

Altered Taste Perception in Oral Submucous Fibrosis: A Research

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ABSTRACT

The sense of taste is among the regulatory mechanism for acceptance or rejection of foods. In oral submucous fibrosis (OSMF) patients, impairment of taste sensation has not received much attention, owing to limited research work in the field. This study was conducted to analyze the taste impairment in OSMF patients by using four basic tastes: Sweet, sour, salty and bitter, among a group of 30 subjects by using physiological taste stimuli tastants. In OSMF, significant taste alteration was found with sweet followed by salt, bitter and sour.

Keywords: Oral submucous fibrosis, Gustatory function, Dysgeusia, Taste buds.

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INTRODUCTION

Oral submucous fibrosis (OSMF) was described in 600 BC by Sushruta and was named 'VIDARI'. In 1952, Schwartz coined the term 'atropica idiopathica mucosae oris'. Subsequently, in 1953 Joshi coined the term 'oral submucous fibrosis' for this condition.¹

OSMF is known to be prevalent in countries like India, Pakistan, Taiwan, China, Malaysia and Singapore.² Overall prevalence of OSMF in India is about 0.5% with a range of 0.2 to 1.2% in different regions of the country.³ It has been suggested that, chewing areca nut and tobacco may be involved in the pathogenesis of this condition.⁴ The progressive inability to open the mouth due to fibrotic mucosal alteration, symptoms like burning sensation, difficulty in eating swallowing and phonetics⁵ are of great concern to the patients.

The major disabilities like trismus and odynophagia that occur in the patient with OSMF are well-documented but impairment of the taste sensation have not received much attention.⁶

Therefore, we decided to carry out a study on taste impairment by using liquid tastant for four basic tastes: Sweet, salty, sour and bitter. The study was performed by whole-mouth rinse and spatial or localized tests. This study was conducted to evaluate the gustatory functions of

subjects with clinically diagnosed OSMF and to compare with a control group involving normal healthy adults.

MATERIALS AND METHODS

This study was performed on 30 male subjects in the age group ranging from 18 to 45 years. All the subjects were randomly selected from Department of Oral Medicine and Radiology, Rungta College of Dental Sciences and Research, Bhilai. An informed consent was taken from the individual (study and control group), who participated in the study. The subjects were divided into study group (n = 15) with clinically diagnosed OSMF (stage II) patient with a given history of chronic chewing of areca nut with tobacco for at least ≥ 5 years of duration and control group (n = 15) with healthy individuals of same age and gender devoid of any systemic illness, without any deleterious habit. Subjects with systemic diseases like diabetes mellitus, hypertension and peripheral neuropathies were excluded from the study group.

Four different solutions for four basic tastes (sweet, salty, sour and bitter) in three different concentrations (low, medium and high) were freshly prepared for gustatory testing. Sucrose for sweet (0.1-1.0 mol/l), citric acid for sour (0.320-0.032 mol/l), quinine hydrochloride for bitter (0.01-1.0 mol/l), sodium chloride for salty (0.01-1.0 mol/l) were used. Two different tests, first being spatial or localized, and second being whole-mouth rinse tests were performed.

For spatial/localized testing, the four different tastants in three progressively increasing concentration were directly applied with a cotton swab over the taste buds on the dorsum of the tongue, approximately for 5 seconds and taste intensity response score was recorded.

For whole-mouth rinse test: Three sets of different concentrations (5 ml each) of the same tastant were prepared and each taste solutions was randomly arranged with two cups of 5 ml of distilled water. The subjects were asked to sip and rinse for 10 seconds and then to spit it. Then, they were asked to identify the taste (sweet, salty, sour and bitter or tasteless) and intensity of the taste was noted. If subject was unable to identify the taste, another row with the next higher concentration of the taste solution was given. This procedure was carried out in the same way for all the four

taste taster in an individual, followed by distilled water rinse which preceded each different taste solutions.

The scorings were recorded based upon 'low concentration' as 1 to 3, 'medium concentration' as 4 to 6, 'high concentration' as 7 to 9. The data obtained was tabulated and analyzed by unpaired t-test. $p < 0.05$ was considered statistically significant.

RESULTS

In this study, 30 male subjects aged between 20 to 44 years with the mean age of 29 years were present. Result showed that delayed perception with sweet followed by salt, bitter and sour as compared with control. In one subject (20 years) severe hypogeusia to sweet taste was observed. It was also observed that altered taste perception was increasing with severity of OSMF. Table 1 indicates the data of significance difference between the study and control group. Table 2 shows study group results with different concentration.

In this study, all OSMF patients showed marked early response to sour taste (93.3%) with both spatial as well as whole-mouth rinse test. In four of the subjects, delayed response to sweet taste was seen; whereas in three other

subjects, decline sensitivity to bitter taste and salty in four other subjects was noted.

