

Effect of Maitland Mobilization Techniques on Mobility and Function in Patient with Oral Submucous Fibrosis

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Abstract: ***Background:** Oral submucous fibrosis (OSF) is a chronic disease that produces scars, tissue fibrosis, and precancerous lesions along with restricted tongue and mouth mobility, trismus, dysphagia, and altered tone, etc. Currently, treatment options for oral submucous often focuses on symptom management and preventing disease progression. Manual therapy, which involves hands - on techniques to improve mobility and alleviate function, may offer a novel approach to address these symptoms. This study aims to find the effects of Maitland mobilization techniques on mobility and functional activities in patient with oral submucous fibrosis. **Methodology:** After the study designed, ethical clearance was taken from IEC. Total number of participants screened were 50, among them 40 were included in the study on the basis of inclusion criteria. Participants were randomly divided into 2 groups, i. e., the experimental group (Group A) (n=20) and the conventional group (Group B) (n=20). A pre - assessment was done for mobility by using a millimetre scale, and functional activities were used and limited by a daily function questionnaire for patients with temporomandibular joint dysfunction. Further, the study was conducted for 3 weeks, followed by post - assessment. **Result:** Data analysis was done using paired and unpaired 't' tests for within - group and between - group analysis, which showed significant results for range of motion and mouth function ($p < 0.0001$) in the both groups. But the experimental group showed an extremely significant result for range of motion and mouth function with ($p < 0.0001$) when compared with control group. **Conclusion:** This study concludes that the Maitland Mobilization techniques are effective to improve range of motion and functional activities of mouth in patient with oral submucous fibrosis.*

Keywords: Oral submucous fibrosis, Temporomandibular dysfunction, Manual therapy, Maitland mobilization techniques, Temporomandibular joint exercises, Therapeutic interventions, Oral physiotherapy

1. Introduction

Even though the temporomandibular joints are among the most used joints in the body, they most likely get the least attention. We wouldn't be able to talk, chew, yawn, kiss, or suck as easily without these joints. It is important to consider the temporomandibular joints in any head and neck examination. A number of intricate multifactorial conditions, including psychological problems, are included in temporomandibular disorders (TMDs) ¹.

Oral Submucous Fibrosis

Oral submucous fibrosis (OSF) is a well - recognized oral precancerous condition, observed predominantly in populations of South Asian ethnic origin. Its distinctive generalized fibrosis (scarring) of the sub - mucosal oral soft tissues causes the oral mucosa to become noticeably hard, which in turn causes progressive trismus (the inability to open the mouth), lips to become rigid, and difficulties protruding the tongue².

Oral submucous fibrosis (OSF) is a chronic disease that produces scars, tissue fibrosis, and precancerous lesions. It frequently occurs in the buccal mucosa. Pathological characteristics include chronic inflammation, excessive collagen deposition in the connective tissues below the oral mucosal epithelium, local inflammation in the lamina propria or deep connective tissues, and degenerative changes in the muscles. OSF patients experience a severe burning sensation in the mouth after ingesting spicy foods. Other symptoms of OSF include dry mouth, pain, taste disorders, restricted tongue mobility, trismus, dysphagia, and altered tone.

According to World Health Organization (WHO) statistics, there are >5 million OSF patients globally. In India, OSF occurs more often in women than men. The patient age range is 20–40 y².

