

ORIGINAL ARTICLE

Prevalence and biosocial determinants of Potentially Malignant Disorders of Oral Soft Tissue in slum population of Western Uttar Pradesh

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Abstract

Background: Oral cancer ranks in the top three of all cancers in India, which accounts for over thirty per cent of all cancers reported in the country and oral cancer control is quickly becoming a global health priority. Early diagnosis is the most important single factor in combating oral cancer and improving the survival rate. **Aim and objectives:** To find out the prevalence of potentially malignant disorders (PMDs) of oral soft tissues in above 15 years age population and to find the biosocial determinants of PMDs of oral soft tissues. **Material & Methods:** Community based, cross sectional study, carried out in a randomly selected urban slum area of Agra, among 1254 individuals of more than 15 years of age. The individuals were interviewed, and oral cavity was examined to detect the PMDs of oral soft tissues. **Results:** The prevalence of PMDs of oral soft tissues was found 16.45%. Prevalence of sub mucosal fibrosis (SMF) is 10.61% followed by leukoplakia (5.11%) and erythroplakia 0.72%. Prevalence of PMDs in males is 23.22% which is much higher than females 8.24%. Prevalence of SMF is much higher in illiterates 19.01%. Unemployed individuals showed lower prevalence of PMDs i.e. 14.73% in comparison to semiskilled laborers 47.56%. PMD prevalence is higher in lower social classes 17.55%. **Conclusion:** Prevalence of PMDs is higher in males and illiterates. PMDs of oral soft tissues showed statistically significant increase in prevalence with advancing age. Statistically significantly lower prevalence is found in unemployed and housewives. Prevalence is high among laborers and lower social classes.

Keywords

Potentially Malignant Disorders; Oral Soft Tissues; Oral Cancer; Sub Mucosal Fibrosis; Leukoplakia; Erythroplakia

Introduction

Oral cancers are sixth most common cancer in the world (1). Oral cancer typically tends to be preceded by a premalignant state for long time. A significant number of these cases would present initially with precursor lesions that are further classified as

precancerous lesions and conditions. World Health Organization in 2005, decided to use the term 'potentially malignant disorders' (PMD) as it conveys that not all disorder described under this term may transform into cancer (2). In India tobacco alone is responsible 1.5 lakh cancer cases every year (3). It is also estimated that around 43% of cancer deaths are

due to tobacco use, alcohol consumption, low level physical activity, unhealthy diet and infections (4). Use of betel quid with areca nut, tobacco, aqueous calcium hydroxide and some spices are accepted socially and culturally in many parts in India.

In India, 47% of individual having age 15 years or more, are found using tobacco in various forms (5). Tobacco and alcohol consumption have been positively associated with oral lesions such as oral submucous fibrosis (OSMF), leukoplakia, erythroplakia, oral lichen planus, nicotine stomatitis smoker's melanosis, tobacco pouch keratosis, palatal lesions of reverse smoker's etc (6,7,8). Oral submucous fibrosis (OSMF) is a high risk precancerous condition. Prevalence of oral submucous fibrosis (OSMF) in various Indian studies is reported to be 0.03% to 3.2% (9,10,11,12). Leukoplakia is more evident in tobacco and areca nut related compounds chewers than non-chewers. Areca nut chewers are predisposed to precancerous conditions early as compared to tobacco chewers (13).

Most 'potentially malignant disorders' (PMD) are asymptomatic and the main aim of treatment is to prevent and/or to detect cancer devolvement early. PMD is an important spectrum of diseases that need to be identified and followed up closely. Correct identification of their malignant potential may help in early diagnosis and treatment of oral cancers and down staging of disease. Clinical and histopathological examination remains the gold standard for detection of oral cancers.

Early diagnosis and treatment remains the single most important factor easily available yet underutilized to combat the oral cancer menace and improve their survival rate.

Aims & Objectives

To find out the prevalence and biosocial determinants of PMDs in oral soft tissues in urban slums of Agra city of western Uttar Pradesh.

Material & Methods

It is community based cross sectional study carried out in urban slum area of Agra city of Western Uttar Pradesh from June 2014 to December 2015. Study participants are individuals of 15 years and above age group. Sample size was calculated using prevalence of oral soft tissue lesions as 8.40%, at 95 % confidence interval and allowable error as 20% of prevalence (14). Thus, on calculating by formula $n = Z^2pq/d^2$ where, $Z = 1.96$, $p = 8.40\%$, $q = 100 - p$,

$d = 20\%$ of p , a figure of 1090 is obtained and adding 15% (164) for non-respondents and incomplete interview and examination forms, sample size of 1254 individuals above 15 years of age is obtained.

