EPIDEMIOLOGY OF UPPER AERODIGESTIVE CANCERS AMONG ARMED FORCES PERSONNEL AND THEIR FAMILIES

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ABSTRACT

Cancers of the oral cavity, pharynx, and esophagus are now suspected to have common etiologic factors and have been grouped together as "upper aerodigestive" cancers. Since this grouping is of relatively recent origin there have been no epidemiological studies on this group among Armed Forces personnel. 114 cases of upper aerodigestive cancers and an equal number of controls were studied. The largest number of cases were in the age group of 40-49 years with male preponderance. Lower level of education, smoking, quid chewing, and alcohol use were found to be the major risk factors for these cancers. A dose response relationship was observed for smoking, quid chewing and alcohol intake.

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KEY WORDS : Neoplasms; Smoking; Quid chewing; Alcohol.

Introduction

Carcinomas of the upper aerodigestive tract include all malignant epithelial neoplasms of the oral cavity, oropharynx, larynx, hypopharynx and esophagus (ICD-O 2nd edition No C0 to C10, C12 to C15 and C32) [1]. These have been grouped together as they share some common etiology [2-4]. Malignancies of the nasopharynx, which is in the same anatomical area, are thought to have a different etiology [5]. The estimated incidence of carcinoma of the upper aerodigestive tract (excluding larynx) for the year 1991, in India, was 87,000 which was expected to rise to 116,000 in the next 10 years [6].

This study was carried out at the Malignant Diseases Treatment Centre, at Pune, to study the epidemiology of carcinomas of the upper aerodigestive tract among Armed Forces personnel and their families. An attempt has been made to study the distribution of upper aerodigestive cancer in terms of age, sex, and socioeconomic status. The role of etiologic factors such as tobacco and alcohol use has also been assessed.

Material and Methods

This was a hospital based case control study. All the Armed Forces personnel and their families undergoing treatment at MDTC, Pune, who had been diagnosed histopathologically to be suffering from cancer of any site of the upper aerodigestive tract between 01 Jan 91 and 30 Jun 92 constituted the cases. An equal number of patients admitted to Command Hospital (SC) Pune, who had never suffered from any malignancy were selected as controls at random after matching for age, sex and socioeconomic status. 114 cases and 114 controls were studied.

All the cases and controls were interviewed personally by one of the authors (RV) using a predesigned questionnaire. The questionnaire was pretested on 15 patients who were included in the study population.

Age was recorded in years as on the last birthday. Matching for age was done upto ± 2 years. As only Armed Forces personnel and their families were studied, the patients were classified into three socioeconomic groups based on the rank structure. The groups were

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Fig. 1 : Distribution of cases as per age, sex, and site.

Officers and their families, Junior Commissioned Officers and their families, and Other Ranks (or their equivalent in the Navy and Air Force) and their families. Information about personal characteristics such as marital status and level of education was recorded. Data was obtained on smoking, quid chewing and alcohol use.

The data obtained was tabulated and analysed statistically. The odds ratio was calculated and tests of significance carried out where relevant.

Results

Age, Sex and Site

The distribution of cases as per age, sex and site is shown in Fig 1. Ninety cases (78.9%) were males and 24 (21.1%) were females giving a male:female ratio of 3.74:1. The largest number of cases were in the age group 40-49 years (43.86%) followed by 31.58% in the age group 50-59 years. The mean age of the cases was 48.58 yrs. The mean age of both the male and female cancer patients was similar to each other. The largest

Fig. 2 : Distribution as per socioeconomic status.

number of cases (35.08%) were suffering from oral cavity cancer followed by esophageal cancer (24.56%). The male to female ratio was 6:1 for oral cancer, 5.5:1 for pharyngeal cancer, 2.5:1 for esophageal cancer and 2.67:1 for cancer of the larynx.

Socioeconomic Status

The distribution of cases according to socioeconomic status is shown in Fig. 2. Ninety four cases (82.46%) were Other Ranks or their families making them, by far, the largest in

terms of socioeconomic status.

