Quest Journals
Journal of Medical and Dental Science Research
Volume 12~ Issue 3 (2025) pp: 41-61
ISSN(Online) : 2394-076X ISSN (Print):2394-0751
www.questjournals.org

Research Paper

Comparative Clinical Evaluation of Diode Laser Fibrotomy and Intralesional Injection in the Management of Oral Submucous Fibrosis

[1)] Adarsh Desai – *Professor and Head of the dept., Department of Oral and Maxillofacial Surgery GRIDS, Gandhinagar, Gujarat*
[2)] Nirav Patel – *Professor, Department of Oral and Maxillofacial Surgery GRIDS, Gandhinagar, Gujarat*
[3)] Aditi Singh- *Associate Professor, Department of Oral and Maxillofacial Surgery GRIDS, Gandhinagar, Gujarat*
[4)] Pooja Nakum- *Assistant Professor, Department of Oral and Maxillofacial Surgery GRIDS, Gandhinagar, Gujarat*
[5)] Nisha Sailor- *Post Graduate Student, Department of Oral and Maxillofacial Surgery GRIDS, Gandhinagar, Gujarat*
[6)] Ratilal Parmar- *Post Graduate Student, Department of Oral and Maxillofacial Surgery GRIDS, Gandhinagar, Gujarat*

Abstract
Background: Oral Submucous Fibrosis (OSMF) is a potentially malignant condition significantly affecting oral function. This study compares the effectiveness of diode laser fibrotomy and intralesional injection therapies in improving clinical parameters in OSMF patients.
Methods: A prospective clinical study was conducted on 26 patients diagnosed with stage II or III OSMF, divided into two equal groups: Group A (diode laser fibrotomy) and Group B (intralesional injections of hyaluronidase, dexamethasone, placental extract, and local anesthesia). Parameters measured included interincisal distance (IID), burning sensation (VAS scale), buccal mucosa color and texture, and cheek flexibility. Results: Group A showed significantly greater improvement in IID (mean improvement: 9.77 ± 2.35 mm vs. 7.23 ± 2.62 mm; $p < 0.05$) and burning sensation reduction (VAS: -4.77 vs. -2.54). Color and texture of buccal mucosa also improved more in Group A.
Conclusion: Diode laser fibrotomy showed superior efficacy over intralesional injections in managing OSMF, offering better outcomes and patient compliance.

Keywords: *OSMF, Diode Laser Fibrotomy, Intralesional Injection, Hyaluronidase, Dexamethasone, Buccal Mucosa, Mouth Opening*

***R**eceived 07 Mar., 2025; **R**evised 14 Mar., 2025; **A**ccepted 18 Mar., 2025 © The author(s) 2025.*
P**ublished with open access at **www.questjournas.org

I. Introduction

Oral Submucous Fibrosis (OSMF) is a chronic, insidious, and progressive disorder characterized by juxta-epithelial inflammatory reaction and subsequent fibroelastic changes in the lamina propria, leading to stiffening of the oral mucosa and limitation of mouth opening[1–3]. It is recognized as a potentially malignant disorder (PMD) with a malignant transformation rate ranging between 7–13%[4]. The condition predominantly affects populations in the Indian subcontinent and Southeast Asia, primarily due to areca nut and tobacco chewing habits[5 6].

The pathogenesis of OSMF involves a complex interplay of factors, including chronic inflammation, upregulation of collagen production, decreased collagenase activity, increased cross-linking of collagen fibers, and genetic susceptibility[7 8]. The resultant fibrosis impairs oral function and often leads to burning sensation, mucosal blanching, progressive trismus, and nutritional deficiency due to altered dietary intake[9].

Conventional management strategies for OSMF have included behavioral cessation, antioxidant supplementation, intralesional injections (hyaluronidase, corticosteroids, placental extract), surgical fibrotomy, and physical therapy[10] [11]. However, none have provided a universally effective solution, especially in moderate to advanced stages. Intralesional injections have shown some benefits in early-stage OSMF, but their efficacy wanes in advanced fibrosis[12].

Laser-assisted procedures, especially diode laser fibrotomy, have recently gained popularity due to their precision, minimal thermal damage, improved hemostasis, reduced post-operative discomfort, and better healing outcomes[13] [14]. Diode lasers operate in the near-infrared range (810–980 nm) and are known for their efficiency in soft tissue surgery[15].

Comparative clinical evaluation of diode laser and conventional intralesional therapy has been underexplored. Existing literature highlights the need for high-quality prospective studies to determine the relative effectiveness of these modalities[16–18]. This study thus aims to comprehensively assess and compare the outcomes of diode laser fibrotomy and intralesional injections in the management of Stage II and III OSMF using clinical parameters such as interincisal distance (IID), burning sensation, buccal mucosa color and texture, and cheek flexibility.

II. Materials and Methods

Study Design: Prospective, comparative clinical study
Sample Size: 26 patients (13 in each group)
Inclusion Criteria: Interincisal opening 20–35 mm, Age 20–65 years, Stage II or III OSMF
Exclusion Criteria: Previous OSMF treatment, Malignant changes, Comorbidities or drug allergies

Treatment Modalities:
- Group A: Diode laser fibrotomy (980 nm, Biolase Epic)
- Group B: Intralesional injections (Hyaluronidase 1500 IU, Dexamethasone 4mg/ml, Placentrax, Lidocaine)

Parameters Evaluated:
- Interincisal Distance (IID)
- Burning Sensation (VAS)
- Buccal Mucosa Color (Scoring 0–3)
- Buccal Mucosa Texture (Scoring 0–3)
- Cheek Flexibility

