

Prevalence of oral premalignant lesions and conditions among the population of Kanpur City, India: A cross-sectional study

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ABSTRACT

Background: The habit of smoking and chewing tobacco is associated with various types of oral mucosal lesions and conditions, many of which pose a potential threat to cancer growth. The present study aims to evaluate the prevalence of potentially malignant lesions (PML) and oral cancer in North India and to identify the associated risk factors. **Materials and Methods:** A cross-sectional study was carried out in the Department of Oral Medicine and Radiology Rama Dental College Hospital and research center Kanpur over a period of 5 years with 1,10,625 patients. Participants were divided into study group with a positive history of the chewing habit as well as oral lesions and control group who had a positive history of habits with no oral lesions. Detailed case history and clinical examination were carried out under visible light by trained professionals to assess any oral mucosal changes. **Results:** The study group consisted of 76.31% males and 23.69% females. In total, 84.34% participants in the study group were literate. However, 57.56% subjects were having oral submucous fibrosis, 23.7% were having leukoplakia, 13.12% were having Lichen planus, and 5.62% were having oral cancer. **Conclusion:** Results from the present study indicate that tobacco smoking, chewing of betel quid with and/or without tobacco chewing are the major risk factors for PML and oral cancer.

Keywords: Oral cancer, oral lesion, oral submucous fibrosis, tobacco

Introduction

Oral cancer is a significant global health issue and is the sixth most prevalent cancer in the world. International Agency for Research on Cancer (IARC) stated that more than 266,000 fresh intra-oral cancer cases occurred in 2000 with the majority (64%) occurred in males. In the same year, the estimated number of

deaths from oral cancer was 128,000. The incidence of oral cancer in the Indian subcontinents is the second-highest among all men's cancers, and it is estimated that 100,000 more fresh cases are identified annually and 90% of all oral malignancies are oral squamous cell carcinomas.^[1,2] Oral cancers mostly result from potentially malignant (precancerous) lesions. Potentially malignant lesions (PML) are oral mucosal lesions that are at enhanced danger of malignant transformation compared to healthy mucosal lesions. "Potentially malignant diseases" was suggested at the World Health Organization Congress in 2005 as a word for malignant and precancerous conditions. Oropharyngeal carcinoma

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is one of the most malignant tumors, as the survival rate is around 50%,^[3] While the oral cavity is available for visual examination, late diagnosis of oral cancers is usually made. Lack of consciousness in patients, phase of negation, and ignorance of the symptoms are the factors for not seeing a clinician immediately and are regarded the “first-time loss”. The “second-time loss” happens owing to absence of medical and dental professionals’ consciousness and absence of timely diagnosis. The “third-time loss” is the period from the diagnosis to the start of therapy.^[3,4] Indian evidence of enhanced incidence of oral precancerous lesions and conditions owing to changes in lifestyle already exists in India. Smoking and chewing habits are rising steeply and in the near future this is likely to achieve an alarming percentage. This means that the incidence of oral cancer would also boost at the same time. Most precancerous lesions and conditions have an elevated rate of malignant transformation. These lesions can be avoided from malignant transformation by mass screening, close observation, early detection, suitable therapy schedule, and prognosis.^[5]

Primary health care physician can play a very vital role in early diagnosis of oral premalignant lesions considering their progressive nature. These lesions of oral cavity have multi-factorial etiology with areca-nut chewing most common one. Thus, the awareness regarding the lesion’s clinical features, diagnosis, and management is the mainstay to curb their menace. Hence, the role of primary healthcare physician, being the first point of contact for general population becomes paramount.

The present study was conducted to assess the prevalence of oral precancerous lesions and conditions and also determine the potential risk factors among patients visiting Dental College and Hospital Kanpur city, India during a period of five years 1 January 2014 to 31 December 2018.

Materials and Methods

A cross-sectional descriptive study on the prevalence of precancerous lesions, conditions, and oral cancer was conducted in the outpatient department of Oral Medicine and Radiology during a period of 5 years (1 January 2014 to 31 December 2018) months. A total of 1,10,625 patients were screened out. Approval from the Ethical Committee of the Institute was obtained and written informed consent was obtained from the participants. Ethical approval was obtained from the Institutional Review Board on 27th December, 2013. Among them, 9,060 individuals were identified as control, who had a positive history of tobacco with no oral lesions and 3,735 individuals having dental complaints were categorized under case with a positive history of the chewing habit along with oral lesions. Those with the habit were questioned for the frequency of the habit in number per day and duration of the habit in years.

