

ORIGINAL ARTICLE

Prevalence and Assessment of Various Risk Factors among Oral Cancer Cases in a Rural Area of Maharashtra State, India - An Epidemiological Study

Hemant J. Pawar^{1*}, K. K. Singh², G. B. Dhumale³

¹Department of Medical Informatics, ²Department of Radiotherapy and Oncology, Rural Medical College of Pravara Institute of Medical Sciences Deemed University, Loni- 413736 (Maharashtra) India, ³Department of Community Medicine, Bharati Vidyapeeth Medical College and Hospital, Sangli-416416 (Maharashtra) India

Abstract

Background: The 'organ distribution' of cancer is often strikingly dissimilar in different groups of population and varies greatly from one community to another and also differs in different communities in the same geographical location, depending on the practices, lifestyles and the influence of deleterious habits like use of tobacco and or alcohol of the people. Among various cancers affecting the human body, oral cancer accounts for nearly one third of it. **Objectives:** i) To find out the relative frequency of oral cancer in relation to other sites from Hospital Based Cancer Registry (HBCR) ii) To find out the various risk factors associated with oral cancer and iii) To recommend appropriate preventive measures. **Methodology:** A hospital based retrospective cross sectional study was conducted through case records of oral cancer patients who reported in the year 2013 to Pravara Rural HBCR, Department of Radiotherapy and Oncology, Rural Medical College and Pravara Rural Hospital, Loni, Maharashtra state, India. The case files and registers of oral cancer cases were reviewed to collect personal and clinical data about sex, age, occupation, marital status, education, socioeconomic status, habits like tobacco chewing and cigarette smoking. A predesigned performa (a core form by HBCR programme) was used to collect the data. The statistical analysis was done using SYSTAT for Windows version 12 and categorical data was analysed by using Chi-square test. **Results:** In all 1328 patients of all cancers visited the hospital during the period January 2013 to December 2013. Out of these, 349 (26.28%) were of oral cancer

cases. The sex wise distribution revealed 256 (73.25%) among males and 93(26.65%) among females. Mean age of the patients was 54.98 years, ranging from 15-78 years, 31.23% were more than 65 years of age. The most oral cancer sites among the males and females were those of tongue (37.82%) and buccal mucosa (32.95%) respectively. Tobacco related cancer patients in males were 79% and in females 61%. **Conclusion:** The present study findings suggest that prevalence of oral cancer is more among tobacco users especially those using tobacco quid which is more common among Indian women which is in line with most of the epidemiological studies about oral cancer in India. There is an urgent need to implement and sustain appropriate preventive measures and oral cancer screening programmes for the community.

Keywords: Health Education, Tobacco, Prevalence, Prevention, Risk Factors, Oral Cancer

Introduction:

Oral cancer is the eleventh most common cancer worldwide. In India, 4 out of 10 of all cancers are oral cancers. According to the Oral Cancer Foundation India, 130,000 people succumb to oral cancer in India annually, translating approximately to 14 deaths per hour. Despite being one of the countries with the highest incidence of oral cancer, India lacks nation-wide oral cancer registry. This implies that the increasing cancer incidence and risk among Indians needs to be addressed at the national level for prevention. Hence, epidemiological studies of

the disease pattern of oral cancer can prove beneficial for better understanding of aetiology and pathology of oral cancer.

The prevalence of cancer is often strikingly dissimilar in different groups of population, varies greatly from one community to another, and differs in different communities in the same geographical location, depending on the practices and lifestyles of the people in that location. Among various cancers affecting the human body, oral cancer accounts for nearly one third of all.

