

Shikoh Naz et. al

Analysis of curcumin extract with and without coconut oil in reducing the symptoms of Oral submucous fibrosis

Analysis of curcumin extract with and without coconut oil in reducing the symptoms of Oral submucous fibrosis

1. Shikoh Naz

Assistant Professor

Department of Community & Preventative Dentistry, Hamdard University Dental Hospital, Karachi

2. Saima Asim

Assistant Professor

Department of Community & Preventive Dentistry, Hamdard University Dental Hospital, Karachi

3. Oam Parkash

Assistant Professor

Department of Oral and maxillofacial surgery, Baqai Dental College, Baqai Medical University, Karachi

4. Warda Yawar

Medical Officer

Samdhani Hospital, Karachi

5. Ghazala Raza Naqvi

Assistant Professor

Department of pharmaceutics, Faculty of Pharmacy, Federal Urdu University of Arts, Sciences and Technology, Karachi

6. Haroon ur Rasheed*

Lecturer

Department of Pharmacology, Ziauddin Medical College, Ziauddin University, Karachi

***Corresponding Author:**

Dr. Haroon ur Rasheed

Abstract:

Background: Oral submucous fibrosis is a chronic condition that causes tissue fibrosis. To improve the quality of life the aim of the management is to improve mouth opening and relieve unpleasant symptoms. Due to its antioxidant, anti-inflammatory, and anti-fibrotic potential of curcumin its role has been validated in OSF, additionally coconut oil add on may give some more efficacious results when used as an adjuvant to physiotherapy in management of OSF.

Methodology: It was an experimental study conducted at tertiary care hospital of Karachi from September 2022 to February 2023. Patients with other oral pre-malignant lesions and newly diagnosed cases (N=30) of oral submucous fibrosis were recruited from the dental OPD and they were divided in to two groups, n= 15 group 1, received the coconut oil and n=15, group 2 received the coconut oil mixed with 1gm of curcumin extract. Patients were counseled regarding the application of oils on the fibrous bands in the oral cavity buccal mucosa and physiotherapy exercises by mouth were recommended. They were instructed to apply the oil 2 times a day and follow-up was performed on every 30th day.

Results: The mean difference in pain/ burning sensation and interincisal opening was observed significant ($p < 0.05$) before and after the intervention in both the groups. Coconut oil with and without curcumin extract reduced the pain / burning sensation however, despite being insignificant curcumin extract seemed to increase the interincisal opening by 3 mm when compared to coconut oil group.

Conclusion: Application of coconut oil facilitates the sufferers in managing pain/burning sensation however, if curcumin extract is added it promotes mouth opening with time.

Keywords: Curcumin extract, Coconut oil, efficacy, Oral submucous fibrosis,

Tob Regul Sci. TM 2023;9(1): 1245-1252

DOI: doi.org/10.18001/TRS.9.1.85

Introduction:

Oral submucous fibrosis (OSF) is a chronic condition that causes tissue fibrosis, precancerous lesions, and scarring of the soft tissues of the oral cavity particularly buccal mucosa (1). Chronic inflammation, excessive collagen deposition, localized inflammation in the lamina propria or deep connective tissues, and degenerative alterations in the muscles attributes the pathological features of OSF. The symptoms of the condition include trismus, dysphagia, altered tone, discomfort, taste problems, restricted tongue motion, dry mouth and predominantly pain and burning sensation,

these symptoms lead to poor quality of life (2, 3). Clinical therapies aim to improve mouth opening and relieve unpleasant symptoms to improve patients' quality of life. The three main types of OSF treatment currently available are mouth opening exercises, medication therapy, and elective surgery (4). Various herbal remedies have been tried and validated their efficacy in alleviating the symptoms when used adjuvant with the exercise for the management of OSF (5).

