Demographics, habits, and clinical presentation of oral cancer in Puducherry's population: An institutional experience

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ABSTRACT

Introduction: Oral cancer ranks among the top three of all cancers in India and accounts for over 30% of all cancers reported in the country. More than one-third of these are preventable by avoiding deleterious habits. Although the term oral cancer encompasses all malignant tumors that originate from the oral tissues, 90% of these are squamous cell carcinomas confirmed histologically. **Aim and Objective:** 1. To assess the demographic profile of patients with oral cancer in Puducherry's population. 2. To evaluate if any correlation exists among the habits, primary site, and clinical presentation of oral cancer. **Materials and Methods:** Demographic, clinical, and histopathological data concerning oral cancer patients were retrieved from the archives of our institution from 2009 to 2014 and tabulated for further statistical analysis using Statistical Package for the Social Sciences (SPSS) version 17.0. Chi-square test was used to assess the correlation between variables ($P < 0.01$ significant). **Results:** The male-to-female ratio was 1:1.35. The mean age at presentation was 53 years; the incidence increased with age and more steeply in females. Smokeless tobacco was used in 69.3% of the cases. Mandibular alveolobuccal complex and buccal mucosa were the most common primary sites. Though no statistically significant correlation ($P > 0.05$) was found between habits and the primary site, the palate was more commonly involved in smokers. Clinical presentation was ulceroproliferative in 67.19% of the cases but no significant correlation ($P > 0.05$) was seen among age, gender, habits, and clinical presentation. 80% of the patients reported within 3 months of onset of symptoms and 66% were in TNM Stage 3. **Conclusion:** Through our study, we have tried to sketch the demographic profile of Puducherry's population with oral cancer but this is just the tip of a massive upsurging iceberg in the subcontinent.

Key words: Clinical presentation, oral cancer, tobacco

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INTRODUCTION

The world is heading toward various types of noncommunicable diseases, which are also known as modern-day epidemics.[1] Oral cancer ranks among the top three of all cancers in India and accounts for over 30% of all cancers reported in the country and oral cancer control is quickly becoming a global health priority. Oral cancer is a broad term that includes various malignant diagnoses that present in oral tissues. Oral cancer is defined as the cancer of the lip, the labial mucosa and buccal mucosa, anterior two-thirds of the tongue, the retromolar pad, the floor of mouth, and the gingival palate and the hard palate. Although the term oral cancer encompasses all malignant tumors that originate from the oral tissues, 90% of these are squamous cell carcinomas confirmed histologically. Carcinogenesis is a general process that leads to change in molecular function, cell morphology, and ultimately cellular behavior. This process is not limited to the epithelium but involves the epithelium, connective tissue, and immune function interaction.

Variability in age-adjusted incidence with crude incidence is projected to increase by 2030.[2] India continues to report the highest prevalence of oral cancers globally with 75,000-80,000 new cases of such cancers reported every year. A recent report prepared by experts of the National Institute of Health and Family Welfare (NIHFW) to study the harmful effects of *gutka* specified clearly that India alone accounted for 86% of the total oral cancer figure across the world. The country is the oral cancer capital of the world because of the rampant habit of tobacco chewing that is as much as twice the global average. Incidence rate is as high as 21.4 per lakh in some districts of India. Districts in central, south, and northeast India have the world's highest incidence of cancers associated with tobacco, which is chewed as well as smoked in India. Aizawl district in the northeastern state of Mizoram has the world's highest incidence of cancers in men of the lower pharynx (11.5 per 100,000) and the tongue (7.6 per 100 000). The incidence of oral cancer among men in Puducherry was 8.9 per 100,000, one of the highest rates in the world for men.[3]

As against 26% chewing tobacco users, India has 14% smoking tobacco users globally, indicating that prevention of the use of chewing tobacco remains one of the single biggest challenges for the Ministry of Health's ambitious program to reduce the incidence of noncommunicable diseases. More disturbing is the finding that chewing tobacco and *gutka* contribute to 90% of oral cancer cases in the country, with the Health Ministry now banking on the successful implementation of the 2011 notification, which banned the use of tobacco in *gutka* by describing *gutka* as a food product and saying that food products cannot contain nicotine. The positive part is that there is evidence that at least one-third of all cancer cases are preventable, and this is the reason why the World Health Organization (WHO) gives oral cancer prevention high priority.