All oral examinations were done by specialist examiners who were familiar with oral mucosal lesions in the local population. A sterile mouth mirror was used for retraction of tissues, and examination of oral cavity was done using examination gloves.

The clinical diagnosis of the precancerous lesions and conditions were done as per the WHO (1997) criteria. Participants with the previous history of hospitalization for any systemic illness, immuno-compromised patients, and patients with recurrence of the primary lesions and multiple oral and/or head and neck lesions were excluded. Individuals with the habit of chewing any form of tobacco such as khaini or pure tobacco, betel leaf with tobacco, chewing tobacco plus lime, mishri (burned tobacco applied to the teeth and gums), moist snuff, dry snuff, niswar (a different kind of tobacco snuff), and naas (a stronger form of niswar) with or without areca nut were considered in one group named “tobacco-chewing” those with the habit of chewing pan masala were considered in a separate group named “pan masala”. Those with the habit of chewing pan masala along with tobacco were considered in a separate group named “pan masala with tobacco,” and those with both the above habits were considered under the “mixed habits” group. Education level was classified as “illiterate” and “literate” where literate meant above class seven. Similarly, economic status was classified as “lower” and “middle.”

Data were analyzed using IBM SPSS Statistics- version 21 (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.) Descriptive statistics included calculation of percentages, mean, and standard deviation. Data distribution was assessed for normality using the Shapiro-Wilk test. Categorical data were compared using the Chi-square test. All values were considered statistically significant for a value of $P \leq 0.05$.

Results

Table 1 shows the socio-demographic characteristics of the study and control group. The study group consisted of 3,735 subjects, 2,850 (76.31%) males, and 885 (23.69%), and control group consisted of 9060, 8625 (95.20%) males and 435 (4.80%) females. Both groups were divided into 10-year interval age groups 20–30, 30–40, 40–50, and above 50 years. The minimum participants were under 40–50 years of age in the study (32.93%) and control group (34.67%). The minimum number of subjects was under 20–30 years of age in the study (4.28%) and control group (16.39%), which was statistically significant ($P < 0.001$).

Table 2 shows the habits according to gender in study group and control group. In the study group out of 3,735 subjects, 2,850 were males and 885 were females. In control group out of 9,060 subjects, 1,800 were males and 435 were females.

In study group, 550 (19.30%) males and 120 (13.56%) females have habit of tobacco chewing, whereas in control group 1,800 males and 130 females were in habit of chewing tobacco. The difference between both the groups was statistically significant ($P < 0.001$).

Table 3 shows the frequency of habit among the study and control group participants. In study group, 370 (9.91%) subjects were in habit of chewing tobacco 1 to 5 times a day, 190 (5.09%) subjects with frequency of 5 to 10 times a day and 110 (2.94%)

Table 1: Socio-demographic characteristics of the study population

Socio Demographic Characteristics	Study Group (n=3735) n (%)	Control Group (n=9060) n (%)	χ^2	P
Age wise distribution				
20-30 years	160 (4.3)	1485 (16.4)	417.386	<0.001* S
30-40 years	885 (23.7)	1900 (21)		
40-50 years	1230 (32.9)	3140 (34.6)		
>50 years	1460 (39.1)	2535 (28)		
Gender wise distribution				
Males	2850 (76.3)	8625 (95.2)	102.364	<0.001* S
Females	885 (23.7)	435 (4.8)		
Place of residence				
Rural	1733 (46.4)	5262 (58.1)	145.603	0.083
Urban	2002 (53.6)	3798 (41.9)		
Literacy				
Literate	3150 (84.3)	4982 (55)	983.478	<0.001* S
Illiterate	585 (15.7)	4078 (45)		
Occupation				
Business	1044 (28)	2493 (27.5)	182.628	0.155
Service	535 (14.3)	1575 (17.4)		
Agriculture	62 (1.7)	2020 (22.3)		
Labor	31 (0.8)	862 (9.5)		
Unemployed	2063 (55.2)	2110 (23.3)		
Socio-economic status				
Lower	858 (23)	3663 (40.4)	358.604	<0.001* S
Middle	1727 (46.2)	3379 (37.3)		
Upper	1150 (30.8)	2018 (22.3)		