III. Results

3.1 Interincisal Distance (IID)

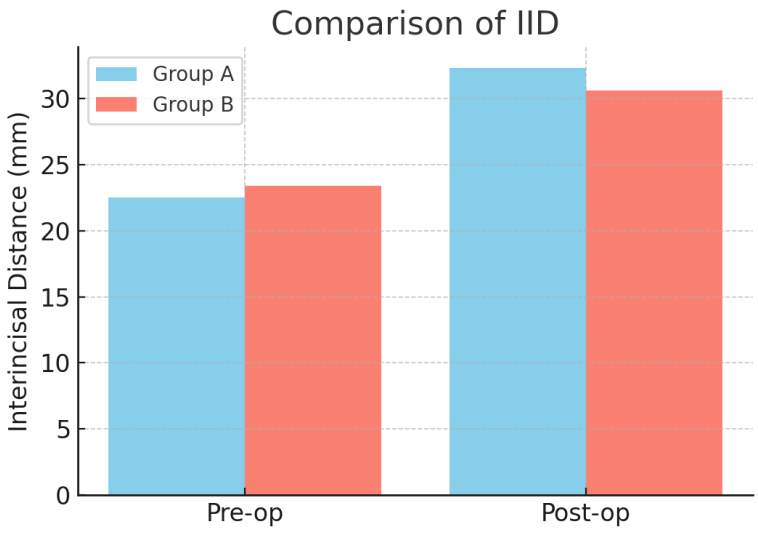

Figure 1. Comparison of Interincisal Distance (IID) between Group A and Group B

3.2 Burning Sensation

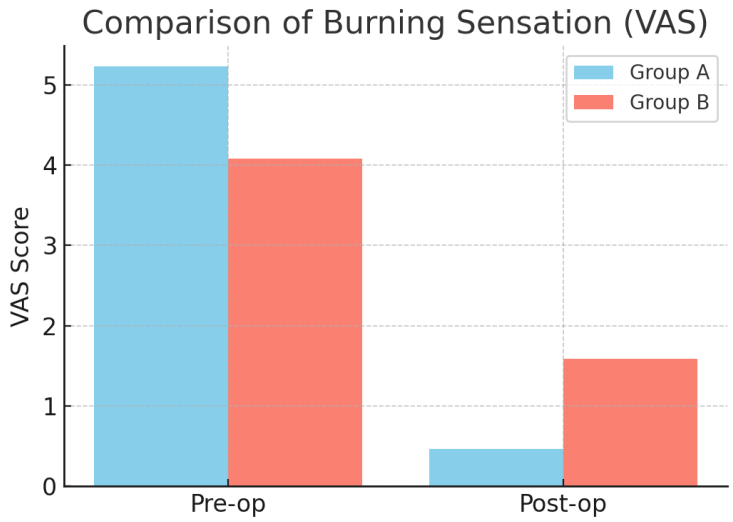

Figure 2. Comparison of Burning Sensation (VAS) between Group A and Group B

3.3 Cheek Flexibility

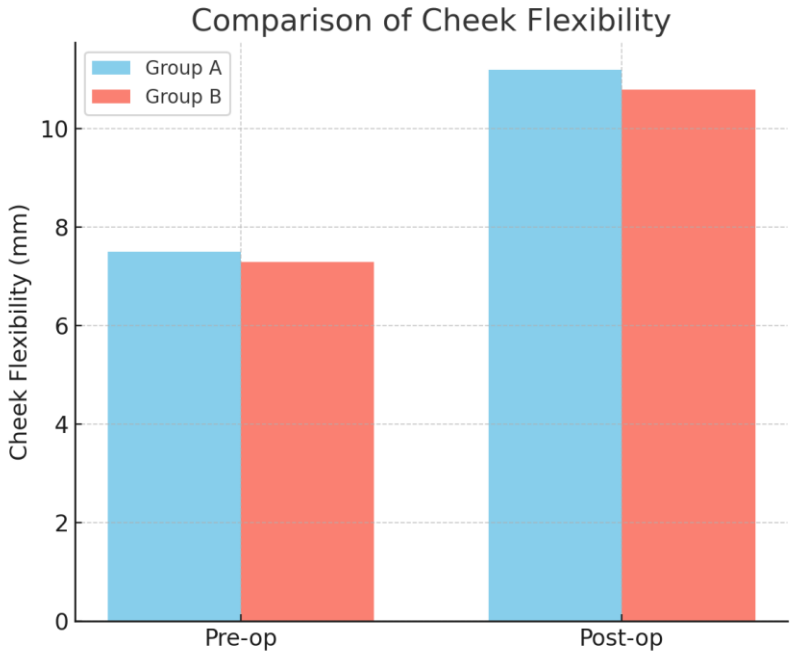

Figure 3. Comparison of Cheek Flexibility between Group A and Group B

IV. Detailed Tables

Table 1. Interincisal Distance (IID) of both study groups

Day	Group A - Passive (mm)	Group A - Active (mm)	Group B - Passive (mm)	Group B - Active (mm)
Preoperative	22.54	-	23.38	-
Day 0	27.92	31.38	25.92	28.77
Day 7	28.54	31.92	26.69	30.77
Day 14	29.38	33.38	27.85	31.92
Day 21	30.31	33.69	28.84	33.38
Month 1	31.54	34.54	29.69	33.08
Month 2	32.23	34.77	29.92	33.46
Month 3	32.31	35.15	30.62	34.46

Table 2. Burning Sensation (VAS Score) of both study groups

Day	Group A (VAS)	Group B (VAS)
Day 0	5.23	4.08
Day 7	4.23	3.77
Day 14	3.00	3.46
Day 21	2.31	2.92
Month 1	1.31	2.46
Month 2	0.62	1.85
Month 3	0.46	1.59

Table 3. Cheek Flexibility (mm) of both study groups

Time Point	Group A (mm)	Group B (mm)
Preoperative	7.54	7.38
Postoperative	12.31	10.69

Table 4. Color of Buccal Mucosa at Month 3

Color Grade	Group A (n=13)	Group B (n=13)
Normal Pink (0)	9 (69.2%)	1 (7.7%)
Red/Deep Pink (1)	4 (30.8%)	5 (38.5%)
Pale White (2)	0	7 (53.8%)
Blanched White (3)	0	0

Table 5. Texture of Buccal Mucosa at Month 3

Texture Grade	Group A (n=13)	Group B (n=13)
No fibrous bands (0)	8 (61.5%)	2 (15.4%)
Few bands (1)	5 (38.5%)	4 (30.8%)
Moderate bands (2)	0	6 (46.2%)
Severe bands (3)	0	1 (7.7%)

V. Follow up of cases

Study Group A:

Figure 4. Preoperative photographs of patient from study group A. Here, a is the left profile, b is the front profile and c is the right profile of the patient; d is the right side view and f is the left side view of the buccal mucosa; e is the preoperative IID of the patient; g is the right side and h is the left side cheek flexibility measurement of the patient.

Figure 5. Photographs of patients at Day 0 from study group A. Here, a is the passive, b is the active IID of the patient's mouth; c is the right side and d is the left side of the buccal mucosa of the patient's mouth; e is the right side and f is the left side image of cheek flexibility measurement of the patient.

