Analysis of Prevalence of Oral Squamous Cell Carcinoma in Patients with History of Chronic Irritation of Oral Tissues - A Retrospective Study

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Abstract

Oral squamous cell carcinoma (OSCC) accounts for more than 90% of the reported oral cancer cases in the world. Even though the habits such as tobacco usage, smoking and old age are the main risk factors for developing oral squamous cell carcinoma some factors like chronic mucosal irritation(CMI) from mechanical and functional factors also play a significant role in the etiology of oral squamous cell carcinoma. The aim of this study was to analyse the prevalence of oral squamous cell carcinoma with history of chronic mucosal irritation and to evaluate various parameters like gender, age, site of the lesion and etiology of chronic trauma in OSCC cases with chronic mucosal irritation history. This retrospective study included a sample size of n= 78 (73 = OSCC with other etiology, 5= OSCC with etiology of chronic mucosal irritation). Data regarding the sample cases were selected after the review and analysis of records of about 86000 patients who visited our institution between june 2019 and march 2020. The retrieved data were tabulated in MS Excel and exported to SPSS for statistical analysis. Prevalence of oral squamous cell carcinoma cases with chronic mucosal irritation history was 6.41% for a duration of 8 months. Etiology associated with chronic mucosal irritation was found to be tooth related factors in all the sample cases. 80% of the oral squamous cell carcinoma cases associated with chronic mucosal irritation history were males and 20% were females and 80% of the OSCC samples with CMI were above 40 years of age. In 60% of OSCC with CMI history were found to be on buccal mucosa followed by tongue and gingivobuccal sulcus. The present study provides an overview and explains the need of considering chronic mucosal irritation as an etiological factor for the development of OSCC without the association of tobacco habit.

Key Words:*Prevalence; OSCC;chronic mucosal irritation; chronic mechanical irritation;dental factors; prosthetic factors.*

Introduction

Oral cancer is one of the most serious health problems and accounts for 2-4%of all cancer types in the world [1,2]. More than 95% of the oral cancer cases reported are oral squamous cell carcinoma (OSCC)[2]. OSCC is the 12th most common cancer in the world and for the past decades there has been a steady increase in oral cancer mortality rates of around 320,000 deaths in the world annually [3,4]. Annual prevalence of oral squamous cell carcinoma is 300,000 cases[1,5,6].

In India also the prevalence of oral cancer is high and accounts for 45% of all of the cancer cases reported in India[1,7,8]. The major etiological factors related to OSCC risk are tobacco usage, advanced age, smoking and alcohol consumption but several other factors like chronic irritation of oral mucosa from mechanical and functional factors will also play a significant role in

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etiology of OSCC [9,10,11]. Mechanical factors can be tooth related and prosthesis related with tooth related factors being sharp tooth, broken tooth and improperly positioned tooth [12,13]. In a study by Fabiana Vargus Ferreirial et al stated that almost 15% to 20% oral cancer occurs without any traditional risk factors association. Traditional risk factors include tobacco usage, smoking and alcohol consumption. Eduardo David Piemonte et al found a statistically significant association between chronic mucosal irritation and oral cancer with p value of 0.0001[14]. An australian study also assessed the gender predilection among oral cancer patients without traditional etiology stated 61% of the study population were females and in which about 30% showed some dental abnormalities in the proximity of the oral cancer lesion [15,16]. Multivariate analysis conducted in a Swedish and Brazilian study also showed the defective complete denture can be a significant risk factor for OSCC development [17,18]. Some of the past studies have also correlated the association of OSCC with CMI with the site of the lesion[19].

The aim of the present study is to analyse prevalence of OSCC with history of chronic mucosal irritation reported during 2019-2020 and to evaluate various parameters like gender, age, site of the lesion and etiology of chronic trauma in OSCC cases with chronic mucosal irritation history. This study will help to evaluate the need of the early diagnosis and treatment of CMI and to conduct institutional level interventions to improve the awareness regarding chronic mucosal irritation and its role as an etiological factor for the development of OSCC.