Although having a scientific background that dates back almost 200 years, curcumin continues to draw researchers from all around the world. While curcumin was initially extracted from turmeric in 1815, there were very few publications on its chemical makeup, production, and biochemical and antioxidant action until the 1970s (6). According to epidemiological evidence, consuming turmeric lowers the risk of a number of diseases in people, notably those linked to oxidative stress and chronic inflammation (7). Due to its antioxidant, anti-inflammatory, anticarcinogenic, chemo preventive, chemotherapeutic, and anti-fibrotic potential, turmeric, or its active constituent curcumin, shows great promise as a therapeutic agent in the therapy of OSMF (8).

Furthermore, the most significant coconut byproduct is coconut oil, which has been used for centuries for its antibacterial, antifungal, and antiviral properties (9). In dentistry, coconut oil is used as a mouthwash because of its viscosity, which helps to remove food particles, bacteria, and microbes from the mouth (10). It has validated its role in physiotherapy of oral cavity in OSF patients as adjuvant (11). Hence evaluating its properties with and without curcumin extract may lead to propose a new herbal remedy with a greater potential in reducing the pain/burning sensation and increased mouth opening to provide improved quality of life.

Methodology:

It was an experimental study conducted at tertiary care hospital of Karachi from September 2022 to February 2023. The calculated sample size was $N=30$, and the sample was recruited via consequent sampling technique. The set inclusion criteria were newly diagnosed cases of oral submucous fibrosis. Patients with other oral pre-malignant lesions and newly diagnosed cases ($N=30$) of oral submucous fibrosis were recruited from the dental OPD and they were divided in to two groups, $n=15$ group 1, received the coconut oil and $n=15$, group 2 received the coconut oil mixed with 1gm of curcumin extract. Patients were counseled regarding the application of oils on the fibrous bands in the oral cavity buccal mucosa and physiotherapy exercises by mouth were recommended. They were instructed to apply the oil 2 times a day and follow-up was performed on every 30th day. the study was concluded on the 90th day. Prior to therapy, interincisal mouth opening (IIMO) and pain/burning sensation were measured using a visual analogue scale (VAS) and a Vernier caliper, respectively. Statistical analysis was performed on SPSS v20. Student t test was applied to compare both groups and paired t test was applied to identify pre and post intervention differences.

Results:

To complete the sample size 41 individuals fulfilling the inclusion criteria were enrolled in the study. Participants who did not comply the instructions and who couldn't come for follow-up were not included in the analysis. Out of 41, data was analyzed for 32 participants. The mean age of participants was 35 ± 4.1 . There were 12 (37.5%) female participants and 20 (62.5%) were males. The mean difference in pain/ burning sensation and interincisal opening was observed significant ($p < 0.05$) before and after the intervention in both the groups. Coconut oil with and without curcumin extract reduced the pain / burning sensation however, despite being insignificant curcumin extract seemed to increase the interincisal opening by 3 mm when compared to coconut oil group.

Table 1. Pain/burning sensation on each visit

| No. of visits | Group 1 (Coconut Oil) | Group 2 (Coconut Oil + Curcumin extract) | p-value |
|-------------------------|--------------------------|--|---------|
| | Pain/Burning sensation | | |
| Before the intervention | 27.71 ± 6.2 | 28.58 ± 7.2 | 0.142 |
| After 30 days | 23.68 ± 5.3 | 20.65 ± 4.1 | 0.065 |
| After 60 days | 18.3 ± 6.6 | 15.24 ± 5.61 | 0.073 |
| After 90 days | 11.4 ± 5.7 | 9.65 ± 3.12 | 0.061 |
| | Mouth opening | | |
| Before the intervention | 21.34 ± 2.5 | 22.81 ± 3.4 | 1.000 |
| After 30 days | 24.61 ± 3.8 | 25.52 ± 2.6 | 0.413 |
| After 60 days | 27.32 ± 4.3 | 30.12 ± 4.9 | 0.078 |
| After 90 days | 30.58 ± 2.71 | 33.61 ± 5.1 | 0.063 |