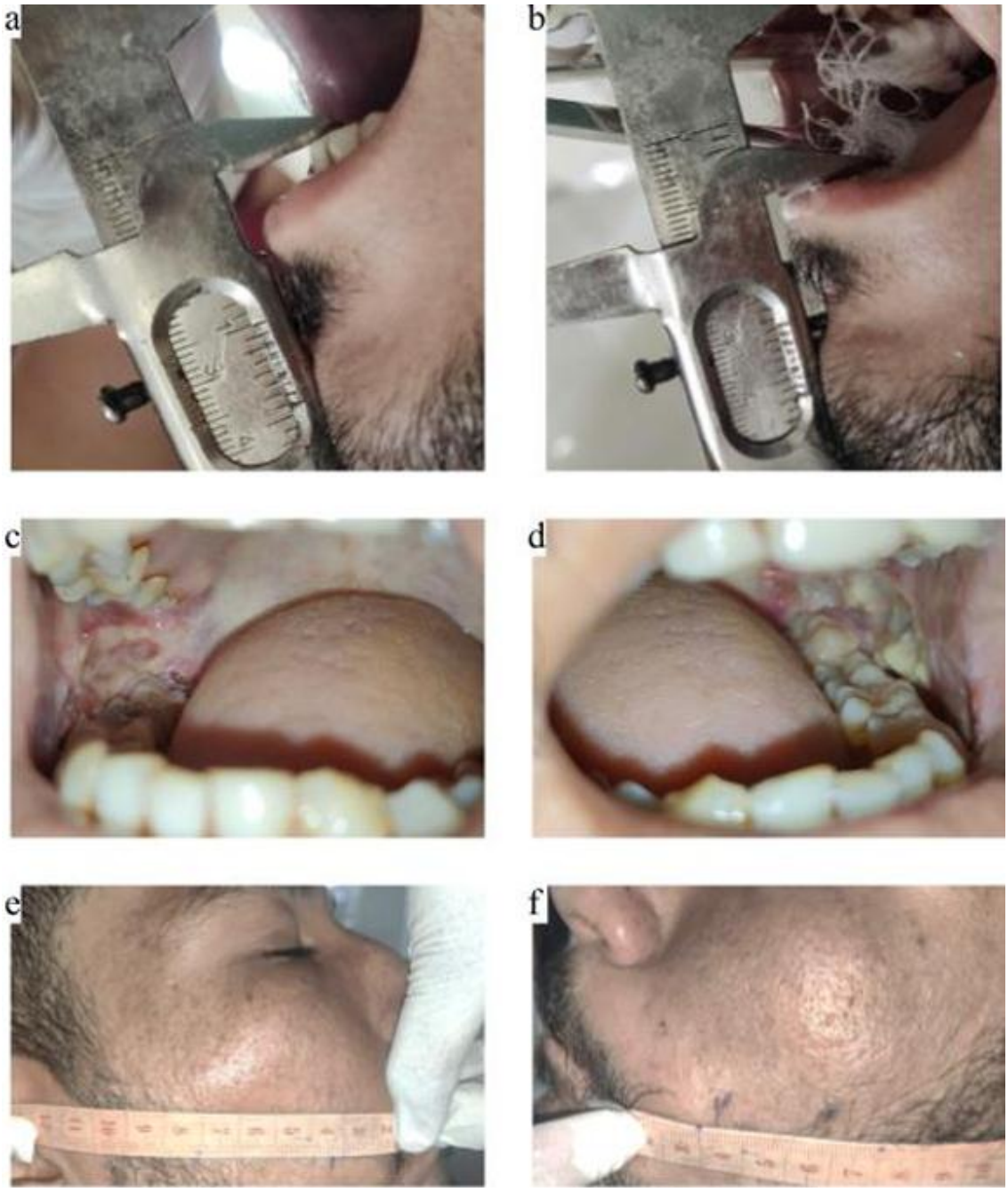

Figure 6. Photographs of patients at Day 7 from study group A. Here, a is the passive, b is the active IID of the patient's mouth; c is the right side and d is the left side of the buccal mucosa of the patient's mouth; e is the right side and f is the left side image of cheek flexibility measurement of the patient.

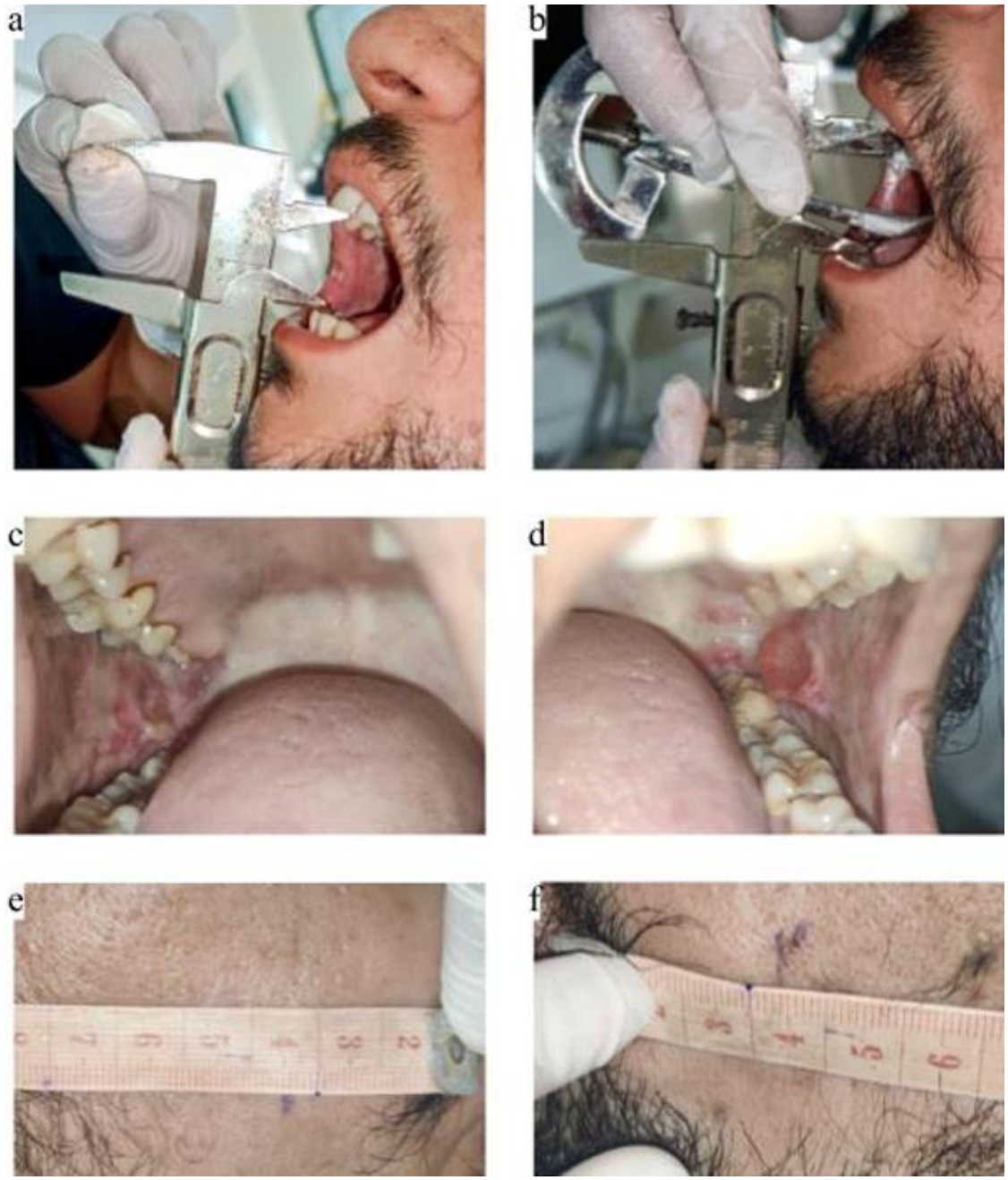

Figure 7. Photographs of patients at Day 14 from study group A. Here, a is the passive, b is the active IID of the patient's mouth; c is the right side and d is the left side of the buccal mucosa of the patient's mouth; e is the right side and f is the left side image of cheek flexibility measurement of the patient.

Figure 8. Photographs of patients at Day 21 from study group A. Here, a is the passive, b is the active IID of the patient's mouth; c is the right side and d is the left side of the buccal mucosa of the patient's mouth; e is the right side and f is the left side image of cheek flexibility measurement of the patient.

