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Correlation of Site of Occurrence of Oral Squamous Cell Carcinoma and Level of Lymph Node Metastasis

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ABSTRACT

Introduction: Oral squamous cell carcinoma (OSCC) is the most common malignant tumor of the oral cavity, associated with poor prognosis. Risk factors associated are tobacco, alcohol, pan chewing, nutritional deficiency, etc. Metastasis is more commonly to cervical lymph nodes various studies have been done to study the pattern of metastasis, which helps surgeons predict the pattern and treatment planning.

Objective: To evaluate the correlation between the site of occurrence of lesion and Levels of lymph node involvement in (OSCC) patients.

Methods: This is a retrospective study conducted in an institution, a totally of 34 patients who were diagnosed with oral squamous cell carcinoma were included. Demographic data was collected from the management software and tabulated in a Microsoft Excel sheet and used for statistical analysis. Association between the site of lesion and Level of lymph node involvement is studied using the Chi-square test.

Results: Well-differentiated squamous cell carcinoma (WDSCC) was more common than moderately differentiated squamous cell carcinoma (MDSCC). The more common site of lesion with lymph node involvement is tongue and buccal mucosa than the retromolar region and gingivobuccal sulcus, 60% of lesions in buccal mucosa show involvement in Level-1B and 2 followed by the tongue (45.5%) more in Level-5. The correlation between the site of lesion and Level of nodal involvement did not show statistical significance.

Conclusion: This study provides a predictive model that appears to be reliable, simple, and may help as a guide for surgeons in planning neck dissections before surgery.

Key Words: Oral squamous cell carcinoma, OSCC, Cancerization, Lymph node, Predictive model, Metastasis

INTRODUCTION

Oral squamous cell carcinoma (OSCC) is the most common type of tumor in the oral cavity. OSCC is frequently associated with poor prognosis.[1,2] Many factors have been reported for the cause of OSCC are nutritional deficiency, habit history like tobacco, pan, gutka, and virus also play a role in cancer like human papillomaviruses (HPV).[3,4] It is known that molecular alterations, microenvironment changes are seen.[5,6] The premalignant lesions with malignant transformation show stromal alterations important for tumor progression[7] Lesions like leukoplakia and oral epithelial dysplasia are reported with malignant transformation.[6,8,9,10] Even with numerous recent advances in OSCC, it is still a challenge. The complex balance of the oral cavity also plays an important role, like saliva can be used as a diagnostic tool.[11] With various other diagnostic methods still in some regions, the prevalence of oral cancer is higher around 45% in India and 10% in Pakistan.[12] Multiple primary tumors in the head and neck region show more recurrence even after complete excision, where the concept of field cancerization was explained.[13,14]

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Even when the tumors are small (T1 & T2) OSCC causes a high risk of cervical lymph node metastasis.[2] Developing histological prediction models– the probability of developing metastasis helps guide effective treatment plans.[15]

The latest reports from the international agency for research on cancer (IARC) with ICD-10 (code COO-06; lip) oral cavity in 2018 reports show incidence around the world is 3,54,864 and in India reported cases are 1,19,992. Prevalence of 9,13,574 cases reported around the world in which India shows 72,616 cases. Various site of occurrence is reported with more common subtype seen in the tongue which shows varied prognosis.[16] This appropriate treatment of cervical lymph nodes is essential for locoregional control of disease.[2] Various studies have revealed that elective neck dissection is more beneficial than the "wait & see" in terms of survival rate. Elective surgery reduces the relapse rate and increases disease-free survival.[17]

A single radiological modality cannot be used to confirm cervical lymph node metastasis.[18] Cervical lymph node metastasis is the most significant independent prognostic factor, as it reduces the rate of survival by 50%.[19] Since studies have demonstrated the neck node (N) Category; number, size and location of positive lymph nodes; and presence of extracapsular spread increases the risk of distant metastasis.[2,20,21]

Despite the significant advances in modern technologies, still, OSCC shows a poor prognosis. The development of a model with clinical and histological parameters helps in the prediction of the nodal status of OSCC patients. The purpose of this study is to evaluate the Level- node metastasis pattern with the Level- of nodal involvement which is correlated with the site of occurrence of OSCC.

