Biological Forum – An International Journal **15(3): 309-312(2023)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Sociodemographic Determinants as Risk Factors for Head and Neck Cancer in Indian Patients of Rural Area

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(Received: 10 January 2023; Revised: 12 February 2023; Accepted: 20 February 2023; Published: 22 March 2023)
(Published by Research Trend)

ABSTRACT: The current clinical study was carried out to find out the association between sociodemographic factors and the risk of developing head and neck cancer in Indian patients of rural area. This study was conducted on 150 participants, divided in two groups as case cohorts and their control cohorts. Sociodemographic variables and tobacco consumption were recorded as study parameters. Statistical analysis was performed to assess association of sociodemographic variables with head and neck cancer. Incidence of head and neck cancer was found to be less in participants with higher education or higher income group as compared to participants with lower education or lower income group. Our findings confirm that some of sociodemographic determinants were associated with the risk of head and neck cancer.

Keywords: clinical, sociodemographic, Indian, cancer, head and neck.

INTRODUCTION

Cancers of the lip and oral cavity are prevalent in South Central Asia (e.g., India, Sri Lanka, and Pakistan) as well as Melanesia (Papua New Guinea, with the highest incidence rate worldwide in both sexes). In 2020, Lip and oral cancer is the second largest cancer with 135 929 new cases (10.3% of all cancers) while third largest cancer-causing mortality with 75 290 deaths in India. In males, lip and oral cancer is a highest prevalent cancer with 1,04,661 new cases (16.2% of all cancers). It is one of the leading causes for cancer death in India among men (Sung *et al.*, 2021; GLOBOCAN 2012).

Head and neck cancers (HNCs) are the second most common cancers in the Indian population (Hashibe *et al*., 2000). In India, HNC has distinct demographic profile, risks factors, family and personal history. Habits of smoking and chewing tobacco are the well-known risk factors for HNC (Iype *et al*, 2001; Balaram *et al*., 2002; Thomas *et al*., 2003). In India, cancers of the tongue and buccal mucosa have been noted to be quite common, due to the local custom of chewing pan, betel leaf with tobacco (Dar *et al*., 2013). Studies showed that smoking and socioeconomic status significantly affects the occurrence of head and neck cancer, but strong relation between any specific risk factor as etiology of head and neck cancer is yet to be proved (Johnson *et al*., 2010; Weizman *et al*., 2021). There are variations in geographical and regional incidences of cancer, therefore there is need for studies in different regions of the world to find risk factors having an important role in carcinogenesis. The aim of this study was to investigate the association between the head and neck cancer and sociodemographic factors in Indian patients of rural area.

MATERIAL AND METHODS

The current study was conducted at Kailash Cancer Hospital & Research Centre, Muni Seva Ashram, Goraj, Vadodara, Gujarat, India. The Head & Neck oncology Department of this hospital treats patients from both rural and urban areas from all around the country. This study was approved by the Institutional Ethical Committee of Kailash Cancer Hospital & Research Centre. Study was conducted on 150 participants, out of which 75 patients of the head and neck cancer were enrolled as case cohorts and 75 participants without disease (mainly patient's relatives) as control cohorts. All study participants were informed for the purpose of the study and study details. Informed consent was taken before their participation in the study. HNC patients and their matched control having age 18 years or above were enrolled for this study. Those who had cancer previously, or who had any other cancer, were excluded. Participants matched by similarity in lifestyle and exposure patterns with patients were selected as control cohorts. All the control cohorts were examined thoroughly to rule out cancer through clinical examination. Structured questionnaire was used to record information from both case controls and their control cohorts. Study information included personal and socioeconomic

information and tobacco consumption status. Questions that were easy to recall were used. A trained interviewer was available for assistance in recording study information. Marital status was recorded as currently married, divorced, widowed or single. Education status was recorded as less than high school, post high school, some college or college graduate. Tobacco consumption status of participants was recorded as current consumer, ex-consumer or non-consumer. Monthly income of participants was recorded as income in Indian rupees.

