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Research Article

Co relation of areaca nut / betal nut, tobacco and alcohol consumption with OSMF – a case control study

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Abstract:

BACKGROUND: Oral submucous fibrosis (OSMF) is a chronic, progressive, scaring high risk precancerous condition of the oral mucosa seen primarily in the Indian subcontinent and in South East Asia. The exact etiology of OSMF is not well understood. Various factors are being studied such as genetic, autoimmune, nutritional and environmental agents. The increasing use of pan masala/gutkha, a mixture of tobacco and a less moist form of betel quid lacking the betel leaf, is associated with an earlier age of onset of OSMF which may play role in initiation and progress of this condition.

AIM AND OBJECTIVES: The aim of this study was to investigate the role of various oral chewing habits in etiology of OSMF and objectives was to investigate the risk of betel quid chewing with or without cigarette smoking, alcohol consumption on OSMF and other mucosal lesions. Also to co – relate the effect of duration and frequency of these habits with severity of the OSMF condition.

MATERIALS AND METHODS: The study group comprised of 120 patients of OSMF and 120 age and gender matched patients were taken as control. Study subjects were drawn from the patients attending the outpatient department of Oral Medicine and Radiology, for different complaints and clinically diagnosed cases of OSMF were included. Diagnosis of OSMF was made on basis of history and clinical features of OSMF that includes mucosal blanching, burning sensation, restricted mouth opening and presence of fibrous bands. A predetermined data sheet was used to record the complete history, including various oral habits – the frequency, duration, and type (areca nut, pan masala, betel quid) along with tobacco, smoking and alcohol habits with the clinical findings. After that biopsy was taken from representative site and was sent for histopathological examination for confirmation.

Results: The maximum number of cases was in the age range of 21-30 years (35.8%). The mean age in case group was 33.59 ± 11.51yrs. The male to female ratio of OSMF was 6.05:1. It was found that chewing areca nut/quid or pan masala was directly related to OSMF, with the risk being greatest for pan masala, chewed by a comparatively younger age group and was associated with OSMF changes earlier than areca nut/quid chewing. However, chewing or smoking tobacco, alcohol with various other chewing habits did not increase the risk of developing OSMF.

Keywords: OSMF, Scaring, Pan masala, Gutkha, Betel Quid, Biopsy.

INTRODUCTION -

Oral sub mucous fibrosis(OSMF)is a chronic, progressive, scaring high risk pre-cancerous condition involving the oral mucosa, seen primarily on the Indian subcontinent and in south East Asia. The condition is characterized by excessive production of collagen leading to inelasticity of the oral mucosa, reduction in vasculature and atrophic changes of the oral epithelium.[1, 2]

The pathogenesis of OSMF is multifactorial and enigmatic. The etiological factors implicated are areca nut chewing, excessive chilly consumption, vitamin B complex & iron deficiency, autoimmunity, altered salivary constituents, genetic and environmental factors.[3]

Various chewing habits (Areca nut/betel nut, betel quid, gutkha, pan masala with or without tobacco) are associated with OSMF in India and an increased uptake of this habits by young people is due to easy access, affordable price ranges, and marketing strategies.[4,5]

Areca nut/betel nut is possibly the second most consumed carcinogen after tobacco in the Indian subcontinent. In India, there are regional variations in the type of areca nut products used. Areca nut is chewed for variety of reasons such as stress reliever, mouth freshener, concentration improver and a

digestive following food.[6] The areca nut contains many alkaloids, arecoline being the most abundant, which have been shown to stimulate collagen synthesis by fibroblasts.[1]

Tobacco in both smoked and smokeless forms have been associated with oral cancer for many decades. Tobacco products are complex mixtures of chemical constituents, many of which have carcinogenic or toxic properties. Tobacco chewing along with various ingredients like areca nut, catechu, lime, cardamom, permitted spices, unspecified flavouring agents have been reported to possess cytotoxic, mutagenic and genotoxic properties.[7] Alcohol has been found to increase the risk of Oral premalignant lesion (OPL) in the presence of tobacco, but the independent association between alcohol and OPL remains unclear. After adjustment for tobacco use, some case-control studies observed a 2 to 3 fold greater risk of leukoplakia, oral submucous fibrosis, erythroplakia and oral epithelial dysplasia, whereas others found no independent associations between alcohol and OPL. Alcohol is a promoter rather than an initiator, but doubles the risk of malignant transformation. Indeed, there is strong evidence that alcohol is an independent risk factor for oral cancer.[8]

