Journal of Dentomaxillofacial Radiology, Pathology and Surgery

Summer 2025, Volume 14, Number 3

Research Paper: Oral Squamous Cell Carcinoma in Zahedan, Southeast Iran (2021–2023): A Cross-sectional Study

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Citation Khazaei AR, Khazaei AM, Gholami A, Risbaf S, Moravej Kh. Oral Squamous Cell Carcinoma in Zahedan, Southeast Iran (2021–2023): A Cross-sectional Study. Journal of Dentomaxillofacial Radiology, Pathology and Surgery. 2025; 14(3):33-39. http://dx.doi.org/10.32598/3dj.14.3.2

http://dx.doi.org/10.32598/3dj.14.3.2

Article info:
Received: 10 July 2025
Accepted: 12 Aug 2025
Available Online: 30 Aug 2025

Keywords:
Epidemiology, Mouth Neoplasms, Tobacco Use Cessation

ABSTRACT

Introduction: Oral squamous cell carcinoma (OSCC) is the most common malignancy of the oral cavity and a persistent public health concern. Although data exist from several regions of Iran, epidemiological evidence from the Southeast, particularly Zahedan, is scarce.

Materials and Methods: This cross-sectional study included all histopathologically confirmed OSCC cases diagnosed at the Zahedan School of Dentistry between January 2021 and December 2023 (n=63). Demographic, clinical, and behavioral information (cigarette, hookah, smokeless tobacco/snuff, and opium use) was collected from clinical records and structured interviews. Data were analyzed statistically (α=0.05).

Results: The mean age was 54.2±12.9 years (range 36–85), and 54.0% were women. Most participants (81.0%) self-identified as Baluch, reflecting the catchment population. The floor of the mouth was the most frequent site (38.1%), followed by mandibular gingiva (28.6%) and tongue (12.7%). Reported exposures included snuff (67.3%), cigarettes (54.0%), hookah (54.0%), and opium (47.6%); categories were not mutually exclusive. At presentation, 79.4% of lesions measured 3 cm or larger. Delays in seeking care beyond three months were more common among patients aged ≥50 years (P=0.012) and smokers (P=0.019). Pain as a presenting symptom was reported more often by women (P=0.020) and patients under 50 years (P=0.023).

Conclusions: In Southeast Iran, OSCC frequently presented with large lesions, floor-of-mouth predominance, and high rates of self-reported smokeless tobacco use. These findings underscore the need for early detection, culturally tailored cessation programs, and public education.

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1. Introduction

Oral squamous cell carcinoma (OSCC), which is over 90% of the oral malignancy, is continuing to be a significant global health challenge (1). It is the 11th most frequent cancer in men and the 16th in women, representing about 27,000 new cases and 5,500 deaths each year (2). Well-established risk factors include tobacco in various forms—such as betel quid, pan masala, gutka, and smokeless tobacco (SLT)—as well as cigarette smoking, alcohol, viral infections, and immunosuppression (3, 4). In many Asian regions, particularly India and Taiwan, the high prevalence of SLT use has been directly linked to increased OSCC burden (3).

Clinical presentation of OSCC is variable, ranging from leukoplakia and erythroplakia to ulcerated or exophytic masses with irregular borders (5-7). Common intraoral sites at risk include the lower lip, floor of mouth, and lateral tongue borders (3). Although histopathological confirmation through biopsy is essential for diagnosis (8), patients frequently present at advanced stages when treatment requires multimodal approaches and prognosis is poor (6, 9-11).

Although some national studies have been conducted, there is a paucity of epidemiological studies in Southeast Iran. Zahedan, the capital city of Sistan and Baluchestan Province, is a deprived area with high prevalence of SLT and opium consumption and with possible poor access to health care. It is important to describe the demography and behavioural profile of OSCC patients in this setting in order to plan for appropriate screening and preventive strategies.

This study aimed to characterize demographic, clinical and behavioral characteristics in cases of OSCC with histopathologically-confirmed diagnosis that were diagnosed between 2021 and 2023 in Zahedan, and to investigate simple associations of the variables (age, sex and reported habits) with the clinical profile.

2. Materials and Methods

This is a cross-sectional study that was conducted between 2021 and 2023. The study population was patients with OSCC referred to the Dentistry School of Zahedan, Iran. In this study, 63 patients with a confirmed OSCC who referred to Zahedan Dental School from 2021 to 2023, were investigated as a census. The inclusion criteria were all patients with histopathologically confirmed primary OSCC diagnosed between 2021 and 2023, and the exclusion criteria were non-OSCC malignancies, recurrent or previously treated OSCC, cases without his-tological confirmation, and patients with incomplete demographic or clinical data. After patients suspected of oral malignant lesions came to the Dental School of Zahedan, the clinical examinations were performed by oral medicine specialists or oral and maxillofacial surgeons. Also, a definite diagnosis was made by histological analyses at the oral and maxillo-facial pathology department of the Zahedan Dentistry School.

Once patients were diagnosed with OSCC and accepted the conditions of the research, a senior dentistry student under the supervision of oral medicine specialists collected data through clinical oral examinations and a questionnaire consisting of demographics, behavioral risk factors, involved intraoral regions and the largest dimension of the lesion, and symptoms which patients were reporting at the time of clinical examination, and duration of lesion presence in mouth since the first time, the patient was aware of its appearance.

Demographic, clinical, and behavioral information (cigarette, hookah, SLT/snuff, and opium use) were obtained from clinical records and structured interviews. Behavioral variables were recorded as yes/no. Although frequency and duration of use were not systematically assessed, all participants were asked standardized questions. Face and content validity of the questionnaire were reviewed by oral medicine specialists, and reliability was evaluated in a pilot sample (Cronbach's α=0.82).

