Relationship between Oral Poor Hygiene and Broken Teeth with Oral Tongue Squamous Cell Carcinoma

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Abstract- Previous studies on etiology of squamous cell carcinoma (SCC) of the tongue have reported results with respect to long term exposure to cigarette smoking and alcohol abuse. The aim of this study was to investigate risk factors for SCC of the tongue in a set of patients with minimum exposure to cigarette smoking and alcohol. Sixty four cases with diagnosis of oral tongue SCC were reviewed in this study. The patients underwent surgical management at the educational and therapeutic centers, Imam and Buali Hospitals (Hamedan, Iran) between the dates of January 1990 and December 2006. Eighty five percent of patients were older than 40 years of age. Most of patients had poor oral hygiene, dental decay and halitosis. It appears that poor oral hygiene and nutritional deficiency can be considered as risk factors for the SCC of the tongue in west of Iran.

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Introduction

Cancer of the tongue has been regarded as a disease that usually affects men between the sixth to eighth decades of life following long term exposure to cigarette smoking and alcohol abuse (1). Among the different sites within the oral cavity, carcinoma of the tongue is the most common (2,3). Case-control studies have consistently shown that patients with oral cancer have history of diets low in fruit and vegetables (4). Oncogenic human papilloma viruses (HPV) also, have been well established as a etiologic factor for these tumors, although these tumors are more common in younger patients (5,6). An alarming rise in the incidence of oral cancer among younger adults has been reported in Europe and in the USA (7,8). Among the molecular mechanisms involved in carcinogenesis, defects in the regulation of programmed cell death (apoptosis) may contribute to the pathogenesis and progression of cancer. Dysregulation of oncogenes and tumor suppressor genes involved in apoptosis has been associated with tumor development and progression (9).

The most important prognostic factor of survival in oral tongue squamous cell carcinoma (SCC) is the presence of cervical metastasis (10).

Although, most studies have concentrated on smoking and alcohol consumption as the major risk factors, new investigations have focused on oral hygiene and diet. Exposure to important public health risks (11), nutrition deficiency and oral health status, such as poor dentition, trauma due to ill-fitted dentures, either partially or totally, sharp or broken teeth, and frequency of poor oral hygiene have been suspected to be associated with oral tongue cancer (12).

Periodontal infection that always is accompanying patients with poor oral hygiene, may affect the host's susceptibility to systemic disease in three distinct pathways: by shared risk factors, by formation of subgingival biofilms acting as reservoirs of gram-negative bacteria, and through the periodentium acting as a reservoir of inflammatory mediators (13).

In this study, we investigated patients who mostly did not have exposure to alcohol and tobacco, but very often had poor oral hygiene and surprisingly broken and sharp teeth. Another interesting etiologic factor that we would liked to evaluate in our patients was pickle (made by vinegar) consumption, that is consumed by Iranian people (particularly in Hamedan province, west Iran).

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Material and Methods

In this study we reviewed all cases of oral tongue SCC who were seen at a private clinic and then referred to either Imam Hospital or Buali Hospital (Hamedan, Iran) for surgical operation between the dates of January 1990 and December 2006. Three patients, whose medical records were incomplete, were excluded. We gathered total 64 histologically confirmed oral tongue SCC cases, of these, 31were men and 33 women.

Patients were analyzed for clinical characteristics including:

1- Demographic variables such as age, sex, occupation and literacy (ability to read and write).
2- Tobacco consumption: We recorded if the subject was a smoker or not. None of the patients had used chewing tobacco as this habit is not common in the west of Iran and especially in Hamedan. However, we recorded individuals who used "Hookah" for tobacco smoking. Hookah is an apparatus that is made of a wooden central tube and a head in the form of a cup for keeping tobacco and fire. A big bottle full of water is kept on the other end of central tube, and the user can smoke from this bottle through another tube. The effects of exposure to tobacco smoke in home setting (environmental) was not determined.
3- Alcohol consumption: Alcohol consumption was only recorded as yes or no.
4- Dental decay, recorded as yes or no.
5- Broken and sharp teeth recorded as yes or no.
6- Dentures, divided to 1- none, 2- partial, 3- complete.
7- Oral hygiene described as good or bad.
8- Diet, there was not any documented observation about the quality of diet, but the aim of this question was to draw attention to pickles (treated with strong vinegar), because, this appetizer is used widely by people in this region.
9- Finally, we applied statistical methods and analyzed all data by SPSS software version 13.