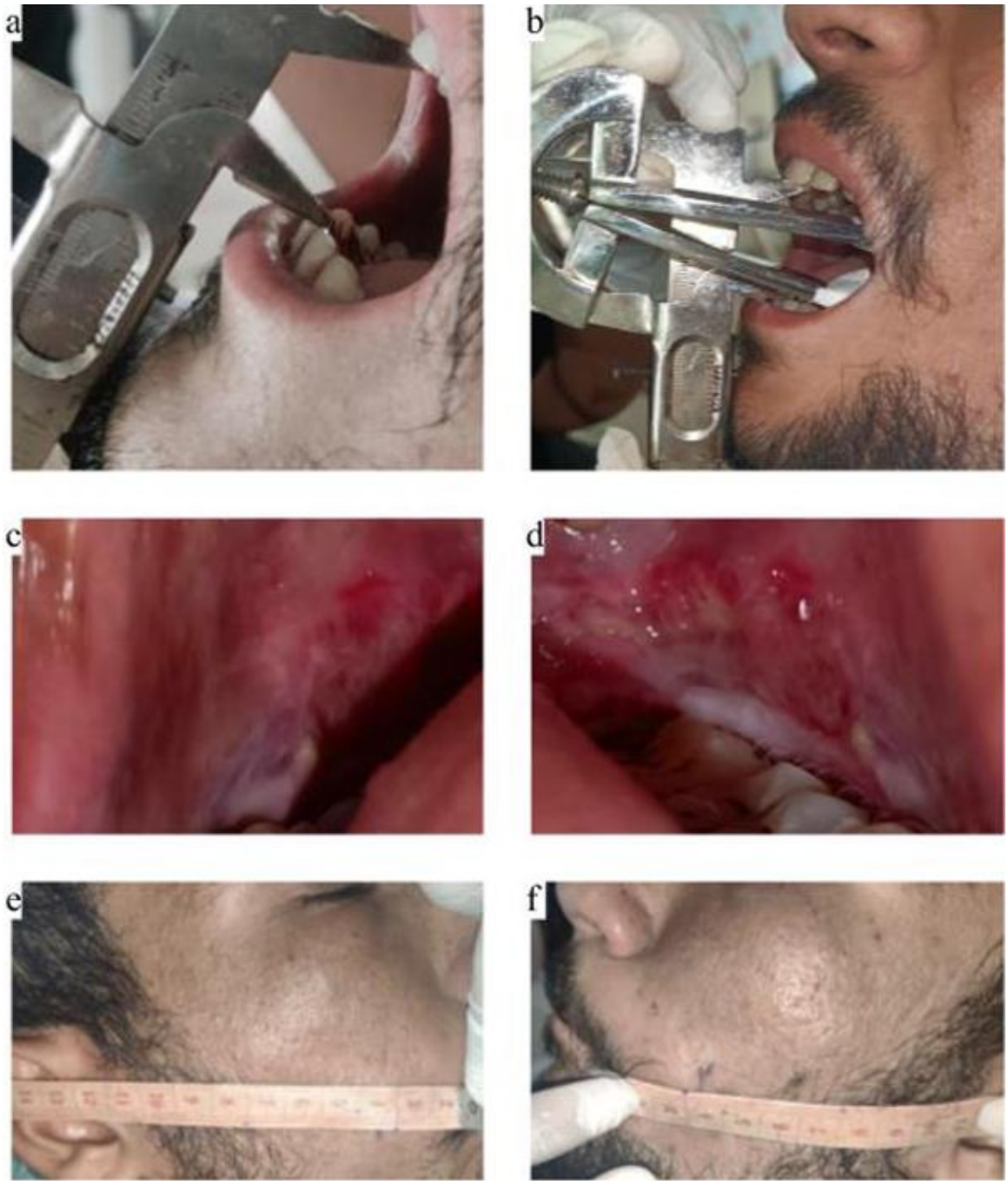

Figure 9. Photographs of patients at the 1 month mark from study group A. Here, a is the passive, b is the active IID of the patient's mouth; c is the right side and d is the left side of the buccal mucosa of the patient's mouth; e is the right side and f is the left side image of cheek flexibility measurement of the patient.

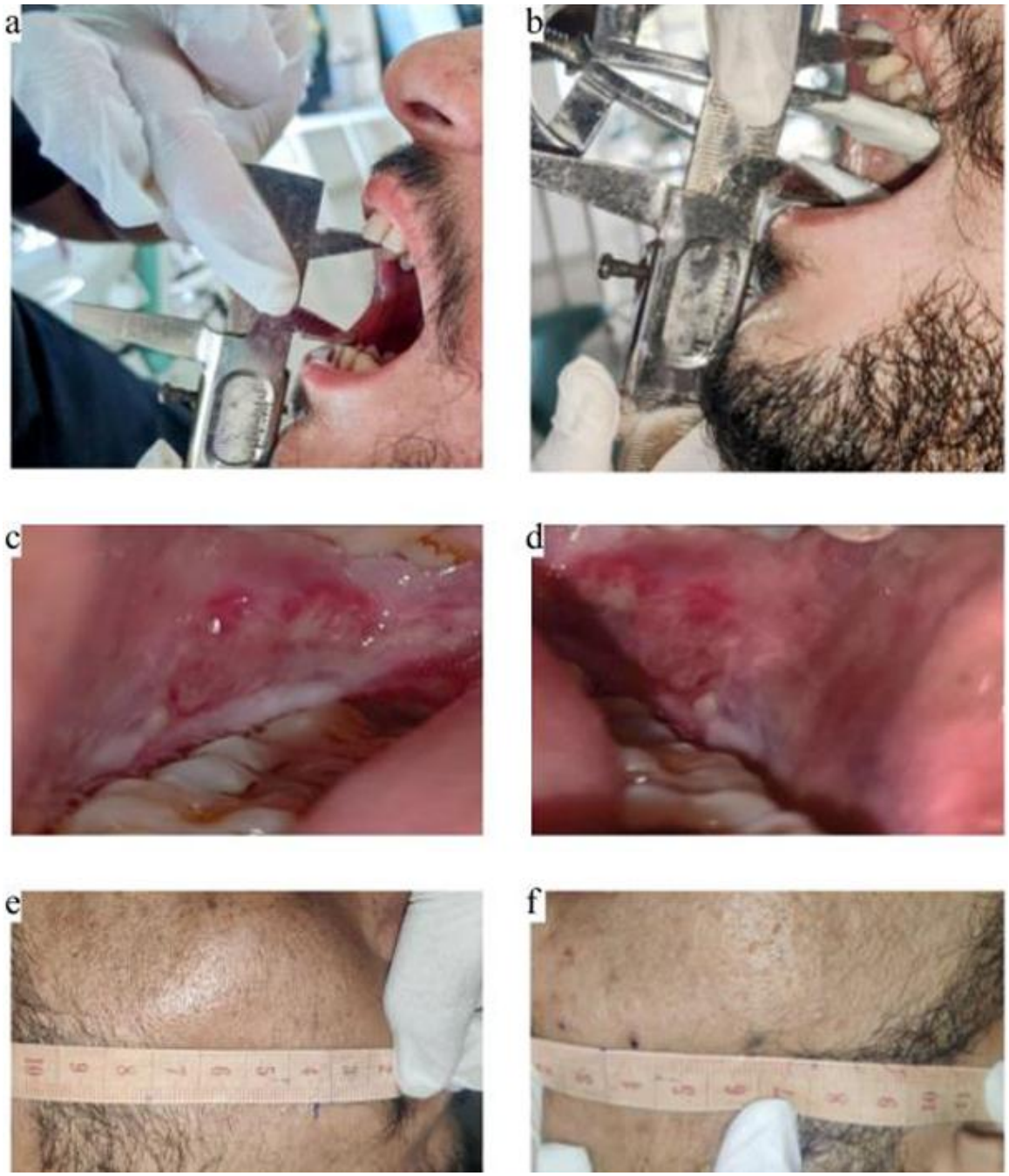

Figure 10. Photographs of patients at the 2 month mark from study group A. Here, a is the passive, b is the active IID of the patient's mouth; c is the right side and d is the left side of the buccal mucosa of the patient's mouth; e is the right side and f is the left side image of cheek flexibility measurement of the patient.