Multistage random sampling technique was used to collect the sample size of 1254 individuals. Agra city is divided into 90 municipal wards, out of which one municipal ward Okharra was selected in first stage and further from the selected ward, one slum New Abaadi Okharra was selected randomly in second stage of sampling. On reaching the centre of selected slum first household was selected randomly using pencil rotation method. The left hand rule has been followed to reach the subsequent household in continuation.

All the individuals fulfilling the inclusion criteria present in each household have been interviewed and examined till the desired sample size was attained. After taking informed written consent from each individual necessary information was collected using a pre-tested and semi-structured questionnaire. All necessary precautions like wearing of gloves, using separate tongue depressors for each individual, have been taken while examining the oral cavity in broad daylight and torchlight. Results of oral cavity examination were communicated to all individuals and all persons having PMDs were referred to dental OPD of SN Medical College, Agra for further assessment.

Inclusion criteria: All male and female age 15 years and above, residing in the selected urban slum of Agra for more than 6 months.

Exclusion criteria: Individuals who refused to participate in study, seriously ill individuals, already diagnosed case of oral cancer and individuals residing in the study area for less than 6 months.

Research has been conducted according to the principle of the Declaration of Helsinki. Appropriate ethical clearance has been taken from the institution.

Data thus collected was entered on MS Excel sheet in computer and analyzed electronically. Test of significance has been applied wherever needed. Out of 1254 questionnaires, 1234 questionnaire were complete in all respect. 20 questionnaires were found to be incomplete and were discarded. Thus completed data from total of 1234 individuals has been used for the analysis purpose.

The researcher has been trained formally by a dental surgeon and ENT surgeon for 15 days in dental surgery and ENT department of Sarojini Naidu

Medical College and Hospital, Agra, to examine oral cavity, identify and appreciate the potentially malignant disorder of oral soft tissue. Occasionally medical consultant also visited the study site and guided the researcher.

Operational Definitions:

Oral Cavity: Oral cavity extends from vermilion border of lips to plane between junction of hard palate and soft palate. It includes lips, buccal mucosa, gingiva, retro-molar trigon and hard palate.

Oral cancer: Term is used in place of oral malignant lesions. These are predominantly squamous cell carcinoma. Precancerous conditions: It is generalized state of oral cavity associated with significantly increased risk of cancer. E.g. sub-mucous fibrosis, lichen planus, discoid lupus erythematosus, epidermolysis bullosa.

Precancerous lesions: It is morphological altered tissue in which oral cancer is more likely to occur than in its normal counterparts. E.g. leukoplakia, erythroplakia, palatal lesions in reverse smokers.

Oral sub mucus fibrosis (OSMF): Oral sub mucosal fibrosis is a chronic disorder characterized by fibrosis lamina propria and sub mucosa with an increasing loss of tissue mobility. It is associated with areca nut chewing, ingestion of chillies, nutritional deficiencies, genetic and immunological process.

Leukoplakia: It is most common pre-cancerous lesion associated with smoking and /or tobacco chewing. WHO working group defines leukoplakia as 'a white patch or plaque that cannot be characterized clinically, pathologically as any other disease'.

Erythroplakia: Any lesion of oral mucosa that presents as bright red velvety plaque which cannot be characterized clinically or pathologically as any other recognized condition.

Results

Out of total 1234 participants of the study 45.20% were females and 54.80% were males. Highest number 433 (35%) of individuals were in 15-24 years of age group followed by 285 (23.10%) in 25-34 years of age group. Most of the participants were Hindu 57.54% followed by Muslims 40.76% by religion. Majority were educated upto primary and junior high school 44%, followed by illiterate 24.70%. Most of the male participants 38.54% were laborers, followed by unskilled 17.90%, semi-skilled 6.64% and skilled 14% workers, whereas mostly 88% female

were housewives. Majority 68% participants belonged to upper lower social class.

[Table 1](#) describes the overall prevalence of potentially malignant disorders (PMDs) of oral soft tissues in study population was 16.45%. The most common variety of premalignant oral soft tissue lesion was sub mucosal fibrosis (SMF) in 10.62% study participants, followed by leukoplakia in 5.10% and erythroplakia in 0.72%. No case of erythroplakia was observed below 45 years of age. Age specific prevalence of PMDs shows positive associations with increasing age of study participants. There is statistically highly significant rise in prevalence of PMDs as age advances ($p=0.0001$). Sub mucosal fibrosis shows significant positive association with advancing age ($p=0.0001$). Prevalence of leukoplakia and erythroplakia does not show any significant positive association in the increase in age ($p=0.34$, $p=0.891$).