With this brief background, a study was conducted at our institution to assess the demographic profile of oral cancer and the correlation among habits, primary site, and clinical presentation in patients visiting our teaching institution.

MATERIALS AND METHODS

Data concerning oral cancer patients were retrieved from the archives of our institution from 2009 to 2014. We included only those cases where lesions were clinically evident in the oral cavity and there was thorough clinicopathologic documentation regarding habits, clinical presentation, primary site, and lymph node status. We excluded cases with insufficient documentation and histopathologically confirmed cases of mucoepidermoid carcinoma, malignant melanoma, non-Hodgkin lymphoma, ameloblastic carcinoma, and recurrent cases of oral carcinoma because factors other than tobacco such as genetic predisposition, immune status, and infections also play a key role in the pathogenesis of malignancies other than squamous cell carcinoma.

The demographic profile of patients such as age and gender was noted. Patients were divided into three categories based on their mode of using tobacco as smokers, smokeless tobacco users, and nontobacco users wherein the etiology was attributed to chronic trauma (due to sharp teeth or ill-fitting denture) and occupational exposure to carcinogens.

On the basis of location, lesions were classified into five primary anatomical sites — the tongue and floor of the mouth, retromolar trigone, buccal mucosa, alveolobuccal complex, and retromolar trigone. On the basis of clinical presentation, we divided them into three categories as follows:[4]

Ulcerative: Discrete ulcer with a raised indurated margin or as a 54% relatively large area of ulceration with indurated area at the periphery [Figure 1a].

Ulcerproliferative: Growth with broad base and indurated margins, pebbled, smooth, or verrucous surface with superficial ulcerations [Figure 1b].

Ulceroinvasive: Ulcer invades into deeper tissue with minimal surface manifestations but the area is indurated [Figure 1c].

All the data were collected were tabulated in Microsoft Excel spreadsheets and Statistical Package for the Social Sciences (SPSS) software version 17.0 was for data processing and data analysis. Later, chi-square test was used to evaluate the

statistical correlation between various parameters. *P* value less than 0.05 was taken as significant.

RESULTS

Three hundred and seventy eight subjects based on inclusion and exclusion criteria were included out of which 217 were males and 161 were females. Male-to-female ratio was 1:1.35. Mean age at presentation was 53 years for males and 55 years for females. Patients mostly reported to our institution with complaint of pain and ulcer and less commonly swelling and growth and most of them presented within 3 months of onset of symptoms. In our study, the incidence of oral cancer increased with age and even more steeply in females [Figure 2].

It was found that consumption of smoke and smokeless tobacco habits were almost equal in males but females barely smoked (only 2 of 161); tobacco chewing in the form of quid was the most common altogether. Some patients did not have any harmful habits where etiology could be attributed to chronic trauma or occupational exposure to carcinogens [Figure 3].

Retromolar trigone and alveolobuccal complex were more commonly involved in males while the buccal mucosa was more common in females. No statistically significant correlation was found between gender and primary anatomical site; $P > 0.05$. Mandibular alveolobuccal complex and buccal mucosa were most common sites of involvement in both smokers and nonsmokers but the palate was commonly involved in smokers and the buccal mucosa in nonsmokers [Figure 4]. No statistically significant correlation was found between the site and age group in chi-square test ($P > 0.05$).

