IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 22, Issue 2 Ser.10 (February. 2023), PP 19-27
www.iosrjournals.org

Evaluation of Intralesional injection triamcinolone acetonideand Hyaluronidase efficacy in Oral Submucous Fibrosis patients: A pilot Study.

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Abstract:
Aim*: To demonstrate the efficacy of injection Triamcinolone acetonide and Hyaluronidase in increasing the interincisal distance in patients affected with oral submucous fibrosis.*
Materials and methods*: Thirty five prediagnosed patients suffering from OSMF were selected for this study,from the outpatient department after being staged as per the classification provided by Kerr et al. Hyaluronidase 1500 I.U. in 1 ml triamcinolone acetonide 40 mg/mland 0.5 ml lignocaine HCL was injected intralesionally using a 26 gauge needle at the site of the palpable fibrous bands in the buccal mucosa with least number of pricks as possible. The Interincisal distance was evaluated and recorded once weekly for 5 weeks, one taken as baseline and rest four taken one week post injections.*
Results*: The mean age of the patients participating in the study was 31.26 years. There was a mean increase of 6.04 mm in the mouth opening of all the participants in the study with patients suffering from Grade 2 showing the maximum improvement in their interincisal distance (6.15 mm). There was least improvement seen in the mean interincisal distance in patients suffering from Grade 1 OSMF. The p-value on ANOVA was <0.05.*
Conclusion*: Hence it is clearly distinguished from the results of the study that localized injections of Triamcinolone acetonide and Hyaluronidase is ahighly effective modality in conservative management of Grade 2 and grade 3 OSMF with high chances of no relapse.*
Clinical Significance*:*
This treatment modality is highly effective in increasing the maximal mouth opening of the patients hence enhancing their quality of life greatly. It has proven to be a very sustainable and an effective option keeping in mind its affordability and ease of administration.

Keywords: *Hyaluronidase, oral submucous fibrosis, Triamcinolone acetonide.*

Date of Submission: 04-02-2023 Date of Acceptance: 15-02-2023

I. Introduction:

Oral Submucous Fibrosis is a disease that has been the Centre of Oral and Maxillofacial research for over four decades now.[1]Over the years it has received several names such as "AtropiaIdiopathicamuosaeoris" or "Idiopathic Scleroderma."[2] All these names were based primarily on observations of the clinical manifestations until histopathology became a common practice and the term "Oral Submucous Fibrosis" was coined in 1953.[2, 3]Although occasionally preceded by and/or associated with vesicle formation, it is always associated with epithelial inflammatory reactions followed by a fibroelastic change of the lamina propria, with epithelial atrophy leading to stiffness of the oral mucosa and causing trismus with inability to eat."[4]

Much like its exhaustive definition Oral Submucous Fibrosis is encompassed of a multifactorial presentation localized to the oral cavity externally and internally.[5, 6] It has commonly been referenced in literature as a chronic premalignant lesion which makes timely and effective intervention in its case more crucial.[7] Another important aspect is it directly interferes with the ability to masticate and digest, hence leading to a state of severe nutritional deficiency. The classical symptoms include palpable fibrous bands that can be palpated through the oral mucosa internally and the skin externally in advanced grades of the disease.[8] Extraorally the mouth appears to have a constricted appearance due to fibrosis in the circumference of the oral aperture.[5,7,9] Other common findings include diffuse blanching of the oral mucosa, hyperpigmented patches on the oral mucosa with leathery consistency with adjacent areas showing loss of pigmentation.[8] Symptoms commonly seen during the prodromal and dominant phases of the disease also include a depapillated tongue with a pale tint. [8] The disease may further extend to the oropharynx and upper third of the esophagus when untreated causing dysphagia and hence nutritional deficiencies.[7] Burning oral mucosa and intolerance to spices is one of the most common prodromal symptoms and has been used to evaluate the efficacy of various treatment modalities.[9,10]But the popular diagnostic and prognostic marker of the disease still remains the interincisal distance or as referred to by some the maximal mouth opening. [8]Interincisal distance for patients in this study was evaluated using a digital vernier caliper to maintain accuracy but it can also be evaluated using a compass and scale. It serves as an effective marker in evaluating the progress of the disease. [7,9,10,11]It also carries the additional benefit of being very obvious and noticeable to the patient and can be used effectivelyin educating and encouraging the patients in continuing treatment.[12] OSMF has multifactorial etiology, but tannin in the arecanut causing decreased collagenase activity and hence decrease in the degradation of the collagen remains the most accepted etiology.[13] Dietary predisposition combined with habitual Areca nut chewing is a predominant factor contributing to the prevalence of OSMF in South and South-East Asian populations, including countries like India. [7]

