Original Article

Prevalence of Tobacco-Related Habits among Oral Squamous Cell Carcinoma Patients

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Abstract

Background: Oral squamous cell carcinoma (OSCC) is associated with long-term use of tobacco products. The aim of the present study was to determine the prevalence of tobacco-related habits among OSCC patients in a hospital setup. **Materials and Methods:** The present study is a hospital-based cross-sectional study carried out during the period, December 2015–August 2018. All the patients diagnosed with OSCC during the stipulated period were enrolled for the study after receiving informed consent. The demographic data of all the study participants was noted in a pre-designed pro forma. The obtained data were tabulated and statistically analyzed in Microsoft Excel. **Results:** Among 134 squamous cell carcinoma patients 61% were men. The mean age of occurrence was 54.69 ± 11.37 years. 34% of the study population had the habit of chewing tobacco in various forms. The primary site of involvement was the buccal mucosa (BM) followed by the tongue, palate, floor of the mouth, lips, gingiva, and alveolus. On histopathological examination, the majority of the tumors were well differentiated (WD). **Conclusion:** Tobacco chewing was the most prevalent habit among the study population. OSCC showed a male predominance and a site predilection for BM with the majority of them being WD.

Key message: A multitude of oral cancer patients are accustomed to some form of tobacco-related habits.
Key words: Habits, Oral squamous cell carcinoma, Prevalence, Tobacco.

Introduction

Oral squamous cell carcinoma (OSCC) is associated with long-term use of tobacco products. The incidence and prevalence of tobacco-associated potentially malignant disorders and OSCC is high in South Asian countries. India is the second largest producer and consumer of tobacco next to China and in India, Andhra Pradesh is the highest. The use of tobacco has long been an established habit in the Prakasam, Srikakulam, and Godavari districts of Andhra Pradesh. A large proportion of the population in tobacco cultivating districts favors its use starting at a very young age and continuing throughout the adulthood. The ranges of tobacco products are diverse with timely strides in the tobacco industry like the advent of heat not burn cigarettes and electronic cigarettes. Conventionally tobacco products are catalogued into smoked and smokeless. Smoked and burnt products include factory-made or handmade cigarettes, cigars, and pipe smoking using loose tobacco. Smokeless tobacco products include loose leaf, dry snuff, or moist snuff, available in flavored and unflavoured forms. Flavored forms include Khaini, Zarda, Mishri, and Datun.[1] Long-standing use of smokeless tobacco displays an increased risk of oral cancer due to the presence of tobacco-specific *N*-nitrosamines. *N*-nitrosonornicotine, 4-methyl- *N*-nitrosamino-1-(3-pyridyl)-1-butanone, *N*-nitrosoanatabine and *N*-nitrosoanabasine. Other carcinogenic agents present in smokeless tobacco include cadmium, polonium-210, formaldehyde, benzopyrene, and lead.[2]

Materials and Methods

A hospital-based cross-sectional study was carried out during the period, of December 2015–August 2018 in the Department of Oral Pathology, St Joseph Dental College, India. The study

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participants included all the patients diagnosed with OSCC during the stipulated period. The demographic data of all the study participants were noted in a pre-designed pro forma. A detailed history of tobacco-related habits, such as chewing, smoking, or both were taken. The presence of any other associated habits, such as alcohol was also noted. The site of the lesion, clinical staging, and histopathological grading were also recorded. The obtained data were tabulated and statistically analyzed using the Chi-square test. A probability of 0.05 or less was taken as statistically significant. Sigma Plot 13 (Systat USA) was used for statistical calculation.

Results

In the series of 134 squamous cell carcinoma patients, 82 were men (61%) and 52 women (39%). The mean age of occurrence was 54.69 ± 11.37 years. 62% of the patients were between 50 and 69 years of age, 25% were 30–49 years with the least occurrence over 70 years (11%) and below 30 years (2%). Among them 34% (n = 46) had the habit of chewing tobacco in various forms, 14% (n = 19) had a smoking habit, 2% (n = 3) were alcoholics, 31% (n = 42) had more than one habit and 18% (n = 24) had no habits (Figures 1 and 2).