The most common clinical presentation of lesions was ulceroproliferative but ulcers were slightly more common in smokeless tobacco users though this difference was not
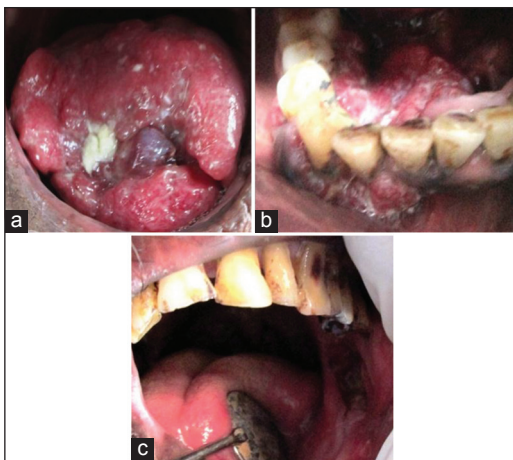

Figure 1: Clinical presentation of oral cancer (a) Ulcerative (b) Ulceroproliferative (c) Ulceroinvasive
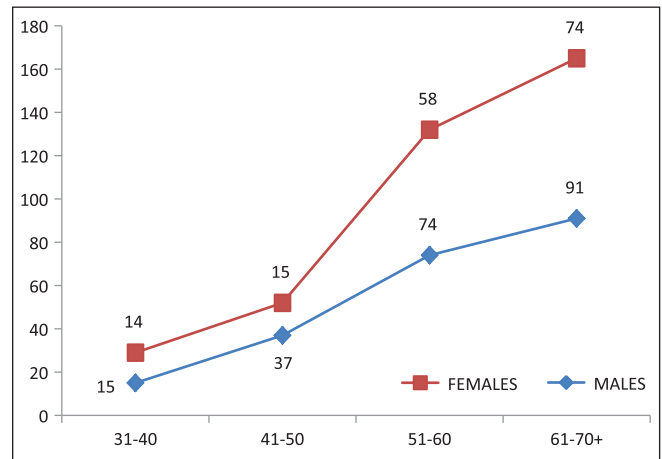

Figure 2: Stacked line diagram with markers depicting an increased incidence of oral squamous cell carcinoma (OSCC) with age in both males and females but a steeper curve in females
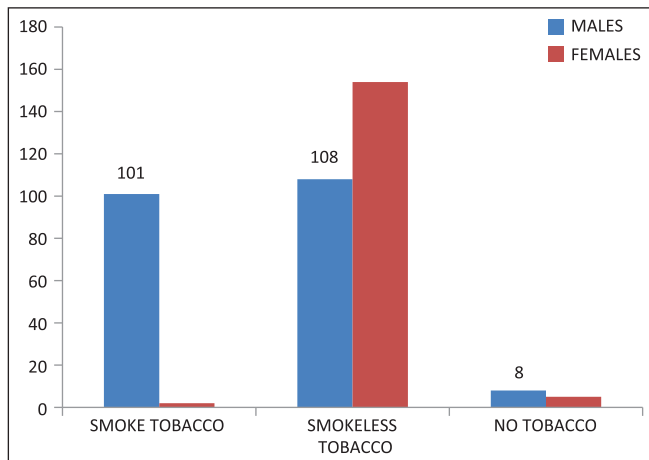

Figure 3: 3D Cone depicting distribution of smoke and smokeless tobacco habits among males and females in the study group of oral cancer
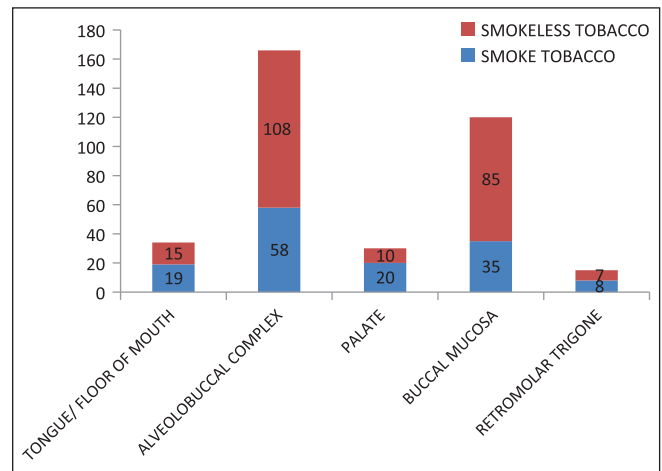

Figure 4: Stacked cylinder diagram depicting distribution of habits and common oral sites in the study group

statistically significant [Figure 5]. No significant difference was found in the distribution of these clinical presentations by age group and gender.

