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Original Article

EPIDEMIOLOGICAL PROFILE AND ASSOCIATION OF VARYING HABITS WITH PRECANCER AND OSCC IN POPULATION OF NORTH INDIA

DIVYA TANDON*, JYOTIKA RAJAWAT

[1]Molecular and Human Genetics Lab, University of Lucknow, Lucknow, Uttar Pradesh, India
*Email: d.tandon84@gmail.com

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ABSTRACT

Objective: The pathologic appearances and clinical symptoms of Oral Premalignant Disorders (OPMDs) and Oral Squamous Cell Carcinoma (OSCC) vary across different patient populations. This is possibly due to behaviours and cultural influences such as excess tobacco use. We aim to evaluate the epidemiological profile and clinical characteristics of OPMDs and OSCC in the North Indian population.

Methods: This was a retrospective study of 600 subjects including 200 OSCC cases, 200 OPMDs and 200 matched controls. Medical records and clinical and histopathological diagnosis of OSCC and oral precancer patients were included. The data was analysed using SPSS.

Results: Two third of the OSCC patients were males and one third were females and mean age of 48.5 y. Maximum incidence of total cases was observed in age groups from 30-70 y and was more in males. Buccal mucosa is found to be the most affected location (67%) in both men and women. We found a significant association between size of the tumor, the number of nodes involved, and degree of differentiation and gender. Significant association was observed between gender and tobacco use, pattern of smoking and alcohol consumption, while no association was observed with fluoride use by habit and gender. Significant results were found between prevalence of OSCC and OPMDs with chewing tobacco and pattern of smoking. Also, pattern of smoking was significantly associated with gender in OPMD and OSCC subjects.

Conclusion: This study could help in educating the people and support the healthcare workers in implementing preventive measures against OPMDs and OSCC.

Keywords: OSCC, OPMD, Epidemiology, Tobacco, Alcohol, Smoking

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INTRODUCTION

Cancer of the oral cavity is a hazard to public health, with rising rates of incidence and mortality, and it ranks sixth in the world's cancer rankings [1, 2]. Cancer of oral cavity reports for 2% of cancer mortality in men and 1% in women. The lips, oropharynx, and mouth floor are the most common sites for OSCC [3]. OSCC is a disease related to age and the risk of its occurrence increases with age [1]. The association with age suggests that time-dependent variables cause genetic processes to commence and progress, leading to malignant alterations.

The incidence of oral squamous cell carcinoma is higher in developing countries like India, where the use of tobacco in all of its forms, including smokeless tobacco, betel quid, and are canut, is widespread [4, 5]. Alcohol and tobacco together have a collaborative effect on oral mucosa. Besides these two common etiologies, some other causative factors are chronic irritation of oral mucosa due to sharp tooth or ill fitted dentures, HPV infection, fluoride use etc [6-8].

The development of oral squamous cell carcinoma is a multistage process that begins with normal tissue and then progresses to dysplastic injury, which, if it is not treated, ultimately results in carcinoma. It is believed that the prevalence of dysplasia and the severity of its symptoms both play a role in the rate of malignant transformation of premalignant to malignant disorders [9, 10].

The onset of OSCC is asymptomatic, with signs appearing after the illness has progressed. Discomfort or burning sensation of oral mucosa is the symptom that leads patients to seek the assistance of a medical professional the most frequently, and it is present in up to 85 percent of patients at the time of diagnosis. Difficulty or pain in swallowing, ear pain, and restricted breathing are less common symptoms. Oral carcinoma progresses lymphatic ally across the submandibular and the upper deep cervical nodes [11].

WHO subdivided Oral Premalignant Disorders (OPMDs) into two clearly defined groups: 1) Oral Precancerous lesions, which is a benign morphologically altered tissue which possess more than normal chances of progression towards malignancy, 2) Precancerous conditions, which is defined as patient's habit that does not always show altered clinical appearance but possess more chances of transforming into malignancy. Commonly detected OPMDs are leukoplakia, erythroplakia, Oral submucus fibrosis and lichen planus [12].

