

RESEARCH COMMUNICATION

Epidemiological Study of Risk Factors for Oral, Laryngeal and Esophageal Cancers at a Tertiary Care Hospital in India

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Abstract

Background and Ais: An epidemiological shift in the form of increase in the incidence of cancer and decrease in the incidence of smoking is universally realized today. This study was conducted to observe an association of smoking, use of alcohol & tobacco and cancers of the oral cavity, larynx and esophagus **Material and Methods:** it was a case control study conducted at Deptt. of Radiotherapy at GMCH, Chandigarh. The registers from radiology department were utilized and studied for the presence of history of alcohol consumption, smoking and tobacco intake. Statistical analysis was done by calculating Odds ratio along with 95% confidence interval. **Results:** Out of 363 cases with the diagnosis of Laryngeal, Esophageal and Oral Cancer along with 568 controls studied, 42 (11.6%) were in the age group of 30-44 years, 153 (42.1%) in the age group of 45-59 years and rest 171 (47.1%) in the age group of 60+ years. Among cases, the percentage of tobacco use, smoking and alcohol consumption was 10.5, 60.6 and 33.6 respectively as against the similar percentages among controls 1.4, 9.0 and 6.3. The odds ratio for tobacco use in relation to patients aged 60+ years was 2.39, in the age group of 45-59 years was 11.19 and increased to 55.35 in the age group 30-44 years. Similarly the overall odds ratio for alcohol consumption was 7.48 and it was 4.98 in the age group 60+ years, 6.30 in the age group 45-59 years and increasing to 17.00 in the age group of 30-44 years. **Conclusion:** Finding suggests that risk of cancer of the upper respiratory and alimentary tracts is higher with tobacco and alcohol use. Further studies are required.

Keywords: Risk factors - oral cavity - pharynx - esophagus - cancer - tobacco - alcohol - tertiary care

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Introduction

An epidemiological shift in the form of increase in the incidence of cancer and decrease in the incidence of smoking is universally realized today. People are seen less often smoking as was the case previously. In fact, the union territory Chandigarh has been declared as a smoke free city. The association between smoking, alcoholism and tobaccoism and cancers of tongue, larynx and esophagus, however remains established to the same extent as was case previously. Since most cancers are due to the environmental factors there is a wide variation in its incidence in different geographical areas. For instance, the cervical cancer ranks first in developing countries whereas it ranks 10th in developed countries and colorectal cancer ranks 2nd in developed countries and 5th in developing countries (Mills,2007). Though many cancers in tropics have relation with chronic infection, more of them have other risk factors like poor socioeconomic status, malnutrition, vitamin A deficiency, silica dust etc (Yu et al., 2005; Vizcaino et al.,1995; Munoz et al.,1985).One study demonstrated that less than 40% of individuals consumed vitamin A amounting to less than 10% of RDA in winter and less than 20% of RDA in spring (Cook GC et

al.,2009). In the year 2004 surgeon general's report adds more to the conclusions that a smoking causes cancers of oral cavity, pharynx, esophagus, stomach, kidney and bladder. Smoking is the major cause of esophageal cancer in United States. Its quitting resulted in decreasing deaths to the tune of 12,300 per year. In the year 2003, 3800 deaths from laryngeal cancer and 7,800 deaths from oral and pharyngeal cancers were prevented. Around 30,200 new cases of the same were also prevented (Parkin et al., 2005).

Keeping in view the fact that the adaptation of smoking free status in the Chandigarh city might have a far reaching positive effect on the health of the people, the following study was undertaken as a base line data to be used for future comparisons with the question of establishing the hypothesis that the smoking causes cancers of the oral cavity, larynx and esophagus more than it causes other cancers.

The aim of the study was to observe an association of smoking, use of alcohol & tobacco and cancers of the oral cavity, larynx and esophagus The following were objectives of this study: 1) To find out the prevalence of smoking, use of alcohol and tobacco among the patients suffering from cancers of oral cavity, larynx and esophagus

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i.e. 'cases'; 2) To find out the prevalence of smoking, use of alcohol & tobacco among the patients suffering from other cancers i.e. 'controls'; 3) To determine whether the frequency (prevalence) of smoking, use of alcohol & tobacco amongst the patients suffering from cancers of oral cavity, larynx and esophagus was more as compared to its similar frequency amongst the patients suffering from other cancers; 4) To find out the extent of above association by calculating the odds ratio.