We also found that there was no significant correlation between primary anatomical sites and clinical presentation. Ulceroinvasive presentation was never found on the tongue and palate while lesions at the alvelobuccal complex were mostly ulceroproliferative [Figure 6].

No significant correlation was found among regional lymph node metastasis, habits, clinical presentation, and the sites of primary presentation ($P > 0.05$). 66% of the patients reported late in the course of disease at TNM Stage 3 and 23% in TNM Stage 4.

DISCUSSION

Oral and orpharyngeal cancer constitute the sixth most common cancer in the world.[5] Nearly 7 lakh Indians die of cancer every year while over 10 lakh are newly diagnosed with some form of the disease. One in every 10 Indians runs the risk of getting cancer before 75 years of age while seven in every 100 runs the risk of dying from cancer before their 75th birthday. Cancer of the lip and oral cavity has emerged as the deadliest among Indian men.[6] The incidence of oral cancer is greater in men in the Lower Rhine area of France, in the south of India, in certain areas of Central and Eastern Europe, and in some regions of Latin America.[7]

In this study group, the maximum number of patients presented within 3 months of onset of symptoms, which can be attributed to poverty, illiteracy, and possibly resorting to home remedies, all leading to delay by the patients. Most of the patients have to earn their living by daily wages and the loss of a working day means a loss of wages. Hence, these patients refer late as compared to Western data.
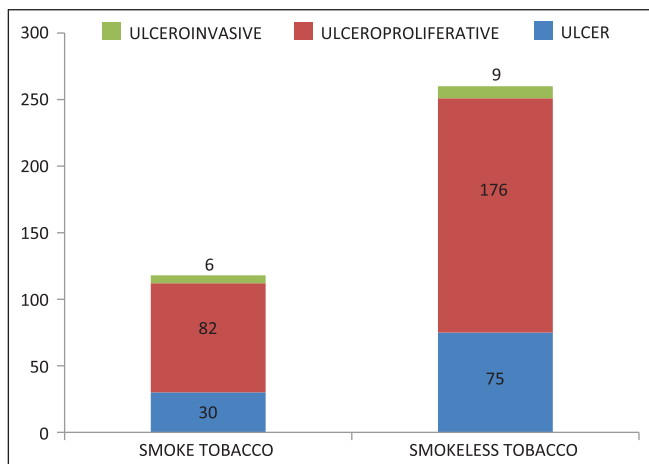
The male-to-female ratio in study was 1:1.35, which was much lower than prior studies documented by Shenoi *et al.* and much in accordance with the study by Pinholt *et al.* where the ratio was 1:1.2. The consumption of tobacco and betel nut as a means of stimulant renders males more susceptible to oral cancers. In India, the consumption of alcohol and tobacco is considered a taboo among the female population but this custom is at present gradually fading away, as females cutting across various ages and socioeconomic lines are turning to these habits. In Puducherry, India, females are extensively involved in agricultural work and other field work, which could have led to this difference in statistics compared to other parts of country.

The mean age of occurrence in the study was 53 years, which was consistent with prior studies by Sankaranarayan *et al.* and the study by Chattopadhyay *et al.* on the Eastern population but much lower than US SEER data where the mean is 65 years.[8,9] 95% oral cancers occur in people older than 40 years with the average age at diagnosis 60 years. The incidence of oral cancer is age-related, which may reflect the time for accumulation of genetic changes, duration of exposure to initiators and promoters, and decreased immunologic surveillance with age.

Neufeld *et al.*, using the National Sample Survey (NSS), which is a representative sample of India, conducted a study in 1995-1996 constituting 4,71,143 people 10 years and older and found that the prevalence of smoking tobacco was 16.2% and chewing tobacco was 14%.[10] The most widespread form of tobacco is chewing of betel-quid with tobacco and this has been demonstrated as a major risk factor of cancer of the oral cavity and our study is also consistent with it; smokeless form of tobacco was most common in both the genders.