Many patients with OSMF give a history of chewing areca nut, pan masala, betel quid, gutkha and tobacco. Therefore it was felt that its role in the etiology of OSMF needs to be investigated. Hence this hospital based case control study was carried out to describe demographic and clinical characteristics and to ascertain the association of different chewing habits, smoking and alcohol use in the causation on OSMF.

Material and Method

The study group comprised of 120 clinically and histopathologically diagnosed cases of oral submucousfibrosis and 120, Age and gender matched individuals without any oral mucosal lesion or condition and with or without any deleterious habit, were taken as control. Thorough clinical examination was done in all the patients. Diagnosis of OSMF was made on basis of history and clinical features of OSMF that includes mucosal blanching, burning sensation, restricted mouth opening and presence of fibrous bands. Histopathological examination was done in OSMF patients following incisional biopsy. Information was given to all the participants regarding the need and design of the study, and the need for undergoing clinical and histopathological examination. Patient consent was obtained for all case and controls, and a comprehensive clinical history was taken and recorded in a predetermined form. Complete history, including the various oral habits – the frequency, duration, and type (areca nut, pan masala, betel quid) – along with tobacco and alcohol use,was recorded, The study was approved by the ethical committee of Institute of Dental Sciences, Bareilly

STATISTICAL ANALYSIS

Statistical analysis of the data was done using the statistical package for the social science (SPSS 17.0). $P< 0.05$ considered as statistically significant. The data was compiled using Microsoft excel sheet (windows 2007). Relative risks (odds Ratio) and chi-square statistics for linear trends were calculated at 5% level of significance (95% confidence interval) using (SPSS 17.0).

RESULT

A total number of 240 patients were involved in the study out of which 120 were OSMF patient and 120 were in control group. The minimum age among the case group was 17 yrs and 13 yrs in control group and maximum age was 65 yrs in both the groups. The maximum numbers of cases were in the age range of 21-30 years (35.8%). The mean age in case group was 33.59 ± 11.51yrs and 33.25 ±11.39 yrs was in control group. There were 103(85.8%) male and 17(14.1%) female in both the groups, the ratio of male to female being 6.05 :1 in both groups and there was no significant difference in age and sex in case and control group(Table 1).

There were 12(10%) persons having habit of chewing nut / quid, 16(13.3%) habit of chewing nut /quid + tobacco, 23(19.2%) habit of chewing pan masala and maximum 51(42.5%) habit of chewing pan masala + tobacco, 6(5%) habit of chewing quid + smoking, 4(3.3%) habit of chewing pan masala + smoking + alcohol and 8(6.7%) habit of chewing pan masala + tobacco + smoking + alcohol in case group. In control group 49(40.8%) persons having no habits of chewing, 16(13.3%) persons having habit of chewing nut / quid, 5(4.2%) habit of chewing nut /quid + tobacco and pan masala and 6(5%) have habit of chewing pan masala + tobacco, 15(12.5%) habit of smoking, 10(8.3%) have habit of taking alcohol, 5(4.2%) having a habit of quid + smoking, 4(3.3%) chewing pan masala + smoking + Alcohol and 5(4.2%) taking Pan Masala + Tobacco + Smoking + Alcohol in control group. There was significant difference in between case and control group in chewing habit of Nut /quid + Tobacco, Pan masala and Pan masala + Tobacco, (Table 2)

There were 2(5.9%) chewers of Nut/Quid and 09 (10.5%) of Pan masala in age group 11-20 yrs, maximum 16 (47.1%) chewers of Nut/Quid and 27 (31.4%) of Pan masala in age group 21-30 yrs and 11 (32.4%) chewers of Nut/Quid and 25 (29.1%) of Pan masala in age group 31- 40 yrs, 03 (8.8%) chewers of Nut/Quid and 18 (20.9%) of Pan masala in age group 41- 50 yrs and 02 (5.9%) chewers of Nut/Quid and 07 (8.1%) of Pan masala in age group >50 yrs. There was significant difference in between age group of 11-20 yrs, 31-40yrs and 41-50 yrs, areca nut/quid and pan masala chewers (Table 3).