Materials and Methods

The present study was conducted with approval from Scientific review board, Saveetha dental college and hospitals, chennai. The ethical approval number for the present study was SDC/SIHEC/2020/DIASDATA/0619-0320. This retrospective study included n=78 samples out of which 6.41% of OSCC cases were associated with chronic mucosal irritation (Figure 1). Data regarding the sample cases were selected after the review and analysis of records of about 86000 patients who visited our institution between June 2019 and March 2020. All the retrieved case sheets were verified by an external reviewer in order to reduce errors in data recording.

Histopathologically confirmed cases of OSCC with history of CMI and proper clinical details were included in the present study. The cases with non specific histopathological diagnosis and improperly recorded case sheets were eliminated from the present study. Cross verification of retrieved data was done by photographs and by direct communication.

The data collected from n=78 were tabulated according to age, gender, history of chronic mucosal irritation, and the site of the lesion in MS excel software. This tabulated data then transported to IBM SPSS-Statistics 23 software and frequency analysis were done for age range, gender, history of chronic mucosal irritation, site of the lesion and diagnosis. Chi-square test was done to assess the correlation between variables and the results obtained after analysis were statistically represented as tables and bar graphs.

Result and Discussion

In the present study the prevalence of OSCC cases with chronic mucosal history for a period of 8 months was found to be 6.4% (Table 1). The etiology of chronic mucosal irritation was found to be tooth related in all the samples (Figure 2). Demographic data analysis stated that 80% of the sample population were males and 20% were females (Figure 3). Among OSCC patients with CMI history 80% of the population were found to be above 40 years of age (Figure 4) and the most prevalent lesion site was found to be buccal mucosa in 60% of the samples followed by tongue and gingivobuccal sulcus (Table 2). The association between gender and site of the lesion in OSCC cases with chronic mucosal irritation history was not found to be statistically significant with p value of 0.082 (Table 3 and Figure 4).

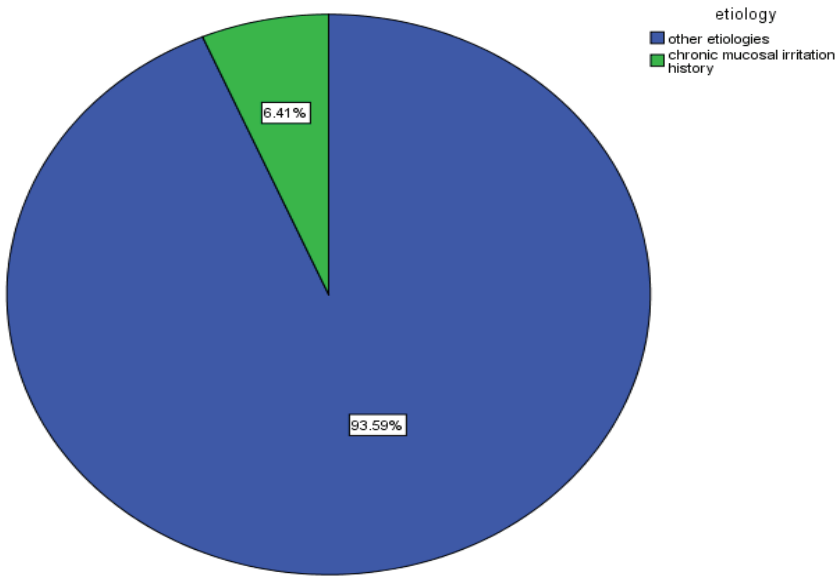

Figure 1- Pie Graph showing the overall distribution of study samples. Total samples selected= 78, and out of which the percentage of OSCC cases with the history of chronic mucosal irritation(CMI) was 6.41% and represented in green colour. OSCC cases with etiologies other than CMI was 93.59% and represented in blue colour.