Oral Submucous Fibrosis (OSMF) is a disease of the oral cavity that has been linked to the consumption of areca nuts in a variety of different forms [13]. This condition has the potential to develop into cancer. In addition to a burning sensation and, in severe cases, ulceration, this condition can be identified by the presence of palpable fibrous bands and changes in the oral mucosa. Another OPMD entity is oral leukoplakia which is more prevalent among males and appears as white, popular plaque with well-defined boundaries that may be homogeneous or nonhomogeneous in appearance. Oral lichen planus (OLP), on the other hand, is a chronic, immune-mediated disease that is more frequent in women. It is distinguished by Wickham's keratotic striae, erythema and/or ulceration in oral. Other body organs, such as the skin and genitalia, may be affected by lichen planus [13-15.

Early detection of OPMDs will reduce the likelihood of OSCC transformation, thereby reducing cancer-related morbidity and mortality. In nicotine reduction therapy, in addition to asking and educating people on the negative outcomes of their habits, action should be taken to conciliate with the habit (i.e., the 5As' protocol, which involves Asking about the status of smoking, Advising the advantage of quitting tobacco and related products, Assessing whether the tobacco user is ready to quit the habit, Assist/helping the patient to stop tobacco habits, and Arranging for positive follow-up [16, 17].

The aim of this study is to determine the epidemiological profile and clinical characteristics of Oral Pre Malignant Disorders (OPMDs) and OSCC among the population of North India.

MATERIALS AND METHODS

Methods

A human research ethical approval is obtained from King George Medical University, Lucknow. The study population was screened from the patients visiting Dental Science Department, KGMU, Lucknow.

Eligible subjects for the study are the patients with histopathologically confirmed OSCC or persistent and clinically visible OPMDs.

After describing the complete study to the patients with history of tobacco, alcohol or arecanut, pain, ulceration, and difficulty in opening of mouth or swallowing, a questionnaire was filled taking all the history and details of each patient. An informed consent is taken from the patients/attendants for their willingness to participate in the study. All grades of OSCC that have been clinically and histopathologically diagnosed and above 18 y of age were included for the study. Vulnerable or critically ill patients, Patients suffering from other types of cancers and Pregnant or breastfeeding mothers were excluded from the study.

Complete extra and intraoral examination was performed

A systematic proforma specifically designed for the study documented habits history, particularly with regard to length in months and frequencies by day, period of symptoms, participation in oral mucosal sites, and involvement in lymph nodes and lesions.

The diagnostic criteria used are a positive history of betel quid, nicotine and alcohol consumption. A systematic proforma developed for the study was used to document symptoms and signs like pain, swelling, persistent oral ulceration, lymph node involvement, and presence of premalignant disorders.

Statistical analysis

Continuous variables were represented as mean and standard deviation, while chi-square test was used to compare categorical variables and for an association of variables. 95% confidence interval was set and p value<0.05 was considered significant. SPSS software was used for analysis.

RESULTS

The study was carried out on 200 cases, 200 precancer cases and 200 controls. Two third (71%) of the OSCC patients were males and one-third (29%) were females with male to female ratio of 3:1. The age of patients varied from 18 to 87 y with mean age of 48.5 y (SD 15.5). Fig. 1 reveals the frequency distribution of Oral squamous cancer patients (OSCC) based on the age and gender. Maximum incidence of total cases was observed in age group from 30-70 y (approx. 80%), while less than 5% incidence was observed in age group less than 20 and more than 70 y. Moreover, the frequency distribution based on gender was same till 50 y in both males and females, while a significantly increased frequency (41%) was observed in males belonging to age group 51-70 y (χ^2 =15.474, p<0.001). Overall, the incidence of OSCC was more in males than females in varying age groups.

