Original Article

Association Between Different Type of Addictions and Oral Cancer: A Case Control Study in Sonipat District of Haryana

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Abstract

Background: Incidence of oral cancer is increasing day by day in both males and females with increased smoking. The early-age onset of consumption, duration of use, frequency of chewing tobacco, bidis or smoked cigarettes and drinking alcohol on daily basis are strongly linked to oral cancer.

Methods: This study included 86 cases of oral cancer aged ≥18 years and 86 controls. Consecutive cases were taken. After taking written consent, interview was conducted. Categorical variables were presented in the form of frequency and proportions while continuous variables as mean and standard deviation.

Results: The findings indicate that mean age for cases was 52.74±5.21 years. We found significant risk factors for oral cancer in relation to various habits like: passive smoking; usage of cigarette, bidi, hookah, smokeless tobacco products (types) and alcohol (types and amount) along with age of their initiation.

Conclusion: To mitigate the increasing incidence of oral cancer in India, extensive public education campaigns and health promotion tactics targeting alcohol and tobacco use must be put into place.

Keywords: Oral cancer, Smoking, Alcohol, Risk factors

Introduction

Oral cancer (OC) is one of the most common cancers that dominates globally and is known for its lethal effects and disastrous outcomes. Oral cancer has become an important component of global oral health problems, with a significant economic impact on society making this an essential component of public health policy.[1]

8,90,000 new head and neck cancers (HNCs)—lip and oral cavity (LOC), nasopharynx, other pharynx,

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and larynx—were expected to be diagnosed globally in 2020 according to the Global Burden of Disease (GBD) study. This amounts to 5.3% of all cancer cases (not including non-melanoma skin cancers). LOC tumors were the most common among them, followed by malignancies of the larynx. HNCs caused 507 000 fatalities in terms of mortality, or 5.3% of all cancer-related deaths.[2]

In India alone, 1,20,000 new patients with OC were diagnosed in 2020, of which 72,000 patients died. OC is one of the three most common cancers in the country, with an age-standardised rate of 7.2/100000 population compared with 3.8 in Asia; this being attributed to tobacco consumption. The epidemiological studies had strongly linked the association between the OC and cigarette smoking.[3]

The early-age onset of consumption, duration of use and frequency of chewing of bidis or smoked cigarettes on a daily basis are strongly linked to OC. Smoked tobacco is a risk factor for the upper respiratory tract cancer which shows linear relationship. The risk for OC in people who use tobacco is 1.4 – 1.7 times higher than those who do not consume tobacco.[4] Prevalence of tobacco consumption in India among men and women was reported as 44.5% and 6.8%, by National Family Health Survey (NFHS 5).[5] Statistical report of National Institute of Cancer Prevention and Research shows as many as 2,500 persons die daily due to tobacco-related diseases in India. In fact, India has the world's highest incidence of OC with 75,000 to 80,000 new cases a year.[3]Risk of oral cavity malignancy is increased by drinking alcohol; the higher the daily intake and duration of use, the higher the risk of oral cavity cancer.[6]

Hence, there is a need to analyse various risk factors in patients suffering from oral cancer with different age, gender, socioeconomic status (SES)and investigate effects of tobacco/ betel quid chewing, smoking and alcohol. In the present study, we aimed to find out prevalent risk factors for OC in our population and to compare our findings with healthy controls to establish their significance.

Material and Methods

This hospital-based case-control study was conducted at the Bhagat Phool Singh Government Medical College for Women, Khanpur Kalan, located in rural area of block Gohana, District Sonepat, Haryana.

Inclusion and exclusion criteria for cases: Histopathologically diagnosed new cases of oral cancer aged ≥ 18 years who gave their consent to participate in the study were included; while those with other malignancy or current debilitating medical or related condition like mental illness, end-stage cancer, blindness which made them unable to be interviewed were excluded.

Inclusion and exclusion criteria for controls: Those who gave their consent to participate in the study aged ≥ 18 years were included while patients having any history, sign and symptoms of oral cavity and oropharynx disease; those with other malignancy or current debilitating medical or related condition like mental illness, end-stage cancer, blindness were excluded.

Sampling Technique: Consecutive cases were taken, while controls were selected by simple random sampling from the patients visiting the BPS GMC(W) Khanpur Kalan in the outdoors of otorhinolaryngology Department not having any complaints of oral cavity and oropharynx. Controls were matched for age with difference of ±2 years; gender; residence and had no history of trauma, precancerous lesions, cancerous lesions, or any other pathology in oral cavity and oropharynx. Case to control ratio was 1:1, so 86 cases and 86 controls were taken as study participants.