Oral cancer is traditionally defined as squamous cell carcinoma of the lip, oral cavity, and oropharynx. According to the World Health Organization (2005) [1] cancer might kill 10.3 million people by the year of 2020, with an increase trend in developing and newly industrialized countries [1]. As per the global status report published by World Health Organization [2] of the diagnosed oral cancer worldwide around 40% occur in India, Pakistan, Bangladesh and Sri Lanka [3]. India has one of the highest rates in the world; accounting for one-third of the total cancers and unfortunately this figure continues to rise [2]. Use of new products, blends such as pan masala and gutkha, is increasing not only among men but also among children, teenagers and women in whom it has also been associated with increased risk. The oral cancer most commonly occurs in the middle-age and older age. Micronutrient deficiencies [4, 5] and poor oral hygiene [6] have also been associated with increased risk. Many epidemiological studies conducted over the last three decades in America, Europe, and Asia have provided a strong evidence of an association between alcohol and tobacco use and an increased risk of oral and pharyngeal tumours [7-12]. Low socio-economic status is as well significantly associated with increased oral cancer risk in high and lower income-countries, across the world [13-14]. National Cancer Registry Programme of

Indian Council of Medical Research reported highest number of oral cancers worldwide with up to 80,000 new cases annually (ICMRNCRP, 2011). Global Adult Tobacco Survey (GATS) data from Indian states and union territories conducted during 2009-2010, has reported approximately 274.9 million tobacco users in India. As per this report more than one-third (35%) of adults use tobacco in some form or the other, 163.7 million are users of only smokeless tobacco, 68.9 million only smokers, and 42.3 million users of both smoking and smokeless tobacco (Ministry of Health and Family Welfare, India, 2010). However, there was no report about the socio-demographic factors as independent risk for oral cancer in India. Hence, the aim of this study was to reveal the clinicoepidemiological pattern of oral cancer cases in rural area of Maharashtra state, India, in relationship between selected socio-demographic factors.

Material and Methods:

Setting of study:

The study population comprised of 349 patients diagnosed with oral cancer at the Department of Radiotherapy and Oncology, Rural Medical College and Pravara Rural Hospital, Loni, Maharashtra state, India during the period January 2013 to December 2013. The Pravara Rural Hospital is recognized as a Hospital Based Cancer Registry (HBCR) (Code-513) in rural area of Central Maharashtra by National Cancer Registry Programme (NCRP) of Indian Council of Medical Research, (ICMR) Government of India. This is a specialty centre for the management of cancer referred by medical practitioners, medical officers of government / private medical institutions from various parts of Maharashtra state, and neighbouring districts.

Study population:

A hospital based retrospective study was conducted through case records of 349 oral cancer

patients who reported in the year 2013 (January to December) to Pravara Rural Hospital Based Cancer Registry (HBCR), Department of Radiotherapy and Oncology, Rural Medical College and Pravara Rural Hospital, Loni, Maharashtra state, India. The case files and registers of oral cancer were reviewed to collect information of all diagnosed and histopathologically confirmed cases classified by the standard International Classification of Diseases (ICD-10) criterion. The personal and clinical data about sex, age, occupation, marital status, education, socioeconomic status, habits like tobacco chewers, cigarette smoking, etc were collected. Using a predesigned proforma (a core form by HBCR programme) the information related to educational, occupational status, socio economic status, religion and marital status was collected according to respondents' self-reporting and

coded. Tobacco use was categorized as ever or never used. Information about smoking and use of smokeless form of tobacco was collected. Alcohol and dietary habits also were assessed according to ever or never use of these factors.

Statistical methods:

The data was presented as the numbers with percentage (proportions) or mean with Standard Deviation (SD) as appropriate. The significance of difference between the proportions of qualitative characteristics was tested using Chi-square test of independence of attributes. All the associations were adjusted for potential confounders like age, gender; the use of tobacco and alcohol drinking. The entire data was analyzed using a Statistical Software SYSTAT version 12 (A licensed copy).

