10.5005/jp-journals-10024-1956

ORIGINAL RESEARCH

A Case–control Study for the Assessment of Correlation of Denture-related Sores and Oral Cancer Risk

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ABSTRACT

Introduction: Oral cancer is one of the most common cancers in the world. Although multifactorial, the exact pathogenesis of oral cancer is still unclear. Apart from tobacco chewing and smoking, chronic long-term irritation by ill-fitting denture is also said to be an important risk factor for the development of oral cancer. Literature quotes some amount of evidence that correlates long-term denture irritation as a risk factor for the development of oral cancer. Hence, we analyzed the correlation of denture-related sores as a risk factor for the development of oral cancer.

Materials and methods: The present case–control study included 140 newly diagnosed oral cancer cases and 140 patients as the control healthy group. One-hour questionnaire was framed and was conducted to the control group and the study group by 10 experienced interviewers who were trained for such type of analysis. Assessment of the patients' socio-economic status, cigarette smoking habit, alcohol drinking habit, and oral health status was done and compared on the two study groups. Logistic regression models along with multivariate models were used for the assessment of the results.

Results: In the control group and the cancer patient group, total of 140 new cancer cases and 140 subjects were included. Out of 140 patients in the cancer group, 16 were nonsmokers, while 110 smoked cigarette in the cancer patient group. As far as alcohol consumption is concerned, 42 patients in the control group and 102 patients in the oral cancer group were chronic heavy drinkers. Fried food intake was high in both the groups. Significant correlation was obtained while comparing the heavy smokers, heavy alcohol consumers, and oral health status in both the study groups.

Conclusion: Our results favor the hypothesis that positive correlation exists between oral cancer risk and recurrent denture sores.

Clinical significance: People wearing denture prosthesis should be periodically visualized for identification of any mucosal alteration or changes at the earliest.

Keywords: Denture, Oral cancer, Risk.

How to cite this article: Jain P, Jain M, Prasad BV, Kakatkar GS, Patel M, Khan J. A Case–control Study for the Assessment of Correlation of Denture-related Sores and Oral Cancer Risk. J Contemp Dent Pract 2016;17(11):930-933.

Source of support: Nil

Conflict of interest: None

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INTRODUCTION

Over 12 million new cancer cases have been detected till 2008, which resulted in more than 7.5 million deaths worldwide.[1] It has been hypothesized that more than 25 million cases of cancers would be detected by 2030.[2] In the list of the top ten cancers, the most common is oral cancer. Although not clear, the pathogenesis of oral cancer is said to be multifactorial and comprises of numerous risk factors.[3,4] Edentulism refers to the complete loss of all natural teeth. Apart from tobacco chewing and smoking, chronic long-term irritation by ill-fitting denture is also said to be an important risk factor for the development of oral cancer.[5-7] As hypothesized earlier, the presence of chronic physical irritation in the oral cavity predisposes to a higher risk for development and increase in severity of oral cancer.[4,8] Literature quotes some amount of evidence that correlates long-term denture irritation as a risk factor

for the development of oral cancer.[9] Hence, we analyzed the correlation of denture-related sores as a risk factor for the development of oral cancer.

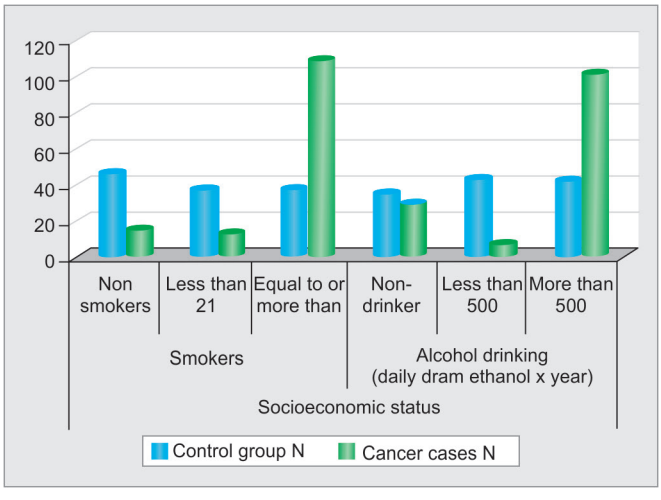
MATERIALS AND METHODS

The present case–control study was conducted in three major hospitals of the city and included all the patients who were diagnosed as affected by oral cancer from 2010 to 2014. A total of 140 newly diagnosed oral cancer cases were included in the present study where patients developed oral carcinoma at the anatomic site associated with significantly higher chances of development of sores due to ill-fitting dentures. Most of the patients had oral cancer developing at hard palate region and on the lateral border of the tongue. A total of 140 patients were included in the control healthy group with comparable demographic details without any evidence of oral malignancy and without a history of taking tobacco or any other similar agent. One-hour questionnaire was framed and was conducted to the control group and the study group by 10 experienced interviewers who were trained for such type of analysis. Interview of the patients and the controls was done in isolation in separate rooms. Institutional ethical clearance was taken after explaining the entire research protocol to the committee, and written consent was obtained for every patient enrolled in the present study. Information regarding the demographic, behavioral, socioeconomic status, and habitual history was obtained by means of questionnaires. Toporcov et al[10] criteria of socioeconomic and dietary evaluation were used in the present study for the assessment of dietary habits. Nonsmokers group included all the patients that gave negative history of smoking a minimum of one cigarette in the past 1 year.