χ^2 - Chi-Square test, *Statistically significant- $P \leq 0.05$

Table 2: Habits according to gender in both the groups

Habits	Study Group		Control Group		χ^2	P
	Males (n=2850) n (%)	Females (n=885) n (%)	Males (n=8625) n (%)	Females (n=435) n (%)		
Tobacco chewing	550 (19.30)	120 (13.56)	1800 (20.86)	130 (29.90)	46.783	<0.001* S
Tobacco smoking	75 (2.63)	0 (0)	2580 (29.91)	0 (0)	-	-
Paan Masala	425 (14.92)	180 (20.34)	1200 (13.91)	115 (26.43)	158.073	0.002* S
Paan Masala + Tobacco	1800 (63.15)	550 (62.14)	2880 (33.40)	190 (43.67)	774.431	0.004* S
Mixed	0 (0)	35 (3.96)	165 (1.92)	0 (0)	-	-

χ^2 - Chi-Square test, *Statistically significant- $P \leq 0.05$

Table 3: Habits according to frequency among the study and control group participants

Frequency	Tobacco chewing		Tobacco smoking		Paan Masala		Paan Masala + Tobacco		Mixed	
	Study Group (n=3735)	Control Group (n=9060)	Study Group (n=3735)	Control Group (n=9060)	Study Group (n=3735)	Control Group (n=9060)	Study Group (n=3735)	Control Group (n=9060)	Study Group (n=3735)	Control Group (n=9060)
1 to 5 times a day	370 (9.91)	485 (5.36)	20 (0.53)	1420 (15.68)	245 (6.57)	860 (9.50)	805 (21.57)	837 (9.26)	35 (0.94)	160 (1.76)
5 to 10 times a day	190 (5.09)	870 (9.6)	55 (1.47)	1160 (12.80)	360 (9.63)	455 (5.02)	450 (12.04)	1190 (13.13)	0 (0)	105 (1.17)
> 10 times/day	110 (2.94)	575 (6.34)	0 (0)	0 (0)	0 (0)	0 (0)	1095 (29.31)	943 (10.40)	0 (0)	0 (0)
No such habit reported	3065 (82.06)	7130 (78.70)	3660 (98)	6480 (71.52)	3130 (83.80)	7745 (85.48)	1385 (37.08)	6090 (67.21)	3700 (99.06)	8795 (97.07)
χ^2	208.290		129.885		56.069		321.473		56.286	
P	<0.001* S		<0.001* S		<0.001* S		<0.001* S		0.072	

χ^2 - Chi-Square test, *Statistically significant- $P \leq 0.05$

subjects with frequency of more than 10 times a day, whereas in control group, 485 (5.36%) subjects were in habit of chewing tobacco 1 to 5 times a day, 870 (9.6%) subjects were with frequency of 5 to 10 times per day, and 575 (6.34%) subjects were with frequency of more than 10 times per day ($P < 0.001$).

In study group, 20 (0.53%) subjects were in habit of tobacco smoking 1 to 5 times a day, 55 (1.47%) subjects were with frequency of 5 to 10 times a day, whereas in control group, 1,420 (15.68%) subjects were in habit of tobacco smoking 1 to 5 times a day and 1,160 (12.80%) subjects were with frequency of 5 to 10 times a day ($P < 0.001$).

Table 4: Habits according to duration among the study and control group participants

Duration	Tobacco chewing		Tobacco smoking		Paan Masala		Paan Masala + Tobacco		Mixed	
	Study Group (n=3735)	Control Group (n=9060)	Study Group (n=3735)	Control Group (n=9060)	Study Group (n=3735)	Control Group (n=9060)	Study Group (n=3735)	Control Group (n=9060)	Study Group (n=3735)	Control Group (n=9060)
1 to 5 years	0 (0)	485 (5.36)	20 (0.53)	1420 (15.68)	245 (6.57)	0 (0)	805 (21.57)	0 (0)	0 (0)	105 (1.17)
5 to 10 years	670 (17.94)	870 (9.6)	55 (1.47)	1160 (12.80)	360 (9.63)	1315 (14.52)	450 (12.04)	2970 (32.79)	35 (0.94)	160 (1.76)
> 10 years	0 (0)	575 (6.34)	0 (0)	0 (0)	0 (0)	0 (0)	1095 (29.31)	0 (0)	0 (0)	0 (0)
No such habit reported	3065 (82.06)	7130 (78.70)	3660 (98)	6480 (71.52)	3130 (83.80)	7745 (85.48)	1385 (37.08)	6090 (67.21)	3700 (99.06)	8795 (97.07)
χ^2	927.948		129.885		6.085		447.796		56.286	
P	<0.001* S		<0.001* S		0.048* S		<0.001* S		0.072	