Table 1 showing the prevalence of OSCC cases with CMI history during 8 months

OSCC cases reported during JUN 2019- March 2020	78
No of OSCC cases reported with chronic Irritation of oral tissues during JUN 2019- March 2020	5
Prevalence of OSCC with the etiology of chronic Irritation of oral tissues during JUN 2019- March 2020	6.41%

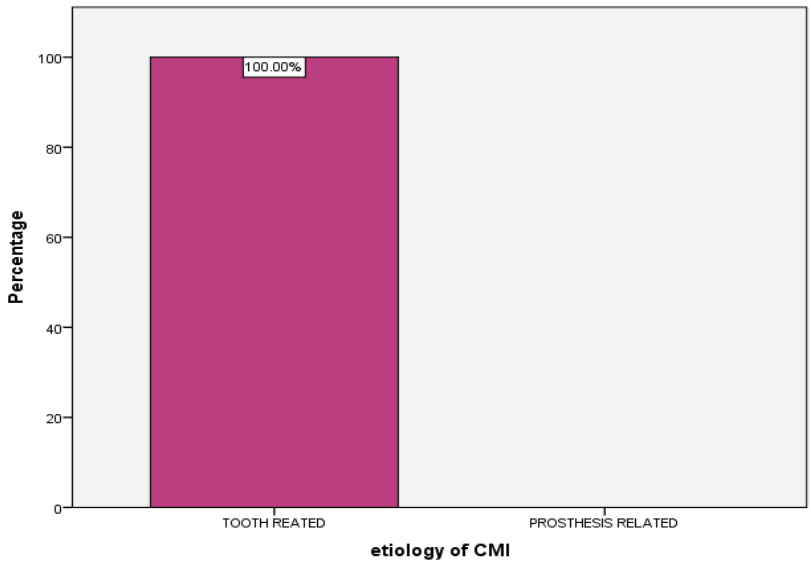

Figure 2- Bar Graph 1 showing the percentage of distribution of etiological factors of CMI in OSCC cases. X axis representing the etiology of CMI and Y axis showing the percentage. Tooth related factors are the major reason for the chronic irritation in OSCC with CMI history.

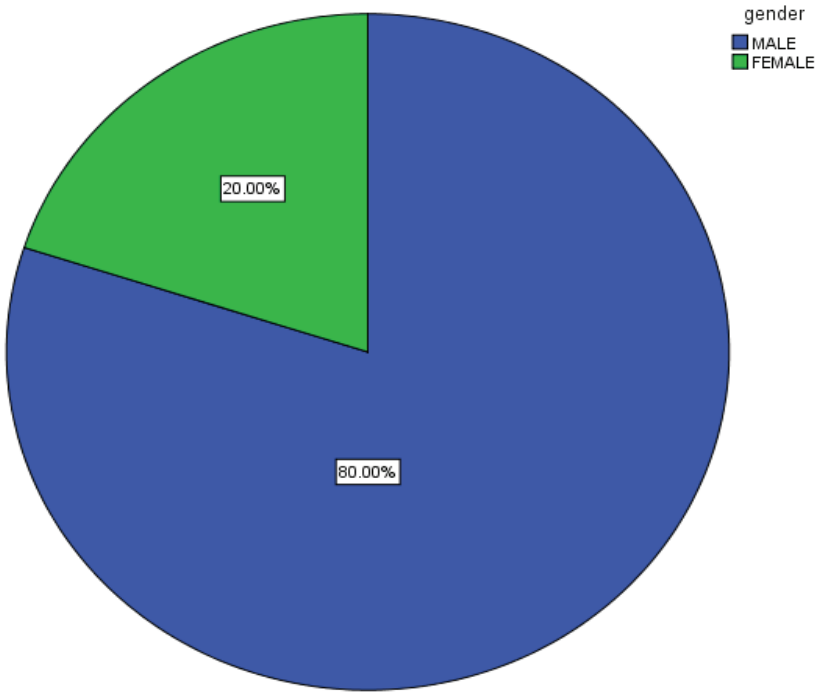

Figure 3- Pie Graph 2 showing the percentage of Gender distribution among OSCC cases with CMI history. Blue color represents Male and Green color represents Female. The male are more commonly affected by OSCC with CMI history.