Treatment of OSMF remains a challenge for the clinician due to lack of proper framed treatment regime protocol. Agents like pentoxyfylline have been demonstrated as a suitable substitute for steroids. Curcumin, tulsi, aloe vera, turmeric oil are other ayurvedic remedies used in the treatment of OSMF. Placental extracts have also been able to reduce the pain, burning sensation, intolerance to spices etc. to some extent. Intralesional injections of chymotrypsin have also been used in OSMF and have given significant results. Being the oral disease that strikes a large economically backward population, it is essential to find a cost effective and simply deliverable treatment option, with limited access to health care facilities. Hence the use of intralesional injections of Triamcinolone acetonide and Hyaluronidase remains highly popular given as they are easiest to be administered, mildly invasive with maximum efficacy with an added advantage of being cost effective and not reliant on the patient's compliance unlike the use of topical agents.[7,11]

II. Materials And Methods

Design:

After an evaluation, clinically diagnosed patients reporting to the outpatient Department of our hospital were selected for this study. Their informed consent was taken prior to starting the study. Due ethical clearance was also taken for conducting the pilot trial from the concerned authorities and the study was in accordance with the declaration of Helsinki. The sample size of 35 patients was selected for the study. The patients were classified and selected for the study adhering to the following classification given by Kerr et al in 2011[7](table 1) and the respective exclusive and inclusion criteria which is Grade 1 (Mild) - Any features of the disease triad for OSMF (burning, depapillation, blanching or leathery mucosa) may be reported and inter-incisal opening >35mm, Grade 2 (Moderate) - Above features of OSMF+interincisal limitation of opening 20-35mm, Grade 3 (Severe) -Above features of OSMF+interincisal opening <20mm, Grade 4A- OSMF+other potentially malignant disorder on clinical examination, Grade 4B- OSMF with any grade of oral epithelial dysplasia on biopsy,Grade 5OSMF+oral squamous cell carcinoma (SCC).

Inclusion criteria:Patients suffering from Grade 1-3 of the above stated classification of OSMF, whose routine hematological and urine investigations were within physiologic limits, with sound mental health and who were independent so that they could perform all the jaw stretching exercises themselves and be regular with it, who had not undergone any major or minor surgical procedures and were not infected with Covid -19 in the

last 6 months before the 1st visit and who were willing to provide the written consent were selected. Exclusion Criteria comprised of patients suffering from Grade 4 and 5 OSMF, ailing from any systemic illness chronic or acute and under medication for whom physicians consent could not be obtained,those suffering from any disorders of the Temporomandibular joint primarily and secondarily of infective and non-infective etiology, who were not willing to regularly follow up with the proposed treatment plan, previously received any form of treatment for OSMF, hypersensitivity to Hyaluronidase or Triamcinolone acetonide and thosewho had active pericoronitis in the mandibular third molar region.

A total of 35 patients were chosen to for this study. All patients were diagnosed and appropriately graded. Clinically the patients were diagnosed based on commonly seen symptoms such as restricted mouth opening, burning sensation in the mouth on consuming anything hot or spicy, restricted protrusion of the tongue,(Fig.1) blanching of the oral mucosa (Fig.2), palpable fibrous bands(Fig.3,4a,4b) and presence of vesicles and ulcers on the oral mucosa .[7, 11]Patients beyond Grade 3 were not selected since those are classified as advanced stages of the disease and are not indicated for conservative management. The patients were explained the entire treatment regime before enrolling them and taking their consent. Following this the interincisal distance of the patients was measured using a digital vernier caliper to evaluate the maximal mouth opening before starting any treatment. The interincisal distance for all patients uniformly was measured between the Maxillary Right Central Incisor and the Mandibular Right Central Incisor. In cases where any of the mentioned teeth were missing, severely attrided or were periodontally compromised, the interincisal distance was measured using the Left Maxillary Central Incisor and the Left Mandibular Central Incisor.