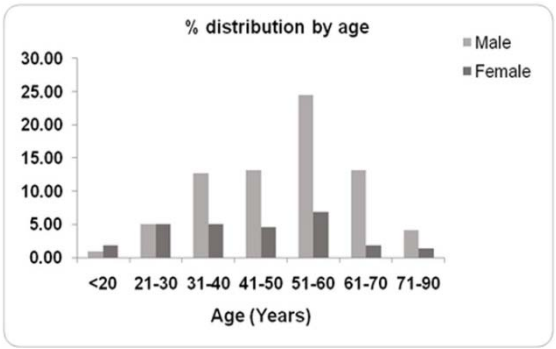

Fig. 1: Distribution of the sample according to age and gender

The study suggests buccal mucosa to be the most affected location (67%) in both men and women followed by tongue (29%), and gingiva was the least affected region with only 4% cases (fig. 2). Although the location of tumor was not statistically associated with gender.

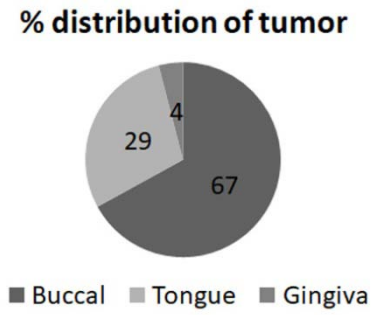

Fig. 2: Distribution of the sample based on topographic location of tumor

Tumors were analyzed to identify the stage (TNM) and degree of differentiation. With respect to the staging of the tumor, most of the cases were diagnosed in stage II(80%) in both genders, while 20% were in stage I (fig. 3). Approximately 76% of the total cases were moderately differentiated/poorly differentiated (grade II) and remaining 24% patients were well differentiated (grade I) (fig. 4).

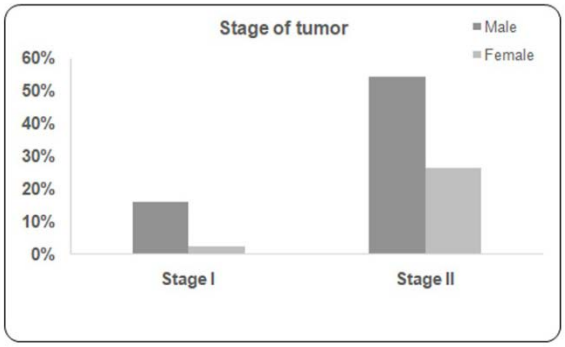

Fig. 3: Distribution of the sample according to stage of the tumor and gender

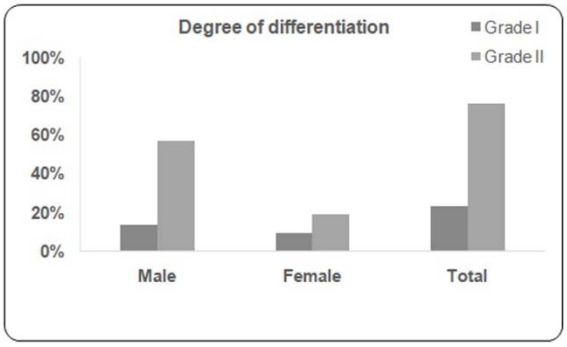

Fig. 4: Distribution of the sample according to the degree of differentiation and gender

Majority of the tumors (75%) falls under T0-T1 and 25% were in T2-T3 in both the genders (fig. 5) and same frequency was observed in number of nodes involved (fig. 6). Further the size of the tumor,

number of nodes involved, and degree of differentiation was significantly associated with gender (χ^2 =11.136, p<0.001, χ^2 =10.406, p<0.001; χ^2 =6.159, p<0.013).