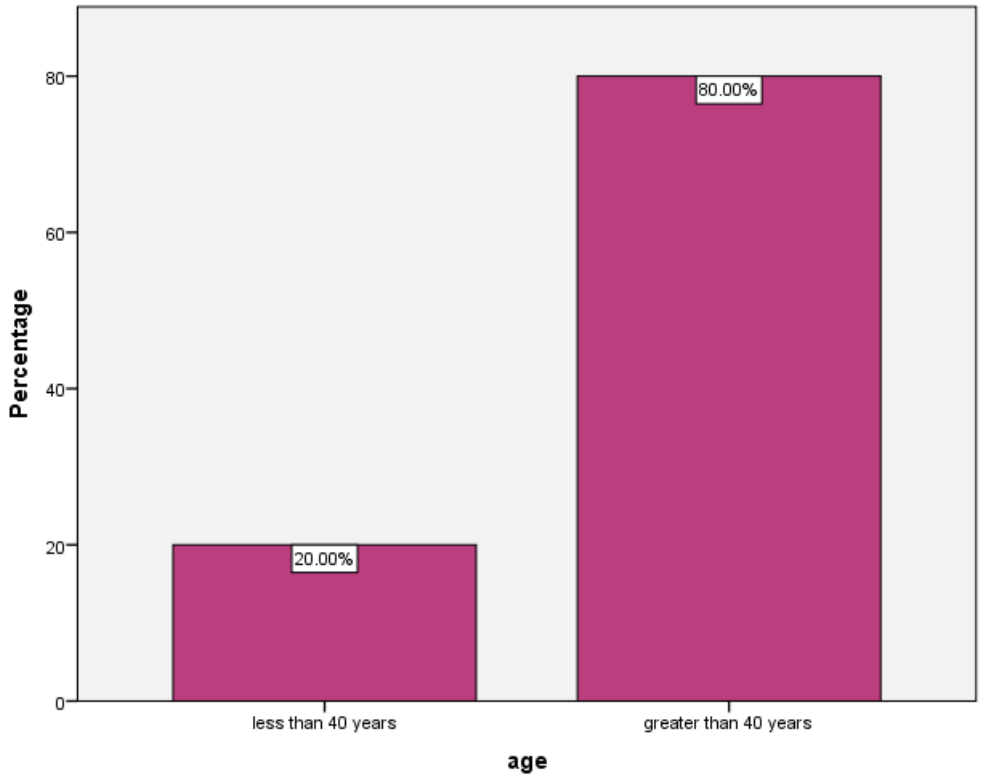

Figure 4- Bar Graph 2 depicting the percentage of distribution of OSCC cases with CMI history according to age. X axis showing the Age groups(<40 years and >40 years) and Y axis showing the percentage. The OSCC with CMI history is more commonly observed in patients above 40 years of age.

Table 2: Distribution of site of lesion among OSCC cases with CMI history. Most common site for OSCC with CMI is Buccal mucosa.

Site of the lesion	Frequency	Percent
Tongue	1	20%
Buccal mucosa	3	60%
Gingivobuccal sulcus	1	20%
Total	5	100%

Parameters compared	Statistical test	P value
Gender and Site of the lesion	Chi-square test	0.082

Table 3: The association between gender and site of the lesion among the cases of OSCC with chronic mucosal irritation history. *p value >0.05: statistically not significant. No significant association observed between the gender and site of lesion among OSCC with CMI history.