There were 35(29.2%) persons having of chewing habits occasional, 47(39.2%) persons having of chewing habits 2-3 times / day, 18(15.0%) persons having of chewing habits 4 -5 times / day and 20(16.7%) persons having of chewing habits almost continuous in case group and 21(45.7%) persons having of chewing habits occasional, 13(28.3%) persons having of chewing habits 2 – 3 times / day, 8(17.4%) persons having of chewing habits 4 -5 times / day and 4(8.7%) persons having of chewing habits almost continuous in

control group (Table 4).

Relative risk of OSMF related to the total duration of chewing habits in case and control group was 3.24(not significant) which was highest in (1-3) years duration of habit (Table 5).

Table 1.Age & Sex distribution

Age groups(yrs)	CASES			CONTROLS		
	Male	Female	Total	Male	Female	Total
11- 20	11	00	11	11	00	11
21- 30	38	05	43	38	05	43
31- 40	32	04	36	32	04	36
41- 50	16	05	21	16	05	21
>50	06	03	09	06	03	09
Total	**103**	**17**	**120**	**103**	**17**	**120**
Mean ± S.D	**33.59 ± 11.51**			**33.25 ±11.39**		
Median	**33**			**33**		

*P > 0.05 not significant.

Table 2. Chewing habits

Habits	Cases		Controls		p-value
	Number	%	Number	%	
No habits	00	0	49	40.8	
Nut / quid	12	10.0	16	13.3	0.4498
Nut /quid + Tobacco	16	13.3	05	4.2	0.0163*
Pan masala	23	19.2	05	4.2	0.0006*
Pan masala + Tobacco	51	42.5	06	5.0	0.000*
Smoking	00	0	15	12.5	
Alcohol	00	0	10	8.3	
Quid + Smoking	06	5.0	05	4.2	0.7629
Pan Masala + Smoking + Alcohol	04	3.3	04	3.3	1.000
Pan Masala + Tobacco + Smoking + Alcohol	08	6.7	05	4.2	0.4054
Total	120	100.0	120	100.0	

*P < 0.05 consider statistically significant

Table 3. Age groups of Areca nut/quid and Pan Masala chewers

Age group(years)	Areca nut/quid	Pan masala	Total	p-value
11- 20	02 (5.9%)	09 (10.5%)	11 (9.2%)	0.0347*
21- 30	16 (47.1%)	27 (31.4%)	43 (35.8%)	0.0934
31- 40	11 (32.4%)	25 (29.1%)	36 (30.0%)	0.0196*
41- 50	03 (8.8%)	18 (20.9%)	21 (17.5%)	0.0016*
>50	02 (5.9%)	07 (8.1%)	09 (7.5%)	0.0955
Total	34	86	120	

*P < 0.05 consider statistically significant

Table 4. Frequency of chewing habits

Frequency of chewing habits	Cases		Controls		p-value
	Number	%	Number	%	
Occasional	35	29.2	21	45.7	0.0614
2 – 3 times / day	47	39.2	13	28.3	0.000*
4 -5 times / day	18	15.0	08	17.4	0.0499*
Almost continuous	20	16.7	04	8.7	0.0011*
Total	120	100.0	46	100.0	

*P < 0.05 consider statistically significant

Table 5. Relative risk of OSMF related to the total duration of chewing habits

Duration of habits (years)	Cases	Controls	Relative risks in comparison to < 1 year (odds ratio)	95% Confidence interval
	No	No		
< 1	14	11		
1- 3	33	08	3.24*	1.0739-9.7821
3- 5	21	08	2.06*	0.6634-6.4127
5- 10	34	10	2.67*	0.9268-7.7005
10- 20	10	05	1.57*	0.4145-5.9578
>20	08	04	1.57*	0.3735-6.6110
Total	120	46		