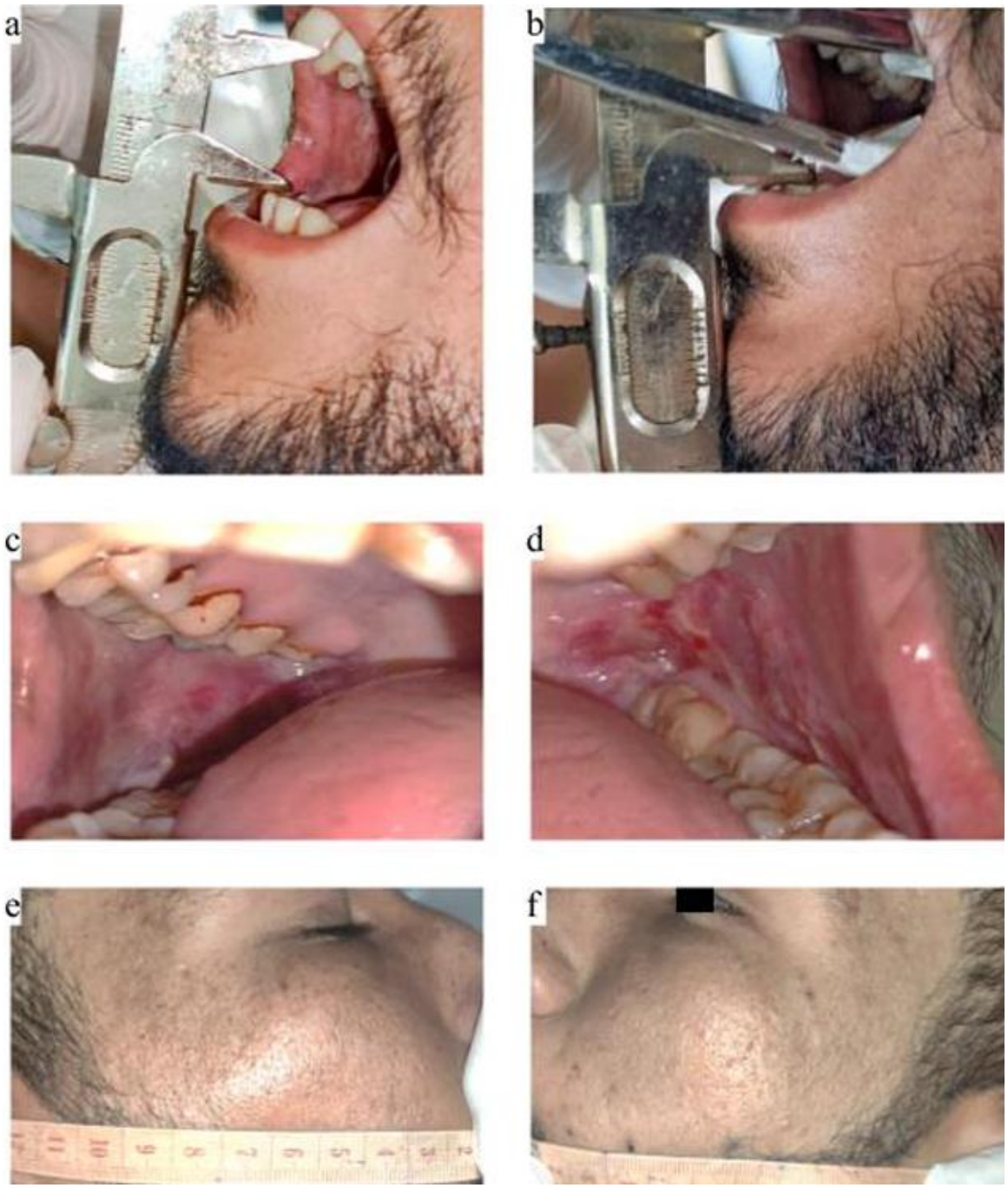

Figure 11. Photographs of patients at the 3 month mark from study group A. Here, a is the passive, b is the active IID of the patient's mouth; c is the right side and d is the left side of the buccal mucosa of the patient's mouth; e is the right side and f is the left side image of cheek flexibility measurement of the patient.

Study Group B:

Figure 12. Preoperative photographs of patient from study group B. Here, a is the left profile, b is the front profile and c is the right profile of the patient; d is the right side view and f is the left side view of the buccal mucosa; e is the preoperative IID of the patient; g is the right side and h is the left side cheek flexibility measurement of the patient.

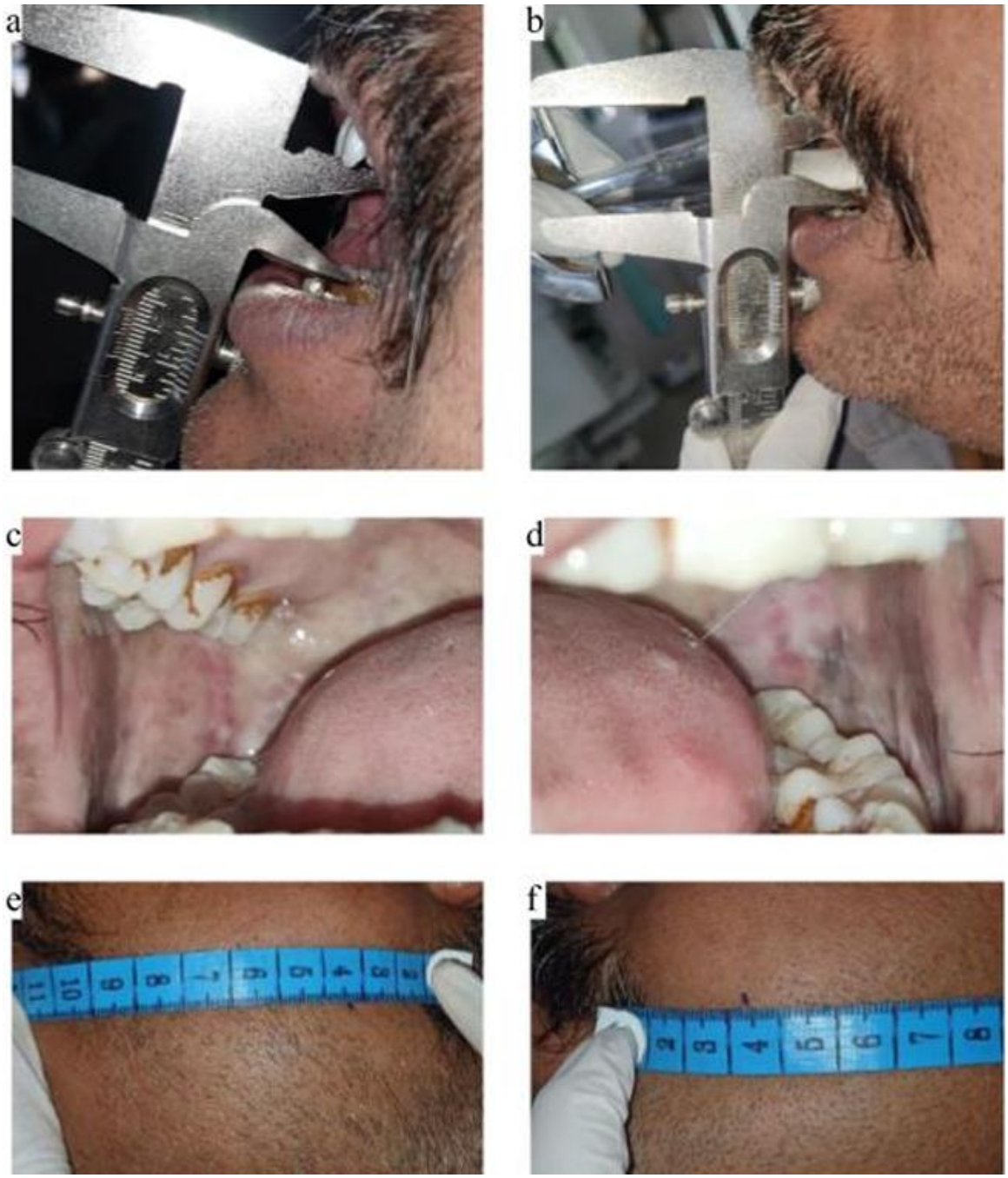

Figure 13. Photographs of patients at Day 0 from study group B. Here, a is the passive, b is the active IID of the patient's mouth; c is the right side and d is the left side of the buccal mucosa of the patient's mouth; e is the right side and f is the left side image of cheek flexibility measurement of the patient.

Figure 14. Photographs of patients at Day 7 from study group B. Here, a is the passive, b is the active IID of the patient's mouth; c is the right side and d is the left side of the buccal mucosa of the patient's mouth; e is the right side and f is the left side image of cheek flexibility measurement of the patient.