Table 2. Effects of intervention before and after the protocol

| No. of visits | Group 1 (Coconut Oil) | Group 2 (Coconut Oil + Curcumin extract) |
|-------------------------|--------------------------|--|
| | Pain/Burning sensation | |
| Before the intervention | 27.71 ± 6.2 | 28.58 ± 7.2 |
| After 90 days | 11.4 ± 5.7 | 9.65 ± 3.12 |
| P-value | 0.001* | 0.001* |
| | Mouth opening | |
| Before the intervention | 21.34 ± 2.5 | 22.81 ± 3.4 |
| After 90 days | 30.58 ± 2.71 | 33.61 ± 5.1 |
| P-value | 0.001* | 0.001* |

Discussion:

Oral submucous fibrosis, a chronic premalignant disease, affects mostly young males who are habitual of tobacco use (12). There is no definitive treatment of oral submucous fibrosis (OSMF) that is why the goal of its treatment is mainly to alleviate its signs and symptoms (13). Apart from physiotherapy and steroids, many natural ointments are also being used by patients to manage acute symptoms like pain (14). In our study we have evaluated the effects of coconut oil and its combination with curcumin extract on pain and limited mouth opening associated with oral submucosal fibrosis. The results of both groups, coconut oil alone and coconut oil along with curcumin extract, showed amelioration in pain associated with oral submucosal fibrosis and significant improvement was observed in both groups. Multiple studies have reported that various herbal formulations can be used for oral submucosal fibrosis. These herbal extracts do not cure the disease but may improve the associated symptoms like pain, burning sensation, intolerance to spicy food, speech or swallowing problems and limitation in mouth opening (15). Literature has reported that *Aloe vera* may control various complication of OSMF and can produce certain therapeutic effects such as analgesic, antioxidant, anti-inflammatory, antineoplastic, immunomodulatory and wound regeneration effects (16). *Olive oil* has reported therapeutic effects against dry mouth, oral ulcers and halitosis (17). *Cocos nucifera* L. also known as the coconut has reported antibacterial, antifungal and antiviral effects (18). *Curcuma longa* L. or curcumin has also reported anti-inflammatory, analgesic, antitumor, carminative, antiseptic, and antibacterial properties (18).

Use of coconut oil as a mouthwash helps to keep the oral mucosa moist and hydrated for a longer time that helps in alleviation of the dryness, pain and burning sensation associated with oral submucous fibrosis (19). Coconut oil is rich in fatty acids such as lauric acid and monolaurin which have potential anti-inflammatory and antimicrobial effects that helps in reducing the risk of secondary infections in patients with oral submucous fibrosis (20, 21).

The curcumin extract in our study showed remarkable improvement in mouth opening of oral submucous fibrosis patients and also alleviated the associated symptoms like pain and burning sensation. Comparable results were observed from another study that expressed significant clinical improvement in mouth opening and subjective symptoms, like burning sensation/pain associated with the lesion and tongue protrusion in the group treated with curcumin lozenges (22). These effects of curcumin signify its role in the treatment of oral premalignant conditions such as OSMF and acts as a very effective chemo-preventive agent in the prevention of cancer.

A systemic review has evaluated six clinical trials and all of the studies found curcumin to be effective in the management of oral submucous fibrosis. The results of the systemic review

suggested that the curcumin extract is a safe and effective therapeutic modality for patients with oral submucous fibrosis, especially for relieving associated discomforts like pain and burning sensation. Apart from its potent analgesic, anti-inflammatory, antioxidant, and anticancer benefits, curcumin can be considered a viable alternative therapeutic option for the management of oral submucous fibrosis (23). Another randomized clinical trial has reported that Curcumin gel and Aloe Vera gel are effective in improving oral submucous fibrosis symptoms, but aloe Vera gel is more efficacious in improving burning sensation without any side effects (24). Another randomized controlled clinical trial reported that curcumin and lycopene showed equal and significant improvement in mouth opening, burning sensation, tongue protrusion and cheek flexibility when compared with placebo (25). Similar results were observed from a previous study that also showed alleviation in mouth opening, burning sensation and color of oral mucosa (26). Combination of curcumin along with lycopene and piperine in another study has remarkably improved mucosal flexibility, mouth opening and tongue protrusion that makes curcumin a strong candidate for the management of oral submucous fibrosis (27). The evidence collected from further systematic reviews and meta-analysis shows that turmeric or curcumin extract is a potentially effective treatment choice for the management of patients with premalignant diseases such as oral submucous fibrosis (28, 29).

