Original Research Article

Case control study for risk factors associated with oral cancer in central India

Dadasaheb Dhage[1], Sonali Patil[2], Uday Narlwar[2], Suresh Ughade[2], Hemant Adikane[2]*

Department of Community Medicine, [1]SVNGMC, Yawatmal, Maharashtra, India; [2]GMC, Nagpur, Maharashtra, India

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*Correspondence:
Dr. Hemant Adikane,
E-mail: dr.hemantadikane@gmail.com

ABSTRACT

Background: Oral cancer is higher prevalent condition in Asian countries. In India, due to higher proportion of population consuming tobacco in either chewing or smoking and alcohol consumption.
Methods: Present matched case control study was carried out in regional cancer institute in central India. The study consists of a total 124 cases and 124 controls. Cases were newly diagnosed patients of oral cancer confirmed by histopathological examination.
Results: For cases, the mean age (years) was 47.62, the range being 23-83 years while that of controls was 47.89 years, the range being 24-84 years. Majority were males (83.88%). Majority of cases (79.04%) were past chewers who had OR 2.61. Maximum number of cases (19.36%) were past smokers and maximum number of controls (12.09%) were current smokers who had OR 4.54. Maximum number of cases (30.64%) were former drinker and maximum number of controls (8.87%) were current drinker who had OR 2.97.
Conclusions: In summary, oral cancer occurs more commonly in middle aged males. The statistical data of this study provide strong evidence that tobacco chewing, smoking and alcohol could be in a straight line responsible for developing oral cancer in central India.

Keywords: Oral cancer, Smoking, Tobacco, Alcohol, Central India, Case control study

INTRODUCTION

Oral cancer includes a variety of tumours seen in different parts of the oral cavity, including cancer of the lip, tongue, gingiva, floor of the mouth, buccal mucosa, palate and retromolar trigone with different outcomes and is one of the commonest cancers and a leading cause of death worldwide.[1,2] In South-East Asia, oral cancer is the second most frequent form of cancer and the second most frequent cause of death from cancer among males. One third of global cases and one half of deaths from oral cancer occur in this region.[3]

According to the World Health Organization cancer might kill 10.3 million people by the year of 2020, with an increasing trend in developing and industrialized countries.[4] National institute of cancer prevention and research statistic report shows as many as 2,500 persons die every day due to tobacco-related diseases in India.[5] Oral cancer is the most common cancer in Southeast Asian countries like India, Pakistan and Sri Lanka and ranks high. In fact, India has the world's highest incidence of oral cancer, with 75,000 to 80,000 new cases a year.[6]

Cancer registration is not compulsory in India, so the true incidence and mortality may be higher, as many cases are unrecorded and lose follow up. None of the national registry provides cancer incidence or mortality data for India.[7] Mere extrapolation of the results of tobacco research in developed countries would, therefore, not provide a full picture of the dimensions of the tobacco problem in India.[8]

The aetiology of oral cancer is multifactorial that is genetic, environmental, social and behavioural. The consumption of tobacco is closely associated not only with the development of oral cancer, but also with the course of disease involving poor prognosis.[9] In addition, the use of alcohol obscures the problems exponentially.[10] Areca nut, seed of the fruit of the oriental palm Areca catechu is commonly used in India. In the traditional form, naturally crude areca nut is used, wrapped in leaves of Piper betel with lime, saffron and additives such as catechu, cinnamon, cloves. This preparation is referred as betel quid or paan.[11] The emergence of newer, chewable flavoured forms of tobacco along with several other ingredients, called gutka has changed the trends in the tobacco market. Gutka contains areca nut, slaked lime, catechu, condiments, and powered tobacco.[12]

In 2014, the overall prevalence of tobacco smokers in the India was estimated to be more than 12.4 %, with 21.9% in males and 2.3 % in females.[13] It is well established that tobacco use plays a major role in the aetiology of several cancers particularly oral cancer, lung cancer and cardiovascular disease.[14]

Although India's National Cancer Control Programme was launched in 1975-76, large scale implementation of cancer prevention and control strategies has yet to take place, and public expenditures on cancer prevention remain low.[15] National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) has strongly supported prevention, early diagnosis and treatment policies.[16]

WHO Global Oral Health Programme works with building oral health policies towards effective control of risks to oral health, based on the common risk factors approach. The focus is on modifiable risk behaviours related to diet, nutrition, use of tobacco and excessive consumption of alcohol, and hygiene.[17] The World Congress 2015 adopted the "Tokyo Declaration" on Dental Care and Oral Health for Healthy Longevity. Life-long oral health is a fundamental human right, under-pinned by an 'oral-health-in-all-policies' approach.[18]

Nagpur is regarded as the oral cancer capital of not just India but world, maximum patients being reported here.[19] The studies on the relationship between tobacco products and other risk factors like alcohol with synergistic effect in the development of the oral cancer are lacking in central India. Hence, there is a need to estimate prevalence and analyse various specific risk factors in patients suffering from oral cancer with different age, gender, and socioeconomic status (SES) group, and investigate effects (if any) of tobacco/ betel quid chewing, smoking, and alcohol consumption.