During the baseline visit until the fourth visit the blood pressure was measured for each patient and only if within physiologic limits, the patient was taken up for the procedure. This was followed by measurement and recording of the interincisal distancebefore administering the intralesional injections.The Interincisal distance was evaluated and recorded once weekly for 5 weeks, one taken as baseline and rest four taken one week post injections.(Fig 5a and 5b) Local lidocaine spray 10% was used at the site of injection to reduce the pain of the prick. Hyaluronidase 1500 I.U. in 1 ml triamcinolone acetonide 40 mg/ml and 0.5 ml lignocaine HCL was injected intralesionally using a 26 gauge needle (Fig.6) at the site of the palpable fibrous bands in the buccal mucosa, faucial pillars, retro molar area and palatal mucosa with least number of pricks as possible followed by jaw stretching exercises using heisters jaw opener and was done weekly for 4 weeks. In all patients intralesional injections were supplemented with chairside jaw stretching exercises which were performed using a Heister's jaw stretcher. The appropriate bedside demonstration for the jaw stretching exercise was given at the baseline visit and the instructions were reinforced in each visit. The jaw stretching exercises were only taught to supplement the current ongoing therapy and were not evaluated as part of the study since the adherence and approach to them was highly dependent on individual adherence of each patient and had great interpersonal difference.

III. Results:

We had a total sample size of 35(N=35) in this study. The mean age of the participants in the study was 31.26 ± 9.69 years. (Table no. 2) The baseline or the first week mean mouth opening of all the patients participating in the study was 23.94±5.490mm followed by the mean mouth opening in the second week which was 25.79±5.843 mm, third week which was 27.202 ± 6.219mm, fourth week showed 28.56± 6.211mm and fifth week which showed 29.98 ± 6.055 respectively is represented in table number 3. The fifth weekmean mouth opening of the patients was after the last or the fourth intralesional injection which was 29.98 ± 6.055mm. This shows that there was a marked improvement of 6.04 mm in the mouth opening of the patients after the completion of the treatment. The gender wise frequency of the participants in the study showed a higher population of males which was 74.3 % of the study sample size as compared to the females in the study (table no. 4). Of the 35 patients, 22 patients were suffering from Grade 2 OSMF while 12 patients were diagnosed with Grade 3 OSMF. Only one patient was diagnosed with Grade 1 OSMF (Table 5). As depicted in Table 6 the participants in the study showed an increase in the interincisal distance hence resulting in an increase in the mouth opening from their baseline visit to their fifth visit, which was after administering the weekly localized injections for 4 weeks. Patients diagnosed with Grade 2 showed maximum response to the treatment with an increase of 6.15 mm in the mean mouth opening on completion of the treatment. Patients diagnosed with Grade 3 OSMF showed an increase of 5.91 mm in the interincisal distance hence effectively increasing their maximal mouth opening. The patient suffering with Grade 1 OSMF showed an increase of 5 mm in the interincisal distance. The p-value on ANOVA was <0.05 (Table 6). The results of the study clearly demonstrate that intralesional injections of Triamcinolone acetonide and Hyaluronidase are effective in increasing the interincisal distance hence effectively increasing the maximal mouth opening. No side effects were reported by any of the participants' post-completion of the study.

