

Evaluation of Taste Perception in Early & Advanced Stage OSMF Patients: A Case Control Study

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Abstract: ***Aim & Objective:** To evaluate taste perception in early and advanced stage OSMF patient's. **Material & methods:** By using physiological stimuli method, taste perception was assessed among the cases and controls. A total of 60 OSMF patients and 30 controls were included in the study. Chi square test and MannWhitney test were used to evaluate the taste response. **Results:** Showed delayed taste perception in OSMF patients as compared to controls. Advanced stage OSMF patients showed maximum delayed response towards salty taste. **Conclusion:** Taste perception alters in OSMF patients and progresses as the severity of disease progresses.*

Keywords: Oral submucous fibrosis, taste perception, physiological stimuli, tastes cells.

1. Introduction

Oral submucous fibrosis is one of the oldest known chronic insidious disease affecting mankind which has multifactorial origin. It is a potentially malignant disorder characterized by fibrotic changes in the oral mucosa, ulceration, erosion, burning sensation, odynophagia (pain on swallowing), difficulty in phonetics and trismus. OSMF is known to be prevalent in Asian countries like India, Taiwan, China and Singapore. Prevalence of OSMF in India is 0.2-1.2%. It is more commonly seen in the age group of 20-35yrs, affecting mostly men.^{1,2}

OSMF is found to be associated with habits such as betel nut, tobacco and gutkha chewing. These betel nut products contain alkaloids, tannins, copper, iron etc which react with the mucosa, alters saliva, and causes atrophy, inflammation or injury to the taste cells. All the other symptoms associated with OSMF are of major concern to the patients and are well documented but impaired gustatory changes in OSMF patients have received less importance.^{1,3}

Impaired taste function in OSMF patients can be justified as, the disease leads to inflammatory changes in tongue (taste cells) responsible for taste perception. Studies have shown that changes of tongue in OSMF are evident. Taste dysfunction should be identified in OSMF patients and even should be correlated with severity of disease because it is important to have a proper taste function for a better quality of life.¹

Hence, we conducted a study to evaluate taste perception among OSMF patients in early and advanced stages of disease.

2. Methodology

To study taste perception different stages of OSMF patients with age and sex matched healthy controls were enrolled in the study. This study was performed on clinically diagnosed 60 OSMF patients and 30 healthy subjects of both the gender with age ranging from 18-60yrs. These subjects were selected on the basis of clinical staging criteria by Chandramani more et al from the outpatient department of

Maratha Mandal NGHIDS&RC, Belagavi. Ethical committee clearance was obtained and informed consent was taken from all participants prior to the study.

Patients with blood dyscrasias, systemic disease associated with fibrosis like scleroderma, or causing atrophic tongue secondary to conditions like diabetes, pseudo-hypoparathyroidism, multiple sclerosis, geographic tongue, severe anemia etc were excluded to eliminate false negative results.

Total of 90 subjects were divided into three groups. Group A (n=30) early stage OSMF (S1, S2), group B (n=30) advanced stage OSMF (S3, S4) and control group C (n=30) healthy controls.

Tastants of four different tastes (sweet, salt, bitter, sour) at three different concentrations (low, medium, high) were freshly prepared for taste analysis. Tastants were prepared at following concentration sucrose for sweet (0.1-1.0 mol/l), sodium chloride for salt (.01-1.0 mol/l), quinine hydrochloride for bitter (.01-1.0 mol/l) and citric acid for sour (0.320-0.032 mol/l). To analyze taste spatial test and full mouth rinse test were performed using three different concentration of tastants which were prepared by adding 5ml and 10 ml of distilled water to the original concentration of the tastant.

Firstly spatial test was done where the tastant solution was applied over dorsum and lateral part of tongue using cotton swab in progressively increasing concentration for approximately 10 seconds for all four tastes and response of identification of taste was recorded. The subject was asked to guess the taste.

Later full mouth rinse test was performed where 5ml of same taste at different concentrations were given to patient to sip and rinse for 10 seconds and spit it. Before every new tastant assessment patient was asked to rinse the mouth using distilled water to avoid taste of last tastant. Then, identification of taste was noted. If patient identified the taste at lower concentration then no further test was done with higher concentration. After changing tastant solution

patient was asked to rinse their mouth with water in order to remove the left tastant solution.

Patient was asked to assess the taste and value was recorded. If subject identified the taste value was given as 1, if not

able to identify the taste value was given as 0, if already identified the taste at lower concentration the value was given as 2.



Spatial Taste Assessment



Full Mouth Rinse



Taste Assessment

3. Results & Discussion

Gustation is one among the five senses, which allows us to perceive different flavors from substances that we consume as food and drink through mechanism of chemoreception. In OSMF along with other signs and symptoms, fibrosis of submucosa causes atrophy of superficial epithelium which involves taste cells leading to impaired taste sensation which is one of the subjective symptoms of this disease. There are total five tastes which a human being can differentiate they are sweet, sour, salt, bitter and umami (savory). Specialized receptor cells are present in gustatory system that are located on the dorsum of the tongue and are called as taste buds which sense tastants (taste molecules).^{4,5,6}

In present study OSMF was seen more prevalent in young patients as they feel it safe to chew tobacco and betelnut products as compare to smoking. Smokeless or chewable tobacco in India is commercially available that might be a reason for reduction in age of occurrence of OSMF which can also be seen in this study where the overall mean age of patients was 33.13yrs. The male: female ratio was found to be 4:1 which might be attributed to the fact that females of this geographic region have less gutkha chewing or any other smokeless tobacco chewing habit.

