

## “Relationship between Socio-Demographic Factors and Oral Cancer in Rural Area of Maharashtra state, India: Case Control Study”

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### Abstract:

**Background:** The aim of this study was to recognize factors associated with oral cancer considering socio-demographic characteristics.

**Material & Method:** In all 132 cases with oral cancer diagnosed during January to December 2011 at department of Radiotherapy and Oncology, Rural medical College and Hospital, Loni, Maharashtra, India. Similar number of controls match for age and sex selected from the background population. Cases and controls were interviewed for tobacco related habits and general characteristics; age, gender, education and possible socio- demographic factors.

**Results:** Chi-square test in uni-variate analysis and estimate for risk showed that education, occupation and monthly household income were significantly different between cases and controls (p, 0.001). Irrespective to gender, relative risk, here odds ratio, (OR) of low level of education (OR = 5.2, CI 3.3–8.3), working in field/farm as a labourer (OR = 2.3, CI 1.4–3.4), and monthly household income less than 5000 Indian Rupees currency (OR = 2.9, CI 1.9–4.2) were significant risk factors for oral cancer. While, there was no significant relationship between religious and or marital status either in males or females.

**Keywords:** socio-demographic factors, oral cancer

### Introduction:

According to the World Health Organization (2005)<sup>1</sup> cancer might kill 10.3 million people by the year of 2020, with an increase trend in developing and newly industrialized countries<sup>1</sup>. As per the global status report published by World Health Organization,<sup>2</sup> of the diagnosed oral cancer worldwide around 40% occur in India, Pakistan, Bangladesh and

Sri Lanka.<sup>3</sup> 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.<sup>2</sup> Use of new products, blends such as panmasala and gutkha, is increasing not only among men but also among children, teenagers and women in which has also been associated with increased risk. Hence, oral cancer most commonly occurs in middle-age and older. Micronutrient deficiencies<sup>4</sup>,<sup>5</sup> and poor oral hygiene<sup>6</sup> has also been associated with increased risk. Many epidemiological studies conducted over the last three decades in America, Europe, and Asia have provided strong evidence of an association between alcohol and tobacco use and an increased risk of oral and pharyngeal tumors.<sup>7–12</sup> Low socio-economic status is as well significantly associated with increased oral cancer risk in

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high and lower income-countries, across the world.<sup>13-</sup>

<sup>14</sup> However, there was no report about the sociodemographic factors as independent risk for oral cancer in India. Hence, the aim of this study was to reveal the relationship between selected socio-demographic factors and increase of oral cancer cases in rural area of Maharashtra state, India.

### **Material and Methods:**

The study population comprised 132 patients diagnosed with oral carcinoma at the Department of Radiotherapy and Oncology, Rural Medical College and Pravara Rural Hospital, Loni, Maharashtra state, India during the period January 2011 to December 2011. 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 Program (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 neighboring districts.

### **Study population :**

The subjects were selected using simple random sampling procedure. Cases were the new known patients of oral cancer of all aged, diagnosed and confirmed by histopathological results and classified by the standard International Classification of Diseases (ICD-10) criterion. The controls were selected from the relatives, friends and neighborhoods of cases, who accompanied the patients referred to the

hospital and cancer registry, who did not have cancer and thus apparently were healthy. The data related to demographic status and occupational was collected from both, cases as well as controls, after taking their written informed consent. The entire information was recorded through personal interview and semi- structured validated questionnaires. A total of 264 subjects were taken for this study.

Interviews were conducted in the local languages, including Hindi, Marathi and English with the help of a trained interpreter. Information related to education level was classified as illiterate, primary school (up to 5 years education), middle school (6–8 years of education), secondary school (9–13. 12 years of education) and graduate (including both undergraduate and postgraduate) Occupation was assessed according to respondents self reports and coded as follows; Agriculture, self-employed, professional and unemployed. Income is categorized according to modified B. G. Prasad's socio-economic classification. Religion was in two categories, Hindu and others, while in terms of marital status it was three categories; married, unmarried and others. Tobacco use categorized as ever or never use of smoking and smokeless types. Alcohol and dietary habits also were assessed according to ever or never use of these factors.