IV. Discussion

As it is clearly evident from the results of the study mentioned above, localized injections of Triamcinolone acetonide and Hyaluronidase were highly effective in reducing the submucosal fibrosis and in increasing in the interincisal distance. Triamcinolone reduces the fibroblastic activity and hence the collagen deposition by suppression of the inflammatory reaction. Hyaluronidase breaks down hyaluronic acid in the connective tissue which in turn lowers the viscosity of the intercellular cement substance and causes the lysis of the fibrinous coagulum. Post completion of the treatment patients also reported that they could visibly notice the difference in their mouth opening as a result of which it was helpful in resuming not just the function and their nutritional status but also the mental health especially in Grade 3 cases where patients often reported of frustration due to inability to eat. Follow up blood investigations were not completed for all patients, hence hematologic changes if any were not noted, although some previous studies have suggested that there was an improvement in the anemic status of the patient. [7] Also, though it was not evaluated as part of the study but post completion of the full course of injections patients reported an improvement in the status of their other localized symptoms such as burning of the oral mucosa, intolerance to spices etc. Previous studies have also reported similar findings. [9] In this study the choice of the classification was based on the clinical parameter used to Grade Oral Submucous Fibrosis, which in this case was the interincisal distance. [7] Also as has been stated previously Grade 4 and 5 as per Kerr et al show premalignant and malignant complications which cannot be managed conservatively. [7, 11, 14]In the sample size of this study Grade 1 patients were the lowest amongst the selected cohort. This could be attributed to the primary reason that the starting stages of the disease for most patient from a socially and economically weaker background may remain undiagnosed since the mouth opening is generally more >35 mm and hence it may not hamper with function severely and remains neglected until it advances to further stages of the disease. [7] Patients suffering from OSMF generally manifest clinical changes in Grade 2, 3 or higher when they start experiencing severe alterations in function. An example of this can be noted in our study where we recorded a higher population of Grade 2 and 3 OSMF patients following the classification stated by Kerr et al. [7]

Although our sample size was restricted this finding was in agreement to previous studies where males have been known to be more commonly affected with the disease than females.[7, 15]Patient were also extensively trained in performing jaw stretching exercises by using a Heisters jaw stretcher based on their preference and affordability. These instructions and demonstrations were strictly reinforced in every visit. The use of physiotherapy served as addendum to the ongoing pharmacological treatment in increasing the interinicisal distance in the patients. The exact percentage of efficacy of the exercises in improving the interincisal distance could not be determined since there was high amount of interpersonal variation in the method of practicing the exercise and the regularity that was maintained by each patient and hence can be considered as a limitation. These findings were in close accordance with those reported by Co and Zelner in 2009.[10,11,16]

Oral Submucous Fibrosis is a disease that plagues a largely economically backward population globally. [7] Hence it is imperative to find a treatment option that is cost effective and easily deliverable in areas and countries with limited access to developed healthcare. [11]Intralesional injections of steroids and Hyaluronidase diluted in 0.5 ml of lignocaine with and without adrenaline, have been used in treating OSMF patients in various clinical studies with variable success rates. [5] They have also been proven to demonstrate an effective decrease in the burning sensation and an increase in the cheek flexibility while in a puffed state. [5] In patients where steroids are contraindicated like acute phase of herpetic infection, immunocompromised conditions, uncontrolled diabetes, high blood pressure, severe gastritis or gastric ulcer, osteonecrotic bone conditions, etcoral Pentoxyfylline has been demonstrated in some studies as a suitable substitute. [5] Various treatment modalities including surgical approaches of varying degrees have been suggested in the treatment of OSMF, including the effective use of turmeric oil and curcumin in successfully treating it. [7] In a study by Kakar et al it was observed that painful ulceration, burning sensation, intolerance to spice, trismus, blanching of the oral mucosa, suppleness of the oral tissues and palpable fibrous bands were all effectively reduced after intralesional injection of steroids and Hyaluronidase and also in some cases with placental extract. [3] The rationale for using steroid is to decrease the localized inflammatory processes thereby reducing fibrosis by further decreasing fibroelastic proliferation and deposition of collagen in connective tissue. [17,18]Also when coupled with Hyaluronidase which has a specific action on hyaluronic acid, the fibrosis has been observed to be significantly decreased.[17,18] The use of steroids and their success in reducing the inflammation and increasing the mouth opening also points towards an autoimmune etiology of OSMF that could be resulting in clinical manifestations from sensitized lymphocytes.[14]Hyaluronidase has also been known to decrease the viscosity of the intercellular matrix hence supplementing in decreasing collagen synthesis.[14] It has been suggested by Gupta et al previously that when using submucosal injection improvement was appreciable only until a maximum of 10 weeks following which no improvement could be appreciated even if the therapy was continued on a monthly basis. Hence follow up visits while necessary to evaluate relapse if any, do not necessitate any additional injection after a full round of treatment is completed. [14]Patient's not benefitting from the treatment or

