

Role of Lycopene in the Management of Oral Submucous Fibrosis

Lycopene in the Management of Oral Submucous Fibrosis

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ABSTRACT

Objective: To evaluate the efficacy of lycopene in treatment of oral submucosal fibrosis in combination with intralesional steroids.

Study Design: A Cross sectional study

Place and Duration of Study: This study was conducted at the Oral and Maxillofacial Surgery, Bibi Aseefa Dental College, Shaheed Mohtarma Benazir Bhutto Medical University, Larkana, Sindh from March 2022 to February 2023.

Materials and Methods: A total of 399 patients with habit of chewing areca nut in the form of Gutka, Mawa, Pan Masala or in the pure form were enrolled and divided into three groups by their treatment plan. SPSS version 24 was used for data analysis. Burning sensation in form of VAS score and mouth opening were variables of study.

Results: Gutka was the most common used areca nut as 255 (63.9%). The average duration of habit was 5.08 ± 2.03 years. Whereas, the overall average VAS scores of the patients was 7.08 ± 1.78 . Mouth opening from baseline and treatment period among the groups A, B and C was 3.88 ± 1.69 , 2.99 ± 1.58 and 2.64 ± 1.42 respectively.

Conclusion: Lycopene combined with hyaluronidase and intralesional steroid is effective in improving pain (VAS) and symptoms of mouth opening in patients with OSF with no side effects.

Key Words: Lycopene, Mouth Opening, Burning Sensation, OSF, VAS score

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INTRODUCTION

Oral submucous fibrosis is characterized by the formation of fibrous bands in the oral cavity, which can lead to restricted mouth opening (trismus) and difficulty in eating and speaking¹. In some cases, OSF can involve the pharynx, causing further complications. While OSF is not considered a malignant disease, it is classified as a potentially premalignant condition, meaning it may increase the risk of oral cancer development in some individuals². Chronic betel quid chewing and tobacco use, which are commonly associated with OSF, are significant risk factors for oral cancer³.

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The occurrence of orofacial clefts is influenced by a combination of genetic and environmental factors⁴. While there might be some genetic predispositions in certain populations, it is not accurate to say that OSF is predominantly found in the Indian population or any other specific ethnicity⁵. Areca nut is often chewed with slaked lime and other ingredients as part of a traditional practice in some parts of Asia and the Pacific region⁶. Chewing areca nut can lead to the release of arecoline, an alkaloid present in the nut, which has been linked to various health issues like oral health problem, increased risk of cancer, cardiovascular disorders and addiction/dependency⁷.

Lycopene is a type of antioxidant known as a carotenoid. It is a red pigment found in various fruits and vegetables, most notably in tomatoes. Research has suggested that lycopene may have several health benefits due to its antioxidant properties⁸. Some studies have linked lycopene intake to a reduced risk of certain cancers, heart disease, and age-related eye conditions like macular degeneration. Lycopene is ten times stronger than alpha-tocopherol (vitamin E) and twice as strong as beta-carotene⁹. The antioxidant strength of a compound can vary depending on the specific context and measurement methods used¹⁰.

MATERIALS AND METHODS

The cross-sectional study was conducted at the Department of Oral and Maxillofacial Surgery, Bibi

Aseefa Dental College at Shaheed Mohtarma Benazir Bhutto Medical University, Larkana, Sindh, from March 2022 to February 2023. Before commencing the study, it received approval from the hospital's ethical board. This approval ensures that the study complies with ethical standards and guidelines for research involving human participants. As part of ethical requirements, the researcher obtained informed written consent from the patients or their attendants. The researchers took measures to ensure the confidentiality and privacy of the participants. OpenEpi software was used for data analysis with 95% confidence interval, 80% power and 64.4% accuracy of lycopene treatment. Participants with addiction of areca nut chewing and its relevant products, limited mouth opening, burning sensation on ingestion were included. Histologically diagnosed malignant cases of oral submucous fibrosis were excluded. Patients were advised to stop chewing areca nut. Severity and malignancy status of disease was noted and antibiotics were given prophylactically. Patients were divided into three groups (A, B and C) by simple random numbering. Group A patients were treated with lycopene 16 mg capsule once daily, Hyaluronidase 1500 IU mixed with lignocaine injection twice daily and 1.5 mg dexamethasone. In group B patients were given 1.5 ml dexamethasone injection intralesional twice/week, multivitamins daily and 1500 IU hyaluronidase mixture with lignocaine. In group C patients were treated with 1.5 ml injection dexamethasone intralesional and 1500 IU hyaluronidase mixture with lignocaine. Patients were followed up for six weeks. During this follow-up period, the patients were evaluated on a weekly basis to track changes in various parameters. These parameters included habits, mouth opening, and burning sensation. The baseline measurements were taken before the start of the treatment, and then subsequent measurements were taken each week to assess any improvements or changes.