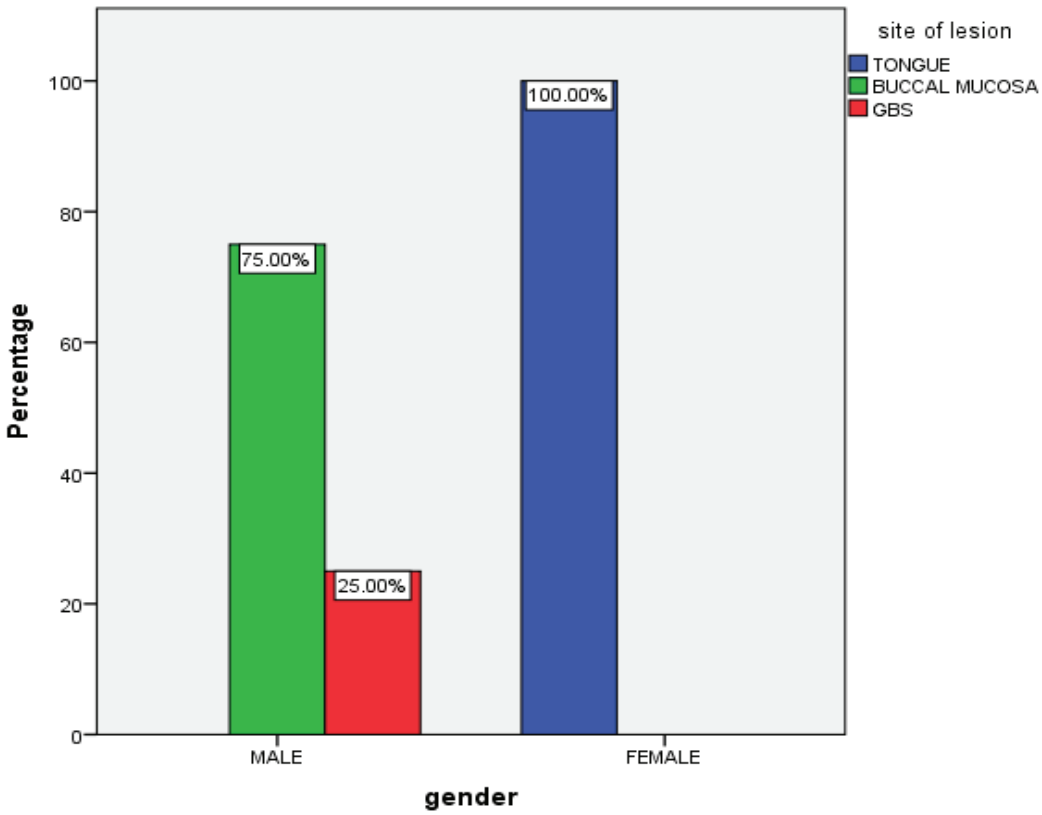

Figure 4- Bar graph depicting the association between gender and site of the lesion among the cases of OSCC with chronic mucosal irritation history. X axis depicting gender and Y axis showing percentage. Tongue is represented as blue, Buccal mucosa as green and Gingivobuccal sulcus(GBS) as red colour. Tongue is the most common site in females whereas it is buccal mucosa in males. No significant association observed between the gender and site of lesion among OSCC with CMI history (Pearson Chi-square test- P value=0.082).

Oral squamous cell carcinoma is a major health problem worldwide, especially in the developing countries[20]. Oral squamous cell carcinoma is one of the common epithelial malignancies of multifactorial etiology and with significant morbidity and mortality[21]. The significance of chronic mucosal irritation in developing malignant transformation and finally progressing into oral cancer is comparatively less studied when compared to other aetiology is like tobacco usage and alcohol consumption[22]. Some experimental animal studies suggested the mechanism of transformation of chronic mucosal irritation to malignancy[23]. They proposed that persistent mechanical irritation can cause DNA damage, which will progress into various degrees of dysplasia and finally may result in malignant transformation and this was stated by increased activity of only ADP ribose polymerase in chronic trauma cases [24-25]. Chronic mucosal trauma results in inflammation, and can release chemical mediators such as cytokine, prostaglandins, and tumor necrosis factor. The inflammation induced oxidative stress can cause genetic and epigenetic changes damaging DNA, inhibiting its repair, altering transcription factors, preventing apoptosis, and stimulating angiogenesis, thus resulting in carcinogenesis. In a nutshell, inflammation may act at different steps and result in cancer formation [26–28].