Sample size

Using nMaster 2.0 software, sample size was estimated on basis of reference study[7] which reported percentage of controls exposed to tobacco chewing 23.6%, anticipated OR 2.5, power 80%, confidence interval 95%, and thus the calculated sample size was 86 cases and 86 controls.

Data collection tools and measurements

Investigator personally interviewed cases and controls by using a semi-structured questionnaire after obtaining written consent. Interviews were conducted in the local language and information related to various socio-demographic characteristics were taken in detail with special emphasis on tobacco and alcohol intake which was recorded in a predesigned, pretested semi-structured proforma.

Operational definitions In our study, 'Oral Cancer' is used as a collective term for cancers of oral cavity and oropharynx.

Statistical analysis

A Microsoft Excel spreadsheet was created using the acquired data. SPSS software was used for the analyses. To summarize the results for continuous variables mean and standard deviation were used. Frequency and proportions were used to display the categorical variables. Chi-Square test and odds ratio with 95% confidence interval were used to statistically assess the categorical data. Statistical significance was attained when the p-value was < 0.05.

Ethical consideration:

Ethical clearance for the study was taken from the Institutional Ethics Committee of Bhagat Phool Singh Government Medical College for Women, Khanpur Kalan vide IEC registration number: BPSGMCW/RC531/IEC/19 dated 21/12/2019.

Results

Table 1: Distribution of study population as per sociodemographic information (n=172)

Variables		Cases	Controls	p value	Odds ratio
Age (Years)	40-50	36(41.9)	35(40.7)	Matched	
	51-60	45(52.3)	48(55.8)		
	>60	05(5.8)	03(3.5)		
	Mean age (SD)	52.74±5.21	52.38±4.78		
Sex	Male	68(79.1)	68(79.1)		
	Female	18(20.9)	18(20.9)		
Marital status	Married	77(89.5)	51(59.3)	<0.001	5.871
	Widowed	9(10.5)	35(40.7)		1
Religion	Hindu	61(70.9)	68(79.1)	0.218	0.646
	Muslim	25(29.1)	18(20.9)		1
Caste	Scheduled caste	48(55.8)	45(52.3)	0.891	1.067
	Other Backward class	32(37.2)	35(40.7)		0.914
	General class	6(7)	6(7)		1

All the cases were in the age range of the 44 to 62 years, while the controls were ranged between 44 to 61 years. Majority of cases and controls were in age group of 51-60 years. 79.1% of cases and controls were males. Cases and controls were matched for gender and age with a range of ±2years. 89.5% cases were married. This difference was statistically significant. 70.9% cases and 79.1% controls belonged to the Hindu community followed by Muslim.55.8% cases and 52.3%controls belonged to the Scheduled caste community. (Table 1)

Table 2: Distribution of study population by Addiction history

Variables		Cases	Controls	p value	Odds ratio
History of chronic drug use (n=172)	Yes	69(80.2)	11(12.8)	<0.001	27.674
	No	17(19.8)	75(87.2)		1
Cigarette use (n=172)	Yes	61(70.9)	25(29.1)	<0.001	5.954
	No	25(29.1)	61(70.9)		1
Age of initiation of cigarette (n=86)	<25 years	51(83.6)	4(16)	<0.001	26.775
	≥25 years	10(16.4)	21(84)		1
Bidi use (n=172)	Yes	62(72.1)	27(31.4)	<0.001	5.645
	No	24(27.9)	59(68.6)		1

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Age of initiation of bidi(n=89)	<25 years	51(82.3)	2(7.4)	<0.001	57.95
	≥25 years	11(17.7)	25(92.6)		1
Use of smokeless tobacco (n=172)	Yes	68(79.1)	16(18.6)	<0.001	16.528
	No	18(20.9)	70(81.4)		1
Initiation age of smokeless tobacco (n=84)	<25 years	54(79.4)	8(50)	<0.001	3.857
	≥25 years	14(20.6)	8(50)		1
Type of smokeless tobacco product (n=84)	BQ with tobacco	17(25)	8(50)	0.002	0.708
	Gutka supari	33(48.5)	2(12.5)		5.5
	Khaini	18(26.5)	6(37.5)		1
Site of placement of smokeless tobacco product (n=84)	Right alveolar margin	47(67.1)	8(50)	0.198	2.043
	Left alveolar margin	23(32.9)	8(50)		1
Hookah use (n=172)	Yes	65(75.6)	27(31.4)	<0.001	6.764
	No	21(24.4)	59(68.6)		1
Age of hookah initiation (n=92)	<25 years	45(69.2)	12(32.4)	<0.001	4.687
	≥25 years	20(30.8)	25(67.6)		1
Passive Smoking (n=172)	Yes	66(76.7)	21(24.4)	<0.001	10.214
	No	20(23.3)	65(75.6)		1

80.2% of the cases had history of chronic drug use (OR=27.6), while 87.2% had no such significant history. 70.9% of cases were habitual of cigarette use (OR=5.9), while equal number of controls (70.9%) were non-users of cigarette. Maximum number of the cases (72.1%) were habitual of bidi use (OR=5.6), while majority of controls (68.6%) were non-users of bidi.