Results:

Table 1: Age and Sex Wise Distribution of 349 Oral Cancer Cases

Age in years	Males No. (%)	Females No. (%)	Total No. (%)
15-19	2(0.78%)	0	2(0.57%)
20-24	2(0.78%)	1(1.07%)	3(0.86%)
25-29	4(1.56%)	1(1.07%)	5(1.43%)
30-34	15(5.86%)	4(4.30%)	19(5.44%)
35-39	20(7.81%)	4(4.30%)	24(6.88%)
40-44	22(8.59%)	5(5.38%)	27(7.74%)
45-49	19(7.42%)	7 (7.53%)	26(7.45%)
50-54	30(11.71%)	14(15.05%)	44(12.61%)
55-59	34(13.28%)	15(16.13%)	49(14.04%)
60-64	33(12.89%)	12(12.90%)	45(12.89%)
65-69	36(14.06%)	14(15.05%)	50(14.33%)
70-74	25(9.76%)	9(9.68%)	34(9.74%)
75 +	14(5.47%)	7(7.53%)	21(6.02%)
Total	256(73.35%)	93(26.65%)	349
Mean ± SD	54.84±9.24	57.44±11.02	56.14±10.47

Table 2: Distribution to according to Socio Economic Status of 349 Oral Cancer Cases

SE status*	Males No. (%)	Females No. (%)	Total No. (%)
Class I (Rs. 10000 & above)	11(4.29%)	2(2.15%)	13(3.72%)
Class II (Rs. 5000- Rs.9999)	19(7.42%)	4(4.30%)	23(6.59%)
Class III (Rs.3000- Rs.4999)	71(27.73%)	28(30.10%)	99(28.37%)
Class IV (Rs. 1500- Rs.2999)	78(30.47%)	27(29.03%)	105(30.08%)
Class V (Rs. 500- Rs.1499)	64(25%)	29(31.18%)	93(26.65%)
Class VI (Less than Rs. 500)	13(5.08%)	3(3.22%)	16(4.58%)
Total	256(73.35%)	93(26.65%)	349

*According to modified B. G. Prasad's socio-economic classification

It was seen that out of 349 cases studied 256 (73.35%) were males and 93(26.65%) were females (Table 1). The age in years ranged from 18–80 years with average age of 54.84 and 57.44 years for males and females respectively ($p=0.318$ by Student's t test). The majority of subjects were above the age 30 years ($p=0.570$). 61.32% of cases were observed in the age group of 45–69 years.

The distribution of socio economic status and according to modified B. G. Prasad's socio-economic classification almost 88.28% and 93.54% subjects showed monthly income between Rs. 500 to 4999 /- in males and females

respectively (Table 2).

Majority of the cases were farmers (37.53 %,) followed by labourers (24.93%) and housewives (20.34%) (Table3). Number of self-employed and belonging to other occupations were higher in males than in females.

Majority of oral cancer patients were illiterate. Illiteracy was higher for females (60.21%) as compared to males (58.21%). The difference was more significant for higher level education, where in the percentage of high school and above education was more in males compared to females ($p, 0.01$) (Table 4).

Table 3: Distribution According to Occupational Status of 349 Oral Cancer Cases

Occupational status	Males No. (%)	Females No. (%)	Total No. (%)
Farmer	127(49.61%)	4(4.30%)	131(37.53%)
Laborer	78(30.46%)	9(9.67%)	87(24.93%)
Housewives	-	71(76.31%)	71(20.34%)
Employee/Professionals	23(8.98%)	4(4.30%)	27(7.74%)
Unemployed/Students	16(6.25%)	3(3.22%)	19(5.44%)
Others	12(4.68%)	2(2.15%)	14(4.01%)
Total	256(73.35%)	93(26.65%)	349

Table 4: Distribution According to Literacy Status of 349 Oral Cancer Cases

Educational status	Males No. (%)	Females No. (%)	Total No. (%)
Literate	107(41.79%)	37(39.79%)	144(41.26%)
- Primary	32(29.91%)	22(59.46%)	54(37.5%)
- Secondary	53(49.53%)	12(32.43%)	65(45.14%)
- College and above	22(20.56%)	3(8.11%)	25(17.36%)
Illiterate	149(58.21%)	56 (60.21%)	205(58.74%)
Total	256(73.35%)	93(26.65%)	349