showing relapse should be referred in view of further management that may necessitate surgical methods. [7,14] While effectivity of surgical procedures such as forcing the mouth open under general anesthesia and surgical management with grafts are being questioned due increased reports of relapse, research has also demonstrated significant effectivity of chymotrypsin in treating OSMF using intralesional injections as the route of administration. [14]The use of intralesional injections has also been demonstrated as more palliative in reducing localized symptoms as compared to topically applied agents. [6,10]

The reason that's its treatment and management has gained so much importance in a short period of time relates to the fact that Oral Submucous fibrosis has now been recognized as a potentially malignant disorder of the oral cavity. [19] Although few in numbers currently Oral Submucous fibrosis cases have been shown to have a high risk of malignant transformation. [7] About 23-30 percent of the cases have demonstrated slow growing squamous cell carcinoma. [6] In a study conducted in 1972 a routine histopathological examination of biopsies of multiple lesions of OSMF from patients revealed evidence of malignancy in 5-6% of the cases, most of whom had no clinically evident symptoms correlating to the diagnosis of a malignancy yet.[20] This serves to be an unpleasant reminder of the extreme comorbidity that may result due to neglect or delay in treatment of OSMF.[19,20]

Due to the noncompliance of many of the participants, a long term follow up of the given treatment could not be achieved in order to evaluate the long term effects. Detailed research and future studies may open the gates to newer possibilities pertaining to the exact histopathological effects of the injected drugs and the etiology of OSMF. [7,9,11]A larger sample size would have given a clearerpicture of the efficacy of the therapy.

V. Conclusion

It is clearly distinguished from the results of the study, that localized injections of Triamcinolone acetonide and Hyaluronidase is an effective modality in conservative management of OSMF.[10]They are highly effective in increasing the maximal mouth opening of the patients hence enhancing their quality of life greatly. It is more effective in patients with Grades 2 and 3 of OSMF and often carries a stronger chance of no relapse.[11]When supplemented with adequate physiotherapy, it may help in enhancing the output of the treatment.[10,7]Although future studies are required to compare the efficacy of different modalities of treatment in patients with OSMF on the same platform. In recent years due importance has also been given to research in treating OSMF with the use of mucoadhesive patches.[21] This treatment option could prove to be a very sustainable and an effective option especially in the post COVID-19 era with the primary aim of reducing frequent visits and crowding at healthcare centres.[21] It also serves as an effective method in ensuring drug delivery and requires minimal patient adherence.[21]An addendum to these should be future legislations and targeted campaigns through various channels that could be effective in reducing the overall abuse of areca nut and hence decrease the associated risk of morbidity due to Oral Submucous Fibrosis.