Results

The total number of cases with SCC of the Oral tongue referred to our clinic from January 1990 till December 2006 was 64, among whom 33 (51.5%) were female and 31 (48.5%) were male.

We also examined the available records of all patients with oral tongue SCC. 45 patients (70.3%) lived in urban areas and 28 (43.8%) were illiterate.

Table 1. Risk habits among patients with oral tongue SCC

	Female *n* (%) N=33	**Male *n* (%) N=31**	**Total *n* (%) N=64**
Cigarette: (P<0.001)			
Yes	2 (6.1)	15 (48.4)	17 (26.6)
No	31 (93.9)	16 (51.6)	47 (73.4)
Hookah: (P=0.12)			
Yes	8 (24.2)	3 (9.7)	11 (17.2)
No	25 (75.8)	28 (90.3)	53 (82.8)
Alcohol consumption: (P<0.004)			
Yes	0	7 (22.6)	7 (10.9)
No	33 (100)	24 (77.4)	57 (89.1)
Never smoke-never drink: (P<0.001)			
Yes	23 (69.7)	13 (41.9)	36 (56.3)
No	10 (30.3)	18 (58.1)	28 (43.7)
Pickle: (P=0.027)			
Yes	29 (78.9%)	20 (64.5%)	49 (76.6%)
No	4 (12.1%)	11 (35.5%)	15 (23.4%)

The mean age of patients was 55.1 years old (SD 13.9, range 22-77) and females were younger than males (50.33 ± 15.17 and 60.13 ± 10.47 respectively) (P < 0.004). Eighty five percent of the patients were older than 40 years of age at the time of diagnosis. More than half of the men and nearly all of the women were not cigarette smokers, it means that cigarette smoking was much more common in male than female (P<0.001); meanwhile, none of the patients were betel quid or marijuana user; however, 11 (17.2%) used Hookah.

Table 2. Oral and tooth care among patients with oral tongue SCC

	Female *n* (%) N=33	**Male *n* (%) N=31**	**Total *n* (%) N=64**
Poor Oral hygiene: (P=0.66)			
Yes	9 (27.3)	7 (22.6)	16 (25)
No	24 (72.7)	24 (77.4)	48 (75)
Dentures: (P =0.88)			
Yes	8 (24.2)	8 (25.8)	16 (25)
No	25 (75.8)	23 (74.2)	48 (75)
Broken Tooth (A): (P=0.84)			
Yes	25 (75.8)	24 (77.4)	49 (76.6)
No	8 (24.2)	7 (22.6)	15 (23.4)
Dental Decay (B): (P=0.28)			
Yes	21 (63.6)	24 (77.4)	45 (70.3)
No	12 (36.4)	7 (22.6)	19 (29.7)
A or B : (P =0.60)			
Yes	26 (78.8)	26 (83.9)	52 (81.3)
No	7 (21.2)	5 (16.1)	12 (18.8)

Considering all kinds of tobacco consumption, 56.3% of all patients were none smoker/none drinker. All women and three fourth of men were non-alcohol consumer; around 77% of the patients had pickle with their meals, females had pickles more than male (P=0.027) (Table 1). Interestingly, around 81% of the patients had decay or broken tooth (Table 2). Of the total of 12 patients without dental decay or dental carry, 8 (66.7%) had denture.