Inflammatory changes when occur in tongue it causes atrophy of taste cells, which impairs taste sensation as they are the chemical receptor which help in perceiving. The cause can be systemic disease which causes depapillation of tongue like diabetes mellitus, multiple sclerolosis, pseudo-hypoparathyroidism. Taste also decreases in geriatric subjects as the age progresses as it causes atrophy of taste cells.

Gustometry or measuring the taste sensation objectively includes two examination methods application of taste substances on dorsal surface of tongue & electrogustometry which is nothing but application of low level electric current to measure the nerve excitability.

Electrogustometry is a method especially useful in estimating the efficiency of sensory pathway. Taste evaluation can also be done using taste strips which contain

the taste molecules in it. To avoid the limitations like faulty taste perception, we used physiological stimuli in the form of chemical solutions to assess the presence of taste impairment. The tastants were freshly prepared at standard concentrations as sodium chloride for salt (0.01-1.0mol/l), sucrose for sweet (0.1-1.0mol/l), citric acid for sour (0.320-0.032mol/l) and quinine hydrochloride for bitter (0.01-1.0mol/l). In the present study a single investigator noted the response towards tastants in all subjects.^{7,8}

Previous studies conducted by **Soni et al.**¹, **Chaturvedi et al.**⁹ have utilized electrogustometry for assessing taste in OSMF patients. In their study they found 46% of cases showed impairment of taste sensation. Our study shows similar results where taste impairment was positive in 44% of OSMF cases.

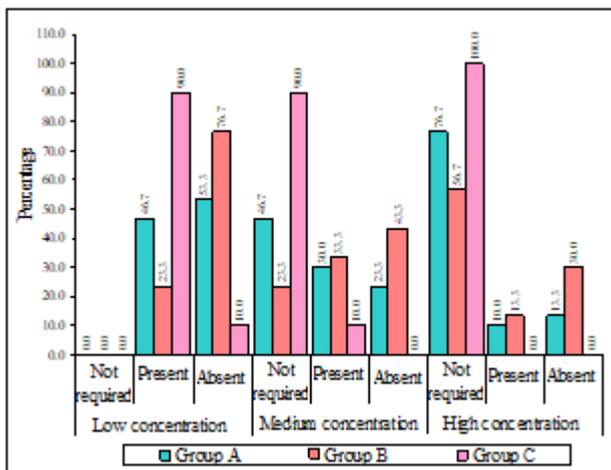
Study conducted by **Mojet et al.**¹⁰ and **Pinjelet al.**¹¹ describes that gustatory changes can occur as an aging process as well. A few other systemic diseases can also cause loss of taste perception most commonly diabetes mellitus. A study done by **Govindkar et al.**¹² concluded that sweet taste perception gets impaired in diabetes patients in relation to blood glucose level.

A study conducted by **Dyasanoor et al.**, **Deeplaxmi et al.** comparing both 45 OSMF patients with normal subjects and concluded that, sensitivity to salt taste was reduced among OSMF individuals as the disease progressed to advanced stage followed by sweet taste, sour taste and bitter taste. Results of the current study also showed similar findings where OSMF group showed delayed perception of salty taste followed by sweet and sour taste as compared with control group. The bitter taste was least affected.

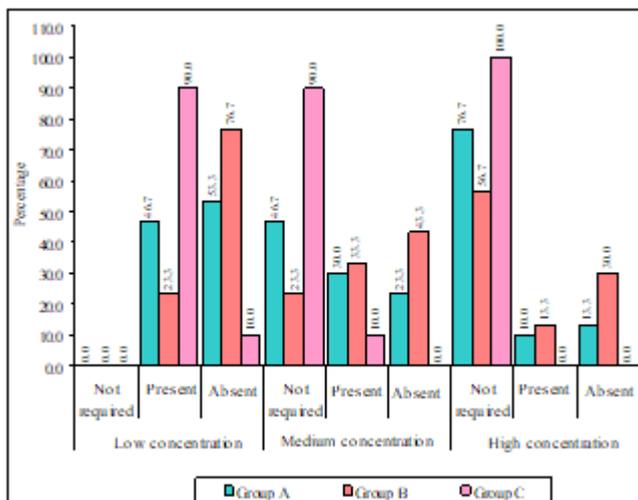
According to a study conducted by **Nishat et al.**¹⁵ among OSMF and areca nut chewers, there was significant decrease in sensitivity for salt taste followed by sour taste, sweet taste and lastly bitter taste. The findings of these studies were slightly different from the current study.