- **Causative factors of OSF-** Autoimmunity, vitamin B, C, and iron deficiencies, chewing betel nut, consumption of spicy foods, human papilloma virus (HPV) infection, and genetic mutations [2, 3]. Other studies confirmed that drinking alcohol and chewing betel nut have an additive effect on OSF induction². Prevalence of OSF The overall prevalence of OSMF is about 4.47% worldwide and 6.36% in India. In India, oral cancer occurs at a high rate of 20 cases per 100, 000 people, making up more than 30% of all cancer cases in the country³.
- **Clinical Features of OSF -** The oral mucosa can be divided into masticatory, specialized, and lining mucosa based on their function and histology. OSF occurs on all three types of mucosae, and most frequently occurs in the buccal mucosa, retromolar area, and the soft palate sites. The symptoms of OSF include dry mouth, pain, taste disorders, restricted tongue mobility, trismus, dysphagia, and changed tone movability. In addition to the oral cavity, the fibrosis even involves the pharynx and oesophagus. In OSF cases, the soft and pink oral mucosa initially becomes inelastic and slightly blanched. Subsequently, the mucosa becomes markedly inelastic and opaque, with white blanching, and appears papery white and tough on palpation, with a firm vertical band, which can be felt just opposite the premolar region. In the later stages, the lips and palate are also involved with lesions occurring on one or more sites. The patients' abilities to open their mouths become limited and their oral mucosae become hardened;

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moreover, they have poor wound healing, and their cheeks and lips become tightly held against their teeth⁴. Previous studies proved that the duration of OSF and the extent to which its symptoms worsen are directly correlated with oral cancer progression. OSF generally progresses to oral cancer 3–16y after the initial OSF diagnosis

Manual Therapy (Maitland) –Manual therapy (MT) is one of the most important interventions that are commonly used for treating musculoskeletal disorders. Generally, the goals of MT are pain reduction, decrease tissue guarding, and muscle relaxation, circulation improvement, and increasing range of motion (ROM) (3). Manual therapy is a specialized area in physiotherapy which manages neuromuscular pain. Manual therapy techniques include the Maitland mobilization technique, Kaltenborn mobilization technique, Mulligan technique, active release technique, and many more. Manual therapy mainly works on arthrokinematics and osteokinematics of the joint. Maitland mobilization aims to reestablish the spinning, gliding and rolling motions of the two joints. In clinical practice, movement quality can be increased via improving joint stability of weak muscles by applying Maitland mobilization combined with psychological effects (self - confidence and motivating factors) and corrected mechanical loading.

2. Materials and Methods

A randomised control trial was conducted from September 2024 to February 2025 in the Orthopaedic Physiotherapy Department of the Pravara Institute of Medical Sciences. Potential participants were assessed according to the eligibility criteria. Eligible people who were willing to participate in the study were provided with verbal information about the study and a written information sheet, and were required to give informed consent before undergoing baseline assessment and being allocated to a group. Randomisation was performed using simple random sampling into two groups: experimental and control. In order to conceal the upcoming random allocations, the randomised allocations were concealed in envelopes. Whenever researchers enrolled a new participant, they were required to contact a researcher

who had no other involvement in the study with the new participant's enrolment details before receiving the random allocation. Before the intervention period, demographic data and baseline assessment of the study outcome measures were recorded. Participants in the experimental group were prescribed a 3 - week Maitland mobilization techniques and traditional physiotherapy treatment and those in the control group received traditional physiotherapy exercise program for 3 weeks. In order to limit the impact of knowing whether they were in the experimental or control group, participants were advised that the study would compare two exercise regimens and they received no information about the exercise intervention to which they were not allocated. The same researchers reassessed the outcome measures after completion of the 6 - week intervention period. Outcome assessors were blinded to the group to which each participant had been allocated. Data were analysed with an intention - to - treat approach.

3. Procedure

Ethical clearance or approval from the IEC (PIMS/Dr. APJAKCOPT/BPT/UG/2024/229) will be obtained and CTRI registration (CTRI/2024/10/075103) was done. After that, 50 participants were screened according to the inclusion and exclusion criteria and 40 participants were selected. The consent form was signed prior to the study. The participants were briefly explained about assessment in the language best understood by them. Prior to the intervention, TMJ mobility using millimetre scale and functional assessments using limitation of daily function questionnaire for patients with temporomandibular joint dysfunction was taken, and measurements were noted. Then participants were divided randomly into two groups. Group A is the experimental group (n=20), in which MMT and conventional physiotherapy treatment was given; Group B (n=20) is the controlled group, in which conventional physiotherapy management was given. A 3 - week intervention program was given to participants (2 days per week). Again, post - intervention assessments of TMJ mobility and functionality were taken. A statistical analysis was done, and the results were calculated using paired and unpaired t test.

