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Tobacco Habits and Risk of Oral Cancer: A Retrospective Study in India

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Abstract

Background: It is suggested that various forms of tobacco use have some effects on diverse sites of head and neck to develop cancer.

Material and Methods: The study examines data for oral cancer in male subjects, collected from the population registered in cancer registry during the year 2007- 2008. All the data collected were entered into the spreadsheets. The statistical package for social sciences (SPSS) software version 11.0 was used for data processing and data analysis.

Results: Smoking and chewing develops a high risk of oral cancer. Most of the tobacco consumers are in their 40s. People younger than 30 years used betel-quid in abundance (47.1%). Bidi was the choice of tobacco for 41-50 age group. In people with less than ten years duration of using tobacco products, gutkha was consumed in abundance (20.7%). For frequency of 6-10 times per day, smoking Bidi was consumed in 61.4% of instances.

Conclusion: The crux of the problem is that majority of the cases are reported with a significant delay to the health care facility. Nationwide counseling on tobacco cessation is required in a developing country like India.

Keywords: Tobacco, Head and neck cancer, Cancer registry, India.

Introduction

In developing countries, cancer is among the ten most common causes of mortality.[1] In the present scenario world is heading towards various types of non-communicable diseases, which are also known as modern day epidemics. Among these modern epidemics cancer is the second most common cause of mortality in developed countries. Cancer, which is defined as abnormal growth of cell, can affect any tissue or organ of body.

Oral cavity is the most common cancer site observed by Indian registries.[2] Oral cancer is usually related to the use of tobacco in different forms.[3] In India, the use of tobacco is common in forms of chewing and smoking.[4] Epidemiological studies have shown that incidence of oral cancer varies significantly in different continents, and also between developed and developing countries like India.[5] The etiology of oral cancer is multifactorial that is genetic, environmental, social, and behavioral.[6] The consumption of tobacco is closely associated not only with the development of oral cancer, but also with the course of disease evolving a poor prognosis.[7]

Tobacco consumption has been blamed for the sharp rise in cancer cases in the country.[8] In India, oral cavity is one of the five leading sites of cancer in either sex. The most widespread form of tobacco is chewing of betel-quid with tobacco and this has been demonstrated as a major risk factor of cancer of oral cavity.[9- 13] A dose-response relationship is measured by the duration of chewing and smoking per day. According to the World Health Organization, cancer has been growing at a rate of 11 percent annually in India due to widespread tobacco consumption.[8] With an estimated 2.5 million cancer and nearly 0.8 million new cases adding up by the year, scientific projection show there could be a 50% increase in cancer death by the year 2015. According to the Indian Council of Medical Research, more than 300 billion rupees is

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spent each year to battle the burden of tobacco consumption. [8]

Types of Tobacco Use

Smoking tobacco

Smoking tobacco as factory-made cigarettes, cigars and loose tobacco in pipes or hand-made cigarettes is familiar to all. Tar, nicotine, and nitrosamine content varies greatly, depending on species, curing additives, and method of combustion. Such smoking habits are the predominant form of tobacco use in the West and among increasing millions in developing countries.

Smokeless Tobacco

Much of the tobacco in the world is consumed without combustion. Rather, it is placed in contact with mucous membranes, through which nicotine is absorbed to provide the pharmacological effect. Use of nasal stuff, popular in the last century, is returning. Other forms of snuff, loose or in the form of packets, are placed in the oral vestibule, which is common in Scandinavia and the United States. Tobacco is also prepared in blocks or flakes for chewing.

Retrospective study on oral cancer is particularly relevant because mortality from oral cancer can be substantially reduced on the basis of available knowledge. Aim of the study was to assess the correlation between various forms of tobacco and various sites of head and neck to develop cancer. To our knowledge, such a study has not been conducted in this part of country previously.

Materials and Methods

The present retrospective descriptive study examines data for oral cancer in male subjects, collected from the Udaipur population based on cancer registry during years 2007 and 2008. The ethical clearance was obtained from the ethical committee of Darshan dental college and hospital before commencing the study. Calculation of sample size was based on the pilot study done two months prior to the study. The required sample size was calculated 507, respectively. In this study due to missing data and after exclusion criteria final sample consists of 520 patients which are more than the calculated number of sample by the pilot study. Individuals with tobacco habits who were reported with oral cancer in the department of radiotherapy and oncology of a local government hospital in years 2007 and 2008 were included in the study. Non-tobacco consumers, ex-smokers, were excluded from the study. Females were also excluded because of the small number of cases and lacking relevant history of tobacco habits due to their cultural taboos and privacy.

A team of two doctors were selected and given a through training to fill in a self-prepared questionnaire from the hospital records. Among the team of doctors the kappa statistics was calculated to be 90.3 when checked two days prior to the study for inter-examination variability. The medical records were reviewed to determine the cancer site, age, gender, area of residence, habits (tobacco use), and duration of tobacco consumption and its frequency.