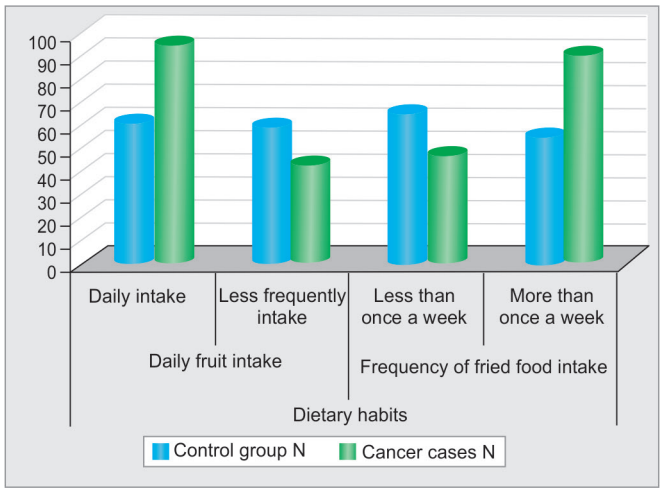
Research criteria standardized in the recent past were used for the assessment of tobacco habits, frequency, and dosage in the patients.[11] For the assessment of cumulative effect of tobacco, pack of cigarette was taken as standard, with one pack containing 20 odd cigarettes which were further multiplied by the number of years; the patient smoked or gave history of smoking. Based on this analysis, patients were broadly categorized into smokers and nonsmokers; smokers were further divided into two types depending on the tobacco intake history. Similar pattern was used for classifying the patient into drinker or nondrinker. Patient giving a negative history of minimum of one or more drinks from the past 1 year on a regular basis was put under the category of nondrinker. Previous standardized criteria were used for further evaluation of drinkers.[12] Denture wearers and nonwearers were classified based on the duration of denture-wearing history. Those patients who had not worn the dentures for more than 6 months in the recent past were classified under nonwearers. Assessment of the denture sores was done based on self-report and history given by the subjects. All the results were analyzed by Statistical Package for the Social Sciences (SPSS) software. Logistic regression models along with multivariate models were used for the assessment of the results. Odd ratios were estimated, and p-value less than 0.05 was considered to be significant.

RESULTS

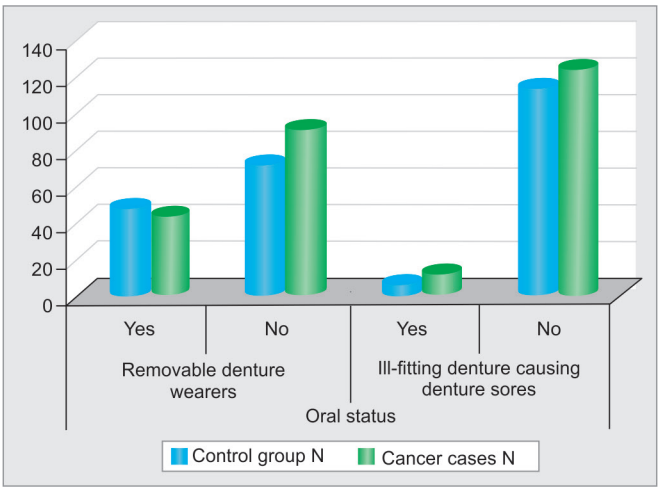
Graph 1 highlights the socioeconomic status of patients in the study group. A total of 140 new cancer cases and 140 control subjects were included. Out of 140 patients in the cancer group, 16 were nonsmokers, while 110 smoked cigarette in the cancer patient group. As far as alcohol consumption is concerned, 42 patients in the control group and 102 patients in the oral cancer group were chronic heavy drinkers. Graph 2 highlights the dietary habits of patients in the study group. Most of the patients in the control group and in the cancer patient group took fruits



Graph 1: Socioeconomic status of the patients in the two study groups



Graph 2: Dietary habits of the patients in the two study groups



Graph 3: Oral health status of the patients in the two study groups

Table 1: p-value for the patients in between the two study groups for various clinical parameters

Parameters			*p-value*
Socioeconomic status	Smokers	Nonsmokers	0.325
		Less than 21	0.252
		Equal to or more than 21	0.002*
	Alcohol drinking (daily dram ethanol × year)	Nondrinker	0.411
		Less than 500	0.632
		More than 500	0.040*
Dietary habits	Daily fruit intake		0.030*
	Frequency of fried food intake		0.010*
Oral status	Removable denture wearers		0.230
	Ill-fitting denture causing denture sores		0.042*

*Significant

more frequently. In both the groups, fried food consumption was high, the frequency being more than once a week. Oral health status of the patients is highlighted in Graph 3. In the control group and in the cancer patient group, 6 and 14 patients respectively, showed the presence of denture sore in relation to ill-fitting dentures. Table 1 shows the p value for various parameters in between the control group and the cancer patient group. Significant correlation was obtained while comparing the heavy smokers and heavy alcohol consumers in between the two study groups (p-value < 0.05). Regarding the oral health status, significant correlation was obtained while comparing the number of patients developing denture sores in relation to ill-fitting dentures.