### **Statistical methods:**

The data is presented as the numbers with percentage (prevalence) or mean with Standard Deviation (SD) as appropriate. The significance of difference between the proportions of qualitative characteristics is tested using Chi-square test of independence of attributes. The multivariate associations of risk factors with oral cancer

were tested using multiple logistic regression analysis. 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).

### Observations and Results :

**Table no. 1** reveals that the self-reported age in years at the time of data collection (interview) matched very well between cases and controls, ranging from 18–80 years with average age being 51.82 and 52.04 years in cases and control respectively. ( $p=0.556$  by Student's *t* test). The majority of subjects were above the age 30 years ( $p=0.760$ ). The gender distribution was also same in cases and controls with sex ratio being Socio-demographic factors associated with oral cancer 1.8:1 and 1.9:1 respectively ( $p = 0.600$  by Chi-Square test).

In terms of education level (self-reported), illiterate number was higher for cases as compared to controls ( $p, 0.001$ ). The difference was more significant for higher level education, where in the percentage of high school and above education was more in controls compared to cases ( $p, 0.001$ ).

The occupational data reveals that majority of the cases belonged to agriculture sector followed by labourers and housewives; 34.09% vs. 18.94%, 28.78% vs. 16.67% and 25% vs. 19.7% as compared to controls ( $p, 0.001$  for all). The self employed and other numbers were higher for controls than cases while there was significant difference in professional and unemployed percentages between the two groups.

Monthly household income was significantly different between cases and controls. Majority of cases had lower household income, i.e. below Rs. 5000/- ( $p, 0.001$ ). According to modified B. G. Prasad's socio-economic classification, almost 88.64% and 86.37% subjects showed monthly income in the range of Rs. 500 to 4999 /- in case and control group respectively.

In terms of marital status has shown that the categories of married and others (widowed, divorced and separated) in both cases and controls was not significant different ( $p = 0.198$  and  $p = 0.430$  respectively). However, the difference was significant among cases and controls ( $p, 0.014$ ) for unmarried category. In terms of religion, majority (90%) of subjects (both cases and controls) belonged to Hindu Religion.

**Table no. 2** shows the crude odds ratio along with 95% confidence interval derived from the univariate analysis calibrated for socio-demographic characteristics such as education, occupation, income, religion and marital status in present and combination of main risk factors for oral cancer. The reference category for all demographical status was absence of the risk factors. The most common independent risk regarding these socio-demographic factors was education, low level education (primary school), with the gender specific odds ratio of 3.2; 3.5–11.0, in males and 4.4; 2.0–10.1, in females. The next common risk was the income, less than 5000 monthly household income, with OR = 2.4; 1.6–3.7, in males and OR = 6.4; 1.5–17.2, in females, followed by the occupation type, farmer with the sex specific odds ratio being 0.1; 0.0-0.5, in males and 1.1; 0.6-1.5 in female and the occupation type, labourer with

sex specific odds ratio being 2.1; 1.4-3.2, in males and 4.7; 1.5-1.3 in females.

Religion and marital status did not show any association with the development of oral cancer independently. Neither of them appeared to increase the risk, either in males or in females (OR was less than 1 in types of religion and marital status among both males and females).

### **Discussion :**

In this study, the low degree of educational status was widespread among cases compared to the controls. The majority of cases had agriculture farming and labourer as a source of occupation. This has resulted in their monthly income level; the cases had relatively lesser income compared to the controls.

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 education, occupation, agriculture labourer and 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;<sup>15</sup> Sankaranarayanan et al<sup>16</sup> and Rao et al<sup>17</sup> reported earlier.