[Table 2](#) describes the prevalence of PMDs among male 23.22% was higher than females 8.24%, gender wise difference found to be statistically highly significant ($p=0.0001$). PMDs were observed more in Muslims 18.09% than Hindus 15.21% though this difference is not statistically significant ($p=0.390$).

[Table 3](#) describes the prevalence of PMDs is higher among illiterates 25.24% and shows a statistically highly significant decrease in PMDs prevalence in the increasing educational status ($p=0.001$). Prevalence of SMF is statistically significantly high among illiterates 19.01% as compared to other groups of literates ($p=0.0001$).

[Table 4](#) describes prevalence of PMDs is significantly lower in unemployed group (14.73%) as compared to other group of employment ($p=0.002$). High prevalence of PMDs among semi-skilled laborer (47.56%) and clerks/shopkeepers (43.90%) statistically significantly associated with their occupation ($p=0.0001$).

[Table 5](#) describes socioeconomic class as per Modified Kuppuswami socioeconomic status scale, 2012 shows higher prevalence of PMDs in lower classes 17.5% and upper middle class 23.61% as compared to upper class and lower middle class this difference is highly significant statistically ($p=0.00001$).

Discussion

In the present study, overall prevalence of potentially malignant disorders of oral soft tissue in the population above 15 years age was 16.45%

leukoplakia, erythroplakia and sub mucosal fibrosis (SMF) being 5.11%, 0.72% and 16.62% respectively. Among the participants PMDs are positively significantly associated with increase in age. A threefold rise in PMD prevalence is observed from 15-24 year age group (5.78%) to 25-34 year age group (17.19%). This rise can be attributed to rising financial independence, long working hours, increasing access to tobacco and alcohol and increased length of use of tobacco products. Similarly, Kadasshetti Vdya *et al* (2015) also reported proportionately maximum number of PMDs in 21-30 years of age group (15). Kumar *et al* (2015) analyzing age wise distribution reported 7.35% prevalence in less than 40 years age group and 9.89% in more than 40 years age group. (16) The difference could be due to difference in socio demographic variables.

PMD prevalence is found to be three times higher in males (23.22%) as compared to females (8.24%). It could be due to occupation requiring long hours of sitting giving rise to tobacco chewing practices, lower social class etc. Sandeep Kumar *et al* (2015) reported 17.5% PMDs among males and 9.6% among females, almost equal to present study. (17) Ambedkar D. M. *et al* (2014) reported 59.7 % prevalence of PMDs among males and 13.79% in females which is higher than present study. The difference is probably due to small sample size of 106 participants and included only tobacco chewers. (18) Prakash C Gupta *et al* (1999) also reported proportionately higher PMDs among illiterates and lower social class (58.03%) as the respondents are all tobacco chewers. (19) Occupations requiring prolonged sitting and monotony like semi-skilled labour (47.56%), skilled labour (27.74%), semi-professionals (33.33%) and clerks or shopkeepers (43.90%) reported higher PMD prevalence whereas unemployed (14.73%) showed lower prevalence. This difference may also be due to the variations in their purchasing power for tobacco and alcohol which are already established as contributing factors for PMDs and oral cancers

Conclusion

The present study thus concludes that a high prevalence of pre malignant disorders of oral soft tissues is closely associated with young age during productive years of life as the age for initiation of tobacco chewing has gone down to even early adolescence. Even higher prevalence is seen in male sex, monotonous jobs and those occupations requiring long hours of sitting, illiteracy or low levels

of educational status. Religion has no association with PMD prevalence. Lower socioeconomic status and thus lower social class is highly associated with rising prevalence of PMDs more or less due to their nature of occupation and limited access to education, prevention and treatment.

Recommendation

There is a felt need of oral cavity screening as a part of ongoing health care system for early detection of potentially malignant disorders of oral soft tissues to intervene the pathogenesis and thus halt the disease progression. Also there is dire need of mass awareness campaigns round the year and in OPD blocks of hospitals

Visual oral examination is a very cost effective and cost benefit tool for early detection of pre-cancerous lesions. A huge manpower of dental surgeons and already existing medical personnel can be utilized for this purpose.

Relevance of the study

Limited number of community-based researches have been done on early detection of PMDs of oral soft tissues though the oral cancer is a leading cause of death among cancer patients.

Authors Contribution

All authors have contributed equally in this study.