Table 5: Distribution According to Various Sites of 349 Oral Cancer Cases

Oral cancer sites	Males No. (%)	Females No. (%)	Total No. (%)
Lip	15(1.95%)	4(4.30%)	19(5.44%)
Tongue	100(39.06%)	31(33.33%)	131(37.53%)
Floor of mouth	8(3.12%)	1(1.08%)	9(2.58%)
Buccal mucosa	64(25%)	35(37.63%)	99(28.37%)
Cheek	17(6.64%)	8(8.60%)	25(7.16%)
Alveolus	37(14.45%)	11(11.82%)	48(13.75%)
Palate	11(4.30%)	1(1.07%)	12(3.44%)
Other part of mouth	4(1.56%)	2(2.15%)	6(1.72%)
Total	256(73.35%)	93(26.65%)	349

Value of $\chi^2 = 8.756$, $p=0.2707$, $d.f. =7$, not significant

The site distribution revealed clinical and pathological feature of oral cancer (Table 5). The tongue was the most frequent single site (37.53%) followed by buccal mucosa (28.37%), alveolus (13.75%), cheek (7.16%), lip (5.44%), palate (3.44%), floor of mouth (2.58%) and other part of mouth (1.72%). It was also observed that tongue was more common site in males (39.06%) as compared to females (33.33%) and buccal mucosa was more common site in females (37.63%) than in males (25%).

Gender wise distribution of habits of use of tobacco in any form and consumption of alcohol revealed that 119 (46.48%) males and 53 (56.99%) females were habituated to either tobacco or alcohol or both (Table 6). There were 170 (66.4%) tobacco chewers among males and 41 (44.1%) among females either alone or in various combinations of use of tobacco and alcohol. There were 39 (15.2%) smokers among males and 7 (7.5%) among females either alone or in various combinations. Habit of alcohol consumption was

Table 6: Gender wise Distribution of Use of Tobacco and Consumption of Alcohol in Oral Cancer Cases

Habits	Male (n=256)	Percentage	Female (n=93)	Percentage	Total No (349)	Percentage
Chewing	87	33.98%	52	55.91%	139	39.83%
Smoking	32	12.50%	1	1.07%	33	9.45%
Alcohol	4	1.56%	0	0	4	1.15%
Chewing + Smoking	63	24.61%	5	5.38%	68	1.95%
Chewing + Alcohol	5	1.95%	1	1.07%	6	1.72%
Smoking + Alcohol	8	3.12%	0	0	8	2.29%
Chewing + Smoking + Alcohol	13	5.08%	1	1.07%	14	4.01%
Persons with habits	218	85.16%	59	63.44%	277	79.37%
Multiple responses	89	34.77%	7	7.53%	96	27.51%

relatively high among men 30 (11.71%) than among women 2 (2.1%). There were 208 (81.3%) males and 42 (45.0%) females using tobacco either smokeless or smoking form. It was further observed that those who chewed tobacco, majority also consumed Gutkha, khaini or pan masala (96.5% men and 65.9% women). Out of those men who were habituated to alcohol, 86.7% were also habituated to tobacco either in smokeless or smoking forms.

Discussion:

In this study, a lower degree of educational status was widespread. The majority of cases had agriculture and labourer as their occupation. This has resulted in their lower monthly income level.

The study thus, suggests that the risk of oral cancer is inversely proportional to increasing level of education and economical status. It is further confirmed by multivariate analysis, which shows that education, particularly low educational status, agricultural or labourer occupation, unemployment and low monthly household income were the significant independent risk

factors. These findings are consistent with the similar studies done in the other parts of India by Chattopadhyay [15]; Sankaranarayanan *et al* [16] and Rao *et al* [17]

Univariate analysis suggests that all these socio-demographic factors to be significant risk factors in this study. Women with oral cancer were more affected by socio-demographic factors, particularly, education, occupation and income. Our findings are supported by Hebert *et al* [18] and Sorensen *et al* [19] who also have observed that social and demographic characteristics are associated to oral cancer. It may be due to effect of sociodemographic characteristics like mouth hygiene in general and in particular association of education and occupation with tobacco use, a known risk factor among men. Therefore, this can have effect on development of oral cancer.