DISCUSSION

In the third decade of life, dental education and health specialists stress on maintenance of oral health especially during this phase of life as during this age, oral mucosa is subjected to maximum stresses and alterations from various external and internal factors. In developing countries, a significant population of elderly persons are either denture wearers or require rehabilitation by full mouth dentures.[13] Denture wearers may be subjected to acute or chronic lesions as a part of reactionary process to bacterial plaque which adheres to the artificial prosthesis, the removable denture. Traumatic ulcerations and allergic reactions form the spectrum of acute infections, while *Candida*-induced denture infections come under chronic inflammatory processes. Although restoring the functional ability and esthetics, complete removable of dentures subjects the oral mucosa to the risk of development of oral cancer.[14] Hence, we analyzed the correlation of denture-related sores as a risk factor for the development of oral cancer.

In the present study, we observed that when consideration is given to the behavioral exposures, a positive association is seen between the denture-related sores and the risk of oral cancer. Our results are in correlation with the previous studies of Vaccarezza et al,[15] Piemonte et al,[4] and Velly et al.[8,] Socioeconomic status of the individuals is known to have some kind of effect on the health of the body. Significant difference was observed between the control group and cancer group when heavy smoking and heavy alcohol intake were taken into consideration (Graph 1). Correlation of dietary pattern is also a subject of long-term research. Whereas on the one hand, intake of fried food denotes fat-rich diet, on the other hand, antioxidant and fiber-rich diet is fulfilled by higher intake of fruits. Significant difference was obtained while comparing the dietary habits between the two study groups (Graph 2). Similar results have been reported by previous studies.[16] A significant difference was observed while comparing the multivariate models for the assessment of association between recurrent denture sores and the risk of oral cancer (Graph 3, Table 1). Our results were in correlation with the results of Rotundo et al who also observed a positive correlation between the denture sores and oral cancer risk. Rotundo et al evaluated the correlation of denture-related sores with the risk of development of oral cancer. They evaluated 71 new patients with oral cancer in a hospital-based control in two hospitals in Brazil and more than 200 healthy controls. without any evidence of oral cancer. They included only those cases that were associated with oral cancer of sites. with increased risk of development of denture-related sores. By analyzing the data, they observed significant correlation between ill-fitting dentures and oral squamous cell carcinoma. From the results, they concluded that controversy still exists regarding the association of oral cancer and denture-related sores, which require future researches for better exploration of results.[16] Vaccarezza et al evaluated the correlation of denture-related sores and development of oral cancer

in tobacco users. They included 124 oral cancer patients in their hospital-based analysis and 124 normal control individuals without any trace of oral malignancy. They observed an odds ratio of 1.40 and concluded that some amount of correlation exists between denture-related sores and oral cancer in tobacco users. They advocated the previous hypothesis that in smokers, some amount of topical carcinogenic effect is contributed by chronic physical irritational process in the oral cavity.[15]

Velly et al assessed the correlation of various dental health parameters and the risk of development of cancer of upper aerodigestive tract in a population of Brazil. They analyzed more than 700 cases of patients with cancer of upper aerodigestive tract and observed some amount of association between ill-fitting dentures and cancers of upper aerodigestive tract. From the results, they concluded that various risk factors are associated with the development of oral cancer including poor oral hygiene and denture sores due to ill-fitting dentures.[8] Rosenquist evaluated four-fifth of consecutive cases in Sweden who were diagnosed with oral cancer. From the results, they concluded that a significant correlation exists between the development of oral cancer and various risk factors, such as alcohol consumption, cigarette smoking, and ill-fitting dentures.[17] Manoharan et al conducted a meta-analysis to assess the correlation between the development of oral cancer and ill-fitting dentures. They conducted a systemic search on the various databases including PubMed, Medline, and Cochrane to look for various research projects in relation to this topic. They observed that a significant association exists between ill-fitting dentures and the development of oral cancer. However, they did not observe any correlation between the development of oral cancer and the duration of wearing of denture. From the results, they concluded that ill-fitting dentures represent a significant risk factor for oral cancer development.[18]

CONCLUSION

From the above observations, the authors concluded that still significant amount of controversy exists regarding the association of recurrent denture sores and oral cancer risk. However, our results favor previous studies, which favor the hypothesis that a positive correlation exists between oral cancer risk and recurrent denture sores. Therefore, proper and periodic monitoring of the artificial prosthesis should be done so that even any minor mucosal alteration can be identified at the earliest and treated.

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