Marital Status

The distribution of cases and controls according to marital status is shown in Table 1. There were no unmarried females in either group. There were no divorcees in the study population. The unmarried and widowed state increased the risk of upper aerodigestive cancers in both sexes. However the proportion of unmarried or widowed cases was not significantly different from the controls ($p > 0.05$ in all cases).

Educational status

Table 2 shows the comparison of cases and controls in terms of educational level. Controls were generally better educated than the cases. The risk of developing upper aerodigestive cancer increased as level of education fell. As compared to persons with college level education, illiterates were found to have a 4.66 times greater risk and those with pri-

mary education 7 times greater risk of developing upper aerodigestive cancers. The proportion of illiterates and those with primary level education was significantly greater among cases as compared to controls ($p < 0.05$ in both cases).

Smoking

For both sexes combined smokers had 2.83 times the risk of nonsmokers of suffering from cancer of the upper aerodigestive tract. The odds ratio was 6.14 and 1.37 for males and females respectively. However, the proportion of smokers among female cases was not significantly more than among female controls. The risk of suffering from upper aerodigestive cancer was found to increase with number of cigarettes smoked per day as shown in Table 3. The risk increased markedly among those smoking more than 30 cigarettes per day. The proportion of those who smoked 30-39 or more than 40 cigarettes per day was significantly greater among cases as

TABLE 1
Marital status and sex distribution in patients and controls

Marital status	Males			Females			Both Sexes		
	Cases	Controls	OR	Cases	Controls	OR	Cases	Control	OR
Married	74	80	1.00	16	20	1.00	90	100	1.00
Unmarried	4	2	2.16	0	0	0.00	4	2	2.22
Widowed	12	8	1.62	8	4	4.32	20	12	1.85
Total	90	90		24	24		114	114	

Odds Ratio (OR) as compared to married ($p > 0.05$ in all cases)

TABLE 2
Comparison of cases and controls in terms of educational status

Educational status	Cases		Controls		Odds Ratio	p
	No	%	No	%		
Illiterate	8	7.02	4	3.51	4.66	< 0.05
Primary	36	31.58	12	10.53	7.00	< 0.05
Middle	34	29.82	40	35.09	1.98	> 0.05
Secondary	30	26.32	44	38.60	1.59	> 0.05
College	6	5.26	14	12.28	1.00	---
Total	114	100.00	114	100.00		

Odds Ratio as compared to college education level

compared to controls ($p < 0.05$ in both cases). Increased risk of upper aerodigestive cancers with earlier age of starting smoking was not found to be statistically significant. Smoking of beedis was found to increase the risk more than smoking cigarettes. However the increased risk was significant for both beedis and cigarette smoking as shown in Table 4.

Quid Chewing

Risk of upper aerodigestive cancers was

found to increase as a result of quid chewing. The odds ratio for chewers as compared to non chewers was 3.71 for both sexes, 3.50 for males and 5.0 for females. The odds ratio increased with rise in amount of quid chewing as can be seen from Table 5.

Alcohol Intake

Drinkers were found to be at greater risk of developing cancer of upper aerodigestive tract in males ($OR = 3.31$, $X^2 = 7.84$, $p < 0.01$),

TABLE 3
Comparison of cases and controls for amount of smoking

Number smoked	Cases		Controls		Relative risk	p
	No	%	No	%		
Non smoker	16	14.04	36	31.58	1.00	---
0 - 9	8	7.02	14	12.28	1.29	> 0.05
10 - 19	28	24.56	22	19.30	2.86	> 0.05
20 - 29	40	35.09	34	29.82	2.65	> 0.05
30 - 39	12	10.53	6	5.26	4.50	< 0.05
> 40	10	8.77	2	1.75	11.25	< 0.05
Total	114	100.00	114	100.00		

TABLE 4
Comparison of cases and controls in terms of type of smoking

Type of smoking	Cases		Controls		Odds ratio	p
	No	%	No	%		
Non smoker	16	14.04	36	31.58	1.00	---
Beedi	28	24.56	16	14.04	3.94	< 0.01
Cigarette	70	61.40	62	54.39	2.54	< 0.01
Total	114	100.00	114	100.00		