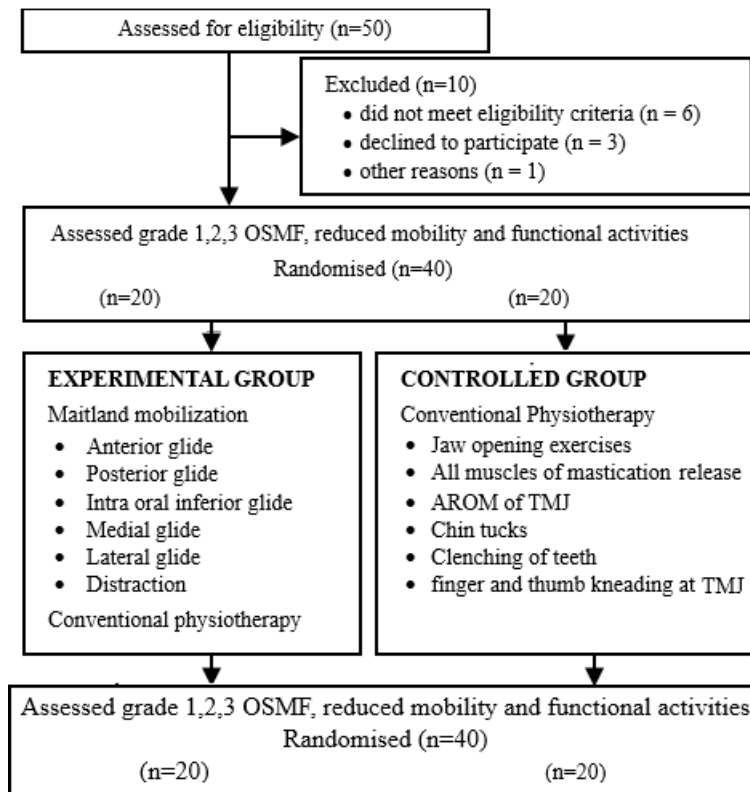
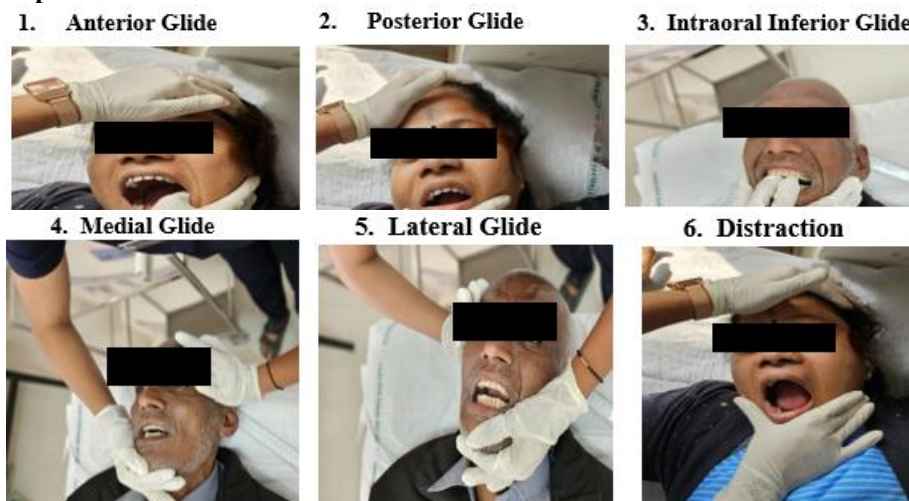