The cancer cases were coded by four digit International Classifications of Disease for Oncology (ICD-O) code.[14] Oral cancer sites included tongue, floor of mouth, maxilla, palate, buccal mucosa, and lip. Forms of tobacco use were smoking form Bidi (Indian cigarette), and smokeless forms Gutka and Betel-quid. Individuals consuming both forms of tobacco (smoking and smokeless tobacco) were segregated by analyzing the hospital records.

The data collected were compiled and quality checks were carried out. The results of variables of interest with or without confounding variables were tabulated. The effect of interaction between variables of interest and confounders were also obtained to understand the validity of adjustments. All the data collected were entered into the spreadsheets. The statistical package for social sciences (SPSS) software version 11.0 was used for data processing and data analysis. ANNOVA, and chi-square tests were applied.

Results

Most of the oral cancer cases belong to the 41-50 years age group (31.1%). In-district cases are predominant with 61.9%. Out-district cases in the age group < 30 consist the smallest group (table 1). Most of the tobacco consumers are between 41-50 age group (table 2). Overall, gutkha chewing habit was more prevalent. In less than 30 years age group, betel-quid was used in abundance (47.1%).

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Bidi was the choice of tobacco for 41-50 years age group.

Table 3 illustrates the cases according to the duration and frequency of chewing and smoking tobacco per day. For less than ten years of duration, gutkha was consumed by most of the cases. For frequency of 6-10 times per day, smoking Bidi was consumed by most of the cases.

Table 4 illustrates that age group 41-50 had more cases of carcinoma of tongue (50.6%) and least is carcinoma of lip (4.9%). In age group < 30 carcinoma of buccal mucosa is highly prevalent (52.9%).

Bidi smoking shows high prevalence of carcinoma of tongue (38.6%) and carcinoma of palate (30.7%) (table 5). Gutkha shows more cases of carcinoma to tongue (47.8%). Betel quid shows carcinoma of buccal mucosa in abundance (45.0%).

Table 6 shows distribution of cancer in different sites of oral cavity according to duration and frequency of tobacco consumption.

Discussion

Tobacco consumption has decreased in many developed countries while in most of the developing countries it is still increasing. This may largely be due to the fact that relatively fewer studies have been reported from developing countries, including India, on the risk of cancer at different cancer sites due to the use of various form of tobacco.[15]

Oral cancer is the most common cancer in India accounting for 50-70% of total cancer mortality.1 High proportion of cases among males may be due to high prevalence of tobacco consumption habits among males. Moreover, tobacco is consumed in

Table 1. *Oral cancer prevalence according to district and out of district cases in different age groups.*

Age	In-district cases N (%)	Out-district cases N (%)	Total N (%)
< 30	30 (88.2)	4 (11.8)	34
31-40	62 (75.6)	20 (24.4)	82
41-50	96 (59.3)	66 (40.7)	162
51-60	64 (56.1)	50 (43.9)	114
61-70	36 (41.9)	50 (58.1)	86
> 70	26 (61.9)	16 (38.1)	42
Total	314 (60.4)	206 (39.6)	520

Table 2. *Tobacco consumption according to different age groups in the cancer cases.*

Age	Bidi	Gutka	Betel-quid	Total
< 30	10 (29.4)	8 (23.5)	16 (47.1)	34
31-40	28 (34.1)	32 (39.0)	22 (26.8)	82
41-50	68 (42.0)	58 (35.8)	36 (22.2)	162
51-60	38 (33.3)	34 (29.8)	42 (36.8)	114
61-70	18 (20.9)	38 (44.2)	30 (34.9)	86
> 70	14 (33.3)	14 (33.3)	14 (33.3)	42
Total	176 (33.8)	184 (35.4)	160 (30.8)	520

Table 3. *Duration and frequency of smoking and chewing tobacco in cancer cases.*

Duration & frequency	Bidi	Gutka	Betel-quid	Total
Duration (years)				
< 10	24(13.6)	38(20.7)	20(12.5)	82(15.8)
10 – 15	104(59.1)	86(46.7)	76(47.5)	266(51.2)
>15	48(27.3)	60(32.6)	64(40.0)	172(33.1)
Frequency (/day)				
1-5/day	30(17.0)	30(16.3)	36(22.5)	96(18.5)
6-10/day	108(61.4)	102(55.4)	88(55.0)	298(57.3)
>10/day	38(21.6)	52(28.3)	36(22.5)	126(24.2)
Total	176	184	160	520

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both chewing and smoking forms in males whereas in our society females are not indulged in tobacco smoking1,16,17, which is in accordance to this study.

Balaram et al18 in a study stated that the low socioeconomic status may be a risk factor for poor oral hygiene thereby further increasing the risk of oral cancer in tobacco chewers. This is in accordance with our results as the people visiting these government hospitals belong to low socioeconomic status with a below poverty line card generally.