Our results are in resemblance with most of the previous literature showing therapeutic effects if curcumin extract against oral submucous fibrosis. Therefore, further long-term studies should be carried out for validation and these herbal products should be added to standard treatment modalities such as physiotherapy and chewing exercises for oral submucous fibrosis management.

Conclusion: The oral submucous fibrosis is a prevalent premalignant condition among the tobacco users. There is no acute treatment available except exercise and physiotherapy with the traditional remedies which improves the quality of life of the patients. In current study it was identified that, application of coconut oil facilitates the sufferers in managing pain/burning sensation however, if curcumin extract is added it promotes mouth opening with time. Further to this, we recommend long term experiments on larger sample to validate the findings and market the prepared products.

References:

1. Shih Y-H, Wang T-H, Shieh T-M, Tseng Y-H. Joms. Oral submucous fibrosis: a review on etiopathogenesis, diagnosis, and therapy. 2019;20(12):2940.
2. Kujan O, Mello FW, Warnakulasuriya SJ. JOD. Malignant transformation of oral submucous fibrosis: A systematic review and meta-analysis. 2021;27(8):1936-46.
3. More CB, Rao NR. JJoob, research c. Proposed clinical definition for oral submucous fibrosis. 2019;9(4):311-4.
4. Shen Y-W, Shih Y-H, Fuh L-J, Shieh T-M. Jjoms. Oral submucous fibrosis: a review on biomarkers, pathogenic mechanisms, and treatments. 2020;21(19):7231.

5. Rajesh Kashyap R, Shanker Kashyap RJOD. Herbal derivatives in the management of mouth opening in oral submucous fibrosis—A network meta-analysis. 2021;27(7):1606-15.
6. Priyadarsini KIJM. The chemistry of curcumin: from extraction to therapeutic agent. 2014;19(12):20091-112.
7. Quispe C, Cruz-Martins N, Manca ML, Manconi M, Sytar O, Hudz N, et al. Nanoderived therapeutic formulations with curcumin in inflammation-related diseases. 2021;2021:1-15.
8. Rai A, Kumar N, Sharma S, Parveen S, Rasheed AJJoCR, Therapeutics. Turmeric in the management of oral submucous fibrosis: A systematic review and meta-analysis. 2021;17(2):327-35.
9. Sankari SL, Regunathan HJIJoPHR, Development. Ayurveda: Panacea for Oral Health. 2019;10(12).
10. Milutinovici R-A, Chioran D, Buzatu R, Macasoi I, Razvan S, Chioibas R, et al. Vegetal compounds as sources of prophylactic and therapeutic agents in dentistry. 2021;10(10):2148.
11. Dick T, Marques LC, Lopes A, Candreva MS, Santos LR, Picciani BJEJoMP. Phytotherapy in dentistry: A literature review based on clinical data. 2020;31(10):1-13.
12. Prajapati K, Chawda J, Thakkar M, Gajera N, Thakkar R, Thakkar J. Oral submucous fibrosis in North Gujarat: A demographic study. International Journal of Preventive and Clinical Dental Research. 2021;8(1):9.
13. Al-Maweri SA, Ashraf S, Lingam AS, Alqutaibi A, Abdulrab S, Alaizari N, et al. Aloe vera in treatment of oral submucous fibrosis: A systematic review and meta-analysis. Journal of Oral Pathology & Medicine. 2019;48(2):99-107.
14. More CB, Patil DJ, Rao NR. Medicinal management of oral submucous fibrosis in the past decade-A systematic review. Journal of oral biology and craniofacial research. 2020;10(4):552-68.
15. Dick T, Marques LC, Lopes A, Candreva MS, Santos LR, Picciani B. Phytotherapy in dentistry: A literature review based on clinical data. European Journal of Medicinal Plants. 2020;31(10):1-13.
16. Nirala RK, Raj P, Anjana K, Mandal K. A review on immunomodulatory activity of amla and Aloe vera. Journal of Pharmacognosy and Phytochemistry. 2020;9(5):2014-6.
17. Dar-Odeh NS, Gasim RA, Binsaad SM, Abu-Hammad S, Abu-Hammad OA. Use of natural remedies to treat oral diseases among female patients in Al Madinah, western Saudi Arabia. Journal of Complementary and Integrative Medicine. 2019;16(3).
18. Milutinovici R-A, Chioran D, Buzatu R, Macasoi I, Razvan S, Chioibas R, et al. Vegetal compounds as sources of prophylactic and therapeutic agents in dentistry. Plants. 2021;10(10):2148.
19. Siripaiboonpong N, Matangkasombut O, Pengcharoen H, Boonchaiyapluk B, Rujiraprasert P, Srithanyarat SS. Microbiological Effects of Virgin Coconut Oil Pulling in Comparison with Palm Oil Pulling as an Adjunctive Oral Hygiene Care for Patients with Gingival