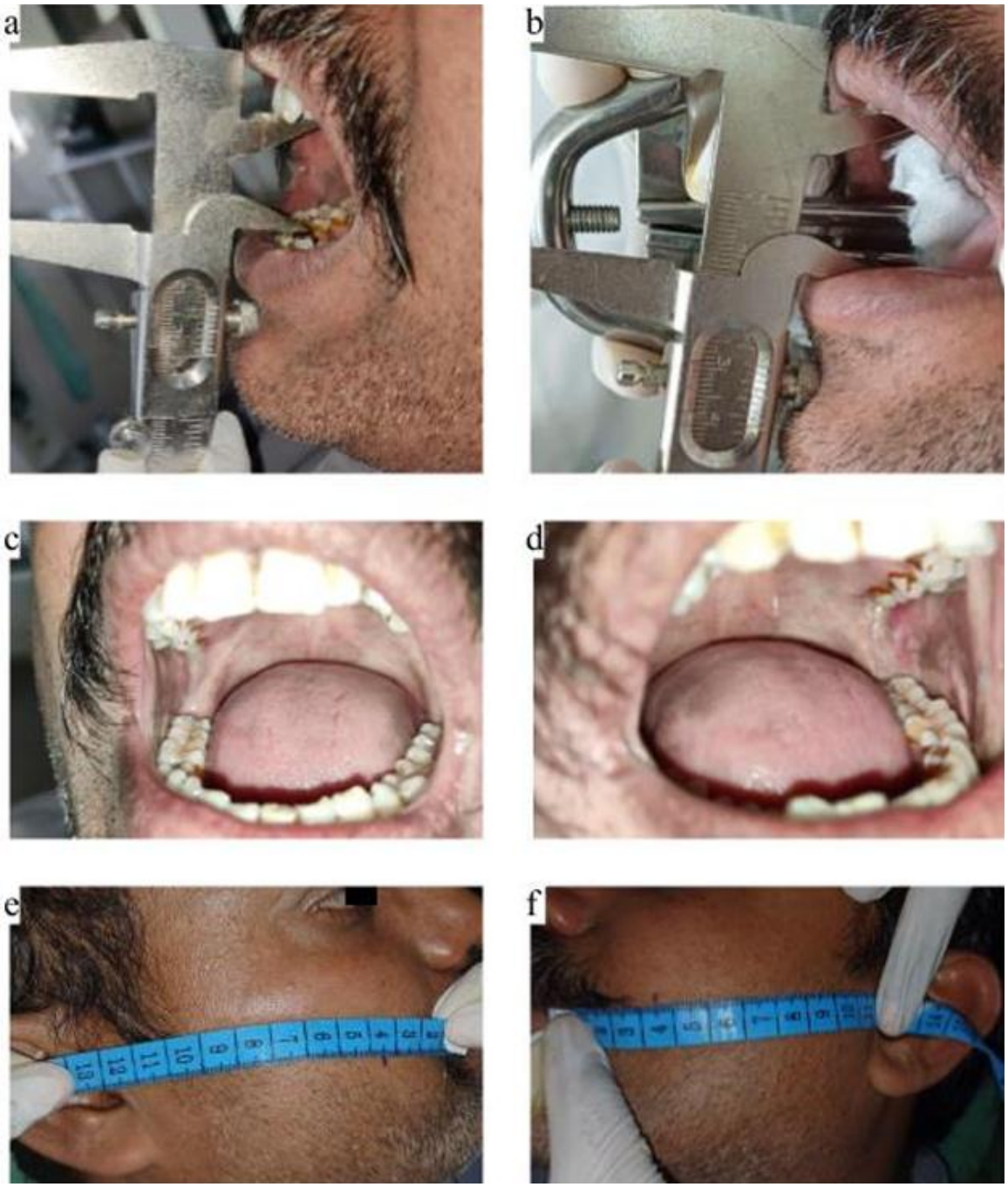

Figure 15. Photographs of patients at Day 14 from study group B. Here, a is the passive, b is the active IID of the patient's mouth; c is the right side and d is the left side of the buccal mucosa of the patient's mouth; e is the right side and f is the left side image of cheek flexibility measurement of the patient.

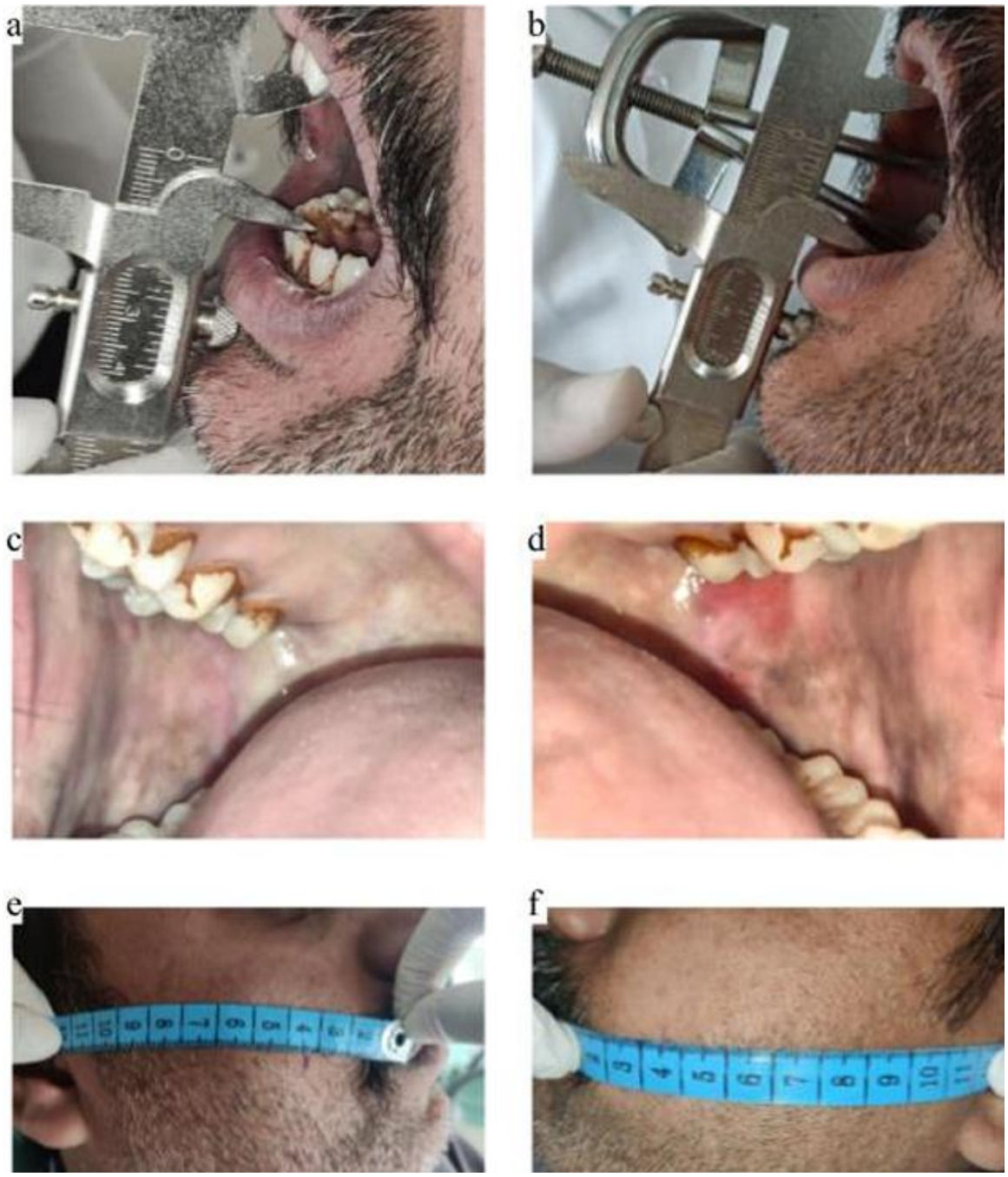

Figure 16. Photographs of patients at Day 21 from study group B. Here, a is the passive, b is the active IID of the patient's mouth; c is the right side and d is the left side of the buccal mucosa of the patient's mouth; e is the right side and f is the left side image of cheek flexibility measurement of the patient.

