



CLINICAL OUTCOMES OF PHYSIOTHERAPY WITH AND WITHOUT ADJUNCTIVE THERAPEUTIC ULTRASOUND IN PATIENTS WITH ORAL SUBMUCOUS FIBROSIS

Maxillofacial Surgery

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ABSTRACT

This study assessed the impact of adding ultrasound (US) therapy to routine physiotherapy in the postoperative management of oral submucous fibrosis (OSMF). Sixteen clinically diagnosed patients were included and divided into two groups. All underwent surgical treatment under general anaesthesia, received 5 mg of Lycopene + Beta Carotene + Selenium daily for four weeks, and were advised to perform mouth-opening exercises at home. One group additionally received twelve sessions of US therapy within the first three weeks after surgery, while the other group continued physiotherapy alone. Patients treated with US therapy demonstrated significantly greater improvement in mouth opening, tongue protrusion, cheek flexibility, and pain reduction compared with physiotherapy alone. Importantly, no adverse effects of US therapy were observed. These findings highlight US therapy as a simple, safe, and effective adjunct that enhances functional recovery and improves the quality of life in OSMF patients when used in combination with conventional postoperative physiotherapy.

KEYWORDS

Ultrasound Therapy, Physiotherapy, OSMF, Mouth-opening Exercise

INTRODUCTION

Oral Submucous Fibrosis (OSMF) is a premalignant condition prevalent in India, affecting 0.2–0.5% of the population, primarily due to areca nut chewing. It leads to progressive subepithelial fibrosis, trismus, and difficulty eating. This study aims to assess the impact of physiotherapy with and without ultrasound therapy on post-operative improvement in mouth opening, cheek flexibility, and tongue protrusion.

Objectives include evaluating these parameters, pain levels, and surgical site infection at periodic intervals in both groups. Therapeutic ultrasound has shown the potential to enhance collagen pliability and improve outcomes. (1,2,3,4,5,6,7).

Subjects And Methods:

This study evaluated the impact of physiotherapy with and without ultrasound therapy on postoperative outcomes in Oral Submucous Fibrosis (OSMF) patients.

Sixteen patients aged 18–45, meeting specific inclusion criteria, were recruited from the Out-Patient Department of Oral and Maxillofacial Surgery, Bapuji Dental College and Hospital, Davangere, following ethical guidelines. Participants were randomised into Group A (ultrasound + physiotherapy) and Group B (physiotherapy only).

Clinical assessments included mouth opening (Figure A), cheek flexibility (Figure B), tongue protrusion (Figure C), and pain/burning sensation. Group A received 12 ultrasound sessions (Figure D) (1.5 W/cm², 3 MHz, 6 minutes) over 21 days, jaw-opening exercises and lycopene supplementation.



Figure A- Mouth Opening



Figure B- Cheek Flexibility



Figure C- Tongue protrusion



Figure D- U/S application

RESULTS

This study compared the effects of physiotherapy with and without ultrasound therapy on postoperative outcomes in 16 clinically diagnosed Oral Submucous Fibrosis (OSMF) patients. Participants were randomly divided into Group A (ultrasound + physiotherapy) and Group B (physiotherapy only), with eight patients in each group. Statistical analysis was performed using SPSS Version 19, and interobserver variability was assessed using an independent t-test. Out of all the 8 patients in Group A, who received ultrasound therapy, 5 patients had undergone reconstruction using the nasolabial flap, 2 with buccal fat pad & collagen membrane and 1 with abdominal full-thickness graft post fibrotomy.

It showed significant improvements in Group A compared to Group B in multiple parameters. Mean mouth opening improved from 12.40 mm (Group A) and 16.62 mm (Group B) (Table 1) at baseline to statistically significant differences at 1 and 3 months ($p < 0.05$). Tongue protrusion and cheek flexibility also showed marked improvement in Group A at 1 month ($p = 0.002$) and 3 months ($p = 0.001$) (Tables 2 & 3). Cheek flexibility differences were higher in Group A on Day 7 and 3 months post-operatively.

Pain and burning sensation on the VAS scale decreased significantly in Group A by Day 7 and at 3 months (Tables- 4 & 5). Burning sensation differences between groups were statistically significant at both time points ($p < 0.05$). The study highlights the enhanced outcomes achieved by combining ultrasound therapy with physiotherapy, emphasising its effectiveness in OSMF management.