DISCUSSION

Gustation is an important chemical sense and its disturbances like dysgeusia can be very distressing.⁷ Taste is the main sensory system that keeps a check on ingested food; human beings are able to recognize four basic tastes, i.e. sweet, salt, sour and bitter.⁸ Taste is a function of taste buds in the mouth. The texture of food and the presence of substances like pepper stimulates pain receptors greatly in condition to the taste experience.^{9,10}

Experimental evidence suggests that each neurologically distinct component of the taste system responds independently to each of the four taste stimuli and that clinical example representing inability to detect or recognize a particular taste might represent different pathologic states. While patient sometimes describe their inability to taste one quality without loss of sensation for the other three, these symptoms are rarely confirmed by demonstration of specific taste loss. Likewise few reports confirm loss of specific taste as a manifestation of particular pathologic state.¹¹

Table 1: The 't' and 'p'-values of study and control groups

Taste	Groups	Mean	SD	t-value	p-value
Sweet	Study group	7.67	0.72	6.38	<0.00001
	Control group	8.93	0.26		
Salt	Study group	7.8	0.77	5.37	<0.0001
	Control group	8.93	0.26		
Sour	Study group	7.33	1.18	2.95	<0.01
	Control group	8.47	0.97		
Bitter	Study group	7.07	1.67	2.75	<0.01
	Control group	8.33	0.62		

Table 2: Study group results with different concentration

Case no.	Age (years)	Gender	T1—sweet			T2—salt			T3—sour			T4—bitter		
			C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3
01	35	Male	1	0	0	2	1	0	1	0	0	1	0	0
02	40	Male	2	1	0	1	0	0	2	1	0	2	1	0
03	20	Male	2	2	1	2	1	0	1	0	0	1	0	0
04	24	Male	1	0	0	1	0	0	1	0	0	2	0	0
05	23	Male	1	0	0	1	0	0	1	0	0	1	0	0
06	44	Male	1	0	0	2	1	0	1	0	0	1	0	0
07	33	Male	1	0	0	1	0	0	1	0	0	1	0	0
08	29	Male	1	0	0	1	0	0	1	0	0	2	1	0
09	31	Male	1	0	0	2	1	0	1	0	0	1	0	0
10	28	Male	2	1	0	1	0	0	1	0	0	1	0	0
11	28	Male	1	0	0	1	0	0	1	0	0	1	0	0
12	30	Male	2	1	0	1	0	0	1	0	0	1	0	0
13	22	Male	1	0	0	1	0	0	1	0	0	1	0	0
14	23	Male	1	0	0	1	0	0	1	0	0	1	0	0
15	25	Male	1	0	0	1	0	0	1	0	0	1	0	0

1: Present; 2: Absent; 0: Not required to perform test because results obtained with previous test; C1: Low concentration; C2: Medium concentration; C3: High concentration

In present study, physiological stimuli tastants were used for testing taste whereas studies done by Soni et al and Chaturvedi et al revealed impairment of taste in OSMF patient with use of electrogustometry method.^{6,12}

It is generally assumed that decline in taste sensitivity occur after the age of 60 years. Mojet et al¹³ and Pinjel¹⁴ described that changes in the gustatory sensation can also occur as an aging process. According to Winkler et al¹⁵ sensitivity to salty and bitter tastes declines with age. Govindkar et al¹⁶ reported that taste impairment was found in patient with diabetes mellitus suggesting altered sweet taste perception in relation to blood glucose level. Considering the above facts, subjects of this study were confined in an age group from 20 to 44 years and free from systemic diseases.

Taste receptor cell found in the taste buds are located in the mouth, throat, larynx and esophagus.¹⁷ Taste dysfunction may be due to inflammation and infection in oral cavity that reduces blood flow to the tongue and interferes with saliva production^{2,18} and leads injury to the cell receptors or atrophy of taste buds. In this study, the alteration in the taste perception with severity of OSMF showed a significant difference, this might be due to the reason that OSMF inflammation and atrophy increases as the stages advances.^{4,5,18}

Atrophy in the specific area will cause alteration in taste related to that region. In this study sweet taste sensitivity was more affected, suggestive of more common and severe depapillation in anterior region of tongue¹⁹ due to chewing habit.

Significant difference between study and control group for taste impairment established, 'altered taste perception' as a subjective sign of OSMF. This test is recommended for clinical assessment of taste perception, as the procedure is easy to handle, inexpensive and solutions can be self-made.

Being this a pilot study the sample size was small only. Male subjects of stage II OSMF patients were included as the patients reported at the time of study did not perform any scientific tests for xerostomia, so to overcome these limitations more research should be performed with a larger sample size to justify the results.

CONCLUSION

The present study demonstrated altered taste perception in OSMF patients, related to sweet, salt, bitter and sour taste, by using physiological stimuli tastants. Aside from increasing risk of cancer the change in taste perception in OSMF patients often leads to depression, anorexia and weight loss. This study led to consider that both sensory

stimuli caused by a lesion and the patients perception (or interception of the significance) of those stimuli must be considered by the clinician who is evaluating the patients sensory complaint. It is also prime important to institute proper balance diet as a part of the overall treatment of OSMF with other modes of treatment.

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