- Inflammation: A Randomized Controlled Clinical Trial. *Journal of Indian Society of Periodontology*. 2022;26(1):58.
20. Mena T, Marfu'ah S, editors. Antibacterial activity of free fatty acids, potassium soap, and fatty acids methyl esters from VCO (virgin coconut oil). *IOP Conference Series: Materials Science and Engineering*; 2020: IOP Publishing.
 21. Haron UA, Mukhtar NI, Omar MN, Abllah Z. Fatty Acid Evaluation and Antimicrobial Activity of Virgin Coconut Oil and Activated Virgin Coconut Oil on *Streptococcus mutans*. *Archives of Orofacial Science*. 2019;14(2).
 22. Srivastava R, Kundu A, Pradhan D, Jyoti B, Chokotiya H, Parashar P. A comparative study to evaluate the efficacy of curcumin lozenges (TurmNova®) and intralesional corticosteroids with hyaluronidase in management of oral submucous fibrosis. *J Contemp Dent Pract*. 2021;22:751-5.
 23. Al-Maweri SA. Efficacy of curcumin for management of oral submucous fibrosis: a systematic review of randomized clinical trials. *Oral surgery, oral medicine, oral pathology and oral radiology*. 2019;127(4):300-8.
 24. Nerkar Rajbhoj A, Kulkarni TM, Shete A, Shete M, Gore R, Sapkal R. A Comparative study to evaluate efficacy of curcumin and aloe Vera gel along with oral physiotherapy in the management of oral submucous fibrosis: a randomized clinical trial. *Asian Pacific Journal of Cancer Prevention*. 2021;22(S1):107-12.
 25. Piyush P, Mahajan A, Singh K, Ghosh S, Gupta S. Comparison of therapeutic response of lycopene and curcumin in oral submucous fibrosis: A randomized controlled trial. *Oral diseases*. 2019;25(1):73-9.
 26. Lanjekar AB, Bhowate RR, Bakhle S, Narayane A, Pawar V, Gandagule R. Comparison of efficacy of topical curcumin gel with triamcinolone-hyaluronidase gel individually and in combination in the treatment of oral submucous fibrosis. *J Contemp Dent Pract*. 2020;21(1):83-90.
 27. Mahato B, Prodhan C, Mandal S, Dutta A, Kumar P, Deb T, et al. Evaluation of efficacy of curcumin along with lycopene and piperine in the management of oral submucous fibrosis. *Contemporary Clinical Dentistry*. 2019;10(3):531.
 28. Rai A, Kumar N, Sharma S, Parveen S, Rasheed A. Turmeric in the management of oral submucous fibrosis: A systematic review and meta-analysis. *Journal of Cancer Research and Therapeutics*. 2021;17(2):327-35.
 29. Ingle E. Turmeric in the management of oral submucous fibrosis—A systematic review and meta-analysis. *International journal of health sciences*. 2020;14(3):41.