*Not significant

DISCUSSION

OSMF is regarded as a precancerous condition and shows a significant tendency to develop cancer. Therefore, it is also equally important to detect and control the premalignant lesions and conditions.[9]

Oral Submucous Fibrosis represents a general pathological state of the oral mucosa which is associated with a significant increased risk of cancer. As it is descriptive of a precancerous condition, so it becomes important to recognize the disease at early interval and intercept its progression.[10] The peculiarity of the disease is that it is confined to a particular geographic region. This has led to the concept that dietary or cultural habits prevalent in these regions act as the aetiological factors.[11]

Recent rise in oral submucous fibrosis in globalised world in general and India in particular has been attributed to rise in the consumption of commercially available areca nut, aggressive marketing and the increase in the popularity of its various products. Several investigators have studied the effects of constituents of areca nut, such as arecoline and arecaidine, on oral fibroblasts in vitro, in order to elucidate the etiopathogenesis of oral submucous fibrosis.[12,13,14,15]

Our study showed a high preponderance of OSMF in males (6.05:1). Increased uptake of this habits by male individuals was due to areca nut was chewed for variety of reasons such as stress reliever, mouth freshener, and concentration improver.[6] Similar result with a male preponderance reported by Shah et al (1998), Rangananthan k et al (2004).[1,4]

The ratio of female affected from OSMF was less, may be due to strong social and cultural influences in the Indian population.[2] A case control study by Maher et al (1994) reported a higher female prevalence.[16]

In this present study both areca nuts/quids and pan masala chewing (with or without tobacco) were found to be related to OSMF when compared with the controls. However, it was observed that pan masala chewing was preferred by people in the younger age group (21 – 30 years). Increased uptake of this habit by younger people was due to easy access, effectives

price range and marketing strategies.[5]

The role of chewing tobacco along with areca nut/quid and pan masala was not found to be significant. This finding was surprising since tobacco chewing had been shown to cause oral leukoplakia and cancers. Our finding was in direct contrast to that reported by Khadim et al.[17] who found the risk to be increase from 4 to 29 when betel quid was chewed without and with tobacco.

In present study, it was found that pan masala with tobacco chewing was preferred over pan masala without tobacco and comprised the largest single group amongst the cases. This may be due to the intoxicating property and added flavor and taste of tobacco in the mix. However, no difference in relative risk was observed when pan masala was chewed without and with tobacco

As the role of smokeless tobacco, similarly the role of smoking tobacco, role of alcohol in the causation of OSMF was not found to be statistically significant. Also, smoking and drinking alcohol alone was not found in a single case of OSMF. Thus it can be concluded that smoking and alcohol consupmtion is not directly related to the etiology of the disease. Interestingly, in control group 15 people had only a smoking habit. Smoking is recognized to be directly associated with the development of leukoplakia, erythroplakia.[18] however, to date it had not been found to be an etiologic factor for OSMF, which was supported by our results.

In the present study not a single case was found who did not practice any form of chewing habit. Where as in the control group, 49 subjects did not have any chewing habit. This was a very significant finding since it proves, beyond any doubt, that the chewing habits is essential to trigger changes leading to fibrosis in susceptile individuals.

The present study provided somewhat different results in terms of role of areca nut chewing in causing OSMF compared with studies in India by Angadi P.V et al (2011), Rangananthan k et al (2004), and Pakistan by Maher R et al (1994).[3,16,19] This may be due to the fact that the number of individuals chewing areca nut alone in present cohort is limited.

CONCLUSION

The result confirms the strong association between areca nut use and OSMF and the increasing use of pan masala in place of the conventionally used areca nut. Pan masala affects OSMF changes in approximately half time taken by quid chewing. Quicker onset of OSMF in younger age group and high prevalence in males was also reported. Chewing tobacco along with quid or pan masala was not found to be additional significant factors in the etiology of OSMF. Smoking and alcohol consumption also had no role in etiology of OSMF. This places dentists in a central position for educating those at risk for OSMF and ultimately preventing this disease.

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