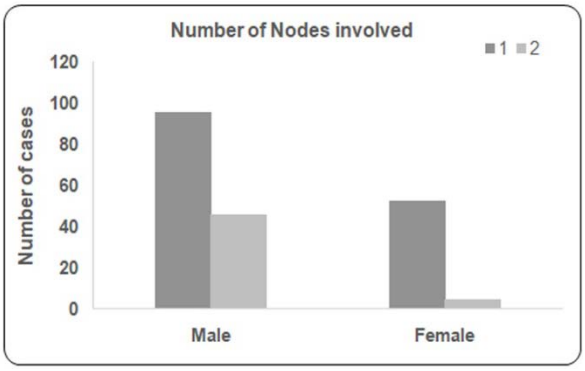

Fig. 5: Distribution of the sample according to size of the tumor and gender

In addition to the tumor distribution studies, we also analysed the prevalence of OSCC with varying habits, including tobacco chewing, smoking pattern, alcohol intake and fluoride use. The frequency of OSCC according to habits and gender is summarized in tables 1-4. The comparison suggested a significant association between gender and tobacco (χ^2 =43.328, p<0.0001), pattern of smoking (χ^2 =102.814, p<0.0001) and alcohol habit (χ^2 =158.877, p<0.0001), while no significant association was observed with fluoride use in a gender-specific way (χ^2 =1.827, p<0.609).

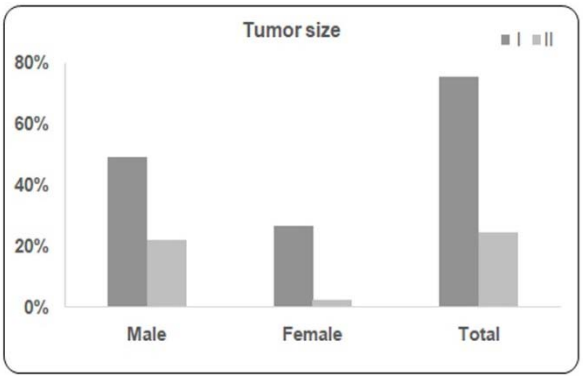

Fig. 6: Distribution of the sample according to number of nodes involved and gender

Table 1: Prevalence of OSCC according to tobacco habit and gender

Tobacco habit	Male	Female	χ2 value	p-value
Tobacco	287	77	43.328	0.0001
Arecanut	55	58		
Betel quid	98	25		

Table 2: Prevalence of OSCC according to alcohol intake and gender

Alcohol habit	Male	Female	χ2 value	p value
Yes	299	12	158.87	0.0001
No	151	148		

Table 3: Prevalence of OSCC according to fluoride use and gender

Fluoride	Male	Female	χ2 value	p value
Use fluoride-based toothpaste	209	69	1.827	0.609
Do not use fluoride-based toothpaste	89	40		
Don't know	87	30		
Don't use toothpaste	55	21		

Table 4: Prevalence of OSCC according to smoking pattern and gender

Smoking pattern	Male	Female	χ2 value	p value
Active	335	50	102.814	0.0001
Passive	105	110		

Additionally, the comparative analysis was also performed to monitor any correlation (association) between the habits in precancer and cancer subjects. Interestingly, we found statistical significance in the prevalence of OSCC and precancer lesions with chewing tobacco (χ^2 =7.178, p<0.028) and pattern of smoking (χ^2 =17.067, p<0.0001), while no association was observed with habit of drinking alcohol (χ^2 =.040, p<0.841) and fluoride (χ^2 =1.236, p<0.744) (tables 5-8).

Table 5: Association of tobacco habit in precancer and oral cancer patients

Tobacco habit	Cancer	Precancer	χ2 value	p value
Tobacco	151	127	7.178	0.028
Arecanut	18	31		
Betel quid	31	42		

Table 6: Association of alcohol intake in precancer and oral cancer patients

Alcohol habit	Cancer	Precancer	χ2 value	p value
Yes	91	89	0.040	0.841
No	109	111		

Table 7: Association of fluoride in precancer and oral cancer patients

Fluoride	Cancer	Precancer	χ2 value	p value
Use fluoride-based toothpaste	101	105	1.238	0.744
Do not use fluoride-based toothpaste	49	40		
Don't know	26	28		
Don't use toothpaste	24	27		

Table 8: Association of smoking pattern in precancer and oral cancer patients

Smoking pattern	Cancer	Precancer	χ2 value	p value
Active	145	105	17.067	0.0001
Passive	55	95		

Moreover, pattern of smoking (χ^2 =23.035, p<0.0001) and alcohol habit (χ^2 =91.511, p<0.0001) was associated with gender, in precancer and cancer subjects but no association was observed with tobacco or fluoride in a gender specific way (Tables 9, 10).