Figure 1: Design and flow of participants through the trial

Exercises Protocol

Experimental Group (Maitland Mobilization + Conventional Physiotrapy)	Controlled Group (Conventional Physiotherapy)
• ANTERIOR GLIDE (Oscillation * 3 Reps)	• Jaw Opening Exercise
• POSTERIOR GLIDE (30 Oscillation * 3 Reps)	• All Muscles of Mastication Release
• INTRAORAL INFERIOR GLIDE (30 Oscillation * 3 Reps)	• AROM of TMJ
• MEDIAL GLIDE (30 Oscillation * 3 Reps)	• CHIN TUCKS
• LATERAL GLIDE (30 Oscillation * 3 Reps)	• Cleenching of Teeth
• DISTRACTION (30 Oscillation * 3 Reps)	• Finger and Thumb Kneading of TMJ
Conventional Physiotherapy	

a) Intervention Group:



4. Data Analysis and Result

Analysis of raw data was done using SPSS software 20 version (IBM SPSS Statistics Inc Chicago, Illinois USA). The p value for statistical analysis was set at $p < 0.05$ with a confidence interval of 95%. Within the group comparison demonstrated that data is normally distributed checked by Shapiro wilk test, so parametric test were applied for the statistical analysis. The Paired t test was done for intragroup analysis of both the groups where Pre and Post value of group A and group B were analyzed separately for determining significant difference in outcome measures (Range of Motion

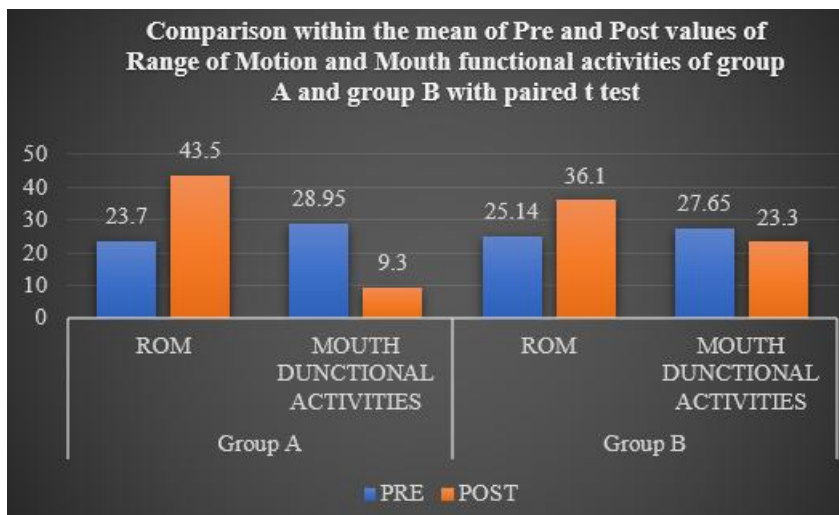
in millimeters, Mouth functional activities) whereas unpaired t test was run for intergroup analysis where difference of pre and post of group A was compared with difference of pre and post of group B for evaluating the hypothesis.

Table 1.1: Baseline Demographic Data

Age	Group A	Group B
Mean	38.7	37.95
Gender		
Male	16	15
Female	4	5

Table 1.2: Comparison within the mean of Pre and Post values of Range of Motion and Mouth functional activities of group A and group B with paired t test

Group A	Mean \pm SD		T Value	P value	Significance
	Pre	Post			
ROM (in millimeters)	23.70 \pm 9.01	43.5 \pm 5.75	15.90	<0.0001	Extremely Significant
Mouth functional activities	28.95 \pm 8.37	9.2 \pm 4.76	15.56	<0.0001	Extremely Significant
Group B					
ROM (in millimeters)	25.14 \pm 6.70	36.1 \pm 7.41	28.11	<0.0001	Extremely Significant
Mouth functional activities	27.65 \pm 6.24	23.3 \pm 5.89	8.21	<0.0001	Extremely Significant



Graph 3: Analysis of comparison within the mean of Pre and Post values of Range of Motion and Mouth functional activities of group A and group B with paired t test

Interpretation: Comparison between the mean of pre and post intervention scores for Group A and Group B for all the two components showed significant difference with a p value <0.0001. For range of motion and functional activities of mouth, the mean \pm SD value showed significant increase from

23.70 \pm 9.01 to 43.5 \pm 5.75 for Group A and 25.14 \pm 6.70 to 36.1 \pm 7.41 and 27.65 \pm 6.24 to 23.3 \pm 5.89 for Group B, respectively which indicates that there was increase in range of motion and mouth function.