79.1% cases were users of smokeless tobacco products (OR=16.5), while 81.4% controls were non-users. Out of those study participants using smokeless tobacco product, about half of the cases (48.5%) were users of Gutka supari (OR=5.5). 67.1%cases had habit of placing smokeless tobacco product at right alveolar margin, while equal number of controls (50%) had habit of placing smokeless tobacco product at both right and left alveolar margins. 75.6%cases were users of hookah (OR=6.7) while68.6% controls were non-users. 76.7% cases had history of passive smoking at home or at workplace (OR=10.2), while 75.6% controls had no such history.

History of usage of chronic drug, cigarette, bidi, smokeless tobacco products, hookah and age of their initiation and passive smoking showed statistically significant association with oral cancer.(Table 2)

Table 3: Distribution of study population by usage of alcohol

Variables		**Cases**	**Controls**	**p value**	**Odds ratio**
Alcohol use (n=172)	Yes	58(67.4)	13(15.1)	<0.001	11.632
	No	28(32.6)	73(84.9)		1
Initiation age of alcohol (n=71)	<25 years	46(79.3)	5(38.4)	<0.001	6.13
	≥25 years	12(20.7)	8(61.6)		1
Type of alcohol consumed (n=71)	Local	38(65.5)	2(15.4)	<0.001	10.45
	Branded	20(34.5)	11(84.6)		1
Amount of alcohol consumed (n=71)	<2 pegs	28(48.3)	12(92.3)	<0.001	0.077
	≥2 pegs	30(51.7)	1(7.7)		1

67.4% cases were habitual of alcohol use (OR=11.6), while 84.9% controls were non-users of alcohol. Out of those study participants using alcohol, 65.5% of the cases were consumers of local made alcohol (OR=10.4) and had habit of consuming more than 2 pegs of alcohol daily (51.7%). All the factors of alcohol showed statistically significant association with oral cancer. (Table 3)

Table 4: Distribution of study population by past history

Variables		Cases	Controls	p value	Odds ratio
History of pre malignant lesion (n=172)	Yes	56(65.1)	16(18.6)	<0.001	8.167
	No	30(34.9)	70(81.4)		1
Family history of cancer (n=172)	Yes	10(11.6)	2(2.3)	<0.001	5.53
	No	76(88.4)	84(97.7)		1
Relation with study participant (n=12)	Parents	7(70)	1(50)	0.001	2.3
	Sibling	3(30)	1(50)		1
Cancer awareness (n=172)	Present	62(72.1)	84(97.7)	<0.001	0.062
	Absent	24(27.9)	2(2.3)		1

65.1% cases had past history of pre-malignant lesion (OR=8.1), while 81.4% controls had no such history. 11.6% of the cases had family history of cancer (OR=5.5), while only 2.3% of controls had such history. 72.1% of the cases were aware of cancer as outcome of tobacco/Alcohol use, while 97.7% of the controls had such awareness. Past history of pre-malignant lesion, family history of cancer and cancer awareness showed statistically significant association with oral cancer. (Table 4)

Discussion

In India the average age range of patients with oral cancer is between 60-70 years and showing increasing trend with age due to increasing length of exposure to disease specific risk factors leading to accumulation of somatic mutations.[8] In the present study, 58% cases were in the age group ≥ 50 years. The youngest patient was 44-year-old and oldest was 62 years. Mean age of cases was 52.74 years. This figure corresponds well with the results of others workers [9,10] who had studied about risk factors for oral cancer.

In India, cancer of the oral cavity and oropharynx is the commonest cancer in men and third commonest cancer in women.[5] The male predominance in most studies[10,11] including ours, may be attributed to the lifestyle factors like early initiation with higher and regular combined consumption of alcohol and tobacco and passive smoking at home and at workplace.[12]

In our study, 89.5% of study cases were married. Studies done by Modi et al[9] and Babashet et al[11] also showed a higher percentage of married population with tobacco habits and lesions and significant association. Studies done in some other parts of India[10,13,14] had concordant findings in relation to religion. Reason for high incidence in Hindu community in our study can be due to predominant population of study area was Hindu.