Odds Ratio relative to non smokers

TABLE 5
Comparison of cases and control in terms of quid chewing habit

Quid Chewing Quids/day	Cases		Controls		Odds ratio	p
	No	%	No	%		
Non chewer	84	73.68	104	91.23	1.00	
< 10	14	12.28	6	5.26	3.03	< 0.05
≥ 10	16	14.04	4	3.51	4.95	< 0.05
Total	114	100.00	114	100.00		

Odds Ratio relative to non chewers

TABLE 6
Comparison of cases and control for amount of alcohol intake

Alcohol intake (ml/wk)	Cases		Control		Relative risk	p
	No	%	No	%		
Non drinker	26	22.81	42	36.84	1.00	---
28 - 112	28	24.56	32	28.07	1.41	> 0.05
140 - 252	24	21.05	28	24.56	1.38	> 0.05
280 - 390	20	17.54	8	7.02	4.04	< 0.05
>420	16	14.04	4	3.51	6.46	< 0.05
Total	114	100.00	114	100.00		

females (OR = 1.67, $X^2 = 0.50$, $p > 0.05$), as well as both sexes combined (OR = 1.97, $X^2 = 5.36$, $p < 0.05$). However the proportion of drinkers among female cases was not significantly more than drinkers among female controls. Risk of developing cancer was found to increase with rise in alcohol intake. The increase in risk was marked for alcohol intake more than 280 ml per week. A significantly larger proportion of cases consumed 280-390 ml per week or more than 420 ml. of alcohol per week as compared to controls ($p < 0.05$ in both cases) as shown in Table 6. The age of starting drinking was not significantly different for cases as compared to controls ($p > 0.05$ in each case).

Discussion

In the present study the majority of cases were in the age group 40-49 years followed by those between 50-59 years of age. This is about a decade younger than that reported by most other studies both from India [7,8] and abroad [4,9]. This difference in age distribution may be as a result of the differences of characteristics of the population studied. Cancers of the upper aerodigestive tract are commoner in men. Male preponderance has been reported by a number of researchers [4,10] as has been found in this study. In this study the difference between cases and controls in terms of marital status was not statistically significant. However Silla et al [4] and Elmwood et al [11] have reported increased risk among the unmarried and widowed.

In this study, cases had a significantly greater proportion of illiterates and those with primary education as compared to controls. Level of education is strongly associated with other factors such as socioeconomic status and occupation and consequently, perhaps, few studies have reported independent association of educational status with carcinomas of the upper aerodigestive tract. Silla et al have reported that in Northern Italy controls were significantly better educated than cases of upper aerodigestive cancers [4]. Similar results have been reported from Germany by Maier et al [9].

The proportion of smokers among cases, in this study, was significantly greater than among controls for both sexes together and for males. The risk of suffering from cancer of the upper aerodigestive tract increased with rise in number of cigarettes smoked per day. Increased risk among smokers has also been reported by Adelhardt et al from Denmark [12] and Maier et al from Germany [13]. Beedi smokers were at a greater risk than cigarette smokers in this study. This is similar to the findings of Sankarnarayan *et al* who have reported greater risk for bidi smokers than cigarette smokers for cancer of the buccal and labial mucosa [14], esophagus [15], and larynx [16]. Quid chewers were found to be at greater risk of upper aerodigestive cancers than non chewers in this study. This was true for males as well as females. Increase in risk with increase in number of quids per day was also demonstrated. Quid chewing has long

been held responsible for the high incidence of upper aerodigestive cancer in India. Similar findings have been reported by Sankarnarayan et al [14] and Jayant et al [17]. Significant association between quid chewing and oral and pharyngeal cancer has also been reported by Shanta [10], and Jussawalla [18].

In this study alcohol drinkers were found to be at a greater risk for upper aerodigestive cancer than non drinkers. Dose response relation between alcohol intake and upper aerodigestive cancer was also demonstrated. Similar findings have been reported by a number of researchers such as Elmwood et al in Canada [11] and Maier et al from Germany [13].

This is a preliminary hospital based study from the Armed Forces and indicates a pattern of epidemiological data on upper aerodigestive cancers. Detail epidemiological studies with better case control are needed to delineate true nature of the problem.

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