Table 9: Association of smoking pattern in precancer and oral cancer patients in a gender specific manner

Smoking pattern	Male	Female	χ2 value	p value
Active	202	48	23.035	0.0001
Passive	88	62		

Table 10: Association of alcohol intake in precancer and oral cancer patients in a gender specific manner

Alcohol habit	Male	Female	χ2 value	p value
Yes	173	7	91.511	0.0001
No	117	103		

DISCUSSION

Oral cavity cancer is seventeenth most common cancer globally according to IARC GLOBOCON report 2020 and stands at the seventeenth position in the mortality rate. Oral cavity and lip cancer constitutes 2% of the total cancer cases, with 377713 new cases and 177757 deaths reported in 2020. It is the third most prevalent cancer in South-Central Asia, which includes India. The prevalence of OSCC is rising in developing nations due to the widespread use of tobacco and alcohol. According to reports, the incidence rate and mortality of OSCC vary by geographic location and altering lifestyle. Tobacco use and excessive alcohol consumption are the leading risk factors, accounting for 90% of all cases [17]. Moreover, an increasing percentage in OSCC has been observed in younger age group. According to World Health Organization report 2020 the incidence and mortality rates are reported to be higher in male population than females.

The characteristics of patients in this study is similar to those previously published study where the incidence of OSCC is higher in men than women with a ratio of 3:1 [18, 19]. In our study, this ratio has varied slightly to 2.5:1. This decline may be primarily attributable to a shift in the lifestyle of women who have begun consuming tobacco and alcohol. The incidence or percentage distribution was maximum (34.5%) in age group above 50 y old which correlates with other published reports. Surprisingly, this study has reported increase in incidence in 30 to 40 y and 40 to 50 y age group, where almost 14.5% distribution was observed in both age category. The consumption of tobacco and alcohol from the young age might be one of the key factors for higher incidence in younger people.

Tobacco has been identified by epidemiology and association studies as a significant risk factor for the development of OSCC. In the western world, smoking is the predominant method of tobacco consumption, whereas in the Indian subcontinent, tobacco is consumed in the form of gutkha, pan masalas, pan, khaini, etc. Our results are in accordance with previous studies [20] where 75% patients are reported to consume tobacco and moreover, we have found pattern of smoking as an associated risk factor. Betel quid and arecanut were other forms consumed by 15% and 10% patients respectively. Most common site of OSCC in India is buccal mucosa [21], and our study has also found buccal mucosa as the prominent site of OSCC in 67% patients. Tongue and gingiva were found in 29% and 4% patients respectively. Early diagnosis of carcinoma results in better therapeutic outcome and the majority of patients in our study were in stage II. These findings are similar to related studies conducted in different parts of India [16-21].

We also studied the risk factors associated with precancer lesions and cancer development and found tobacco chewing and pattern of smoking to be the risk factors [22]. Our data also suggest the pattern of smoking and alcohol consumption to be associated with OPMD and OSCC subjects in a gender-specific manner.

There are increasing incidence of OSCC in regions where consumption of smokeless tobacco like gutkha, betel quid, and arecanuthas been popular. There is a need to put a check on consumption of these products specially in children.

CONCLUSION

OSCC is mostly presented in 5th decade of life in both men and women. A rising trend is observed in age group 30 to 50 y in both genders. In North Indian population, buccal mucosa is the commonest site for tumor origin. Tobacco chewing was a prominent risk factor found in both men and women in our study. Furthermore, the smoking pattern was a risk factor associated with OSCC. Tobacco consumption and pattern of smoking was found to be a risk factor in precancer (OPMD) and OSCC cases.

LIMITATIONS OF THE STUDY

The limitation of the study is that we could gather only a small sample and hence drew our primary conclusion based on it. Large sample size is needed to study stratified analysis.

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AUTHORS CONTRIBUTIONS

Both Divya Tandon and Jyotika Rajawat contributed equally for the study.

CONFLICT OF INTERESTS

The authors declare no conflict of interest.

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