References

[1]. Mukherjee AL, Biswas SK. Oral Submucous Fibrosis: A search for etiology. Indian J Otolaryngol. 1972; 24(1): 11-16.
[2]. Joshi SG. Submucous fibrosis of the palate and pillars. Indian J OtolaryngoI1953; 4:1-4.
[3]. Su I Pin. Idiopathic scleroderma of the mouth-Report of three cases. Arch OtolaryngoI.1954; 59:330-2.
[4]. Pindborg JJ, Sirsat SM. Oral submucous fibrosis. Oral Surg Oral Med Oral Path. 1966; 22: 764-79.
[5]. Aara A, Satishkumar GP, Vani C, Venkat Reddy M, Sreekanth K, Ibrahim M. Comparative study of intralesional dexamethasone, hyaluronidase and oral pentoxifylline in patients with oral submucous fibrosis. Glob J Med Res. 2012; 12(7):1-4.
[6]. Chaturvedi V.N. Oral Submucous Fibrosis. Natl Med J India.1989; 2(1):11-17.
[7]. Kerr AR, Warnakulasuriya S, Mighell AJ, Dietrich T, Nasser M, Rimal J, et al. A systematic review of medical interventions for oral submucous fibrosis and future research opportunities. Oral diseases. 2011 Apr; 17:42-57.
[8]. Pindborg JJ, Bhonsle RB, Murti PR, Gupta PC, Daftary DK, Mehta FS. Incidence and early forms of oral submucous fibrosis. Oral Surg. 1980; 50 (1): 40-44.
[9]. James L, Shetty A, Rishi D, Abraham M. Management of oral submucous fibrosis with injection of hyaluronidase and dexamethasone in grade III oral submucous fibrosis: a retrospective study. Journal of international oral health: JIOH. 2015 Aug; 7(8):82.
[10]. Lai DR, Chen HR, Lin LM, Huang YL, Tsai CC, Lai DR. Clinical evaluation of different treatment methods for oral submucous fibrosis. A 10-year experience with 150 cases. Journal of oral pathology & medicine. 1995 Oct; 24(9):402-6.
[11]. Cox S, Zoellner H. Physiotherapeutic treatment improves oral opening in oral submucous fibrosis. Journal of oral pathology & medicine. 2009 Feb; 38(2):220-6.
[12]. More CB, Gupta S, Joshi J, Varma SN. Classification system for oral submucous fibrosis. Journal of Indian Academy of Oral Medicine and Radiology. 2012;24(1):24.
[13]. Murti PR, Bhonsle RB, Gupta PC, Daftary DK, Pindborg JJ. Mehta FS. Etiology of oral submucous fibrosis with special reference to the role of areca nut chewing. J Oral Pathol. Med. 1995; 24: 145- 152.
[14]. Gupta D, Sharma SC. Oral submucous fibrosis—a new treatment regimen. Journal of Oral and Maxillofacial Surgery. 1988 Oct 1; 46(10):830-3.
[15]. Angadi PV, Rekha KP. Oral submucous fibrosis: a clinicopathologic review of 205 cases in Indians. Oral and maxillofacial surgery. 2011 Mar; 15(1):15-9.
[16]. Sharma JK, Gupta AK, Mukhija RD, Nigam P. Clinical experience with the use of peripheral vasodilator in oral disorders. Int J Oral MaxillofacSurg 1987; 16: 695–9.

[17]. Kakar PK, Puri RK, Venkatachalam VP. Oral submucous fibrosis—treatment with hyalase. The Journal of Laryngology & Otology. 1985 Jan; 99(1):57-60.
[18]. Sirsat SM, Khanolkar VR. Submucous fibrosis of the palate in diet-preconditioned Wistar rats. Induction by local painting of capsaicin--an optical and electron microscopic study. Arch Pathol. 1960 Aug; 70:171-9. PMID: 14447211.
[19]. Warnakulasuriya S, Johnson NW, van der Waal I (2007). Nomenclature and classification of potentially malignant disorders of the oral mucosa. J Oral Pathol Med 36: 575–580.
[20]. Pindborg JJ. Is submucous fibrosis a precancerous condition in the oral cavity? Int Dent J 1972; 22: 474-80.
[21]. Priya S, Rathnanand M, Nayanabhirama U, Ongole R, Sumanth KN, Joshi U. Preparation and evaluation of buccal mucoadhesive patch of betamethasone sodium phosphate for the treatment of oral submucous fibrosis. J Chem Pharm Res. 2011;3(6):56-65.