Cancer in general is multi-factorial in origin and several environmental interactions are possible. Age, gender, illiteracy or low educational level, occupation; working in agricultural sector, low monthly household income and married status of men result in smoking, chewing, drinking and

dietary habits which can be considered as significant contributing factors modifying the multistage process of carcinogenesis.

Recommendations for optimum cancer registration as a whole and specifically for primary prevention of oral cancer include:

A standard recording system should be adopted for registration to achieve considerable validity of data and to ensure completeness. Incorporating a quality control procedure for cancer registration throughout the cancer registries and a closed loop of feedback mechanism can optimize the results. Quitting tobacco would greatly limit deaths from oral cancers. Regular oral examination by professionals needs to be emphasized, and early detection of Oral and Pharyngeal Cancer Control (OPC) will greatly improve not only survival rates but also quality of life as a consequence of less radical and debilitating treatment. Suspicious oral lesions should be promptly biopsied thereby enhancing early diagnosis and treatment.

Conclusion:

Results of the present study revealed the differences in the habits according to verities in

socio-demographic characteristics between oral cancer patients which suggest that socio-demographic factors do play an important role in genesis of oral cancer. The social awareness through the educational programmes about the risk of oral cancer in India is highly warranted. The comprehensive cancer control programme emphasizing on the rural and remote places is the need of the hour. Health education of general population can definitely decrease the incidence and also can help in down staging of cancer by early diagnosis at a stage which the cancer could be curable.

Acknowledgement:

This study was conducted under the aegis of Hospital Based Cancer Registry Programme (HBCR) recognized by Indian Council of Medical Research (ICMR) in rural area of India. We are grateful to the subjects participated in the study. We also thank the management of Rural Medical College and Pravara Rural Hospital Based Cancer Registry (ICMR code-513) of Pravara Institute of Medical Sciences (Deemed University) Loni, Maharashtra, India for their support throughout this study.

References

1. World Health Organization. Global Action against Cancer (2005). WHO library cataloguing in publication data. Available at: www.who.org
2. WHO, 1997. Tobacco or Health: A Global status report: Country presentations at various Regional Meetings on Tobacco 1997-1998. Geneva.
3. Ahluwalia KP. Assessing the oral cancer risk of South-Asian immigrants in New York City. *Cancer* 2005; 15(104):2959-61.
4. Garrote LF, Herrero R, Ortiz RM, et al. Risk factors for cancer of the oral cavity and oro-pharynx in Cuba. *Br J Cancer* 2001;85:46-54.
5. Sanchez MJ, Martinez C, Nieto A, et al. Oral and oropharyngeal cancer in Spain: influence of dietary patterns. *Eur J Cancer Prev* 2003; 12:49-56.
6. Talamini R, Vacarella S, Barbone F, et al. Oral hygiene, dentition, sexual habits and risk of oral cancer. *Br J Cancer* 2000; 83:1238-42.
7. Akhileswaran R, Vidyasagar MS, Rao KK, Kasturi DP et al. Analysis of habits in oral cancer in rural south India. *POral oncology* 1999:35-38.
8. Sankaranarayann R. Oral cancer in India: an epidemiologic and clinical review. *Oral Surg Oral Med Oral Pathol* 1990;69(3):325-30.
9. Madani AH, SotoodehJahromi A, Dikshit M, Bhaduri D. Risk Assessment of Tobacco Types and Oral Cancer. *Am J Pharmacol Toxicol* 2010; 5: 9-13.
10. Blot WJ, McLaughlin JK, Winn DM, et al. Smoking and drinking in relation to oral and pharyngeal cancer. *Cancer Research* 1988; 48:3282-3287.