Table 1 – Intergroup Comparison Of Mouth Opening

Timeline	Group	Mean	Std. Deviation
Pre-op	I	12.4000	9.60729
	II	16.6250	7.26906
Intra Op	I	36.8000	6.30079
	II	36.1250	6.89591
7 th POD	I	23.0000	3.80789
	II	24.6250	5.99851
15 th POD	I	23.8000	6.64831
	II	21.6250	6.94751
1 st MONTH	I	29.7143	5.99206
	II	22.1250	4.82368
3 rd MONTH	I	40.8571	11.82411
	II	26.8750	10.45313

Table 2: Intergroup Comparison Of Tongue Protrusion

Time line	Group	Mean	Std. Deviation
Pre-op	I	14.2500	2.18763
	II	13.4000	2.60768
7 th POD	I	16.5000	3.16228
	II	15.0000	3.31662
1 st MONTH	I	25.6250	2.13391
	II	17.0000	5.29150
3 rd MONTH	I	27.0000	2.00000
	II	20.0000	3.74166

Table 3: Intergroup Comparison Of Cheek Flexibility

Timeline	Group	Mean
PRE-OP	I	25.6000
	II	23.8750
7 th POD	I	29.2000
	II	25.6250
1 st MONTH	I	30.0000
	II	26.5000
3 rd MONTH	I	33.4000
	II	28.0000

Table 4: Intergroup Comparison Of Burning Sensation

Timeline	Group	Mean
Pre-op	I	3.8000
	II	3.7500
7 th POD	I	1.6000
	II	2.6250
1 st MONTH	I	.4000
	II	1.3750
3 rd MONTH	I	.0000
	II	.2500

Table 5: Intergroup Comparison Of Pain

Timeline	Group	Mean
Pre-op	I	5.4000
	II	5.8571
7 th POD	I	2.6000
	II	4.4286
1 st MONTH	I	1.0000
	II	2.5714
3 rd MONTH	I	.4000
	II	.2857

DISCUSSION

This study demonstrates the therapeutic advantage of incorporating ultrasound (US) therapy into routine physiotherapy for the postoperative management of Oral Submucous Fibrosis (OSMF). Patients in Group A, who received US therapy in addition to physiotherapy, exhibited superior improvements in mouth opening, cheek flexibility, and tongue protrusion compared with those in Group B, who underwent physiotherapy alone. The enhanced outcomes can be attributed to the thermal and mechanical effects of ultrasound, which are known to increase collagen extensibility, reduce inflammation, and improve tissue pliability, thereby facilitating functional recovery. These observations are consistent with the findings of Warren et al. (2008), who highlighted the efficacy of combined heat and stretch techniques in improving tissue elasticity⁸.

A notable reduction in pain and burning sensation among patients in Group A further supports the hypothesis that ultrasound elevates pain thresholds by modulating nerve conduction and enhancing local

circulation, as previously reported by Parker et al. (2011) and Yu et al. (2016)^{9,10}. Additionally, improved mucosal healing and reduced sensitivity to irritants were observed, in line with earlier evidence suggesting ultrasound's role in accelerating repair processes (Huang et al., 2015)¹¹. Importantly, better outcomes were also observed in patients reconstructed with nasolabial flaps, where adjunctive US therapy appeared to enhance postoperative physiotherapy acceptance and recovery during the critical early stages.

Despite these encouraging findings, the study is limited by its small sample size and the absence of objective imaging-based tools for assessing wound healing. Larger multicentric trials, coupled with advanced diagnostic methods, are necessary to validate these results and optimize rehabilitation protocols.

Overall, this study underscores the value of physiotherapy supplemented with ultrasound therapy as an effective and well-tolerated approach for improving functional recovery and quality of life in OSMF patients following surgery.

CONCLUSIONS

Oral Submucous Fibrosis (OSMF) is a progressive premalignant condition with limited treatment options and significant morbidity. While several therapies have been proposed, evidence on the use of ultrasound in postoperative OSMF patients is scarce. This study demonstrated that adjunctive ultrasound therapy with physiotherapy produced significant improvements in mouth opening, tongue mobility, cheek flexibility, and pain control, with no adverse effects. These results suggest ultrasound as a safe, effective, and patient-friendly modality that enhances compliance and functional recovery. However, the small sample size limits generalization, and larger multicentric trials across different stages of OSMF are needed to establish standardized protocols.

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