MATERIALS AND METHODS

This retrospective study was done among clinically and pathologically confirmed oral squamous cell carcinoma patients from the department of oral and maxillofacial pathology, Saveetha dental college & hospital, Chennai, from July 2019 to February 2020. The study was approved by the scientific review board of the institution. The ethical approval was given by the institution, SDC/SIHEC/2020/DIASDATA/0619-0320. 86,000 patient data were reviewed and 34 clinically and histopathologically confirmed cases were included in the study. Data including variables like age, gender, habits, site of occurrence, pathological diagnosis, and Level- of lymph node involvement were collected. The inclusion criteria included pathologically diagnosed oral squamous cell carcinoma cases with and without neck involvement. Cases other than oral squamous cell carcinoma were excluded.

Statistical analysis

The total sample size was 34. Data were tabulated in Microsoft Excel sheets and then exported to SPSS. D-SPSS trial version by IBM was used for statistical analysis. The frequency tabulation, percentage mean, quantitative variables of standard deviation, and Chi-square test for correlation of variables like the site of occurrence and level of lymph node involved were done. The P-value of <0.05 was used as a reference and considered as statistically significant.

RESULTS AND DISCUSSION

In this study, a total of 34 patients diagnosed with OSCC were taken for analysis. The frequency distribution of the histopathological variants showed that 73.5% were well-differentiated squamous cell carcinoma (WDSCC) and 23.5% were moderately differentiated squamous cell carcinoma (MDSCC) and only 2.9% were verrucous carcinoma (Figure 1). The analysis of the site of the lesion showed that tongue was the most common site followed by buccal mucosa, gingivobuccal sulcus, retromolar region, and lower alveolus (Figure 2).

The Analysis Of lymph node involvement shows Level-1A was involved in 2.9% of the cases, Level-1B in 11.8%, Level-2 in 11.8%, Level-3 in 11.8%, Level-5 in 5.9%, and no involvement was seen in 55.9% of the cases (Figure 3).

The correlation between the site of lesion and Level- of nodal involvement findings did not show statistical significance with p-value=0.589 ($P>0.05$) (Figure 4). The correlation shows that the overall frequency of lymph node metastasis to Level-1A was seen only in the tongue. Level-1B was seen in buccal mucosa 5.88% and gingivo buccal sulcus 5.88%. Level-2 involvements were seen in lesions from buccal mucosa 5.88%, retromolar region 2.94%, and tongue 2.94%. Level-3 was seen in lower alveolus 2.94%, retromolar region 5.88%, and tongue 2.94%. Level-5 was only seen in tongue constituting 5.88% of the cases (Figure 4).

Demographic data collected from management software is cross verified with clinical pictures, dental photography plays an important role to record the clinical information in the oral cavity, for the purposes of dento-legal documentation, to improve the learning process and communication.[22] The majority of OSCC occurs in the tongue, buccal mucosa, and retromolar region. Other cases also reported with the site of occurrence in gingiva and alveolar mucosa.[23, 24] According to the meta-analysis of four randomized control studies, there is an increased survival rate among patients who have undergone elective neck surgery.[25] There are cases reported with failure of neck surgery, shows recurrences.[26-28]

In this present study, analysis of the site of the lesion shows more common in the tongue (32.4%) followed by buccal

mucosa (29.4%), then by retromolar region and gingivobuccal sulcus (14.7%), lower alveolus (5.8%), and neck (3%). Our study finding in concordance with Fabio Ramoa Pires et al. in 2013 in this study showed site distribution which was more common among borders of the tongue (37%), alveolar mucosa gingiva (20%), and floor of mouth (19%) are common sites.[29,30]

The current study has shown that 55.9% of the cases did not show any lymph node involvement and metastatic deposits in lymph nodes were present in 44.1% of the cases. The study findings are not in concordance with Sharma et al. study in 2018 which showed occult metastases of 8 of 52 with clinically negative nodes, neck metastases found in 17 patients, and the rest of the cases did not show any lymph node involvement.[2] Among the involved cases the most commonly involved lymph node level was Level-1B, 2, and 3.This could be due to the anatomic location and lymphatic drainage. When the site of occurrence of the lesion was associated with the Level- of lymph node metastasis, Level- 5 lymph node metastasis was found only in lesions of the tongue which constituted 5.88% of all the cases. Similarly, level-1A lymph node metastasis was found to occur only in tongue lesions which constituted 2.94% of all the cases. Similar to numerous studies reported that tongue metastasis will skip level-1, 2 usually, and jump to level- 3, 4. This metastasis is due to anatomic features, hematologic and lymphatic drainage in the neck.[26,31–33] This unpredictable pattern of invasion leads to more common distant malignant cells showing poor prognosis and recurrence of lesions with decreased survival rate among patients with oral squamous cell carcinoma of the tongue.[34,35] Bilateral nodal metastasis is also common in tongue lesions.[33] But, 17.65% of the tongue did not show any nodal involvement and this could be attributed to early diagnosis.