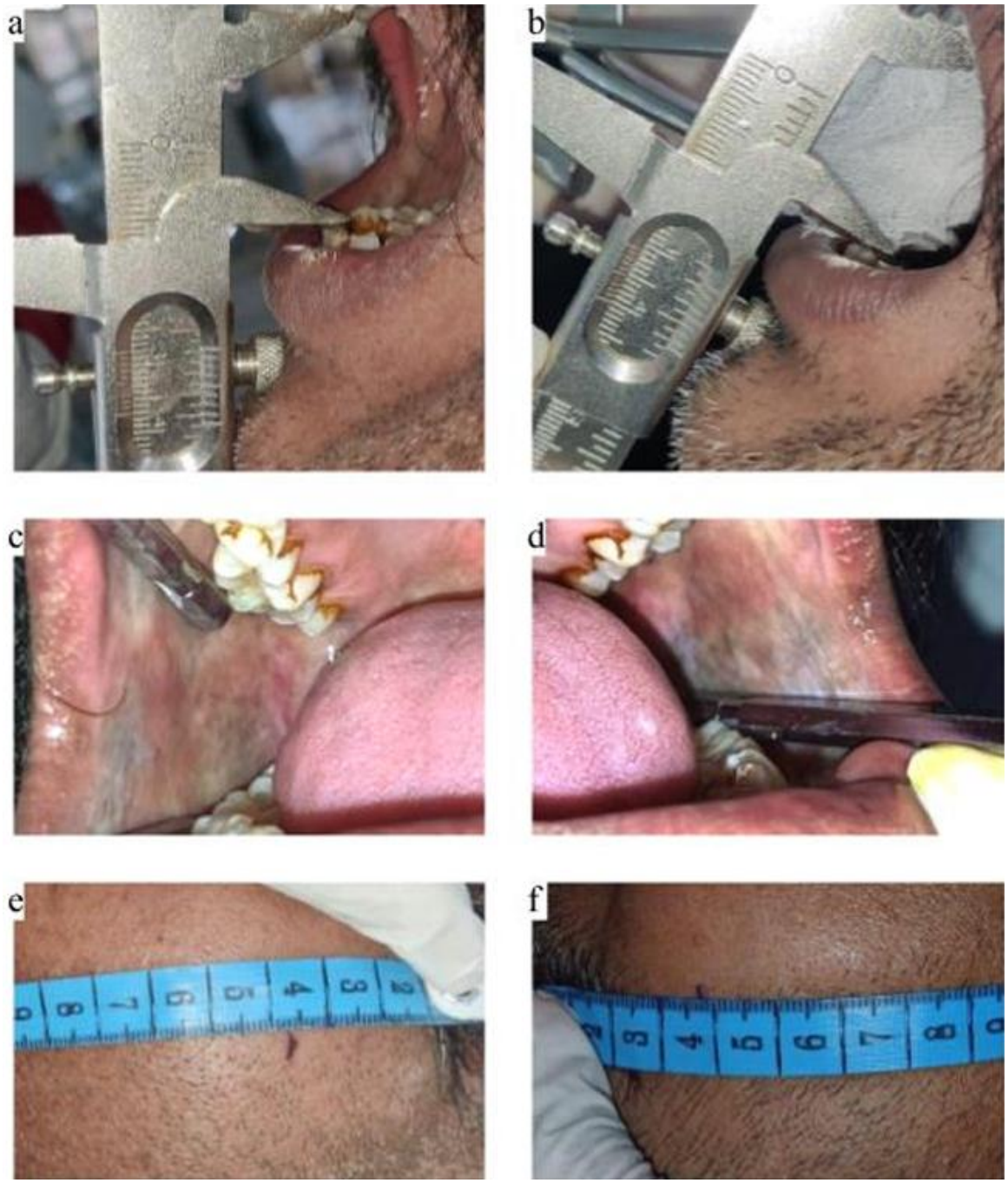

Figure 17. Photographs of patients at the 1 month mark from study group B. Here, a is the passive, b is the active IID of the patient's mouth; c is the right side and d is the left side of the buccal mucosa of the patient's mouth; e is the right side and f is the left side image of cheek flexibility measurement of the patient.

Figure 18. Photographs of patients at the 2 month mark from study group B. Here, a is the passive, b is the active IID of the patient's mouth; c is the right side and d is the left side of the buccal mucosa of the patient's mouth; e is the right side and f is the left side image of cheek flexibility measurement of the patient.

Figure 19. Photographs of patients at the 3 month mark from study group B. Here, a is the passive, b is the active IID of the patient's mouth; c is the right side and d is the left side of the buccal mucosa of the patient's mouth; e is the right side and f is the left side image of cheek flexibility measurement of the patient.

VI. Discussion

The clinical management of Oral Submucous Fibrosis presents significant challenges due to its irreversible fibrotic nature and potential for malignant transformation[4 9]. The results of this study demonstrate a clear advantage of diode laser fibrotomy over intralesional injections in improving various clinical outcomes.

The most notable improvement was seen in the interincisal distance (IID), where Group A (diode laser) showed a mean increase of 9.77 mm, significantly greater than Group B (7.23 mm). This can be attributed to the precise excision of fibrotic bands using the diode laser, causing minimal collateral tissue trauma and promoting faster recovery[13 15 19].

Burning sensation, measured via the Visual Analog Scale (VAS), also showed greater reduction in Group A. This outcome may reflect the anti-inflammatory and nerve-sealing effects of laser application, which contrasts with the transient and variable relief offered by injectable agents[22 23]. Intralesional therapy, while effective in

reducing inflammation, does not mechanically release fibrotic constraints, hence its limited long-term impact on symptoms.

Cheek flexibility improved significantly in the laser group, reinforcing the benefit of surgical release of fibrotic bands over biochemical modulation alone. Improvement in buccal mucosa color and texture also indicated better healing and mucosal regeneration in the diode laser group. The higher prevalence of normal pink color and fewer fibrous bands in Group A is consistent supporting laser-induced neoangiogenesis and reduced fibrosis[14 24].

Intralesional injection therapy, comprising hyaluronidase, corticosteroids, placental extract, and local anesthetic, has been advocated for decades[10 11 25]. However, its impact remains limited in cases of moderate to severe fibrosis. Hyaluronidase enhances tissue permeability, corticosteroids reduce inflammation, and placental extract promotes tissue healing[26–28]. Despite these properties, such therapy does not physically disrupt fibrotic bands, explaining its relatively inferior performance in this study.

Laser-assisted procedures also offer better patient compliance due to shorter recovery times, reduced pain, and minimal scarring[29]. The procedure is bloodless, precise, and allows immediate functional rehabilitation through physiotherapy. In contrast, repeated injections are often painful, require multiple sessions, and may lead to local discomfort or fibrosis recurrence[30].

Nonetheless, both modalities require adjunctive post-operative physiotherapy to maintain improvements in mouth opening and cheek flexibility[31]. The study findings reinforce the need for a multimodal approach, integrating surgical intervention with behavioral therapy and rehabilitation exercises.