Figures:

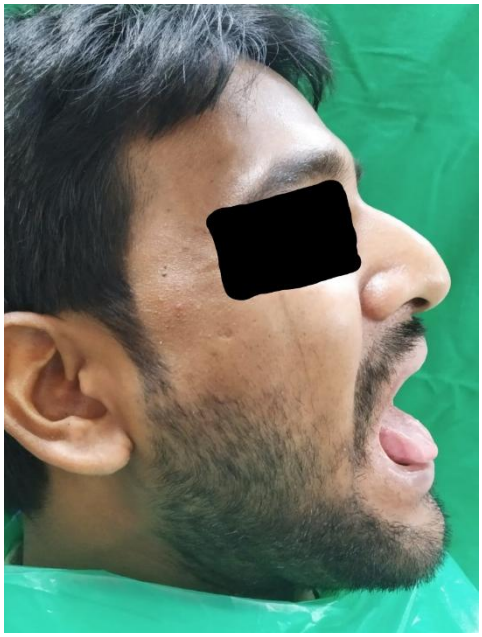

Figure :1 OSMF Patient showing restricted protrusion of tongue due to fibrosis on the floor of the mouth.

Figure 2: Blanching seen on the soft palate and bilaterally over anterior faucial pillar.

Figure 3: Fibrosis in the floor of the mouth.

Figure 4 (a) and 4(b): Fibrous bands and blanching of the buccal mucosa and the retro molar region seen bilaterally.

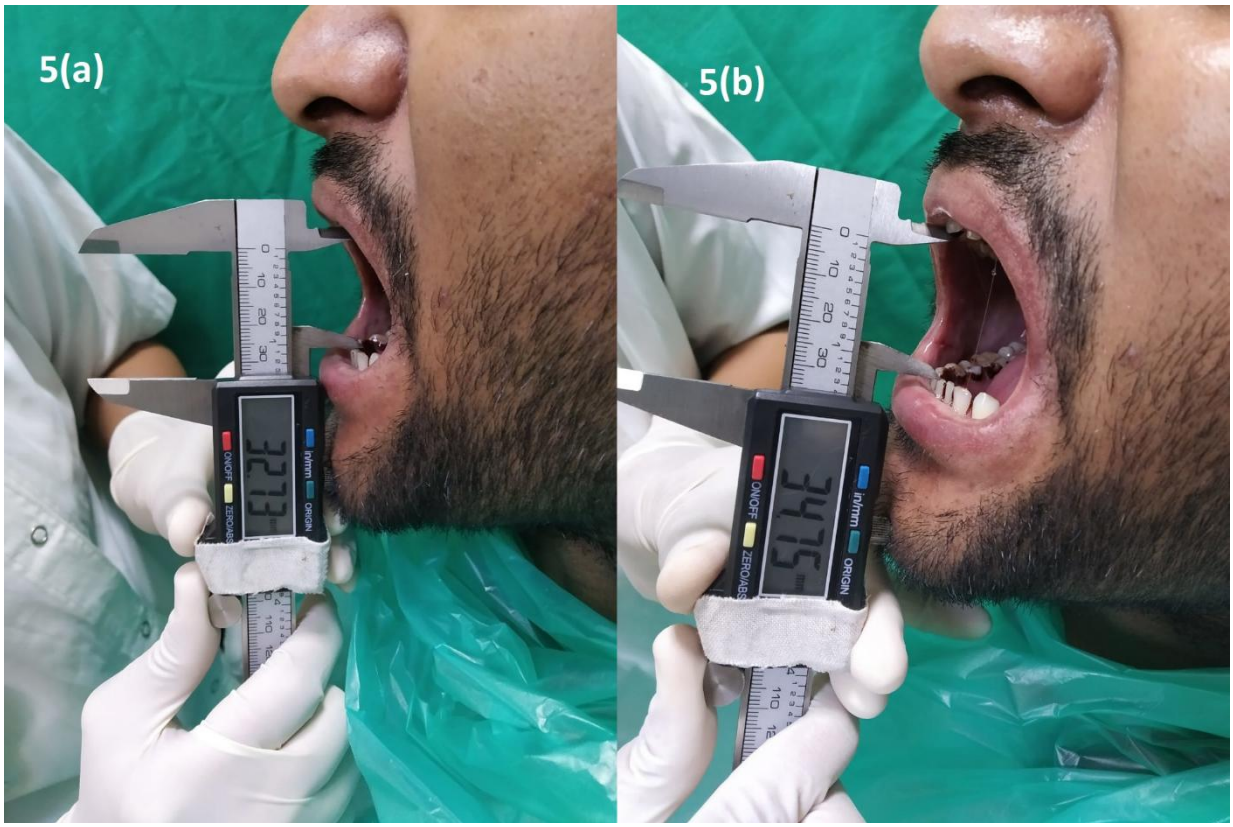

Figure 5(a): Mouth opening before the commencement of the treatment.
(b): Mouth opening after completing the weekly regime of intralesional injections.