The odds ratio derived by univariate analyses suggest that all socio-demographic factors except religion and marital status to be significant risk 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<sup>18</sup> and Sorensen et al<sup>19</sup> which they believe that social and demographic characteristics are in relation to oral cancer. It may be due to effect of sociodemographic characteristics, in particular, education and occupation on tobacco use among men; therefore, it can effect on development of oral cancer.

The selection of controls from cases accompanying families and sibling could lead to bias, hence, we likely faced overmatching, however, it is worthy to note that relatives, friends and caretakers of cases were more serious to cooperate in the study. Cancer in general is multi-factorial in origin and several environmental interactions are possible. Age, gender, illiteracy or low education level, occupation; working in agriculture sector, income; low monthly household income, marital status and married people resulting in smoking, chewing, drinking and dietary habits can be considered as significant contributing factors modifying the multistage process of carcinogenesis.

### **Conclusion :**

Results of the present study revealed the differences in the habits according to verities in socio-demographic characteristics between oral cancer patients and controls which suggest that socio-demographic factors do play an important role. The social awareness through the education programs about the risk of oral cancer in India is highly warranted. The comprehensive cancer control program emphasizing on the rural and remote places is the need of the hour. This can definitely decrease the incidence and also can help in presentation of cancer at an early stage at which they can be curable.

**Tables: Table No.1: Socio-economic characteristics of patients with oral cancer:**

Characteristics	Case (n=132) No. (%)	Control (n=132) No. (%)	'p' value	Significance
<b>Sex</b>				
Male (n=172)	85 (64.39%)	87 (65.91%)	>0.05	Not significant
Female (n=92)	47 (35.61%)	45 (34.09%)		
<b>Age in years</b>				
< 30 (n=15)	8 (6.06%)	7 (5.30%)	>0.05*	Not significant
30-60 (n=170)	86 (65.15%)	84 (63.64%)		
> 60 (n=79)	38 (28.79%)	41 (31.06%)		
Mean± SD <sup>1</sup> Range	51.82 ± 12.14 (18-80 years )	52.04 ± 11.98 (18-78 years)		
<b>Education</b>				
Literate (n=171)	78 (59.09%)	93 (70.45%)	<0.01	Highly significant
Illiterate (n=93)	54 (40.91%)	39 (29.55%)		
Primary school (n=50)	41 (31.06%)	9 (6.82%)		
Middle school (n=37)	18 (13.63%)	19 (14.40%)		
High school (n=49)	13 (9.85%)	36 (27.27%)		
Undergraduate (n=23)	4 (3.03%)	19 (14.39%)		
Postgraduate (n=12)	2 (1.52%)	10 (7.57%)		
<b>Occupation</b>				
Farmer <sup>2</sup> (n=70)	45 (34.09%)	25 (18.94%)	<0.01	Highly significant
Labourer <sup>3</sup> (n=60)	38 (28.78%)	22 (16.67%)		
Housewives (n=59)	33 (25%)	26 (19.70%)		
Employee <sup>4</sup> /Professionals <sup>5</sup> (n=24)	5 (3.78%)	19 (14.39%)		
Unemployed/Students (n=33)	7 (5.31%)	26 (19.70%)		
Others (n=18)	4 (3.04%)	14 (10.60%)		
<b>Socio-economic status**</b>				
Class I (n=9) (Rs. 10000 & above)	3 (2.27%)	6 (4.54%)	<0.01	Highly significant
Class II (n=16) (Rs. 5000- Rs.9999)	7 (5.30%)	9 (6.82%)		
Class III (n=76) (Rs.3000- Rs.4999)	35 (26.52%)	41 (31.07%)		
Class IV (n=83) (Rs. 1500- Rs.2999)	39 (29.54%)	44 (33.33%)		
Class V (n=72) (Rs. 500- Rs.1499)	43 (32.58%)	29 (21.97%)		