The period prevalence of oral squamous cell carcinoma cases with a history of chronic mucosal irritation for eight months visiting our institution was found to be 6.4%. This value is significant when comparing time duration. Similar results were obtained for the study conducted by Piemonte et al in 2018. He stated there exists a significant statistical association between chronic mucosal irritation and oral cancer both in cross-sectional and in case control studies [29]. Manoharan et al in 2014 and Singhvi et al in 2017 also found a significant statistical association between oral cancer and chronic mucosal irritation in relation to wearing defective prosthesis [23,30].

On analysis of etiology of chronic mucosal irritation, all the samples showed a tooth related etiology. But none of the samples showed prosthesis related etiology. This observation can be correlated with the study by Jeronimo P Lazos et al in 2017, in which he found that dental factors were the common etiological factors causing chronic mucosal irritation followed by prosthetic factors [31]. However in another study by Velly A.M. in 1998 and by Rosenquist K et al in 2005 stated that the ill fitting denture was the most common cause for Oral squamous cell carcinoma with chronic mucosal irritation history followed by sharp tooth [17,19]. Even though tooth related factors and prosthesis related factors are the major reason for chronic trauma to oral mucosa, the present study couldnt establish any relation between chronic trauma and prosthesis related factors. This could be possibly due to the small sample size and small duration of sample collection in the present study.

The gender distribution analysis of OSCC with chronic mucosal irritation history showed 80% of the samples were males and only 20% of the samples were females. Jeronimo P lazos et al in 2017 stated that the males are more affected than females in oral cancer associated with chronic mucosal irritation etiology when compared to chronic traumatic ulcer and benign irritative mechanical lesion[31]. This was in concordance with the present study, but the selection of samples, determination of adequate sample size and the duration of sample collection should be increased to get more statistically significant results.

On analysing age distribution of oral squamous cell carcinoma cases with chronic mucosal irritation history, it was found that 80% of the samples were above 40 years of age. This was also in concordance with the study by Jeronimo P Lazos et al in 2017. The possible explanation for this could be the increased incidence of teeth attrition, dental caries, fractured tooth and prosthesis usage among elderly population.

In the present study buccal mucosa was the most commonly affected lesion site among OSCC cases with history of CMI when compared to tongue and gingivobuccal sulcus. This was in contrast to the result of studies by Velly A.M in 1998 and Jeronimo. P. Lazos et al in 2017. Through their studies they both stated that tongue was the most affected site in OSCC cases with a history of chronic mucosal irritation, and they linked it with Odds ratio of 9.1 [32]. The present study results vary from the above mentioned studies and this variation could be due to the limited sample size and short duration of sample collection.

The present study couldn't find any statistically significant relation between gender and site of lesion

in OSCC cases with history of CMI. This has to be evaluated with a larger sample size and duration for more confirmatory results.

Chronic mucosal irritation is the less identified and most ignored factor in oral squamous cell carcinoma. Further research on the current topic may provide the precise understanding regarding the significance of chronic mucosal irritation in oral cancer development. Institutional level interventions like awareness programs addressing the importance of CMI as an oral cancer etiological factor can be conducted to improve the knowledge among the public, so that it will promote the early diagnosis and treatment of chronic mucosal irritation without progressing to aggressive outcomes like oral squamous cell carcinoma.

Small sample size, Geographic limitations of sampling and small duration of data collection were the major limitations of the present study.

Conclusion

In conclusion the prevalence of oral squamous cell carcinoma with chronic mucosal irritation history was found to be 6.41 % and it was significant when considering the duration for which prevalence was calculated. In the present study, the etiology of CMI was due to tooth related factors, buccal mucosa was the predominant site of lesion and OSCC with CMI was found to be more common in patients above 40 years of age. More extensive research on the current topic may provide precise understanding about the need of considering chronic mucosal irritation as an etiological factor for OSCC, without the association of tobacco and also the importance of its early diagnosis and treatment.

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