The buccal mucosa showed lymph node metastasis up to Level-2 and Level-1B. This is in accordance with other studies where buccal mucosa was commonly associated with Level-2 lymph node involvement.[36] It is also the most common site of occurrence which is related to habits like tobacco chewing which is the main etiology for oral squamous cell carcinoma. More recurrence has been reported with locoregional and less of distance metastasis.[37] The gingivo buccal sulcus most commonly metastasizes to Level-1B whereas the retromolar region shows lymph node involvement up to Level-3. Thus the site of occurrence of lesions can help the surgeon to plan their surgery effectively.

A study by Sriwardena et al. in 2018 confirms that the poorly differentiated tumors have a higher metastatic rate. Tumors common site of occurrence is the palate and upper alveolar ridge with higher metastasis than the other intraoral sites[15] is not in concordance with the present study where the tongue and buccal mucosa reported as the common site with metastasis due to high vascularity depending on the tumor size, depth of invasion, and crossing midline show contralateral metastasis[38,39], and location of occurrence plays important role in metastasis.[39,40] Factors affecting the results may be minimum sample size, the anatomic variation of lesion site, limited to the institution, and population with geographic limitations were considered limitations of the study.

The importance of the study is to help early treatment plan and diagnosis of OSCC and provide a nodal metastasis pattern with the site of lesion occurrence. Lymph nodes metastasis helps in the identification of tumor-host interactions and also improves methods of detecting micro-metastasis can help in further treatment planning. This study emphasizes the usefulness of the site of lesion for the correct treatment plan for elective neck dissection.

CONCLUSION

The results of the study have shown that buccal mucosa and tongue were found to be the most common site associated with lymph node metastasis in oral squamous cell carcinoma patients. The tongue was most associated with Level-5 lymph node involvement and this could be attributed to the lymphatic drainage and increased vascularity. The study has attempted to provide a predictive model that appears to be reliable, simple, and may help as a guide for surgeons in planning neck dissections before surgery. This study on lymph node metastasis helps to improve the patient's survival rate. Further studies involving a larger sample size will help to come to a more definitive conclusion.

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Conflict of Interest

The author declares there is no conflict of interest

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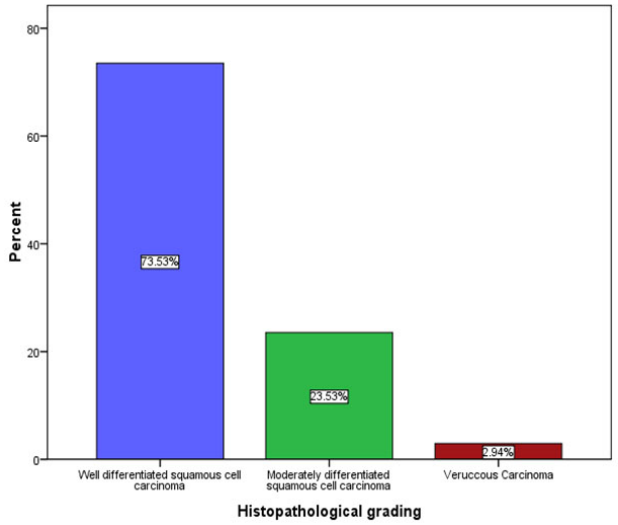

Figure 1: Bar graph depicting the frequency distribution of various histopathological grades of oral squamous cell carcinoma. X-axis represents the histopathological grade and Y-axis represents the frequency, the predominant variant is well-differentiated squamous cell carcinoma (WDSCC) comprising of (73.5%) followed by moderately differentiated squamous cell carcinoma (MDSCC) (23.5%) and metastasizes Verrucous carcinoma (VC) (2.9%).