χ^2 - Chi-Square test, *Statistically significant- P≤0.05

Table 4 shows the habits according to duration among the study and control group participants. In study group, 670 (17.94%) subjects were in habit of chewing tobacco with duration of 1 to 5 years, whereas in control group, 485 (5.36%) subjects were in habit of chewing tobacco with duration of 1 to 5 years, 870 (9.6%) subjects with duration of 5 to 10 years, and 575 (6.34%) subjects with duration of more than 10 years ($P < 0.001$).

In study group, 20 (0.53%) subjects were in habit of tobacco smoking with duration of 1 to 5 years, 55 (1.47%) subjects with duration of 5 to 10 years, whereas in control group, 1,420 (15.68%) subjects were in habit of tobacco smoking with duration of 1 to 5 years and 1,160 (12.80%) subjects with duration of 5 to 10 years ($P < 0.001$).

In study group, 245 (6.57%) subjects were in habit of chewing pan masala with duration of 1 to 5 years, 360 (9.63%) subjects with duration of 5 to 10 years, and in control group, 1,315 (14.52%) subjects were in habit of chewing pan masala with duration of 5 to 10 years.

Table 5 shows the various diseases among study and control group participants. In total, 2,150 (57.56%) subjects were having oral submucous fibrosis (OSF), 885 (23.70%) were having leukoplakia, 490 (13.12%) were having Lichen planus, and 210 (5.62%) were having oral cancer ($P < 0.001$).

Table 6 shows the various diseases among study group participants according to gender. Out of 2,150 (57.56%) subjects with OSF, 1,865 (65.445%) were males and 285 (32.20%) were females. Out of 885 (23.70%) subjects with leukoplakia, 690 (24.21%) were males and 195 (22.03%) were females. Out of 490 (13.12%) subjects with Lichen planus, 130 (4.56%) were males and 360 (40.68%) were females. Out of 210 (5.62%) subjects with oral cancer, 165 (5.79%) were males and 45 (5.08%) were females ($P < 0.001$).

Discussion

The scenario in India is really bad, with an estimated 274.9 million tobacco consumers, where only 163.7 million smokeless tobacco users, 68.9 million smokers, and 42.3 million both smoking and smokeless tobacco users as per the Indian Global

Adult Tobacco Survey (GATS). It means around 355 of adults (47.9% males and 20.3% females) in India use tobacco in some form or the others. The use of smokeless tobacco is more prevalent in India (21%).^[6] In the same way in India, areca nut products are used widely by young individuals because of the industry’s marketing and promotion strategies aimed at them and false claims about their security. Its popularity is also owing to its low-cost, commonly accessible and simple to perform packaging in tiny sachets. Kanpur itself produces 12 top brands and 170 small brands of pan masala.^[7] PML can transform malignant in the oral mucosa and early diagnosis of PML is of excellent significance for cancer prevention and early cancer detection. In the initial stage, if cancer is detected, the potential for remission is 80%.^[8]

Saraswathi *et al.*, Sujatha *et al.*, and Behura *et al.* reported the male predominance deleterious oral habits. Similarly, in the present study, male predominance was also reported in both study (76.3%) and control group (95.2%). This difference because of easy accessibility for males to use areca nut and its products more frequently than females or maybe owing to many occupations of men require a substantial amount of physical energy and a high level of concentration, as in the case of drivers with unusual hours of work. This can be stressful, which can lead to the initiation of harmful oral habits in conjunction with peer pressure.^[9-11]

Lim *et al.* in 2003, Saraswathi *et al.* in 2006, and Sujatha D *et al.* in 2012 included different age groups ranging from 35 years and above, 13 years and above, and 14 years and above respectively.^[1,9,10] However, by selecting 20 years and above age group, present study included the population with a mean age group of the previously mentioned authors. In present study, among the study group, the maximum number were in 30 to 50 years and >50 years of age group, which is similar to the study by conducted by Hazarey *et al.*^[12] Difference in the subjects according to age between study and control group was found to be statistically significant ($P < 0.001$).