Figure 6: Digital Vernier caliper, sterile drape, heisters jaw stretcher, syringe and needle, gloves, hyaluronidase 1500 I.U. and triamcinolone acetonide 40 mg/ml.

Table 1. **Classification of Oral Submucous Fibrosis stated by Kerr et al in 2011.**[7]

Grade 1 – Mild	Any features of the disease triad for OSMF (burning, depapillation, blanching or leathery mucosa) may be reported – and inter-incisal opening >35 mm
Grade 2 – Moderate	Above features of OSMF + inter-incisal limitation of opening 20–35 mm
Grade 3 – Severe	Above features of OSMF + inter-incisal opening <20 mm
Grade 4A	OSMF + other potentially malignant disorder on clinical examination
Grade 4B	OSMF with any grade of oral epithelial dysplasia on biopsy
Grade 5	OSMF + oral squamous cell carcinoma (SCC)

Table 2: **Mean age of all the study participants suffering from various grades of OSMF.**

Total study participants	Mean age (±S.D)
35	31.26(±9.69)

*S.D.=Standard deviation

Table 3. **Mean mouth opening in the study participants suffering from OSMF at various stages of visit irrespective of the grade of OSMF.**

Various visits	Mean	Std. Deviation
Baseline	23.94	5.490
2nd visit	25.79	5.843
3rd visit	27.202	6.2198
4th visit	28.56	6.211
5th visit	29.98	6.055

Table 4: **Gender wise frequency distribution of study participants suffering from OSMF.**

Gender Distribution	*n(Percentage)
Males	26(74.3)
Females	9(25.7)
Total Patients	35(100)

*n=Total number of participants

Table 5: **Frequency distribution of study participants suffering from various grades of OSMF.**

Grade of OSMF	*n(Percentage)
1	1(2.9)
2	22(62.9)
3	12(34.3)
Total Patients	35(100)

*n=Total number of participants

Table 6: Intergroup comparison of various grades of OSMF at different time intervals using one way ANOVA followed by Post hoc Tukey's test

		Mean Mouth Opening (mm)	Std. Deviation	Std. Error	95% Confidence Interval for Mean		F value	*p-value
					Lower Bound	Upper Bound		
Baseline	1	36.00						
	2	25.89	4.042	.862	24.09	27.68		
	3	19.38	4.301	1.242	16.65	22.11	14.000	0.000
	Total	23.94	5.490	.928	22.06	25.83		
2nd visit	1	37.00						
	2	27.85	4.713	1.005	25.76	29.94		
	3	21.08	4.360	1.259	18.31	23.85	11.497	0.000*
	Total	25.79	5.843	.988	23.78	27.79		
3rd visit	1	39.500	.	.	.	.		
	2	29.249	5.4308	1.1578	26.841	31.657		
	3	22.425	4.0310	1.1637	19.864	24.986	10.369	0.000*
	Total	27.202	6.2198	1.0513	25.065	29.339		
4th visit	1	40.00	.	.	.	.		
	2	30.64	5.481	1.169	28.21	33.07		
	3	23.78	4.058	1.171	21.21	26.36	9.846	0.000*
	Total	28.56	6.211	1.050	26.42	30.69		
5th visit	1	41.00	.	.	.	.		
	2	32.04	5.300	1.130	29.69	34.39		
	3	25.29	4.025	1.162	22.73	27.85	9.967	0.000*
	Total	29.98	6.055	1.024	27.90	32.06		

*p value<0.05 is statistically significant.

Dr. Archana H.Dhusia, et. al. "Evaluation of Intralesional injection triamcinolone acetonideand Hyaluronidase efficacy in Oral Submucous Fibrosis patients: A pilot Study." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 22(2), 2023, pp. 19-27.