The primarily site of involvement was the buccal mucosa (BM) (48%) followed by the tongue (20%), palate (8%), floor of the mouth (9%), lips (8%), gingiva (1.5%), and alveolus (1%). Among the tobacco chewers, 89% of the tumors were located in the area where the quid is traditionally held between the BM and the gingiva (79%) or labial mucosa and the gingiva (10%). The tongue was involved in 6 patients (8%) and the floor of the mouth and alveolus in two (3%). On histopathological examination, 91 (67.9%) tumors were well differentiated (WD), 38 (28.4%) moderately differentiated (MD), 3 (2.2%) poorly differentiated (PD) squamous cell carcinoma, and 1.5% were early invasive squamous cell carcinoma (Table 1 and 2). The chi-square test showed no significant association between age and gender, histological grade, and tumor site. Similarly, no association was elicited between gender and age, histopathological grade, and tumor site.

Discussion

The epidemiological characteristics of 134 patients with oral squamous carcinoma revealed its peak incidence in the fifth and sixth decades of life with a male predominance in the ratio of 1.6:1 (male-female). Accordingly, many studies across the world have shown a male predilection.[3-6] The International Agency for Research on Cancer monograph also revealed a male predominance in Buenos Aires, Eastern and Central Europe, the UK, and the USA.[7] Male: Female ratios ranging from 6:1 to 2:1 have been reported in the literature. While in Western countries, the proportion of oral cancers in women is increasing especially among young white individuals as habits, such as smoking and drinking are becoming socially acceptable in women.[8,9]

A consistent age relationship with OSCC in the Indian subcontinent has been established in many studies as in the present study.[10,11] The youngest patient was 26 years and the oldest was 82 years with a mean age of 55 years. The incidence rate in young patients has increased over several decades in particular in Western populations.[12] The abridged Immune surveillance in the 2nd decade in conjunction with indiscriminate use of tobacco-related products justifies the incidence at a very early age in life.[13] A study in the Nigerian population revealed a lower mean age of 45.3 years old and 40% of the patients below 40 years. This divergence was attributed to a shorter life expectancy or earlier exposure to risk factors.[14] Not all the young OSCC patients in the present study reported a history of tobacco and alcohol use. The