VII. Conclusion

This study presents a robust comparative analysis of diode laser fibrotomy and intralesional injection therapy in the management of Stage II and III Oral Submucous Fibrosis. Diode laser fibrotomy demonstrated significantly better clinical outcomes in terms of interincisal distance, reduction in burning sensation, cheek flexibility, and improvement in buccal mucosa color and texture. The minimally invasive nature, precise excision, and faster healing profile make diode laser an effective modality with superior patient compliance.

While intralesional injection therapy remains a viable option for early-stage disease, its limited efficacy in moderate fibrosis underscores the need for surgical intervention in advanced cases. This study advocates diode laser fibrotomy as a primary treatment approach in intermediate OSMF stages, supplemented by physiotherapy and habit cessation.

Further large-scale, multi-centric studies with long-term follow-up are essential to validate these findings and establish standardized treatment protocols.

References

[1]. Ranganathan K, Devi MU, Joshua E, Kirankumar K, Saraswathi TR. Oral submucous fibrosis: a review of the aetiology, pathogenesis, clinical features, and management. Indian Journal of Dental Research. 2006;17(4):215-220.
[2]. Arakeri G, Brennan PA. Oral submucous fibrosis: an overview of the aetiology, pathogenesis, classification, and principles of management. British Journal of Oral and Maxillofacial Surgery. 2013;51(10): 877-882.
[3]. Lai DR, Chen HR, Lin LM, Huang YL. Clinical evaluation of different treatment methods for oral submucous fibrosis. A 10-year experience with 150 cases. Journal of Oral and Maxillofacial Surgery. 1995;53(9): 1042-1046.
[4]. Rajendran R. Oral submucous fibrosis: etiology, pathogenesis, and future research. Bulletin of the World Health Organization. 1994;72(6):985-996.
[5]. Gupta PC, Murti PR, Bhonsle RB, Mehta FS, Pindborg JJ. Epidemiology of cancer of the oral cavity in India. Analytical and preventive approaches. British Journal of Cancer. 1984;50(5): 559-563.
[6]. Hazarey VK, Erlewad DM, Mundhe KA, Ughade SN. Oral submucous fibrosis: study of 1000 cases from central India. Journal of Oral Pathology and Medicine. 2007;36(1):12-17.
[7]. Angadi PV, Rekha KP. Oral submucous fibrosis: a clinicopathologic review of 205 cases in Indian South Population. Oral and Maxillofacial Pathology Journal. 2011;2(1): 15-19.
[8]. Tilakaratne WM, Klinikowski MF, Saku T, Peters TJ, Warnakulasuriya S. Oral submucous fibrosis: review on etiology and pathogenesis. Oral Oncology. 2006;42(6):561-568.
[9]. Sharma R, Mahajan S. Management of oral submucous fibrosis: a review. Contemporary Clinical Dentistry. 2013;4(3): 386-389.
[10]. Borle RM, Borle SR. Management of oral submucous fibrosis: a conservative approach. Journal of Oral and Maxillofacial Surgery. 1991;49(8): 788-791.
[11]. Joshi SG. Submucous fibrosis of the palate and pillars. Indian Journal of Otolaryngology. 1953;4(1):1-4.
[12]. Kumar KK, Saraswathi TR, Ranganathan K, Uma Devi M, Elizabeth J. Oral submucous fibrosis: a clinico-histopathological study in Chennai. Journal of Oral and Maxillofacial Pathology. 2003;7(2):12-16.
[13]. Vatsa R, Srivastava R, Sinha R, Srivastava A. Comparative study between diode laser and scalpel technique in oral submucous fibrosis management. Journal of Dental Research and Review. 2018;5(3):90-94.
[14]. Tripathy R, Mishra N, Mishra S. Evaluation of efficacy of diode laser in treatment of oral submucous fibrosis. International Journal of Oral Health Dentistry. 2014;2(4): 209-213.

[15]. Pogrel MA. The use of the carbon dioxide laser in oral and maxillofacial surgery. Journal of Oral and Maxillofacial Surgery. 2007;65(7):1343-1350.
[16]. Babu P, Sankar K, Reddy P, Satish Kumar Y. Comparative evaluation of surgical techniques in oral submucous fibrosis – A prospective study. Journal of Maxillofacial and Oral Surgery. 2013;12(3): 293–299.
[17]. Aggarwal N, Goel A, Tiwari S. Comparative study of different treatment modalities in oral submucous fibrosis. International Journal of Health Sciences and Research. 2017;7(7): 75-80.
[18]. Maher R, Lee AJ, Warnakulasuriya KAAS, Lewis JA. Role of areca nut in the causation of oral submucous fibrosis: a case-control study in Pakistan. Oral Oncology. 1994;30(3):193–200.
[19]. Deshmukh V, Doshi A. Comparative evaluation of diode laser versus conventional scalpel technique in the surgical management of oral submucous fibrosis. Journal of Evolution of Medical and Dental Sciences. 2017;6(13):1002–1007.
[20]. Kumar V, Chandra P, Gupta KC, Biswas G. Comparative evaluation of efficacy of diode laser and electrocautery in treatment of oral submucous fibrosis. Journal of Maxillofacial and Oral Surgery. 2014;13(4): 442–446.
[21]. Srivastava R, Jyoti B, Anand A, Tiwari S, Srivastava A. A comparative evaluation of diode laser and scalpel surgery in the management of oral submucous fibrosis. Journal of Clinical and Diagnostic Research. 2014;8(10): ZC78–ZC80.
[22]. Agarwal P, Agrawal M, Kumar R. Clinical evaluation of dexamethasone and placental extract in the treatment of oral submucous fibrosis. International Journal of Medical Science and Public Health. 2015;4(7): 933–936.
[23]. Hussain A, Rehman A. Role of corticosteroids and hyaluronidase in oral submucous fibrosis. Archives of Orofacial Sciences. 2013;8(1): 12–16.
[24]. Mehrotra R, Thomas S, Nair S, Pandya S, Nigam NS, Singh M. Biomarkers in oral submucous fibrosis: a clinico-pathological study. Medicina Oral Patología Oral y Cirugía Bucal. 2009;14(7):E360–E364.
[25]. Rajendran R. Oral submucous fibrosis: etiology, pathogenesis and management. Journal of Oral and Maxillofacial Surgery. 1995;53(9):1042-1045.
[26]. Utsunomiya H, Matsuo K, Shibata Y, Taniguchi T. A clinical study of intra-lesional injection of steroids in oral submucous fibrosis. International Journal of Oral and Maxillofacial Surgery. 2005;34(6): 640–643.
[27]. Pindborg JJ, Mehta FS, Gupta PC, Daftary DK. Prevalence of oral submucous fibrosis among 50,915 Indian villagers. British Journal of Cancer. 1966;20(4):646–654.
[28]. Cox SC, Walker DM. Oral submucous fibrosis: a review. Australian Dental Journal. 1996;41(5):294–299.
[29]. Nayak DG, Uppal M, Pai KM. Diode laser excision in management of oral submucous fibrosis: a case series. Journal of Oral and Maxillofacial Surgery, Medicine, and Pathology. 2019;31(2): 105–110.
[30]. Singh M, Niranjan R, Verma R. Comparative evaluation of surgical techniques in oral submucous fibrosis. Journal of Contemporary Dental Practice. 2015;16(10): 825–831.
[31]. Reddy V, Wanjari SP, Banda NR, Reddy VP. Physiotherapeutic management of oral submucous fibrosis: a review. Journal of Clinical and Experimental Dentistry. 2013;5(5):e239–e243.