Advanced stage OSMF subjects showed more delayed response to salty, sweet taste as compared with early stage OSMF subjects. Overall delayed response to salty taste was

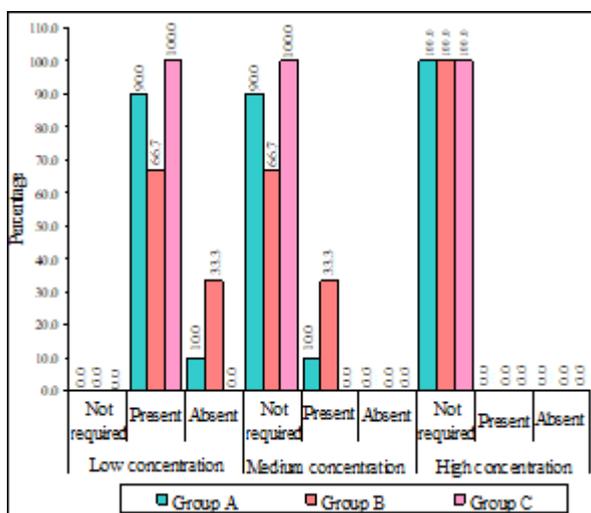
seen maximum in group B (30%) followed by group A (13.33%).For sweet taste 6.67% of group B subjects showed negative response and 10% showed delayed response whereas 3.37% of group A subjects showed delayed response.



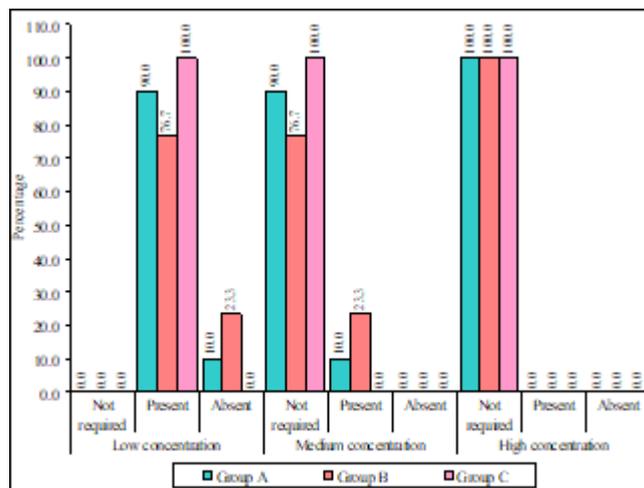
Graph 1: Comparison of three study groups (A, B, C) with respect to status of sweet at different concentrations



Graph 2: Comparison of three study groups (A, B, C) with respect to status of salt at different concentrations



Graph 3: Comparison of three study groups (A, B, C) with respect to status of sour at different concentrations



Graph 4: Comparison of three study groups (A, B, C) with respect to status of bitter at different concentrations

Taste impairment in OSMF group was seen maximum with salty taste. Among 60 OSMF subjects altered salty taste was seen in 44%, altered sweet taste was seen in 17%, altered response to sour taste was seen in 10% and altered bitter taste was seen only in 3% of cases. Advanced stage OSMF cases showed maximum altered taste response towards salty taste which was 30% and only 13.33% of early stage OSMF cases. Delayed response was seen in advanced stage OSMF patients towards sour taste which was only 3.33%. On comparing bitter taste response of case group was similar to control group.

In this study the taste perception was severely affected in advanced OSMF cases. This might be due to increased amount of atrophy & inflammation of taste cells in advanced cases of OSMF. Atrophy in the specific area will cause alteration in taste related to that region. In the current study maximum impairment of taste sensation towards salty taste was seen which is associated with atrophy or depapillation of lateral border of tongue in patients with advanced stage OSMF where 9 subjects showed complete loss of salty taste sensation whereas in early stage OSMF only 4 patients showed complete loss of taste sensation out of 30 subjects.

We acknowledge limitations in our study, as we could have compared different methods of gustometry like electrogustometry and physiological stimuli. Two examiners to assess the taste for the same patient would have reduced any kind of subjective bias. A larger sample size and a longitudinal study would have given us more objective outcome.

4. Conclusion

The present study showed that altered taste sensation is a common clinical symptom among OSMF cases. Our study has shown a positive increase in impairment of taste sensation with increase in severity of OSMF especially to salt taste. Hence, we being Oral Physicians should not overlook this clinical feature. Alteration in taste perception does affect an individual's quality of life in terms of reduced interest to have food or to avoid a certain type of food which might result in imbalanced diet. Severe cases and long term altered taste sensation can cause cachexia and depression. It

is usually treated with institution of proper balanced diet with additional Zinc supplements. Hence treatment of OSMF should focus on overall well being of an individual by treating his impaired taste sensation as well. Advising the patient to have a balanced diet, supplementing him/ her with Zinc will probably improve his altered taste sensation. If the patient is hypertensive along with OSMF then salt restricted diet should be advised to reduce the electrolyte imbalance or any further complications which might occur due to heavy salt intake. Improved taste sensation will further prevent complications such as depression and cachexia among these patients. Longitudinal studies with larger sample size wherein pre and post treatment of altered taste sensation with Zinc supplements among OSMF cases might be required to compulsorily add Zinc in treatment of OSMF especially advanced cases.

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