Class VI (n=8) (Less than Rs. 500)	5 (3.79%)	3 (2.27%)		
<b>Marital status</b>				
Married (n=119)	111 (84.09%)	108 (81.82%)	>0.05	Not significant
Widowed/Divorced (n=24)	14 (10.61%)	10 (7.57%)		
Single (n=21)	7 (5.30%)	14 (10.61%)		
<b>Religion</b>				
Hindu (n=147)	74 (56.06%)	73 (55.30%)	>0.05	Not significant
Others <sup>6</sup> (n=117)	58 (43.94%)	59(44.70%)		

**Notes:** Values are n (%), p-by Chi-square test; \* by t-test, p. 0.05=□Not Significant. <sup>1</sup>Standard deviation; <sup>2</sup>Farm's worker; <sup>3</sup>Manual/industrial laborers; skilled / unskilled, building/construction, and mechanical worker; <sup>4</sup>Non-manual labor working in office; <sup>5</sup>Businesspersons/contractors, property owners; \*\* Monthly income (Indian Rupees)- according to modified B. G. Prasad's socio-economic classification; <sup>6</sup>Muslim, Christian, Buddhist, Sikh, etc.

**Table No.2: Risk of oral cancer by selected socio-demographic characteristics in male and female (unadjusted risk):**

Characteristics	* Odds Ratio (OR) - 95% CI		
	Over all	Males	Females
<b>Education</b>			
Illiterate	3.4 (2.1-5.5)	2.2 (1.1-4.4)	5.2 (2.5-10.7)
Primary school	5.2 (3.3-8.3)	3.2 (3.5-11.0)	4.4 (2.0-10.1)
Middle school	1.2 (0.7-1.8)	1.4 (0.8-2.4)	0.1 (0.0-0.6)
High school	0.3 (0.1-0.4)	0.3 (0.2-0.5)	0.4 (0.1-1.0)
Graduated <sup>+1</sup>	<b>1.0</b>	<b>1.0</b>	<b>1.0</b>
<b>Occupation</b>			
Farmer <sup>2</sup>	0.8 (0.6-1.2)	0.1 (0.0-0.5)	1.1 (0.6-1.5)
Labourer <sup>3</sup>	2.3 (1.4-3.4)	2.1 (1.4-3.2)	4.7 (1.5-13.0)
Employee <sup>4</sup>	0.6 (0.4-0.9)	0.6 (0.4-0.9)	0.3 (0.1-1.6)
Professionals <sup>5</sup>	1.0	1.0	1.0
<b>Income<sup>**</sup></b>			
Less than Rs. 5000	2.9 (1.9-4.2)	2.4 (1.6-3.7)	6.4 (1.5-17.2)
More than Rs. 5000	1.0	1.0	1.0
<b>Marital status</b>			
Married	1.2 (0.6-1.9)	1.1 (0.8-1.5)	1.0 (0.7-1.4)
Widowed/Divorced	1.3 (0.3-2.6)	0.5 (0.1-1.6)	1.2 (0.8-5.3)
Single	1.0	1.0	1.0
<b>Religion</b>			
Hindu	1.3 (0.8-2.0)	0.9 (0.7-1.3)	1.2 (0.9-1.7)
Others <sup>6</sup>	1.0	1.0	1.0

**Notes:** \*Unadjusted odds ratio; <sup>†</sup>Reference group. <sup>2</sup>Farm's worker; <sup>3</sup>Manual/industrial laborers; skilled / unskilled, building/construction, and mechanical worker; <sup>4</sup>Non-manual labor working in office; <sup>5</sup>Businesspersons/contractors, property owners; <sup>\*\*</sup> Monthly income (Indian Rupees) - according to modified B. G. Prasad's socio-economic classification; <sup>6</sup>Muslim, Christian, Buddhist, Sikh, etc.

### 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.

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Date of manuscript submission: 22 June 2012

Date of initial approval: 5 July 2012

Date of Peer review approval: 2 August 2012

Date of final draft preparation: 29 August 2012

Date of Publication: 5 September 2012