Materials and Methods

The study was conducted in Government Medical College Hospital, Chandigarh. It is a tertiary care hospital which was established in the year 1992 and thus is little less than two decades old. The hospital is situated around 250 Kilometers in the North East direction of National Capital of India (New Delhi) on National Highway. The topographical situation of the hospital allows the patients to attend it coming from Uttar Pradesh, Haryana, Punjab and Himachal Pradesh. The Department of Radiotherapy has been engaged in managing the maximum number of cancer patients attending hospital. The health records of such patients are maintained in the department of Radiotherapy. The records in the said department were checked with the permission of Head of the Department who was also consulted for certain difficult situations related to the clinical knowledge of cancer. As such he deserves lot of thanks for the same. The records were found to be very satisfactory. The patients suffering from cancers of oral cavity, larynx & esophagus were considered as 'cases'. The cases were recorded according to the specific age group and sex. Since in Indian circumstances the patients often report late and also because at most of the times the grading was not mentioned in the record sheet of patients, the cancers grading was not specified, all patients with the diagnoses of above mentioned cancers were included as 'cases'. E.g. there was hardly any record seat on which diagnosis of pre-cancerous lesion was made, though it is very common as per the community studies. However, only those patients who were diagnosed in the year of 2009-2010 were included in the study as cases. E.g. there was hardly a any record seat on which diagnosis of pre-cancerous lesion was made, though it is very common as per the community (field) studies. The selection of controls was done from the same department because of two reasons 1) The control thus selected would have come from same reference population as the cases and thus their being comparable (with cases) regarding age, sex and socio-economic status was highly likely. 2) Even in the same hospital different clinics might have different admission policies and by selecting controls from the same clinic this factor was also taken care. The age and sex wise matching of the controls was done. The greatest difficulty was faced in finding out the controls for male cases as among them, the patients with the diagnosis of lung cancer were excluded from the list of controls (since lung cancer and smoking area highly associated). No other exclusions were made. The data was analyzed manually and with the help of computer. Assistance of an expert statistician was sought.

Table 1. Risk Factors for Oral, Esophageal and Laryngeal Carcinoma among Both Sexes Combined

Risk Factors	Cases	Controls	Odds Ratio	95% CI	P Value
Age 30-44					
Tobacco +	11	1	55.35	Not Valid	<0.001
-	31	156	1.00		
Smoking +	20	8	16.93	6.12-48.2	<0.001
-	22	149	1.00		
Alcohol +	16	04	17.00	4.92-64.5	<0.001
-	26	153	1.00		
Sub-Total	42	157			
Age 45-59					
Tobacco +	17	02	11.19	2.43-71.30	<0.001
-	136	179	1.00		
Smoking +	94	25	9.94	5.65-17.6	<0.001
-	59	156	1.00		
Alcohol +	58	16	6.30	3.30-12.1	<0.001
-	95	165	1.00		
Sub-Total	153	181			
Age 60 & Above					
Tobacco +	9	5	2.39	0.72-8.36	0.11
-	162	215	1.00		
Smoking +	108	21	8.90	4.91-16.3	<0.001
-	63	199	1.00		
Alcohol +	48	16	4.98	2.61-9.58	<0.001
-	123	204	1.00		
Sub-Total	171	220			
All Ages					
Tobacco +	38	08	8.18	3.61-19.3	<0.001
-	325	560	1.00		
Smoking +	220	54	14.64	10.2-21.1	<0.001
-	143	514	1.00		
Alcohol +	122	36	7.48	4.92-11.4	<0.001
-	241	532	1.00		
Grand Total	363	568			

Results

A total of 2,600 (2,276 males and 2,324 females) patients were diagnosed as having the presence of cancer disease by the Department of Radiotherapy at Government Medical College Hospital, Chandigarh. Out of these, 2071 (42.8%) cases (17.7%) were the patients of Cancers of Digestive and Respiratory Tracts. Out of these patients, 363 cases with the diagnosis of Oral, Laryngeal & Esophageal Cancer along with 568 controls were studied for the presence of history of alcohol consumption, smoking and tobacco intake. Overall male to female ratio for the above mentioned cancers was 4.8:1. This ratio was highly male preference (12.3:1) in case of Laryngeal Carcinoma and least male preference (1.9:1) in case of Esophageal Cancer. Out of 363 cases, 42 (11.6%) were in the age group of 30-44 years, 153 (42.1%) in the age group of 45-59 years and rest 171 (47.1%) in the age group of 60+ years. Among cases, the percentage of smokeless tobacco use, smoking and alcohol consumption was 10.5, 60.6 & 33.6 respectively. The corresponding percentages among controls were 1.4, 9.0 & 6.3. The overall 'odds ratio' for tobacco use was 8.18 (Table 1). In relation to patients aged 60+ years, it was 2.39 which in the age group of 45-59 years was 11.19 and further increased to 55.35 in the age group of 30-44 years. Similarly the overall 'odds ratio' for alcohol consumption was 7.48. It was 4.98 in

Table 2. Sex-wise Risk Factors for Oral, Esophageal and Laryngeal Carcinoma

Risk Factors	Cases	Controls	Odds Ratio	95% CI	P Value
Females					
Tobacco +	3	2	8.00	1.05-70.9	0.03
-	42	224	1.00		
Smoking +	8	1	48.65	5.88-1067	<0.001
-	37	225	1.00		
Alcohol +	1	1	5.11	0.01-191	0.30
-	44	225	1.00		
Grand Total	45	226			
Males					
Tobacco +	35	6	6.93	2.74-18.6	<0.001
-	283	336	1.00		
Smoking +	212	53	10.91	7.38-16.2	<0.001
-	106	289	1.00		
Alcohol +	121	35	5.39	3.49-8.36	<0.001
-	197	307	1.00		
Grand Total	218	342			

relation to patients aged 60 years and above, 6.30 in the age group of 45-59 years and increasing to 17.00 in the age group of 30-44 years. Similarly the over all odds ratio for smoking was 14.6. In relation to patients aged 60+ years, it was 8.90 which in the age group of 45-59 years was 9.94 and further increased to 16.9 in the age group 30-44 years (Table 1). Sex-wise analysis of the data demonstrated that amongst females the alcohol and amongst males the tobacco was not found to be significantly associated with cancers of larynx, esophagus & oral cavity taken combined as together. This may very well be because of small number of cases in the concerned groups (Table 2).