Results were analyzed statistically using Graph pad prism 9.0.0. We calculated adjusted and unadjusted odd ratio (OR) and 95% confidence intervals (CI) for HNC risk using multiple logistic regression. The Hosmer–Lemeshow test was used for goodness of fit.

RESULTS

The current study was conducted from May 2019 to September 2020. Table 1 gives the sociodemographic details of the two groups. Results showed that greater number of males were having HNC (80%) as compared to females and the most of the patients were in age group of 31-50 years age. Most of the participants in case cohort were diagnosed with HNC in 1-3 months prior to recruitment in the study. Inverse association was observed between years of education and odds of HNC.

Table 1: Sociodemographic Variables in Cases and Control Groups.

Variables	Cases (n = 75)	Controls (n = 75)
Age		
18-30 Y	7 (9.3)	23 (30.7)
31-50 Y	40 (53.4)	34 (45.3)
51-60 Y	17 (22.7)	13 (17.3)
>60 Y	11 (14.7)	5 (6.7)
BMI		
Underweight	28 (37.3)	18 (24)
Normal	39 (52)	48 (64)
Overweight	8 (10.7)	8 (10.7)
Obese	0 (0)	1 (1.3)
Duration since diagnosis (Months)		
< 1 month	NA	7 (9.3)
1-3 months	NA	58 (77.4)
> 3 Months	NA	10 (13.3)
Academic status		
High school or less	67 (89.3)	55 (73.3)
Post high school	4 (5.3)	8 (10.7)
Some college	1 (1.3)	4 (5.3)
College Graduate	3 (4)	8 (10.7)
Marital status		
Currently married	71 (94.7)	62 (73.3)
Divorced	0 (0)	0 (0)
Widowed	1 (1.3)	0 (0)
Single	3 (4)	13 (10.7)
Monthly income		
< 5000	33 (44)	30 (40)
5000-10000	34 (45.3)	38 (50.7)
10000-20000	8 (10.7)	7 (9.3)
> 20000	0 (0)	0 (0)

*Data are Expressed as Number (%)

Participants with less than a high school education having nearly three times the crude odds of HNC, compared to college graduates (Table 2, OR 3.19 (0.88–15.09)), while adjusted odds of HNC were found to be two times. Of the 75 patients in the case cohort, 71 patients (94.7 %) were married. Distinct differences in income were noted between control and case groups. Income was also inversely associated with odds of HNC. Participants with income less than INR 5,000/month were having nearly three times the adjusted odds of HNC, compared to those having income INR 10,000 to 20,000/month (Table 2).

Table 2. Association between Social Determinants and Risk of Head and Neck Cancer.

Variables	Crude OR (95% CI)	Model 1 OR*(95% CI)	Model 2 OR† (95% CI)
Academic status:			
College Graduate	Ref	Ref	Ref
High school or less	0.31 (0.07 to 1.14)	0.42 (0.09 to 1.57)	0.42 (0.07 to 1.99)
Post high school	0.66 (0.01 to 4.01)	0.75 (0.10 to 4.99)	1.23 (0.12 to 12.18)
Some college	1.50 (0.13 to 35.88)	1.83 (0.15 to 45.85)	1.26 (0.06 to 51.50)
Nagelkerke's R^2	0.053	0.139	0.471
Monthly income:			
10000-20000	Ref	Ref	Ref
< 5000	1.04 (0.33 to 3.30)	0.87 (0.24 to 3.15)	0.32 (0.05 to 1.68)
5000-10000	1.28 (0.42 to 4.00)	1.73 (0.53 to 5.80)	1.99 (0.47 to 9.42)
Nagelkerke's R^2	0.004	0.128	0.507

*Adjusted for age and sex; †Adjusted for age, sex, and tobacco consumption.

Table 3. Association between risk factors and risk of head and neck cancer.