In the present study, majority of the cases of carcinoma of buccal mucosa (45%) may be correlated with the tobacco chewing habit. Smokeless "Spit" tobacco contains over 2000 chemicals, five of which have been directly related to causing cancer. Wrapped inside a betel leaf and plated in the side of the mouth, tobacco has been chewed for centuries in India. This is commonly called paan (betel-quid). But in the last decade tobacco companies have started selling tobacco in ready-packaged small sachets. Mostly these quids (Gutka) are kept where it is gradually absorbed after dilution with saliva. Thus the floor of the mouth (that area beneath the tongue) is the site of maximum insult and thus are maximally affected (47.8 %).

Majority of the subjects included in the study belonged to 41-50 years age group whereas in

Table 4. *Distribution of cancer in different sites of oral cavity according to different age groups of cancer cases.*

Age	Tongue/floor of mouth N (%)	Buccal mucosa N (%)	Maxilla/palate N (%)	Lip N (%)	Total N
< 30	14 (41.2)	18 (52.9)	2 (5.9)	0 (0)	34
31-40	44 (53.7)	20 (24.4)	4 (4.9)	14 (17.1)	82
41-50	82 (50.6)	36 (22.2)	36 (22.2)	8 (4.9)	162
51-60	26 (22.8)	38 (33.3)	26 (22.8)	24 (21.1)	114
61-70	28 (32.6)	26 (30.2)	30 (34.9)	2 (2.3)	86
> 70	18 (42.9)	16 (38.1)	6 (14.3)	2 (4.8)	42
Total	212 (40.1)	154 (29.6)	104 (20)	50 (9.6)	520

Table 5. *Distribution of cancer in different sites of oral cavity according to different tobacco habits in cancer cases.*

Habits	Tongue/floor of mouth N (%)	Buccal mucosa N (%)	Maxilla/palate N (%)	Lip N (%)	Total N
Bidi	68 (38.6)	34 (19.3)	54 (30.7)	20 (11.4)	176
Gutka	88 (47.8)	48 (26.1)	34 (18.5)	14 (7.6)	184
Betel-quid	56 (35.0)	72 (45.0)	16 (10.0)	16 (10.0)	160
Total	212 (40.1)	154 (29.6)	104 (20)	50 (9.6)	520

Table 6. *Distribution of cancer in different sites of oral cavity according to duration and frequency of tobacco consumption.*

Duration & Frequency	Tongue/floor of mouth N (%)	Buccal mucosa N (%)	Maxilla/palate N (%)	Lip N (%)	Total N (%)
Duration (years)					
< 10	44(53.7)	26(31.7)	6(7.3)	6(7.3)	82
10 – 15	110(14.4)	68(25.6)	56(21.1)	32(12.0)	266
> 15	58(33.7)	60(34.9)	42(24.4)	12(7.0)	172
Frequency (/day)					
1-5	38(39.6)	30(31.3)	20(20.8)	8(8.3)	96
6-10	118(39.6)	88(29.5)	66(22.1)	26(8.7)	298
> 10	56(44.4)	36(28.6)	18(14.3)	16(12.7)	126
Total	212 (40.1)	154 (29.6)	104 (20)	50 (9.6)	520

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other studies majority of the cases were from more than 50 years. 19,20 This shows the alarming factor regarding tobacco consumption and cancer cases in relation to age which is dropping at a significant rate. In this study, 15.8% of the subjects were tobacco smokers which is less than some other reports.19

Tongue was the most frequently involved site accounting for 212 (40.8%) cases which is similar to a study done in Brazil 20 reported 44%. In a study done in United States carcinoma of tongue was the most prevalent in 20- 44 years age group individuals with 39% which is less than our study with 53.7%. Rate of carcinoma cases of lip in this study was 17.1% whereas this was 31% for U.S population and number of cancer cases for palate was 4.9% in this study with just double in U.S population with 8%.21

Comparing the results with a study done in Bhopal by Dikshit et al 22, oral caner associated with smoking was 48.6% while in our study this association was 33.3%.

Indian Bidi contains only a small amount of tobacco dust rolled in a dried leaf of tendu (Diospyrous malanoxylon) or temburni tree (Diospyrous ebenum).23 In comparison to U.S cigarettes the main stream of smoke of Bidi contains a much higher concentration of several toxic agents such as hydrogen cyanide, carbon monoxide, ammonia, and other volatile phenols and carcinogenic hydrocarbons such as benz anthracene and benzopyrene. Bidi also delivers more nicotine than cigarettes. The Nitrosonornicotine (NNN) and 4(methyl1-nitrosoramino)-1-(3pyridol) (NNK) level of Bidi tobacco ranged from 6.2-12 micro gram/gram compared with 1.3 to 58.0 micro gram/gram in cigarette tobacco.24 In this study, only Bidi was considered in smoking form of tobacco as it is much more associated with cancer because Bidi smokers are found to take almost five puffs per minute compared to the cigarette smokers who smoked two puffs per minute.23

Conclusion

Though, oral cancer occurs at a site which is accessible for clinical examination and amendable to diagnosis by current diagnostic tools, the crux of the problem is that majority of the cases are reported late to the health care facility as evident from the findings of studies done in various countries. Tobacco consumption is a well-established risk factor for development of oral cancer. Proper counseling on tobacco cessation by the medical practioners is required to protect against this cancer.

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