METHODS

Present case control study was carried out at Otorhinolaryngology Department of Rashtra Sant Tukadoji Regional Cancer hospital from July 2013 to December 2013. This is a regional tertiary centre for the management of cancer referred by medical practitioners, medical officers of government/private medical institutions from various parts of Vidarbha, and neighbouring states like Madhya Pradesh, Chhattisgarh.

The study consists of a total 124 cases and 124 controls. Cases were newly diagnosed as well as known patients of oral cancer confirmed by histopathological examination and classified by the standard International Classification of Diseases (ICD-10) criterion. Equal number of controls, group matched for age and pair matched for gender and residence from urban field practice area of tertiary care hospital and rural area were taken. Controls are the healthy individuals who were not having any lesion in the oral cavity on oral examination.

Study population

The subjects were selected using simple random sampling procedure.

Sample size estimation

Sample size was estimated by reference study (20) who reported percentage of controls exposed to tobacco chewing 23.6%, anticipated OR 2.25, power -80%, Confidence interval 95 %, the estimated sample size was 124 cases and 124 controls.

Approval of institutional ethics committee was obtained. The cases were selected by using simple random sampling procedure. After explaining the purpose of study, written informed consent was taken from all study subjects. Cases were interviewed and examined in a side room during the Out Patient Department (OPD) timing. Equal time approximately 20-30 minutes was given to cases as well as controls to eliminate interviewer's bias.

Study tool

Interviews were conducted in the local languages, including Hindi, Marathi and English. Information related to various socio-demographic characteristics were taken in detail with special emphasis on tobacco and alcohol intake and recorded in a predesigned, pretested proforma.

History of chewing tobacco (categorized as past, current, and non-user), history of smoking (categorized into past smoker, current smoker, non-smoker), history of alcohol consumption (categorized into former drinker, current drinker, life time abstainer). This classification was adapted as per the definition of IDSP 2006-2007.

Statistical analysis

Data was entered and analyzed using statistical software Epi Info 7.1.4 ver. Descriptive statistics (percentage, mean, standard deviation, range) were used to summarize

baseline characteristics of the study subjects. An association between two categorical variables was analyzed by using Chi-square test and p value < 0.05 was considered to be statistically significant. Conditional logistic regression models were calculated with the help of STATA Ver 13.1 for assessing risk factors.

RESULTS

Table 1 shows matching and socio demographic characteristics of study subjects.For cases, the mean age (years) was 47.62, the range being 23-83 years while that of controls was 47.89 years, the range being 24-84 years.

Table 1: Matching characteristics and socio demographic of study subjects.

Variables	Study subjects			
	Cases (n=124)		Controls (n=124)	
	No	%	No	%
Age in completed years				
<25	1	0.80	1	0.80
25-34	18	14.51	20	16.12
35-44	37	29.83	38	30.64
45-54	29	23.38	24	29.35
55-64	23	18.54	23	18.54
≥65	16	12.94	18	14.55
Gender				
Male	104	83.88	104	83.88
Female	20	16.12	20	16.12
Residence				
Urban	60	48.38	60	48.38
Rural	64	51.62	64	51.62
Educational status				
Professional degree / PhD	00	00.00	00	00.00
Graduate or PG	13	10.48	15	12.10
Intermediate or post high school diploma	18	14.52	18	14.52
High school completion	31	25.00	38	30.65
Middle school completion	16	12.90	11	8.87
Primary school or functional literate	19	15.32	12	9.68
Illiterate	27	21.78	30	24.18
Occupational status				
Profession	7	5.70	5	4.00
Semi profession	00	00.00	00	00.00
Clerk, shop owner, farm owner	24	19.35	34	26.51
Skilled worker	11	8.80	23	19.50
Semi skilled worker	00	00.00	00	00.00
Unskilled	66	53.25	47	37.90
Homemaker	16	12.90	15	12.09
Religion				
Hindu	86	69.37	68	54.85
Boudhha	32	25.80	47	37.90
Muslim	6	4.83	9	7.25
Marital status				
Married	114	91.93	113	91.13
Unmarried	04	3.23	00	0.00
Widow	03	2.42	05	4.03
Widower	03	2.42	06	4.84
Socioeconomic status				
I/upper	3	2.42	3	2.42
II/upper middle	16	12.90	21	16.94
III/lower middle	19	15.32	35	28.22
IV/upper lower	53	42.74	47	37.90
V/lower	33	26.62	18	14.52

Table 2 Risk factors for oral cancer.

Variables	Study subjects				Odds Ratio (95%CI)	p value
History of Chewing tobacco	Cases		Controls			
	No	%	No	%		
Past chewer	98	79.04	00	00	2.61 (1.67-4.28)	<0.001
Current chewer	00	00	68	54.84		
Non chewer	26	20.96	56	45.16		
History of smoking						
Past smoker	24	19.36	00	00	4.54 (2.89-7.39)	< 0.001
Current smoker	00	00	15	12.09		
Non smoker	100	80.64	109	87.91		
History of alcohol consumption						
Former drinker	38	30.64	00	00.00	2.97 (2.07-4.41)	<0.001
Current drinker	00	00.00	11	8.87		
Life time abstainer	86	69.36	113	91.13		

*As per definition of IDSP 2006-07.

