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A Study on Oral Cancer and Its Correlation with Tobacco Chewing, Smoking and Alcohol Drinking In Western Rajasthan

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Abstract
An estimated 300373 new cases and 145353 deaths from lip and oral cavity cancer occurred in 2012 worldwide1. To assess the effect of tobacco chewing, smoking and alcohol drinking in the development of the oral cancer and to determine the interaction among these habits, we conducted a hospital based study in Jodhpur, western Rajasthan. Histopathologically confirmed 100 cases of oral cancer were included in this study. The male to female ratio was 2.70:1. The mean age of oral cancer was found to be 51.15 years. The tongue was the most frequently involved site. In our study oral cancer was significantly associated with tobacco chewing, smoking and alcohol drinking. Patients who had combined habit developed oral cancer earlier than who had habit of tobacco chewing alone or smoking alone. Majority of female patients who had tobacco chewing habit developed oral cancer earlier than male patients. The habit of tobacco chewing alone was found to be significant in cancer of buccal mucosa (BM) and anterior 2/3rd of tongue (AOT) in male patients. In female patients tobacco chewing was not found to have a significant association with oral cancer at all sites. Oral hygiene significantly associated with oral cancer in both gender.
Keywords: *Oral cancer, tobacco, smoking, alcohol*

Introduction

An estimated 77003 new cases and 52067 deaths from oral cavity cancer (including lip cancer) occurred in 2012 in India. In India oral cavity cancer is the third most common cancer. In men and women oral cavity cancer is first and fifth most common cancer respectively in India[1]. Oral cancer is a major public health challenge in India [2]. In the India, oral cancer mainly caused by tobacco use, especially of smokeless tobacco, areca nut consumption, smoking and alcohol abuse. Tobacco is smoked, chewed, sucked or applied to teeth and gums in diverse ways. Many of these methods are specific to particular geographic regions. Despite the fact that the oral cavity is accessible for visual examination, oral cancers are detected in their advanced stages [3]. In fact, in India, 60-80% of patients present with advanced disease as compared to 40% in developed countries [4]. Early detection would not only improve the survival rate, but it would also

lower the cost and morbidity associated with treatment.

Material and method

The study was done under the Department of Pathology Dr. S.N. Medical College, Jodhpur. The study group included 100 histopathologically diagnosed cases of oral cancer. Subsequently, socio demographic data in addition to clinical details was collected by using a standardized questionnaire. Chi-square test was performed to assess the association of gender with age groups, habits, site of cancer. The risk factor associations were reviewed and compared with site and habits. *P* value of <0.05 was considered to be statistically significant.

Result

Histopathologically confirmed 100 cases of oral cancer were included in this study. The male patients were 73% and female patients were 27%. The male to female ratio was 2.70:1.

Table 1: Distribution of oral cancer cases according to age in male and female.

Age (In years)	*Male (N=73)*	*Female (N=27)*	*Total (N=100)*
21 –30	6 (8.21)	2 (7.40)	8 (8)
31 –40	10 (13.69)	5 (18.51)	15 (15)
41 –50	14 (19.17)	7 (25.92)	21 (21)
51 –60	28 (38.35)	10 (37.03)	38 (38)
61 -70	14 (19.17)	3 (11.11)	17 (17)
>70	1 (1.36)	0 (0)	1 (1)
(Mean ± SD)	51.72±12.72	49.59±11.11	(51.15±12.29)

Table 2: Distribution of oral cancer cases according to the residence.

Residence (Rural/Urban)	*Male (N=73)*	*Female (N=27)*	*Total (N=100)*
Urban	43 (58.90)	15(55.55)	58 (58)
Rural	30 (41.09)	12(44.44)	42 (42)

Table 3: Distribution of oral cancer cases according to occupation in male and female.

Occupation	*Male (N=73)*	*Female(N=27)*	*Total (N=100)*
Laborer	23 (31.50)	10 (37.03)	43 (43)
Farmer	18 (24.66)	6 (22.22)	24 (24)
Govt. Service	6 (8.21)	0 (0)	6 (6)
Private Service	7 (9.58)	0 (0)	7 (7)
Business	5 (6.84)	0 (0)	5 (5)
Housewife	-	11 (40.74)	11 (11)
Unemployed	14 (19.17)	-	14 (14)

Table 4: Distribution of oral cancer cases according to educational status in male and female.