Data related to variables like age, VAS (Visual Analog Scale) score, mouth opening, and gender were collected. The collected data was entered into the SPSS software version 23.1 for analysis. For quantitative data such as age, VAS score, and mouth opening, the mean and standard deviation were calculated. The mean represents the average value of the data, while the standard deviation measures the variability or spread

around the mean. For qualitative data like gender, the frequency (number of occurrences) and percentages of each category (e.g., male, female) were calculated and presented. The post stratification analysis involved using the chi-square test, a statistical test used to assess the independence or association between two categorical variables (e.g., gender and VAS score). A significance level (alpha) of 0.05 was used, which means that if the p-value obtained from the statistical tests is less than or equal to 0.05, then the results are considered statistically significant.

RESULTS

Overall, 399 patients were included in this study having a habit or addiction of chewing areca nut in the form of Gutka, Mawa, Pan Masala or in the pure form. The mean age of the patients was 32.05 ± 6.36 years. There were 341 (85.5%) males and 58 (14.5%) females. Gutka was the most common used areca nut as 255 (63.9%). The average duration of habit was 5.08 ± 2.03 years. Whereas, the overall average VAS score of the patients was 7.08 ± 1.78 .

The patients were equally divided into three groups as 133 (33.3%) in each group. The age distribution, sex distribution, duration of habit and VAS score were displayed in table. I. All three groups were almost equal with respect of age, sex, duration of habit and VAS score, ($p > 0.050$). (Table. 1).

Group-A: The mean increase in mouth opening from baseline (before treatment) to week 6 was 2.48 ± 1.41 mm. Whereas, the average mouth opening, during the treatment period 1 to 6 weeks of the group A patients was 1.53 ± 0.93 mm, 2.63 ± 1.16 mm, 2.89 ± 1.56 mm, 4.20 ± 1.24 mm, 4.44 ± 1.01 mm and 5.08 ± 1.05 mm, respectively. The differences from baseline to treatment periods were statistically significant, ($p < 0.001$). (Table. 2)

Group-B: The mean increase in mouth opening from baseline (before treatment) to week 6 was 4.48 ± 1.38 mm. Whereas, the average mouth opening, during the treatment period 1 to 6 weeks of the group B patients was 0.98 ± 0.69 mm, 2.19 ± 1.25 mm, 3.48 ± 0.55 mm, 3.84 ± 0.74 mm, 4.47 ± 0.85 mm and 4.50 ± 0.62 mm, respectively. The differences from baseline to treatment periods were statistically significant, ($p < 0.001$). (Table. 3)

Table No. 1: Demographic characteristics of the study groups

Variable	Group A	Group B	Group C	p-value
Sex				
Male	110 (82.7)	114 (85.7)	117 (88.0)	0.474
Female	23 (17.3)	19 (14.3)	16 (12.0)	
Age	32.08 ± 6.01	31.07 ± 6.55	32.91 ± 6.44	0.064
Duration of Habit	4.92 ± 2.05	5.22 ± 2.01	5.12 ± 2.05	0.508
VAS Score	6.78 ± 1.74	7.18 ± 1.94	7.27 ± 1.62	0.053

Table No. 2: Mean change in mouth opening of group A during the treatment period from the baseline

Time period	Change Mouth Opening (mm)	p-value
1 st week	1.53±0.93	<0.001
2 nd week	2.63±1.16	<0.001
3 rd week	2.89±1.56	<0.001
4 th week	4.20±1.24	<0.001
5 th week	4.44±1.01	<0.001
6 th week	5.08±1.05	<0.001

Table No. 3: Mean change in mouth opening of group B during the treatment period from the baseline

Time period	Change Mouth Opening (mm)	p-value
1 st week	0.98±0.69	<0.001
2 nd week	2.19±1.25	<0.001
3 rd week	3.48±0.55	<0.001
4 th week	3.84±0.74	<0.001
5 th week	4.47±0.85	<0.001
6 th week	4.50±0.62	<0.001