Discussion

At the outset it must be mentioned the patients used as controls were also likely to have the presence of studied risk factors more as compared to the general population since the role of smoking and alcohol has been discovered in almost all the cancers. Thus there appears to be a strong need to compare the frequency of risk factors among," The present analysis can only tell us that smoking, tobacco use & alcohol intake will harm (or otherwise) more (or less) to the persons who will be developing the cancers of lung, larynx and esophagus as compared to those persons who will be developing other cancers. An overall inference from the findings of the present study suggests that the risk of cancer development is higher if tobacco used and alcohol consumptions are started at early age. Similar observations have been made by other workers (RR was 13.6 if smoking was started before the age of 17 years) using a hospital based case control study in the year 1986-1989 covering 'male' cancer patients- 157 of oral cavity, 134 of pharynx, 162 of larynx and 208 of esophagus along with 1272 controls having acute conditions (Franceschi et al.,1990).They had demonstrated an 'odds ratio' for current smokers as 1.1, 12.9, 4.6 and 3.8 respectively and also observed that the RR for oral cancer was 5.3 if smoking is restricted to less than 15 cigarettes and it was 14.3 if one smokes more than 15 cigarettes per day and 5.9 if cigarettes were smoked for < 30 years and it was 18.0 if cigarettes were smoked for > 40 years(Franceschi

S et al.,1990).

A big meta-analysis from 26 studies on alcohol and cancer demonstrated that alcohol intake in the doses of 25g, 50g and 100g per day was associated with pooled risk (RR) of 1.75, 2.85 & 6.01 respectively for esophageal cancer (Peluchhi et al., 2006). Among non-smokers an over all RR was 5.00 for drinkers as compared to non-drinkers. The effect of stopping alcohol consumption on cancer is not so clear. It is observed only after 15-20 years of abstinence(Altieri et al.,1987). Many analyses on cancers have demonstrated that the risk of cancer development increases regardless of type of alcohol but association is inconsistent. It has been observed that the beverages commonly consumed by the population demonstrate maximum association with the risk of cancer development (Boffetta et al., 2006). An important case control study demonstrated that the RR for non drinkers in relation to laryngeal cancer was 7 if one smokes 25 or more cigarettes per day (Talamini et al., 2002).The impact of smoking on laryngeal cancer was more if it is consumed for more duration as compare to the impact due to higher amount of consumption. IARC in 2004 opined that risk of cancer development is higher if smoking is started at early age (IARC, 2004). A similar association has been observed by us. In an Italy based study it was demonstrated that the RR is 11.1 with cigarette smoking and 20.7 with pipes and cigars use (Zheng et al., 1990). Combined effect of alcohol smoking in the causation of laryngeal cancer is multiplicative. Some authors have observed a supra-multiplicative effect e.g. Zheng and colleagues in the year 2004 demonstrated that chances of cancer development were 300 times more if alcohol and tobacco both were used simultaneously (Zheng T et al., 2004). An important study on both sexes of Asians has demonstrated the role of betel quid in the causation of these cancers(Jain RV et al.,2005). Several case control and cohort studies have demonstrated an association of cancer development and current smokers- its duration and amount (IARC, 2004). The RR for larynx cancer development with smoking was > 10 if one smoked > 20 cigarettes per day and if it continued for > 40 years. After stoppage of smoking, risk of cancer development decreased to 60% by 10-15 years and further by more years of abstinence. An Italy and Switzerland based important study has demonstrated an odds ratio of 2.46 for non-smoker drinkers and 9.38 for non-drinker smokers demonstrating the fact that smoking has stronger effect on the development of laryngeal cancer than Alcohol (C Bossetti et al.,2002).Other studies including ours have also made similar observations(A Altieri et al.,1987; Talamini R et al.,2002; Hashibe M et al.,2007; Lee YCA et al.,2009). In an India (Mumbai) based study it has been emphasized that Areca Nut and Betel Nut control is mandatory if India wants to decrease the burden of carcinoma, especially cancer of oral cavity (Chatuvedi et al., 2009).

It is thus concluded that smoking, tobacco use & alcohol intake will harm more to those persons who will be developing the cancers of lung, larynx and esophagus as compared to the ones who will be developing other cancers. This study must be further extended using the presently selected cases and general population as

controls (i.e. in the second control group) by visiting the field beyond the boundaries of the hospital so that we can emphatically conclude (by such comparison) the fact that smoking, tobacco use & alcohol intake are the risk factors for the development of cancers of lung, larynx and esophagus.

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