Educational Status	*Male (N=73)*	*Female (N=27)*	*Total (N=100)*
Illiterate	45 (61.64)	22 (81.48)	67 (67)
Primary	10 (13.69)	3 (11.11)	13 (13)
Middle	9 (12.32)	2 (7.40)	11 (11)
Secondary	4 (5.47)	0 (0)	4 (4)
Higher Secondary	3 (4.10)	0 (0)	3 (3)
Graduate and above	2 (2.73)	0 (0)	2 (2)

Table 5: Distribution of oral cancer cases according to socioeconomic status in male and female (Modified Prasad's Classification)[5]

Socioeconomic Class	*Male (N=73)*	*Female (N=27)*	*Total (N=100)*
I	5 (6.84)	0 (0)	5 (5)
II	13 (17.80)	3 (11.11)	16 (16)
III	27 (36.98)	10 (37.03)	37 (37)
IV	22 (30.13)	10 (37.03)	32 (32)
V	6 (8.21)	4 (14.81)	10 (10)

Table 6: Anatomical distribution of oral cancer cases in male and female.

Site Of Oral Cancer	*Male (N=73)*	*Female (N=27)*	*Total (N=100)*
Tounge	34 (46.57)	10 (37.03)	44 (44)
BM	17 (23.28)	9 (33.33)	26 (26)
Tonsil	8 (10.95)	2 (7.40)	10 (10)
Palate	9 (12.32)	1 (3.70)	10 (10)
Gingivae	2 (2.73)	2 (7.40)	4 (4)
Lip	1 (1.36)	2 (7.40)	3 (3)
Retro Molar Trigone (RMT)	1 (1.36)	1 (3.70)	2 (2)
Floor Of Mouth (FOM)	1 (1.36)	0 (0)	1 (1)

$p > 0.4$

Table 7: Anatomical distribution of tongue cancer cases in male and female

Site Of Oral Cancer	*Male*	*Female*	*Total*
AOT	16 (21.91)	9 (33.33)	25 (25)
Base of Tongue (BOT)	18 (24.65)	1 (3.70)	19 (19)
Total	34 (46.57)	10 (37.03)	44 (44)

$p < 0.02$

Table 8: Distribution of oral cancer cases according to histopathological characteristics

Histopathology	*No. Of Cases /(%)*
Well Differentiated Squamous Cell Carcinoma	42
Moderately Differentiated Squamous Cell Carcinoma	49
Poorly Differentiated Squamous Cell Carcinoma	9

Table 9: Presence of cervical lymph node metastasis at the time of diagnosis in oral cancer cases in male and female

Lymph Node Metastasis	*Male (N=73)*	*Female (N=27)*	*Total (N=100)*
Yes	61 (74)	21 (26)	82 (100)
No	12 (67)	6 (33)	18 (100)

Table 10: Tobacco chewing, smoking and alcohol drinking habits in male and female in oral cancer

Habit	*Male (N=73)*	*Female (N=27)*	*Total (N=100)*
No habit	1 (1.36)	8 (29.62)	9 (9)
Only Tobacco Chewers(TC)	13 (17.80)	19 (70.37)	32 (32)
Only Smokers(Sm)	14 (19.17)	0 (0)	14 (19.17)
Only Alcoholics(Al)	0 (0)	0 (0)	0 (0)
TC And Sm	6 (8.21)	0 (0)	6 (6)
TC And Al	7 (9.58)	0 (0)	7 (7)
Sm And Al	18 (24.65)	0 (0)	18 (18)
TC, Sm And Al	14 (19.17)	0 (0)	14 (14)

$p < 0.001$

Table 11: Duration of tobacco chewing, smoking and alcohol drinking habits in oral cancer in male

Duration (In Years)	*Only TC (N=13)*	*Only Sm (N=14)*	*TC and Sm (N=6)*	*TC and Al (N=7)*	*Sm and Al (N=18)*	*TC , Sm and Al (N=14)*
1 –10	6(46.15)	1(7.14)	2 (33.33)	6 (85.71)	1 (5.55)	11 (78.57)
11 –20	7(53.84)	4(28.57)	2 (33.33)	1 (14.28)	12(66.66)	1 (7.14)
21 –30	0 (0)	7(50)	1 (16.66)	0 (0)	5 (27.77)	2 (14.28)
31 –40	0 (0)	2(14.28)	1 (16.66)	0(0)	0 (0)	0 (0)

$p < 0.001$

Table 12: Duration of tobacco chewing habit in exclusively tobacco chewers in male and female.

Duration(In Years)	*Male (N= 13)*	*Female (N=19)*	*Total(N=32)*
1 –10	6 (46.15)	14 (73.68)	20 (62.50)
11 –20	7 (53.84)	2 (10.52)	9 (28.12)
21 –30	0 (0)	1(5.26)	1 (3.12)
31 –40	0 (0)	2 (10.52)	2 (6.25)

$p < 0.02$

Table 13: Distribution of oral cancer by site according to tobacco chewing, smoking and alcohol drinking habits in male.