Smoking tobacco as factory-made cigarettes, cigars, and loose tobacco in pipes or handmade cigarettes is familiar to all. Tar,

Figure 5: Stacked cylinder diagram depicting variations in the clinical presentation of oral cancer among smokers and nonsmokers in the study group
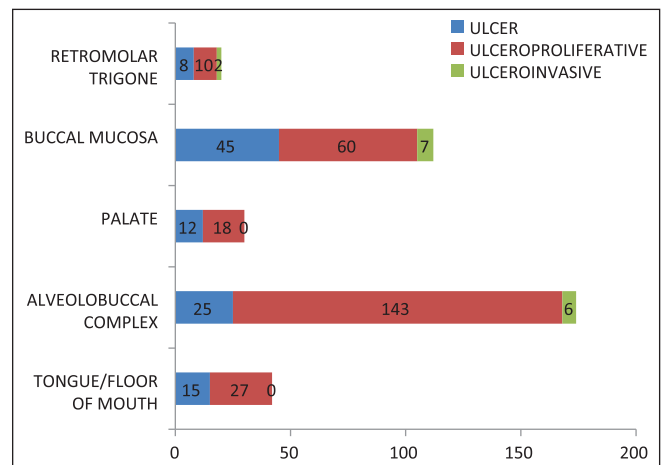

Figure 6: Stacked pyramid diagram depicting variations in clinical presentation at different oral sites in the study grou

nicotine, and nitrosamine content vary greatly, depending on the species, curing additives, and method of combustion. Indian *bidi* contains only a small amount of tobacco dust rolled in a dried leaf of tendu (*Diospyrous melanoxylon*) or temburni tree (*Diospyrous ebenum*). In comparison to cigarettes, the main stream of smoke of *bidi* contains a much higher concentration of several toxic agents such as hydrogen cyanide, carbon monoxide, ammonia, thiocyanates, and other volatile phenol and carcinogenic hydrocarbons such as benzanthracene and benzopyrene. *Bidi* also delivers more nicotine than cigarettes. The nitrosonornicotine (NNN) and 4 (methyl1-nitrosoramino)-1-(3 pyridol) (NNK) levels of *bidi* tobacco ranged 6.2-12 mcg/g compared with 1.3-58.0 mcg/g in cigarette tobacco.[11]

Much of the tobacco in the world is consumed without combustion. Rather, it is placed in contact with mucous membranes, through which nicotine is absorbed to provide the pharmacological effect. Smokeless "spit" tobacco contains over 2,000 chemicals, five of which have been directly related to causing cancer. Wrapped inside a betel leaf and plated in the side of the mouth, tobacco has been chewed for centuries in India. This is commonly called *paan* (betel-quid). But in the last decade, tobacco companies have started selling tobacco in ready-packaged small sachets. Mostly, these quids (*gutka*) are kept where it is gradually absorbed after dilution with the saliva. Smokeless tobacco contains carcinogens such as nitrosoamines, polycyclic hydrocarbons, nitrosodiethanolamine, nitrosoproline, and polonium.

In this study, we have not included alcohol as an independent risk factor because according to several published studies alcohol is a dependent risk factor for oral cancer in the presence of tobacco. Dehydrating effects of alcohol on the mucosa increases mucosal permeability and thus, the effects of potential carcinogens in tobacco on patients.[12]

Alveolobuccal complex and buccal mucosa are the most common primary sites of presentation in Puducherry's population. This is in contrast to prior studies by Lype *et al.* where they have documented the tongue as the most common site but consistent with study Sharma *et al.* in western Uttar Pradesh, India.[13,14] This could be attributed to the fact that most of the patients tend to keep the raw tobacco with other constituents in the form of quid in the buccal sulcus with close proximity to the alveolus, which in turn led to constant irritation with chemical and physical insult of the gingiva. Also, whether smoked or chewed noxious agents get dissolved in the saliva and some saliva normally remains in the vestibule of the mouth, causing greater and prolonged contact with the buccal mucosa.

A majority of the patients presented in Stage III and Stage IV, which was in accordance with a prior study by Shenoi *et al.*[15]

Balaram *et al.* in a study stated that the low socioeconomic status may be a risk factor for poor oral hygiene, thereby further increasing the risk of oral cancer in tobacco chewers. This is in accordance with our results as the people visiting our institution mostly belonged to the low socioeconomic status.[16] Also, the patients with low socioeconomic status consume lesser amounts of antioxidant-rich fruits and vegetables.