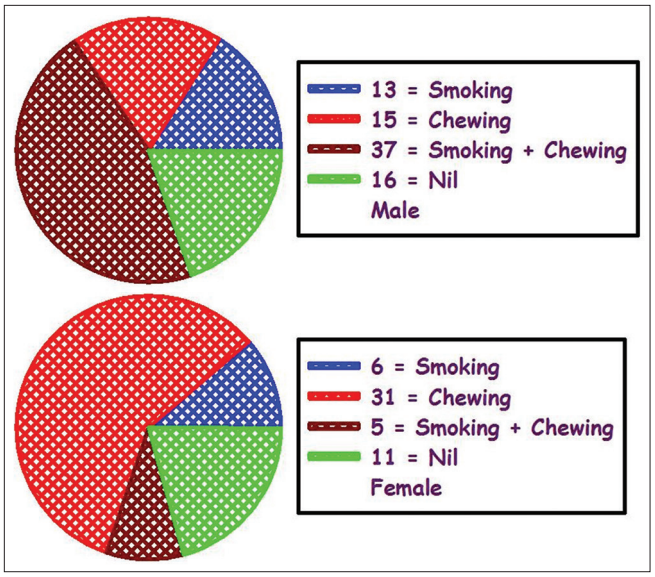

Figure 1: The association of tobacco habits in oral squamous cell carcinoma

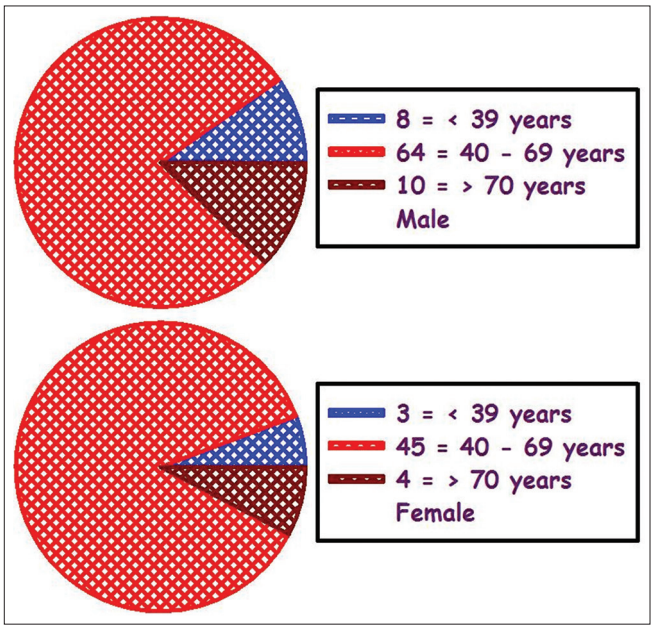

Figure 2: Association of age and gender in oral squamous cell carcinoma

possible risk factors in them could be dietary or nutritional factors, genetic predisposition, or exposure to high-risk HPV types especially HPV type 16. The relative survival in young patients was higher than in older patients.[15] Another study showed contradictory results were young age turned out to be an independent predictor of poor survival.[16]

The predominant tumor site in the present study is the BM. The geographical location of the tumor is subjective to pertinent risk factors. Consistent with previously reported studies, smokeless tobacco consumption is a significant risk factor for OSCC. The majority of studies from India and Pakistan[3,10,17-19] have revealed a strong predilection for the involvement of BM in both genders. The prevalence of smokeless tobacco habits in these regions validates the commonness of BM cancers. In the majority of the cases left side was commonly involved and they clinically presented as ulcero-proliferative lesions.

Unlike the Asian population, BM cancers are common in European and American populations the tongue is the most common site for oral SCC.[12] Few studies from India, Japan, Taiwan, Thailand, Yemen, and Iran have reported tongue predominance estimated to be 42% of all oral cancer cases. In the present study tongue cancers accounted for 20% and labial mucosa was involved in 6% of the cases. Tongue cancers were mostly related to chronic trauma, such as sharp teeth and the majority of them did not have any habit history. Most of the tongue cancers clinically presented as ulcers with induration. Out of a total 40 tongue cancers, 28 were in males and 12 in females. A male predilection for tongue cancers is reported in a number of studies expect in Scandinavian countries where women show high incidence due to a pre-disposition to Plummer–Vinson syndrome.[20]

Stuffing of tobacco between labial mucosa and gingiva was the risk factor in almost all cases of labial cancers. They mostly presented as ulcero-proliferative lesions. The lower lip was involved in all the cases. Apart from tobacco chewing and smoking, prolonged exposure to ultraviolet rays is another risk factor. The lower lip receives more direct sunlight and countries closer to the equator with regular long hours of sunshine, such as Greece, lip cancer accounts for 60% of oral cancer.[21,22] Cancers involving labial mucosa predominate in the Myanmar region also.[23] In western populations, the incidence of lip cancer is especially high because of their low skin melanin levels and outdoor activities.[6] Pires *et al*.[4] demonstrated gender-specific tumor locations, such as in male tumors involving the lateral border of the tongue, the floor of mouth/ventral tongue, and gingiva and alveolar mucosa were more prevalent and in females border of the tongue, gingiva, alveolar mucosa, and BM were prevalent. Kruse *et al*.,[24] reported a gender-specific pattern that is females were more affected by OSCC located on the palate and alveolar mucosa. The exact reasons for this differential site predilection for OSCC in males and females are unknown. No such associations were elicited in the present study.

OSCC of the palate accounted for 8% and was mostly associated with smoking. Two of the palatal OSCC individuals had a reverse smoking habit. Petruzzelli and Mayers[25] in 1994 noted that neoplasia of the upper jaw constitutes only 2% of all head and neck malignancies and 10% of oral cancers. More than three-fourths of the OSCC of hard palate were in

Table 1: Association of age and gender with grades of squamous cell carcinoma

S. No.	Gender	WD	MD and PD	Statistical significance
1	Male	40	12	χ^2=1.721
	Female	53	29	*P*=0.190
2	Age	WD	MD and PD	Statistical significance
	<39 years	7	4	χ^2=0.424
	40–69 years	77	32	*P*=0.809
	>70 years	9	5	

n-Male=82; Female=52. WD: Well differentiated OSCC, MD: Moderately differentiated OSCC, PD: Poorly differentiated OSCC

Table 2: Association of age and gender with tumor site and association of age with habit