Site	*Only T.C. (N=13)*	*Only Sm (N=14)*	*T.C. & Sm (N=6)*	*T.C. & Al (N=7)*	*Sm & Al (N=18)*	*T.C., Sm & Al (N=14)*	*No habit (N=1)*	*Total (73)*
B.O.T.	0 (0)	6(33.33)	0 (0)	1 (5.55)	7 (38.88)	4 (22.22)	0 (0)	18 (100)
AOT	5 (31.25)	2(12.25)	2 (12.25)	3(18.75)	1(6.25)	3 (18.75)	0 (0)	16 (100)
B.M.	8 (47.05)	1 (5.88)	0 (0)	2 (11.76)	0 (0)	5 (29.41)	1 (5.88)	17 (100)
Tonsil	0 (0)	2 (25)	2 (25)	1 (12.5)	3 (37.5)	0 (0)	0 (0)	8 (100)
Palate	0 (0)	2 (22.22)	0 (0)	0 (0)	5 (55.55)	2 (22.22)	0 (0)	9 (100)
Gingivae	0 (0)	0 (0)	2 (100)	0 (0)	0 (0)	0 (0)	0 (0)	2 (100)
Lip	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)
R.M.T.	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	1 (100)
F.O.M.	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	1 (100)

$p < 0.003$

Table 14: Distribution of oral cancer by site according to tobacco chewing habit in female

Site	*Tobacco chewers (N=19)*	*Never Tobacco Chewed (N=8)*	*TOTAL (N=27)*
BOT	0 (0)	1(100)	1(100)
AOT	7 (77.77)	2 (22.22)	9 (100)
BM	7 (77.77)	2 (22.22)	9 (100)
Tonsil	1(50)	1(50)	2 (100)
Palate	1(100)	0 (0)	1 (100)
Lip	1(50)	1(50)	2 (100)
Gingivae	2 (100)	0 (0)	2 (100)
RMT	0 (0)	1(100)	1 (100)
FOM	0 (0)	0 (0)	0 (0)

$p > 0.9$

Table 15: Distribution of oral cancer cases according to oral hygiene in male and female.

Oral hygiene	*Male (N=73)*	*Female (N=27)*	*Total (N=100)*
Bad	58(79.45)	7 (25.90)	65 (65)
Good	15 (20.54)	20 (74.07)	35 (35)

$p < 0.001$

Discussion

In India oral cavity cancer is the third most common cancer. In men and women oral cavity cancer is first and fifth most common cancer respectively in India[1]. Oral cancer is a major public health challenge in India [4]. Early diagnosis of oral cancer is important as it leads to better prognosis. Late detection and diagnosis is directly proportional to increased morbidity and mortality.Oral cancer was more commonly seen in male than female. The male to female ratio was 2.70:1 in our study. In a study by Sharma et al., 2010; [6] Aruna et al., 2011; [7] Shenoi et al.,2012 [8] found ratio of 2.2:1, 2:1 and 4.18:1 respectively. A few study from one of the India and Pakistan show equal male to female ratio of 1:1 (Franceschi et al., 2000; [9] Bhurgri et al., 2003 [10]). A reverse gender ratio is observed in India (Bangalore) and Thailand where male to female ratio was 1:2 and 1:1.56 respectively (Franceschi et al., 2000; [9] Kruaysawat et al., 2010 [11]).

According to US National Cancer Institute Surveillance, Epidemiology, and End Results (SEER) program, the mean age of diagnosis of oral cancer is 65 years [12]. In this study, the most affected age group was 51-60 years, youngest of all patients affected was 24-years old and the oldest was 71 years. The mean age of patients of oral cancer was found to be 51.15 years in this study. The recent studies in India have shown an increase in incidence of oral cancer in younger age group with mean age of 49.73 yrs (Shenoi et al.,2012 [8]), 55 years (Aruna et al., 2011 [7]) and 51 years old (Subapriya et al., 2007 [13]). In a study by Addala L et al., 2012 [14], the highest incidence of oral cancer was seen within the age group of 40–69 years. Epidemiological study of oral cancer in India by Mathew et al., 2001 [15], reported that in developing countries, oral cancer may affect younger men and women more frequently than seen in the developed countries.

Majority of the patients were from urban area in our study. In a study by Vogler et al., 1962 [16], oral cancer was more commonly seen urban population while in study by Winn et al., 1981 [17] rural population was commonly affected. In this study people doing manual occupations such as laboring and farming were at increased risk for developing oral cancer, however no significant association was found between occupation and oral cancer which was similar to study by Jayalekshmi et al., 2011 [18] . There was significant association found in study by Balaram et al., 2002 [19] and Muwonge et al., 2008 [20]. Oral

cancer was more commonly seen in illiterate group in our study, however no significant association was found between illiteracy and oral cancer while in study by Rao et al., 1998; [21] Balaram et al., 2002; [19] Subapriya et al., 2007; [13] Muwonge et al., 2008; [20] Jayalekshmi et al., 2011 [18] significant association was found. In the present study patients from low socioeconomic status are at increased risk than patients from high socioeconomic status, however no significant association was found between socioeconomic status and oral cancer while significant association was found in Jayalekshmi et al., 2011 [18].