Male cases and controls were 104 (83.88%) and female cases and controls were 20 (16.12%). Thus giving male to female ratio as 5.2:1.

Maximum number of cases belong to upper lower/IV, 53 (42.74%) and lower/V, 33 (26.62%) socioeconomic status group on comparing lower class Vs. others OR was 2.13 (95% CI 1.12-4.04) and p value 0.02.

Table 2 depicts the distribution of study subjects according to some risk factors and also the categorization with its measurement strategy. Maximum number of cases 98(79.04%) were past chewers (as they had stopped chewing after diagnosis) and maximum number of controls 68(54.84%) were current chewers. It was observed that the risk of developing oral cancer was thrice in those who had chewing habit (OR=2.61) against non- chewers and the association was statistically significant (p=0.001).

Maximum number of cases 24(19.36%) were past smokers and maximum number of controls 15(12.09%) were current smokers. It was observed that the risk of developing oral cancer was five times in smokers (OR=4.54) against non-smokers and the association was statistically significant (p=0.001).

Maximum number of cases 38(30.64%) were former drinker and maximum number of controls 11(8.87%) were current drinker. It was observed that risk of developing oral cancer was three times in former drinkers when compared against life time abstainers (OR=2.97) and the association was statistically significant (p=0.001).

DISCUSSION

The actual burden of head and neck cancer in India is much greater than reflected through the existing literature and hence can be regarded as a 'tip of iceberg' situation. The percentage increase of Indian population has been nearly twice that of the world in last 15 years there is a likelihood of increase in cancer burden with the same proportion.[21]

In our study, 56 (45.14%) of cases were belonging to <45 years of age, which shows that India is losing much of

productive life years. These can be saved with prevention of addictions among adults. Al Shammari et al conducted case control study, in which 91.08% of cases were < 45 years of age group.[22] Shenoi R et al and Mahapatra et al found age distribution (44.52%), similar to our study.[10,12]

Gender distribution in our study was 104 (83.88%) males and 20 (16.12%) females. Mahapatra S et al found gender distribution, 82.78% were males and 17.23% of females, similar to our study.[12] Mishra et al, Wasnik et al found nearly equal gender distribution.[9,20]

Understanding the epidemiology and the risk factors for oral cancers should help in early identification and prompt treatment of patients with oral cancers. Tobacco chewing in any form was seen in 98 (79.04%) of cases and 68 (54.84%) of controls, OR 2.61 (1.67-4.28) which was found to be statistically significant. This was higher than study conducted by Anantharaman et al, Mahapatra et al, Thorat et al.[12,23,24]

In India, people have habit of using sun dried and processed tobacco leaves in various forms.[20] A report from National Sample Survey Organization shows that, smoking is the most common form of the tobacco consumption among males while chewing among females.[25]

History of smoking was present in 24 (19.36%) of cases and 15 (12.09%) of controls. Balaram P et al studied risk factors in southern India and found 72.17% of cases and 53.40% of controls were smokers.[26] Also Madani et al, Wasnik et al found higher proportion of smoking status among cases and controls.[11,20] Alcohol consumption was

seen in 38 (30.64%) of cases and 11(8.87%) of controls. Madani AH et al found 30.32% cases and 13.72% controls consumed alcohol which is consistent with our findings.[11] However, Wasnik K et al found 11.41% cases consumed alcohol and 8.12% controls consumed alcohol which was lower than our study findings.[20]

Cancer in general is multi-factorial in origin and several environmental interactions are possible. Age, gender, illiteracy or low education level, occupation; working in various sectors, income; low monthly household income, marital status and married people resulting in smoking, chewing and drinking habits can be considered as significant contributing factors modifying the multistage process of carcinogenesis.[4]

Limitation

This design has inherent limitations due to its susceptibility to various biases. Moreover, using researcher-made questionnaire was a potential limitation of this study as well. Another limitation that should be mentioned is that the cases were derived from a hospital and, therefore, may not approximate the relative risk for the general population.

CONCLUSION

In summary, oral cancer occurs more commonly in middle aged males. The statistical data of this study provide strong evidence that tobacco chewing, smoking and alcohol could be in a straight line responsible for developing oral cancer in central India.

Strength

The strength of our study includes selecting age, gender, residence matched selection of controls, and also their selection was community based rather than other hospital based controls. Appropriate scientific background was taken to calculate sample size.

Recommendations

All risk factors considered in this study are preventable addictions. Effective intervention by adopting primary prevention strategies can certainly help in bringing down the incidence of oral cancer, some of these are given in WHO guidelines for cancer prevention.[27]

There is an urgent need for developing and reinforcing comprehensive oral cancer control programmes, tailored to the socioeconomic context, specifically through the systematic, stepwise and equitable implementation of evidence-based strategies for prevention, early detection, diagnosis, treatment, rehabilitation and palliative care, and to evaluate the impact of implementing such programmes. Further epidemiological studies are required in other parts of India to demonstrate the similar effects of these consumptions.

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