Respondents belonging to scheduled castes and tribes were significantly more likely to report early, combined and regular use of alcohol as well as smoking and chewing tobacco/STPs which may be due to low education and consequent low awareness apart from economic crunch making health services inaccessible, inapproachable and unaffordable. Moreover, the type of alcohol and tobacco consumed by them was local made, adulterated and sub-standard.[15]

In this study, 90% cases were habitors. 79.1% of the cases were users of smokeless tobacco products, out of which 79.4% had its initiation at an early age of <25 years. 48.5% of STP habitors were users of *Gutka/supari* and 67.1% had habit of placing smokeless tobacco product at right alveolar margin; supported by other studies done [14,16,17] at different places and at different time periods. However, other studies[6,18] found that tobacco smoking was the most frequent habit followed by tobacco chewing which

is discordant with the present study. This preference of chewing over smoking may be due to social stigma, public ban of smoking, influence on people's perceptions and attitude towards smoking and smoker; apart from cheaper availability of chewing form of tobacco.[15]

In our study, 70.9%,72.1% and75.6% of the cases were habitual of cigarette, *bidi and* hookahuse and out of them, 83.6%,82.3% and 69.2% had its initiation at an early age of <25 years respectively. 76.7% of the cases had history of passive smoking at home or at workplace. 67.4% of the cases were habitual of alcohol use, while 84.9% controls were non-users of alcohol; out of which, 65.5% were consumers of local made alcohol, 79.3% had its initiation at an early age of <25 years; and 51.75 had habit of consuming > 2 pegs of alcohol daily.

Tobacco produces cancer due to its property of chronic irritation. The irritation is mechanical as well as chemical due to presence of anthracin, phenanthracin and benzopyridin. Lime, besides its catalytic action, might be responsible for removing the protective mucus covering the oral mucosa, thus allowing the tobacco and alkaloids to come in close and intimate contact with it and produce its harmful effects. In support of this argument, low incidence of oral cancer in Afganistan, where chewing habit is common, is due to the non-incorporation of lime in tobacco quid.[4]

The habit often starts among young people, usually as a fashion, because of peer pressure, or to imitate parents. It is often used by adults engaged in such as drivers or merchants or other elementary workers, to cope with irregular meals, stress, or to stay awake during shift work and even to relieve toothache.[15]

Bidi smokers were at higher-risk of developing oral cancer compared to nonsmokers. This could be due to poor combustibility as well as nicotine and tar content which exceeds that of cigarette; and qualitative difference between bidi & cigarette smoking due to additional burning of dried temburni leaf. More over in India, bidi smoking is affordable to mass of population and so it is more common than cigarette smoking. The number of bidis smoked per day, a longer duration of smoking and a younger age at starting to smoke were associated with oral cancer.[4]

A multicenter case-control study[19]showed the association of tobacco (OR=2.3) and alcohol (OR=1.04) with the risk of oral cancer. Alcohol has been identified as a co-agent, most probably through a topical effect and by inhibiting folate absorption. Alcohol interferes with the correct transport and metabolism of folate, increasing the risk of cancer, since it alters the synthesis, repair and methylation of the DNA of oral epithelial squamous cells. Furthermore, acetaldehyde production from ethanol occurs in the oral cavity, possibly impeding the potential beneficial effects of folate.[17]

In our study, 72.1% of the cases were aware of cancer as outcome of tobacco/alcohol use, while 97.7% of the controls had such awareness which was statistically significant. Other studies[1,7]also had similar results and active awareness campaigns were advocated.

Strengths and limitations: This is one of the most thorough studies on the risk factors for oral cancer conducted in this region of the nation since all of the cases and controls. The results of this study can be utilized to create cohort studies that will help to clarify the relationship between different risk variables and lesions related to oral cancer. There could have been three types of bias: observer bias, recollection bias and Berkesonian bias. The results of this study cannot be generalized because it was conducted solely within a single hospital and all of the patients were from the Sonipat district.

Conclusion and Recommendations

The difference of occurrence of oral cancer in relation to marital status, family history of cancer, various habits like: passive smoking; usage of cigarette, bidi, hookah, smokeless tobacco products (types) and alcohol (types and amount) along with age of their initiation were statistically significant.

As addiction is a modifiable risk factor, we recommend tobacco cessation training should be made mandatory in education and training of health care professionals so that they can effectively implement tobacco cessation advice in their routine health care practice. Population-based preventive campaigns with the aim of reducing or eliminating tobacco and alcohol should be encouraged and implemented.

Ethical consideration:

Ethical clearance for the study was taken from the Institutional Ethics Committee of Bhagat Phool Singh Government Medical College for Women, Khanpur Kalan vide IEC registration number: BPSGMCW/RC531/IEC/19 dated 21/12/2019.

Conflict of Interest: Nil

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