CONCLUSION

Through this study, we have tried to sketch the demographic profile of a Puducherry's population with oral cancer, visiting our teaching institution but this is just the tip of massive upsurging iceberg in the subcontinent. The statistical model generated in the present study highlights the importance of awareness of risk factors among the lower socioeconomic strata considering that almost 90% of the patients report at advanced stages. The key for moving this disease from its unchanged position on the "ladder of death" lies in the hands of the public and oral physicians. Basic and standard comprehensive oral examinations take just 90 s. Our minimal vigilant effort can raise us on a pedestal as doctors making an impact on the health profile of the nation.

The suffering, disfigurement, and death associated with oral cancers is definitely avoidable due to easy surgical accessibility of the site, well-recognized causative factors, and the precedence by precancerous lesions, providing an excellent opportunity for early detection and control. Strategies to overcome the present situation must be undertaken by oral health programs for the early diagnosis and prevention and management and follow-up of oral cancer.

Conflicts of interest
There are no conflicts of interest.

REFERENCES

1. Mathur A, Jain M, Shiva M, Navlakha M, Prabu, Kulkarni S. Tobacco habits and risk of oral cancer: A retrospective study in India. Iran J Blood and Cancer 2007;3:111-6.
2. Coelho KR. Challenges of the oral cancer burden in India. J Cancer Epidemiol 2012;2012:701932.
3. Mudur G. India has some of the highest cancer rates in the world. BMJ 2005;330:215.
4. Mathur PT, Dayal PK, Pai KM. Correlation of clinical patterns of oral squamous cell carcinoma with age, site, sex and habits. J Indian Acad Oral Med Radiol 2011;23:81-5.
5. Warnakulasuriya S. Global epidemiology of oral and oropharyngeal cancer. Oral Oncol 2009;45:309-16.
6. World Health Organization (WHO). GLOBOCAN. IARC, 150 COURS ALBERT THOMAS, 69372. LYON CEDEX 08 France: WHO; 2012.
7. Moore SR, Johnson NW, Pierce AM, Wilson DF. The epidemiology of mouth cancer: A review of global incidence. Oral Dis 2000;6: 65-74.

8. Sankaranarayanan R. Oral cancer in India: An epidemiologic and clinical review. Oral Surg Oral Med Oral Pathol 1990;69:325-30.

9. Chattopadhyay A. Epidemiologic study of oral cancer in eastern India. Indian J Dermatol 1989;34:59-65.

10. Neufeld KJ, Peters DH, Rain M, Bono S, Bronner RK. Regular use of alcohol and tobacco in India and its association with age, gender and poverty. Drug Alcohol Depend 2005;77:283-91.

11. Dikshit RP, Kanhere S. Tobacoo habits and risk of lung, oropharyngeal and oral cavity cancer: A population-based case-control study in Bhopal, India. Int J Epidemiol 2000;29: 609-14.

12. Glick M. Burket's Oral Medicine. 12th ed. USA: People's Medical Publishing House - USA, Ltd.; 2014.

13. Mathew Iype E, Pandey M, Mathew A, Thomas G, Sebastian P, Krishnan Nair M. Squamous cell carcinoma of the tongue among young Indian adults. Neoplasia 2001;3:273-7.

14. Sharma P, Saxena S, Aggarwal P. Trends in the epidemiology of oral squamous cell carcinoma in Western UP: An institutional study. Indian J Dent Res 2010;21:316-9.

15. Shenoi R, Devrukhkar V, Chaudhuri, Sharma BK, Sapre SB, Chikhale A. Demographic and clinical profile of oral squamous cell carcinoma patients: A retrospective study. Indian J Cancer 2012;49:21-6.

16. Balaram P, Sridhar H, Rajkumar T, Vaccarella S, Herrero R, Nandakumar A, *et al*. Oral cancer in southern India: The influence of smoking, drinking, paan-chewing and oral hygiene. Int J Cancer 2002;98:440-5.