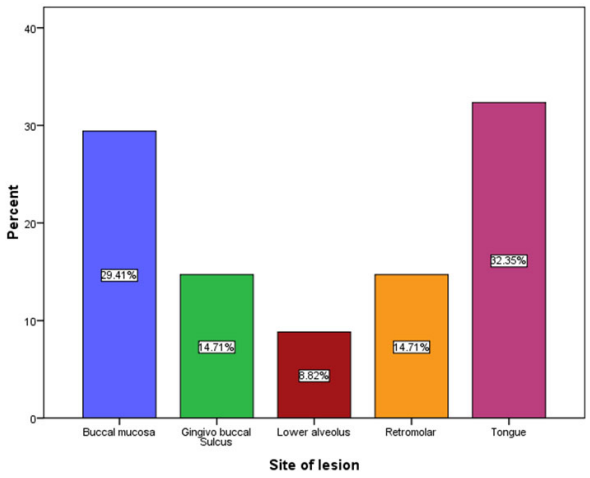

Figure 2: Bar graph depicting frequency distribution of site of occurrence of oral squamous cell carcinoma. X-axis representing the anatomic site of occurrence of oral squamous cell carcinoma and Y-axis represents the frequency of cases. The tongue is the most common site with (32.4%) followed by buccal mucosa (29.4%), retromolar region (14.7%), and gingivobuccal sulcus (14.7%).

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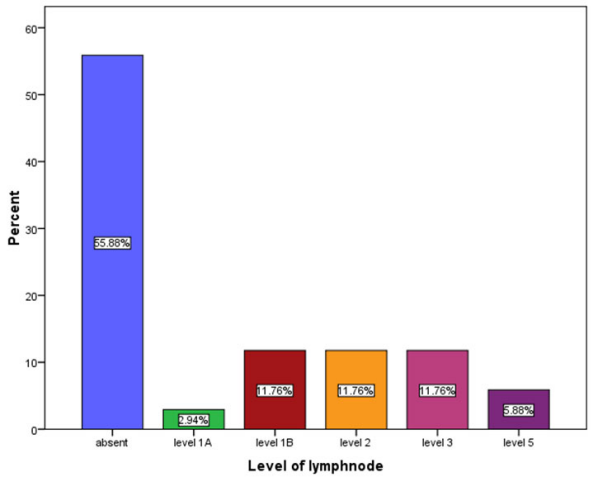

Figure 3: Bar graph depicting the frequency distribution of metastasis to various levels of cervical lymph nodes from oral squamous cell carcinoma. X-axis represents the levels of lymph nodes involved and Y-axis represents the frequency of occurrence. Most oral squamous cell carcinomas did not show any lymph node involvement (55.9%), Level-1B, 2, and 3 were involved in (11.8%) each, and Level-5 was involved in (5.9%).

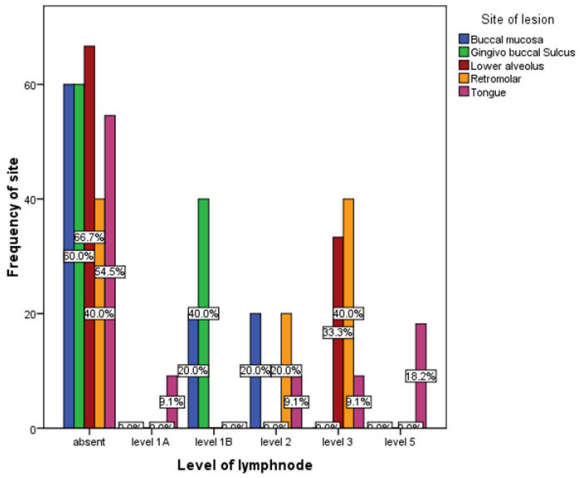

Figure 4: Bar graph representing the correlation between the site of occurrence of oral squamous cell carcinoma and the Level of lymph node involvement. X-axis depicts the Level of lymph node involvement and Y-axis depicts the frequency of site of occurrence of the lesion. Blue depicts the buccal mucosa, green depicts gingivobuccal sulcus, red depicts the lower alveolus, yellow the retromolar region, and pink the tongue. Most of the lesions were not accompanied by any lymph node involvement. Level-5 and Level-1A were most commonly involved when the primary lesion was in the tongue and Level-1B was involved when the lesion was in the buccal mucosa and gingivobuccal sulcus. Chi square analysis (Chi-square value=22.804) showed no statistical significance with P-value=0.589 (P>0.05).