Association of age and gender with tumor site

S. No.	Gender	BM	Tongue	Others	Statistical significance
1	Male	37	28	17	χ2=1.873
	Female	27	12	13	P=0.392
2	Age	BM	Tongue	Others	Statistical significance
	< 39 years	8	2	1	χ2=3.773
	40–69 years	49	35	25	P=0.438
	> 70 years	7	3	4	

n-Male=82; Female=52, BM: Buccal mucosa

Association of age with habit

S. No.	Age	Smoking	Chewing	Smoking+Chewing	No	Statistical significance
1	<39 years	1	7	1	2	χ2=6.119
	40–69 years	17	36	36	22	P=0.410
	>70 years	1	3	5	3	

n-Male=82; Female=52

the advanced stage at presentation due to early invasion of the underlying bone.[26] 9% of the OSCCs were involving the floor of the mouth. The possible predisposing factors could be the pooling of the carcinogens mixed with saliva in the floor of the mouth and secondly curtailed protection by the non-keratinized mucosal lining against carcinogens.

82% of the OSCC were associated with tobacco-related habits. Chewing tobacco was the most prevalent habit in either sex. About 60% of the female patients were tobacco chewers. Conventionally, Indian women are convicted from smoking or alcohol consumption but are overlooked with other habits, such as tobacco chewing, especially in the rural population. Therefore the prevalence of tobacco chewing is more in females whereas other habits, such as smoking and alcohol are more in men. Only three female patients were recorded to have a reverse smoking habit. Over the decades, cigarette smoking was increasingly popular but with warning labels and antismoking messages in electronic and print media in recent years, people have become increasingly well known of the hazards of cigarette smoking. Assuming smokeless tobacco to be less harmful some cigarette smokers switched to snuff or chewing tobacco. Adding to this, extensive advertising campaign by tobacco companies has led to increased use of smokeless tobacco.

The rural population in developing countries, such as India is addicted to tobacco products. The dependency may be related to monotonous work and unawareness of its health hazards. The smokeless tobacco products exert their effect by directly irritating the mucosa as well as by inducing genomic modifications. The relative risk of developing oral or upper respiratory cancer due to the use of moist snuff and chewing tobacco ranges from 0.6 to 1.7. While it ranges from 4 to 13 with dry snuff use.[27] Despite patient's systemic, immune, and other relative factors, such as the quantity, frequency, and duration of habit, oral mucosa must undergo prolonged exposure to the carcinomatous agent in smokeless tobacco before cancer develops. According to Phillips *et al.* (1987), 25-year latency exists between the initial exposure to a carcinogen and the development of a clinically recognizable cancer.[28] Around 78% of smokeless tobacco users are habituated to snuff or chewing tobacco for longer than 40 years.[29] Awan *et al.*[30] in 2016, showed 2–4 times higher odds ratio of developing oral cancer in smokeless tobacco users when compared to those non-consumers of these products.

Almost 45% of the men had more than one habit, that is, the association of chewing with alcohol or smoking, smoking and alcohol, or all three habits. Consumption of smokeless tobacco combined with other products produced a synergistic effect that appeared to increase the risk of cancer. 24% of the study participants weren't associated with any habit and the majority of them who had no tobacco-related habits were subjected to other risk factors, such as chronic trauma due to sharp tooth, cheek biting, or ill-fitting dentures. In two cases the etiology was non-specific.

About 69% of the tumors were WD, 28% were MD, and 2% were PD. Similarly high frequency of WD SCC was earlier reported in the literature.[4,31] On the contrary, Effiom *et al.*[14] in 2008 reported PD SCC (47.6%) as the most predominant histological subtype and MD as the least common type. Pires *et al*.[4] in their study observed that males were predominantly affected by MD and PD OSCC, while females were mainly affected by WD and MD tumors. It was also shown that OSCC affecting the BM and lower lip were predominantly WD, while tumors affecting the border of the tongue, floor of the mouth, ventral tongue, and alveolar mucosa and gingiva were predominantly MD whereas no such gender or site association with a grade of the tumor was present in this study.

Conclusion

Thus, the current study focuses on the association of tobacco-related habits in OSCC. The most prevalent habit was tobacco chewing. OSCC showed a male predominance and a site predilection for BM with a majority of them being WD.

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