Variables	Crude OR (95% CI)	Model 1 OR*(95% CI)	Model 2 OR† (95% CI)
Tobacco consumer			
Never	Ref	Ref	Ref
Current consumer	0.16 (0.06 to 0.39)	0.13 (0.04 to 0.38)	0.08 (0.02 to 0.29)
Ex-consumer	0.05 (0.02 to 0.13)	0.04 (0.01 to 0.11)	0.02 (0.00 to 0.07)
Nagelkerke's R^2	0.389	0.455	0.52

*Adjusted for age and sex; †Adjusted for age, sex, academic status, and monthly income.

Table 3 describes the impact of tobacco consumption on HNC risk. A higher proportion of cases than controls reported ever having tobacco consumption. Risk was significantly elevated for current and ex- tobacco consumers in comparison to non-consumers as indicated by crude and adjusted odd ratios (Table 3).

DISCUSSION

Cancer is a malignant disease and one of the leading causes of death worldwide. Approximately 70% of death from cancer occur in low and middle countries. Etiology of cancers is still not clear, thus various studies were conducted by researchers worldwide to find possible cause of cancers. In the current study, we observed an association between sociodemographic factors and the risk of HNC in the selected group of participants from rural area.

Oropharyngeal and oral cancers are about twice as common in males as compared to females. Our data also showed that majority of patients with HNC were males. Weizman *et al*. (2021) reported the mean age of 64 years for the patients diagnosed with HNC, while in our study we found that majority of patients were having age less than 60 years (Inverso *et al*. 2015). In a study Inverso *et al*. (2015) reported that married patients are less likely to present with metastatic disease (Hsiao *et al*., 2020). In our study, we found that a greater number of married patients were having HNC as compared to other groups. Reason for this outcome may be the increased stress level associated with handling of family responsibility in low income. Previous studies indicated the association between lower level of education and HNC (Conway *et al*., 2008; Conway *et al*. (2015). However, Conway *et al*., (2008); Conway *et al*. (2015) mentioned about the association between better education and an increased risk of oral cancer. They observed increased risk of oral cancer with low monthly income in developed compared as compared to undeveloped countries (Stanford-Moore *et al.,* 2018). Stanford-Moore *et al.* (2018) found that low education status and less income significantly increased the risk of HNC (Gregory *et al*., 1993). We also found similar results. Majority of patients were having education status as High school or less and low income. Income and education are important parameters for prediction of socioeconomic status of patients. We found that low income and less education, that indicates low socioeconomic status of patients, are associated with increased risk of HNC. Tobacco consumption is a well-known risk factor for HNC. Our results indicated that tobacco consumption had a significant contribution on the occurrence of HNC. Stanford-Moore *et al.* (2018) reported that current smoking was more strongly associated with HNC. In 90% cases, HNCs occur in people who smoke tobacco alone or with alcohol (Maasland *et al*., 2014; Lyon 1998; Pöschl *et al.,*2004; Kamangar *et al*., 2006: Dhull *et al*., 2016). Other studies showed that increase in duration of tobacco consumption increases the risk of developing HNCs. The average risk for developing HNCs for male and female smokers, is ten and five times higher respectively as compared to lifetime non-smokers (Maasland *et al*., 2014). In similarity to this, our data indicates that greater number of male participants, who were ex-tobacco consumers, were having HNC as compared to non-smokers.

CONCLUSIONS

Our results indicate significant association between sociodemographic factors and occurrence of HNC. It is concluded that tobacco consumption, low income and lower education level are significant risk factors for head and neck cancers.

FUTURE SCOPE

Current study included HNC patients of rural area to assess impact of sociodemographic factors on the occurrence of HNC, in future, further studies may be conducted to find out role of sociodemographic factors as one of the etiological factors in patients of urban area.

Acknowledgement. We are thankful to the management of Kailash Cancer Hospital & Research Centre, Muni Seva Ashram, Goraj, Vadodara, Gujarat, India, for allowing us to use their facilities to conduct this study.
Conflict of Interest. None.

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How to cite this article: Kaushal P. Jani, Rajesh Kantharia, Shehnaz Kantharia, Deepti K. Jani and Sunita Goswami (2023). Sociodemographic Determinants as Risk Factors for Head and Neck Cancer in Indian Patients of Rural Area. *Biological Forum – An International Journal, 15*(3): 309-312.