Table 1.3: Intergroup analysis between Group A and Group B comparing difference values of ROM and Mouth functional activities scale with unpaired t test

	Groups	Post Intervention (Mean \pm SD)	Mean Difference	t - value	P value	Significance
ROM	A	43.5 \pm 5.75	7.40	3.52	<0.0011	Highly Significant
	B	36.1 \pm 7.41				
Mouth Functional Activities	A	9.2 \pm 4.76	14.10	8.32	<0.0001	Extremely Significant
	B	23.3 \pm 5.89				

Interpretation: Between the group comparison showed significant results in patients of Group A. Mean and SD values of the intergroup analysis of ROM between group A and Group B comes out to be 43.5 \pm 5.75 and 36.1 \pm 7.41 respectively, t value= 3.52 and p value <0.0001 which

indicated that the result was extremely significant. Mean and SD values of the intergroup analysis of ROM between group A and Group B comes out to be 9.2 \pm 4.76 and 23.3 \pm 5.89 respectively with a mean difference of 14.10, t value= 8.32 and p value <0.0001. Patients who were given Maitland

mobilization techniques with conventional physiotherapy (Group A) showed significant improvement in ROM And Mouth functional activities rather than the ones who underwent conventional physiotherapy (Group B).

5. Discussion

The purpose of current study was to evaluate the effectiveness of Maitland Mobilization techniques on mobility and function in patient with oral submucous fibrosis. We hypothesized that after treatment there would be improvement in mobility and function in temporomandibular joint. In this current study, after the designed intervention, Group A (Experimental group) showed that there was significant improvement in Range of Motion (43.5 ± 5.75 to 36.1 ± 7.41) and mouth function (9.2 ± 4.76 to 23.3 ± 5.89) As compared to Group B.

Fibrotic changes in the oral tissues, including the cheeks, soft palate, and tongue, limit the ability to open the mouth fully, with the severity of restriction depending on the stage of OSMF. As well as, this condition can cause stiffness in the TMJs, further restricting jaw movement. Tightened mucosa also obstruct the manipulation of food, making swallowing less efficient. Also, reduced mobility of the tongue and oral structures can impair speech clarity. Restricted mouth opening complicates oral hygiene practices, such as brushing teeth or cleaning the posterior areas of the oral cavity, increasing the likelihood of infections and dental issues.

The pathology behind OSFM is Quid which is a mixture of areca nut and tobacco in raw or processed form. It is placed in the mouth or chewed and remains in contact with the mucosa. The continues contact between the mixture and oral mucosa causes absorption of alkaloids from quid into the mucosa and undergoes metabolism. The coarse Fibers of areca nut cause friction and produces microtrauma which paves the way for diffusion of alkaloids into the subepithelial connective tissue resulting in juxta epithelial inflammatory cell infiltration. In Oral Submucous fibrosis the lesion starts as an inflammatory condition and as it progress the vascularity of the involved area decreases and blanching of the affected oral mucosa occurs and fibrosis of the involved areas is observed. As the disease progresses further, fibrous bands are formed which lead to restricted mouth opening, difficulty in swallowing and tongue movements.

Maitland mobilizations involve applying graded, rhythmic mobilization to the temporomandibular joint (TMJ) and surrounding structures to reduce stiffness. By improving joint play and soft tissue mobility, it helps reduce the mechanical restrictions caused by fibrosis. Graded movements known as Maitland mobilizations help the TMJ regain its natural glide and roll, which is frequently compromised in OSMF because to fibrosis and decreased tissue elasticity. By breaking up the micro adhesions in the fibrotic tissues around the TMJ, oscillatory movements can increase range of motion and joint mobility. In order to counteract the tightening and fibrosis characteristic of OSMF, mobilization stretches the TMJ's capsule, ligaments, and other soft tissues. In the TMJ, mobilization improves the flow of synovial fluid, which helps to lubricate and nourish the soft tissues and cartilage.