11. Franceschi S, Bidoli E, Herrero R, Munoz N. Comparison of cancers of the oral cavity and pharynx worldwide: etiological clues. *Ora Oncol* 2000;36:106-15.
12. Balaram P, Sridhar H, Rajkumar T. Oral cancer in Southern India : the influence of smoking, drinking, pann-chewing and oral hygiene. *Int J Cancer* 2002 ;98(3):440-5.
13. Zheng TZ, Boyle P, Hu HF, et al. Tobacco smoking, alcohol consumption, and risk of oral cancer: A case-control study in Beijing, People's Republic of China. *Cancer Causes and Control* 1990; 1:173-179.
14. David IC, Mark P, Helen M, Julien B, Mia H, Lorna MDM. Socioeconomic inequalities and oral cancer risk: a systematic review and meta-analysis of case-control studies. *International Journal of Cancer* 2008; 122(2): 2811-9.
15. Chattopadhyay A. Epidemiologic study of oral cancer in Eastern India. Indian J Chen, JK Katz, RV, Krutchkoff, DJ, 1990. Intraoral squamous cell carcinoma. *Dermotol* 1989; 34(3):59-65.
16. Sankaranarayanan R, Duffy SW, Day NE, et al. Case-control investigation of cancer of the oral tongue and the floor of the mouth in Southern India. *International Journal of Cancer* 1989; 44:617-21.
17. Rao DN, Ganesh B, Rao RS, Desai PB. Risk assessment of tobacco, alcohol and diet in oral cancer-a case-control study. *International Journal of Cancer* 1994; 58:469-473.
18. Hebert JR, Gupta PC, Bhonsle RB, et al. Dietary exposures and oral precancerous lesions in Srikakulam District, Andhra Pradesh, India. *Public Health Nutrition* 2001; 5(2):303-12.
19. Sorensen G, Gupta PC, Pednekar MS. Social disparities in tobacco use in Mumbai, India: The role of occupation, education, and gender. *American Journal of Public Health* 2005; 95(6):1003-8.10.
20. Swaminatahn R, Selvakumaran, Esmey PO, Sampath P, Ferlay J, Jissa V et al. Cancer patterns and survival in a rural district in South India. *Cancer Epidemiol* 2009; 33:325-31.
21. Khandekar SP, Bagdey PS, Tiwari RR, Oral cancer and some epidemiological factors. A hospital based study. *Indian Journal of Community Medicine* 2006.
22. Gupta PC. Mouth Cancer in India: a new epidemic? *J Indian Med Assoc* 1999; 97:370-373.
23. A K Agarwal. Social classification: The need to update in the present scenario. *Indian Journal of Community Medicine* 2008;33(1):50-51.
24. Ajit Mishra, Savita Ghom, Anshul Khandelwal, Manish Kanungo, Pranoti Pradhan, Puneet Gupta. Prevalence of Oral Cancer in Chhattisgarh-An Epidemiological study. *Chhattisgarh Journal of Health Sciences* 2013; 1:1-10.
25. Manoharan N, Tyagi BB, Raina V. Cancer incidences in rural Delhi--2004-05. *Asian Pac J Cancer Prev* 2010; 11: 73-77.
26. Pednekar MS, Gupta PC, Yeole BB, Hébert JR. Association of tobacco habits, including bidi smoking, with overall and site-specific cancer incidence: results from the Mumbai cohort study. *Cancer Causes Control* 2011; 22: 859-868.
27. Karmakar R, Bandyopadhyay A, Barui G, Maiti PK, Bhattacharya A, Choudhuri MK. Pattern of cancer occurrence in rural population of West Bengal--a hospital-based study. *J Indian Med Assoc* 2010; 108: 505-508.

*Author for Correspondence: Mr. Hemant J. Pawar, Department of Medical Informatics, Rural Medical College of Pravara Institute of Medical Sciences, Deemed University, Loni- 413736 (Maharashtra) India
Cell: 9921589577 Email: hemant.pawar1970@gmail.com