In recent years many countries report the tongue as the most frequently affected site. In the present study tongue is the most commonly involved site of oral cancer both in male and female, accounting for 44% cases. The similar result was obtained in the study in Dhar et al., 2000; [22] Su et al., 2007a; [23] Ariyoshi et al., 2008; [24] Kruaysawat et al., 2010; [11] Ibayashi et al., 2011; [25] Razmpa et al., 2011; [26] Addala L et al., 2012 [14]. Mandibular alveolus was the most common site of oral cancer in Shenoi R et al.,2012 [8]. BM was most common site of oral cancer in Sharma et al., 2010 [6]. The tongue is the leading site not only among oral cancers but also among head and neck cancers in India (Addala et al., 2012) [14]. In our study AOT more commonly involved than BOT in oral cancer. Similar results were obtained in Lam et al., 2006; [27] Addala et al., 2012; [14] Ranjan et al. 2014 [28]. BOT was more frequently involved than AOT in male patients. Similar results were obtained in Rao DN et al., 1998 [21].

In our study all patients were diagnosed as squamous cell carcinoma of oral cancer histopathologically out of which 42% patients were diagnosed as well differentiated squamous cell carcinoma, 49% patients were diagnosed as moderately differentiated squamous cell carcinoma and 9% patients were diagnosed as poorly differentiated squamous cell carcinoma. In a study in Maharashtra (Agarwal et al., 2012) [29], 32% patients were diagnosed as well differentiated squamous cell carcinoma, 23% patients were diagnosed as moderately differentiated squamous cell carcinoma, 21% patients were diagnosed as poorly differentiated squamous cell carcinoma and 23% were diagnosed as verrucous squamous cell carcinoma. In the present study there were 82% patients who present with cervical lymph node metastasis at the time of diagnosis. Presence of lymph node metastasis show advanced stage in oral cancer. Similar results was obtained in Shenoi R et al.,2012; [8] Addala et al., 2012 [14] and in Ranjan et al. 2014 [28].

In the present study significant association found between habits and oral cancer. In our study oral cancer was more commonly seen in patients who had habit of tobacco chewing, bidi or cigarette smoking and alcohol drinking either alone or in combination than who had no habits in both male and female. Similar results was obtained in study by Rao DN et al., 1994 [30] and 1998; [21] Datta et al., 1997; [31] Balaram et al., 2002; [19] Znaor et al., 2003; [32] Rahman et al., 2003; [33] Subapriya et al., 2007; [21] Muwonge et al., 2008; [20] Sharma et al., 2010; [6] Aruna et al., 2011; [7] Lin et al., 2011; [34] Addala et al., 2012 [14] and Shenoi et al.,2012 [8]. Oral cancer was found more commonly in patients who had combined habits than tobacco chewing alone. The similar results was seen in Znaor et al., 2003; [32] Subapriya et al., 2007; [13] Muwonge et al., 2008; [20] Aruna et al., 2011; [7] Lin et al., 2011 [34]. The patients who had habit of tobacco chewing alone developed oral cancer earlier than who had habit of smoking alone. Similar results were found in Jayalekshmi et al., 2011 [18]. Majority of female patients who had tobacco chewing habit developed oral cancer earlier than male patients. Similar results was obtained in study by Balaram et al.,2002 [19]. The habit of tobacco chewing alone was found to be significant in cancer of BM and AOT. In female patients tobacco chewing was not found to have a significant association with oral cancer at all sites. In the study by Aruna et al., 2011 [7] BM was most commonly involved in patients who had habit of

tobacco chewing. In the study by Shenoi et al.,2012 [8] no significant association found between site to habit in male and female. In study by Addala et al., 2012 [14], tongue was the commonest site of cancer occurrence with respect to all the habits (both singly and in combination) except for chewing tobacco where BM was the most common site.

There were 65% patients who had bad oral hygiene. In study by Dhar et al., 2000 [22] more than 85% of oral cancer patients had poor oral hygiene. Oral hygiene significantly associated with both gender in our study, similar result was found in study by Balaram et al., 2002; [19] Subapriya et al., 2007 [13] .

Conclusion

The present study was a hospital based study which focused only on the histopathologically confirmed cases of oral cancer patients. Majority of the cases were in advanced stage at the time of diagnosis that depicts the negligence of the health care among the population. Widely spread educational campaigns against risk factors of oral cancer are urgent in order to reduce oral cancer incidence rates. Moreover, programs should be developed emphasizing the early diagnosis which affect patient's survival rate, quality of life, and treatment costs.

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