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Tables

TABLE 1 AGE GROUP SPECIFIC PREVALENCE OF POTENTIALLY MALIGNANT DISORDERS OF ORAL SOFT TISSUES

Age gp (in years)	N	Potentially malignant disorders				Chi square test
		Leukoplakia n (%)	Erythroplakia n (%)	SMF n (%)	Total PMDs n (%)	
15-24	433	6(1.38)	0(0.0)	19(4.38)	25(5.78)	X ² = 82.88 p=0.0001 df=5
25-34	285	19(6.67)	0(0.0)	30(10.52)	49(17.19)	
35-44	202	14(6.93)	0(0.0)	24(11.82)	38(18.81)	
45-54	130	6(4.61)	6(4.61)	16(12.32)	28(21.54)	
55-64	102	11(10.78)	1(0.98)	23(22.54)	35(34.32)	
≥65	82	7(8.53)	2(2.43)	19(23.17)	28(34.13)	
Total	1234	63(5.11)	9(0.72)	131(10.62)	203(16.45)	

TABLE 2 GENDER AND RELIGION WISE PREVALENCE OF PMDS OF ORAL SOFT TISSUES

variable	N	Potentially malignant disorders				Chi square test
		Leukoplakia n(%)	Erythroplakia n(%)	SMF n(%)	Total PMDs n(%)	
Gender						X ² =49.91 p=0.0001 df=1
Female	558	2(0.36)	0(0.0)	44(7.88)	46(8.24)	
Male	676	61(9.02)	9(1.33)	87(12.86)	157(23.22)	
Religion						X ² =1.88 p=0.390 df=2
Hindu	710	30(4.22)	2(0.28)	76(10.7)	108(15.21)	
Muslim	503	30(5.96)	6(1.19)	55(10.93)	91(18.09)	
Others	21	3(14.28)	1(4.76)	0(0.0)	4(19.04)	
Total	1234	63(5.11)	9(0.72)	131(10.62)	203(16.45)	

TABLE 3 EDUCATIONAL STATUS WISE PREVALENCE OF PMDS OF ORAL SOFT TISSUES

Educational Status	N	Potentially malignant disorders				Chi square test
		Leukoplakia n(%)	Erythroplakia n(%)	SMF n(%)	Total PMDs n(%)	
Illiterate	350	17(5.57)	2(0.65)	58(19.01)	77(25.24)	X ² =14.16 p=0.002 df=3
Up to Jr. High School	544	24(4.41)	3(0.55)	51(9.37)	78(14.33)	
Up to intermediate	284	15(5.28)	4(1.40)	16(5.63)	35(12.32)	
Graduate & Above	101	7(6.93)	0(0.0)	6(5.94)	13(12.87)	
Total	1234	63	9	131	203	

TABLE 4 PREVALENCE OF PMDS OF ORAL SOFT TISSUES ACCORDING TO OCCUPATION

Occupation	N	Potentially malignant disorders				p value
		Leukoplakia n%	Erythroplakia n%	SMF n%	Total PMDs n%	
Housewives	490	6(1.22)	1(0.20)	23(4.69)	32(6.53)	X ² =80.7 p=0.001 df=4
Unemployed	190	6(3.15)	3(1.58)	21(11.05)	28(14.73)	
Unskilled	222	2(0.90)	0(0.0)	32(14.41)	34(15.31)	
Semiskilled	82	16(19.51)	2(2.43)		39(47.56)	
Skilled	173	19(10.98)	0(0.0)	29(16.76)	48(27.74)	
Clerk/Shop	41	12(29.26)	3(7.31)	3(7.31)	18(43.90)	
Semi-Professional	6	0(0.0)	0(0.0)	2(33.33)	2(33.33)	
Professional	30	2(6.66)	0(0.0)	0(0.0)	2(6.66)	
Total	1234	63	9	131	203	

TABLE 5 SOCIO ECONOMIC CLASS WISE PREVALENCE OF PMDS

Socio Economic class	N	Potentially malignant disorders				Chi square test
		Leukoplakia n%	Erythroplakia n%	SMF n%	Total PMDs n%	
Upper class	18	2(11.11)	0(0.0)	0(0.0)	2(11.11)	X ² =30.84 p= 0.00001 df=4
Upper Middle class	72	7(9.72)	0(0.0)	10(13.89)	17(23.61)	
Lower Middle class	269	13(4.83)	3(1.12)	14(5.20)	30(11.15)	
Upper Lower class	834	39(4.69)	4(0.47)	103(12.35)	146(17.50)	
Lower class	41	2(4.87)	2(4.87)	4(9.75)	8(19.51)	
Total	1234	63(5.10)	9(0.72)	131(10.62)	203(16.45)	