PMLs and malignant lesions have been seen predominantly in men owing to the greater incidence of smoking and/or chewing habits in men reported by Priya *et al.* and Mishra SS *et al.*^[13,14] In

Table 5: Various diseases among study and control group participants

Type of Diseases	Study Group (n=3735) n (%)	Control Group (n=9060) n (%)	χ^2	p
Oral Submucous Fibrosis	2150 (57.56)	0 (0)	25592	<0.001* S
Leukoplakia	885 (23.70)	0 (0)		
Lichen Planus	490 (13.12)	0 (0)		
Oral Cancer	210 (5.62)	0 (0)		

χ^2 - Chi-Square test, *Statistically significant- $P \leq 0.05$

Table 6: Various diseases among study group participants according to gender

Type of Diseases	Males (n=2850) n (%)	Females (n=885) n (%)	χ^2	p
Oral Submucous Fibrosis	1865 (65.44)	285 (32.20)	19065.09	<0.001* S
Leukoplakia	690 (24.21)	195 (22.03)	15096.8	<0.001* S
Lichen Planus	130 (4.56)	360 (40.68)	14032.02	<0.001* S
Oral Cancer	165 (5.79)	45 (5.08)	13313.93	<0.001* S

χ^2 - Chi-Square test, *Statistically significant- $P \leq 0.05$

the present study, 2,850 (76.3%) male participants found total oral soft-tissue lesions.

Considering the individual lesion in present study among study group showed an overall high prevalence of OSMF (57.56%) followed by leukoplakia (23.70%), Lichen planus (13.12%), and oral cancer (5.62%). OSF showed the highest prevalence among the potentially malignant oral disorders diagnosed, similar to Mehrotra *et al.* findings.^[15]

In the current study, the prevalence of leukoplakia (23.70%) was higher than study conducted by Bhowate *et al.* in rural populations in India but somewhat different than study conducted by Balsaraf S *et al.* in Bhopal India.^[16,17]

In the current study, the incidence of oral Lichen planus was 13.12% in study group. Axell and Rundquist reported that snuff consumers had slightly greater Lichen planus incidence compared to smokers. In tobacco betel chewers, Lichen planus should not be ignored, although the potential of malignant transformation such lesion remains somewhat unsure, smoking habits may affect the natural history of the oral Lichen planus.^[18]

The present study also showed a higher frequency of oral carcinoma (5.62%) as compared to the study conducted by Ikeda N *et al.* and Campisi G *et al.* but somewhat different as compared to study conducted by Sharma P *et al.*^[19,21] Lesion was more prevalent among males than females. This distinction may be owing to the reality that a big proportion of males have the habit of smoking and chewing tobacco and have blended oral carcinoma habits.

In the present study, the most frequent habit reported was chewing of pan masala with tobacco among both the groups, which was statistically significant ($P < 0.001$).

Maher R *et al.* and Shiu MN *et al.* reported the risks increased with the duration and frequency of the habit.^[22,23] In present study, 1,095 (29.31%) subjects from study group had frequency of >10 times/day with duration of >10 years of duration, and 1,190 (13.13%) subjects from control group had frequency of 5 to 10 times/day and 2,970 (32.79%) with duration of 5 to 10 years. Present study revealed that the main cause PML of Oral Leukoplakia (OL) and OSF was betel quid chewing. This study found that habits were the principal cause of PML and oral cancer and risks increased with the duration and frequency of the habit.

One of the 10 major causes of cancer fatalities in India is PML that converted to oral cancer. Today, tobacco and areca nut products are component of both contemporary urban and rural lifestyles.^[24,25]

To reduce the incidence of these illnesses, it is essential to continue instructional campaigns at the domestic and global level, to provide public education not only for signs and symptoms of possibly malignant oral illnesses but also for those people who are associated with high-risk factors.

Conclusion

Results from the present study indicate that tobacco smoking and chewing of betel quid with and/or without tobacco chewing are the major risk factors for PMLs and oral cancer. Primary prevention should be focused on the elimination of risk factors. The dentist and primary health care team must be engaged in primary prevention to decrease the number of subjects involved in these deleterious habits. To decrease the burden of this eminently preventable cancer, a multi-faceted approach that integrates health education, tobacco and alcohol control, early detection, and early therapy is required.

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Conflicts of interest

There are no conflicts of interest.

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