Table No. 4: Mean change in mouth opening of group C during the treatment period from the baseline

Time period	Change Mouth Opening (mm)	p-value
1 st week	1.32±1.22	<0.001
2 nd week	1.91±0.56	<0.001
3 rd week	2.54±0.62	<0.001
4 th week	3.23±0.81	<0.001
5 th week	3.19±0.96	<0.001
6 th week	4.79±0.79	<0.001

Table No. 5: Comparison of change in mouth opening from baseline and treatment period among the three study groups

Time Period	Group	Mean±S.D	p-value	Sig. Groups
0-6 weeks	A	3.88±1.69	<0.001	A vs B
	B	2.99±1.58		B vs A
	C	2.64±1.42		C vs A

Group-C: Increase in mean mouth opening before treatment to duration of 6 weeks was noted 3.41±0.92 mm. Mean opening of mouth during treatment from 1-6 weeks was 1.32±1.22mm, 1.91±0.56mm, 2.54±0.62mm, 3.23±0.81mm, 3.19±0.96 mm and 4.79±0.79mm, respectively. The differences from baseline to treatment periods were statistically significant, (p<0.001). (Table. 4)

The comparison of change in mouth opening from baseline and treatment period among the groups A, B and C was shown in table V. The group A was statistically different from group B and group C, (p<0.001). (Table. 5).

DISCUSSION

Lycopene, as an antioxidant, is believed to play a significant role in the treatment and management of many chronic diseases. In oral diseases like OSF (oral submucous fibrosis), leukoplakia, and malignant lesions, lycopene's antioxidant activity may be beneficial in the management plan and early symptom relief¹¹.

In this study mean VAS score in group A was 6.78±1.74, in group B 7.18±1.94 and in group C it was 7.27±1.62. In a study conducted by Zeeshan et al¹² in 2018 it was reported that combination of lycopene with hyaluronidase and intralesional steroids may have potential benefits in betterment of mouth opening Oral Submucous Fibrosis (OSF) patients. This combination was believed to have a positive effect with minimum side effects.

Similarly study conducted by Nidhi Elizabeth et al¹³ showed that the combination of lycopene with intralesional steroids and Hyaluronidase drugs was highly effective in treating mouth opening and reduction of its symptoms. This finding highlights the potential benefits of using lycopene in such cases. Selvam et al¹⁴ conducted interesting study on lycopene's effectiveness in OSF treatment. Combining lycopene with intralesional steroids and hyaluronidase seems to show better results than other drug combinations or using them alone.

In this study change in mouth opening from baseline and treatment period among the groups A, B and C was 3.88±1.69, 2.99±1.58 and 2.64±1.42 respectively. A study reported that combination of lycopene, intralesional steroids, and hyaluronidase is significantly effective in the treatment of Oral Submucous Fibrosis (OSF) without any reported side effects. In another study reported that the treatment plan involving intralesional placental extracts has resulted in a significant improvement in the burning sensation for the patient with OSMF (Oral Submucous Fibrosis). A 40.2% improvement in the burning sensation indicates a positive response to the treatment.

Anshumalee N and colleagues¹⁵ conducted a study comparing the effects of IFN (Interferon) on burning sensation in two groups, Group I and Group II. The study found that there was a 54-60% reduction in burning sensation in both groups when treated with IFN. Another study by Driпти Singh et al¹⁶ conducted a study comparing the use of lycopene and intralesional injection of steroids (specifically betamethasone) for the treatment of a condition that affects mouth opening and causes a burning sensation. Lycopene led to a greater improvement in the ability to open the mouth compared to the intralesional injection of betamethasone.

Study conducted by Kopuri et al¹⁷ on the efficacy of lycopene and curcumin in the management of OSMF

and reported that Lycopene have much better results as compare to curcumin in terms of pain relieve and mouth opening. Kitade et al¹⁸ also reported similar findings that lycopene can be used in treatment of OSMF.

CONCLUSION

Results of this study suggested that lycopene combined with hyaluronidase and intralesional steroid is effective in improving pain (VAS) and symptoms of mouth opening in patients with OSF with no side effects.

Author's Contribution:

Concept & Design of Study: Asfar Hussain
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