which were assessed for evaluating the efficacy were limited mouth opening and burning sensation.

MATERIALS AND METHODS

A total of 20 patients, each with clinically proven Oral Submucous Fibrosis, were included in the study. Exclusion criteria included patients who were already undergoing treatment for Oral Submucous Fibrosis, patients with Couagulopathies, Blood Disorders, Parkinson's disease and Heart Disease. Ethical Clearance was duly taken from the Institutional Review Board, I.T.S. Dental College, Hospital and Research Centre, Greater Noida. Each patient was informed about the procedure and technique, and his/her written consent was obtained after duly explaining the study protocol.

Pre-procedural evaluations were conducted for the following parameters in Oral Submucous Fibrosis:

1. **Burning Sensation**- Using Visual Analogue Scale (VAS).
2. **Mouth Opening**- Using Metric Vernier Caliper & 'O' Scale.

The laser unit which was utilized in the current study was 'Photon Plus Diode Laser' (Zolar Technology and mfg. Co., Canada) which was duly calibrated prior to the commencement of the study (Figure 1). The laser unit was set at an output power of 0.8 W and a wavelength of 980 nm. Prior to starting with LLLT, the patient was seated comfortably on the dental chair and protective eyewear was adorned by the patient, the dentist and the assistant. (Figure 3) The treatment consisted of four sittings i.e. Day 0, 3, 7 & 15.

Each sitting consisted of three cycles of low level laser applications, each cycle for 10-15 Seconds with a gap of about 20-30 seconds between each cycle, for a total laser application time of about three minutes. The application of the Laser was done in the non-contact mode with a distance of 2-3 cm between the Laser tip and the fibrous band surface/ mucosal surface.

The laser beam was applied in a continuous sweeping, circular motion, so as to cover the lesion surface. Precautions were taken to prevent overheating of the mucosa and /or tissue surface, which were; a 20-30 seconds gap after each cycle, the continuous sweeping motion of the laser beam and the 2-3 cm distance between the laser tip and mucosal surface.

The burning sensation scores (using VAS) and mouth opening (Figure 4) were evaluated immediately post the laser applications, at day zero, 3, 7 and 15th day. The patients were asked to refrain from using any medications for OSMF treatment over the next 15 days. Also, the patients were asked to keep a record of any post procedural adverse effects, such as a burning sensation, pain, bleeding, etc over the next 15 days.

The responses of the patients were then captured into Microsoft excel, and then duly transferred to Statistical Package for Social Sciences (SPSS) version 21.0 for further analysis.¹¹ After applying descriptive statistics, the data was analysed using paired t-test. Statistical significance was set as $p \leq 0.05$.

RESULTS

The present study, with the aim of assessing the efficacy of LLLT in treatment of Oral Submucous fibrosis enrolled 20 patients, out of which 8(40%) were females and 12 were males (60%)(Figure 2).

Table 1. depicts the differences in mouth opening before and after LLLT therapy at 0, 3rd, 7th and 15th day. It was observed that generally, there was an increase in mouth opening after LLLT therapy and a significant difference was seen in males($p=.04$) as well as the total population($p=.02$).

Upon comparison of the burning sensation based on the VAS Scale, it was again observed that there was a decreased burning sensation experience by the entire study population, as on day zero, it was 5.5 ± 1.20 , which was reduced to 3.4 ± 0.84 on the 15th day. A significant difference was seen among the entire study population ($p=.03$)(Table 2)

DISCUSSION

As compared to broadband light sources, lasers emit coherent, monochromatic, and collimated electromagnetic radiation with high intensity and display a high optical power per unit area for a given amount of energy, and hence, give laser the opportunity to be applied in both medical and dental field with unique applications.¹²

In the present study, the use of laser for treatment of OSMF was found to be quite beneficial for the study subjects, with a reduction in pain and increased mouth opening. Such results are supported by findings of various authors^{2,12-16} across the globe who report better mouth opening, reduced discomfort and little inflammation of the treated lesion, making it a preferred treatment modality for treating lesions with OSMF.

CONCLUSION

A variety of treatment modalities for treatment of OSMF are easily available and are strongly supported by various authors, with each modality having its own pros and cons. However, there is still no universally acceptable protocol for the management of OSMF as the etiology of the disease is not fully understood.² The results of the present study support the fact that laser treatment

is an acceptable, and a less painful method of treating OSMF with excellent results.

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LEGENDS



Figure 1. Diode laser unit used for LLLT

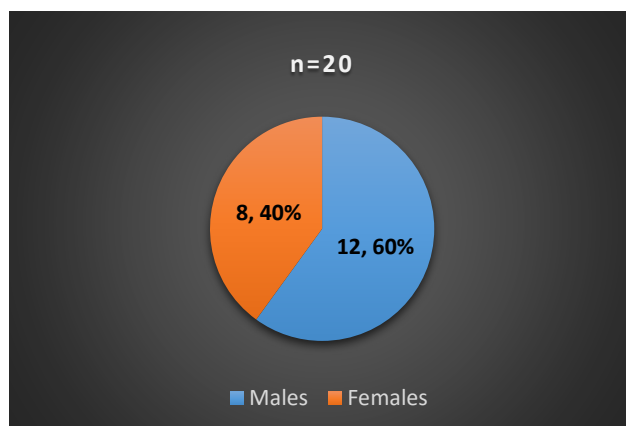


Figure 2. Distribution of the study population

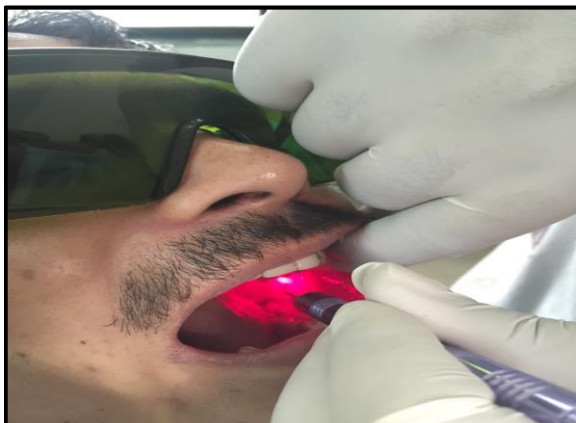


Figure 3. Application of LLT therapy



Figure 4. Measurement of Mouth Opening

Characteristic	Mouth Opening at 0 days(in mm) (Mean±SD)	Mouth Opening at 3 rd day(in mm) (Mean±SD)	Mouth Opening at 7 th day(in mm) (Mean±SD)	Mouth Opening at 15 th day(in mm) (Mean±SD)	p Value
Males	25.07±1.87	25.85±2.12	26.28±2.01	26.98±2.14	.04*
Females	22.25±0.83	22.75±0.82	24.10±0.93	24.65±0.86	1.6
Total	23.94±2.07	24.61±2.29	25.37±2.00	26.05±2.08	0.2*

Table 1. Differences in Mouth Opening among study subjects

Characteristic	Burning Sensation at 0 days (in mm) (Mean±SD)	Burning Sensation at 3 rd day (in mm) (Mean±SD)	Burning Sensation at 7 th day (in mm) (Mean±SD)	Burning Sensation at 15 th day (in mm) (Mean±SD)	p Value
Males	5.5±0.95	4.83±0.69	4.3±1.00	3.5±0.95	1.1
Females	5.5±1.5	4.75±0.82	4.25±0.43	3.25±0.43	0.7
Total	5.5±1.20	4.8±0.74	4.3±0.90	3.4±0.84	0.3*

Table 2. Differences in VAS Score among study subjects