Discussion

This study was conducted on the registered cases with documented oral tongue SCC in the resident population of Hamedan, Iran. Although, tobacco and alcohol consumption is significantly associated with increased risk of oral cancer in other countries, our results show that in our population it has minimum effect on genesis of oral tongue carcinoma. We demonstrated that broken teeth and poor oral hygiene act as important risk factors for oral tongue cancer in our patient population. Despite the well known carcinogenic effect of alcohol and tobacco, a recent evidence points to an absence of these risk factors in a significant proportion of younger patients, especially amongst females (14,15).

In our study, there was no exposure to either tobacco or alcohol in female group, except 2 who was cigarette smoker. However, in the male group 15 patients smoked cigarette and 7 consumed alcohol. None of our patients consumed chewing tobacco, but hookah was used by 11 cases.

Schantz *et al*. hypothesized the development of this cancer in youth may be related to genetic predisposition to environmental carcinogenesis, reflected by chromosomal abnormalities, increased susceptibility to mutagen-induced chromosome damage, or impaired DNA repair. This aspect remains however subject to debate (1).

Head and neck cancer disproportionately affects those with the lowest incomes and the least education (11,12), also, significant relationship between oral hygiene and the risk of oral tongue cancer has been documented (16).

Within our patients, nutritional problems, such as low intake of fresh fruit and vegetables were common.

Toothbrush was an important item. Most of dossier of our cases did not include any record about this item but at least in the new patients' files, it was seen that most of them were not using toothbrush, nor visited dentist. This is important form two points of view: a: It is not clear whether or not patients would trust the dental care provided in this region, b: We do not know if there is any difference between those visited by dentist and those who did not. We did not have complete data but most of them had poor oral hygiene. In addition, a high percentage of patients had suffered from dental decay, and interestingly they were diagnosed with halitosis. Previous studies reported oral sores have a greater risk of malignant transformation when Candida infection was present (12).

Although, an earlier study reported no correlation between broken teeth and oral tongue cancer (12), our findings were consistent with the presence of broken teeth in the majority of our cases. The position of the broken teeth was not recorded in our study. Our cases may have broken teeth in specific positions that cause more tissue trauma. In addition, all our cases had tumor at the lateral aspect of the oral tongue and especially in the form of ulcer which is often considered as a common form of presentation for the tongue SCC (17).

Our results are consistent with the hypothesis that chronic physical irritation of the tongue's squamous epithelium by a broken tooth or an inappropriately fitted denture may promote dysplasia and carcinogenesis, and this is independently of other risk factors (12).

Recently, an association between dental erosion and gasteroesophageal reflux disease (GERD) has been demonstrated (18). One interesting finding of this study is the suspicion of GERD in our population, and this can be attributed to high consumption of pickle by the population of this region. It is interesting that in our sample, pickle consumption, on a regular basis, was as common as 79% in the female group. We speculate that pickle may cause irritation of the epithelium and dental erosion and therefore can potentially be a carcinogen due to chronic irritation of the epithelium.

Dentist visits and patient's occupation were not verified, because, our data was incomplete.

The results of this investigation have several important implications. Firstly, there is the need for continued dentist visit and care for dental and oral hygiene status of these patients which commonly have lower education levels. Secondly, emphasize on the benefits of a diet rich in fresh fruit and vegetables. Thirdly, moderation in pickle consumption. Excessive pickle consumption may lower the pH of the oral cavity and increase dental erosions. Interestingly, in our female group, there was no exposure to any of the major risk factors such as alcohol and smoking; therefore, this finding warrants further investigation into other risk factors such as genetic predisposition or viral infections and sexual practices (10).

Finally, the role of otolaryngologists for oral screening and finding oral cancers are valuable and should not be forgotten (19). In conclusion, in the west of Iran, instead of classic risk factors, poor oral hygiene and nutritional deficiency should be considered as potential risk factors for the SCC of oral tongue.

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