In 2015 Susan Armijo - Olivo, et. al in their study concluded

that Manual therapy has been used to restore normal ROM, reduce local ischemia, stimulate proprioception, break fibrous adhesions, stimulate synovial fluid production, and reduce pain. Based on the results of this systematic review, MT shows promising results for treatment of myogenous, arthrogenous, and mixed TMD, although the evidence is limited and low. A combination of MT for the orofacial region plus MT of the cervical spine was more effective than home exercises or treatment to cervical spine alone in people with mixed TMD [4].

According to this study, the application of glides at the TMJ results in an improvement in synovial fluid, which lubricates and nourishes the fibrous bands, increasing joint play and, consequently, improving mouth range of motion and functional activities. Additionally, a home exercise regimen of traditional physiotherapy helped the patient maintain their mobility and functional abilities on other days. By relaxing the muscles and promoting smooth mandibular movement at the temporomandibular joint, these approaches also assisted in reducing muscle spasm. Additionally, by reducing muscle spasms, this method promotes relaxed muscles and smooth mandibular motions. It expands the tight structure and decreases adhesion.

6. Conclusion

Study conclude that the both the groups were statistically significant in improving mobility and functional activities of mouth, on comparison between groups the experimental group showed significant result on improving Mobility and functional activities of mouth.

7. Limitations and Future Scope

- 1) Sample size for the study was moderately small; future studies can be done in large sample size.
- 2) Study done on specific age group. There is scope to co - relate this study to the specific age group.

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Conflict of Interest:

The authors declare that they have no conflict of interest

Funding: No funding sources

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Appendix I

Institutional Ethical Committee Certificate



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(Deemed to be University)
University Established under section (3) of UGC Act
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Ph.02422-271489

Ref. No. PIMS/DR.APJAKCOPT/IEC/2024/ 229

Date: 01/03/24

SHRADHA ZAWAR

IV BPT

Dr. APJ Abdul Kalam College of Physiotherapy

The institutional Ethical committee in its meeting held on 14th to 17th February 2024 reviewed and discussed your research proposal.

Registration No:	Dr.APJAKCOPT/BPT /UG/2024/80
Title of study:	"EFFECT OF MAITLAND MOBILIZATION TECHNIQUES ON MOBILITY AND FUNCTION IN PATIENT WITH ORAL SUBMUCOUS FIBROSIS "
Decision of committee	Approved
Approved period	01/03/24 TO 01/03/25
Committee's recommendation:	NIL

Please Note:

- The research is to be carried out in line with the information provided in the forms submitted by the candidate
- Inform IEC immediately in case of any Adverse events and serious adverse events
- Inform IEC immediately in case of any change in study procedure/ Protocol, site and investigator
- This permission is only for period mentioned above. Six month/ final reports are to be submitted to IEC
- Members of IEC have right to monitor the progress with prior intimation

Datan
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University Established under section (3) of UGC Act
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Plagiarism Report



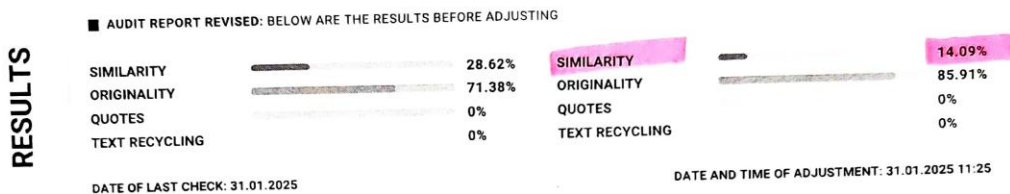
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