Statistical analyses were performed using SPSS software, version 22, (IBM Corp., Armonk, NY, USA). Descriptive statistics were calculated as Mean±SD for continuous vari-ables and as frequencies and percentages for categorical variables. Associations between cate-gorical variables such as age group, gender, tobacco and snuff use, lesion site, and delay in seeking treatment were assessed using the chi-square test or Fisher's exact test when expected cell counts were small. Normality of continuous variables was checked using the Shapiro–Wilk test. All statistical tests were two-tailed, and a significance threshold of $P<0.05$ was applied. Subgroup analyses by gender and age were considered exploratory.

3. Results

Sixty-three patients with histopathologically confirmed OSCC were included. The mean age was 54.2±12.9 years (range, 36–85), and 55.6% of the participants were older than 50 years. Women comprised 54.0% of cases (n=34). A family history of oral cancer was reported

Table 1. Demographic characteristics of the patients with OSCC in Zahedan, southeast of Iran, 2021-2023

Variables		No. (%)/Mean±SD (Range)	
		Cases	Total
Gender	Male	29(46.0)	63(100)
	Female	34(54.0)	
Race	Fars	12(19.0)	63(100)
	Baluch	51(81.0)	
Family history of oral cancer	Yes	20(31.7)	63(100)
	No	43(68.3)	
Age (y)		54.24±12.9 (36-85)	

by 31.7% of patients, and 81.0% (n=51) self-identified as Baluch, reflecting the local catchment population (Table 1). The most common habit was snuff (naswar) use in 42 patients (66.7%), followed by cigarette smoking in 34(54.0%), hookah in 34(54.0%), and opium in 30(47.6%) (Figure 1).

At presentation, 34.9% of patients reported pain only, 15.9% reported pain with burning, 33.3% reported pain combined with burning and hemorrhage, and 15.9% were asymptomatic. The interval from first awareness of the lesion to seeking care was 1–3 months in 41.3% and 3–6 months in 42.9% of patients. Most lesions (52.4%) measured 3–10 cm; overall, 79.4% were >3 cm (Table 2). The most frequent primary site was the floor of the mouth (38.1%), followed by mandibular gingiva (28.6%) and tongue (12.7%). Buccal mucosa was the least common (1.6 %; Figure 2).

Table 2. Distribution of symptoms, size of the lesion, and duration of the lesion's presence among patients with OSCC in Zahedan, southeast of Iran, 2021-2023

Variables		No. (%)	
		Cases	Total
Symptoms at the time of examination	Pain	22(34.9)	63(100)
	Pain and burning sensation	10(15.9)	
	Pain, burning sensation, and hemorrhage	21(33.3)	
	Without symptoms	10(15.9)	
Duration of lesion before seeking treatment (m)	<1	7(11.1)	63(100)
	1-3	26(41.3)	
	3-6	27(42.9)	
	6-12	3(4.8)	
Size of the lesion	≤2	13(20.6)	63(100)
	3-10	33(52.4)	
	>10	17(27.0)	

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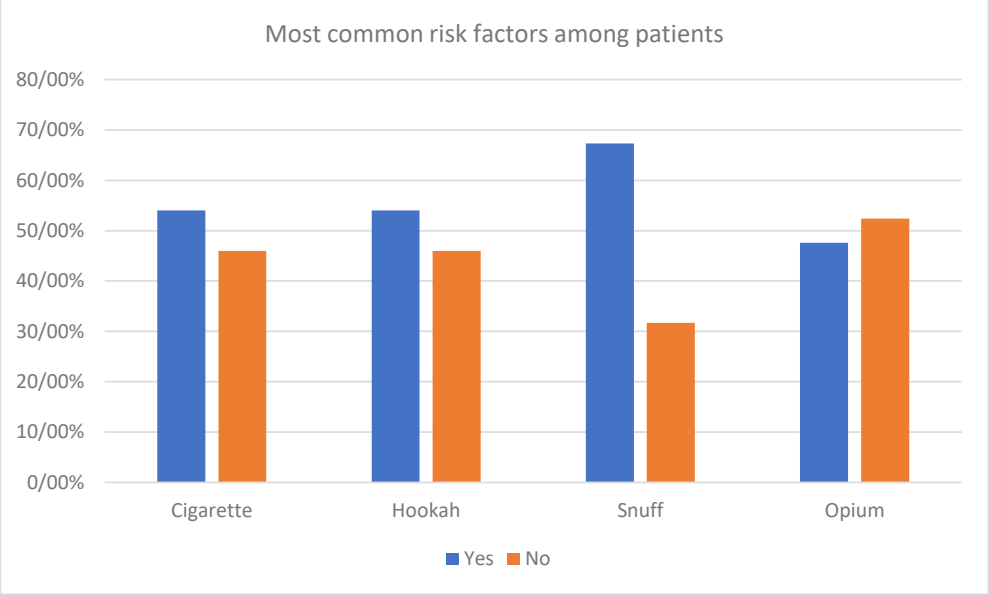

Figure 1. Distribution of some of the most common risk factors among patients with OSCC in Zahedan, southeast of Iran, 2021-2023

Longer delays in presentation (>3 months) were more common in patients aged ≥50 years compared with younger patients (57.1% vs 25.0%; P=0.012) and in smokers compared with non-smokers (55.6% vs 11.1%; P=0.019; Table 3). For instance, lesions present for 3–6 months were reported in 57.1% of older patients compared with 25.0% of younger patients, and in 55.6% of smokers compared with 11.1% of non-smokers.

Pain as a presenting symptom was more frequent in women than men (44.1% vs 24.1%; P=0.020) and in patients younger than 50 years compared with older patients (42.9% vs 28.6%; P=0.023) (Table 4). No other significant associations were observed between demographic or behavioral factors and tumor site, size, or symptoms.

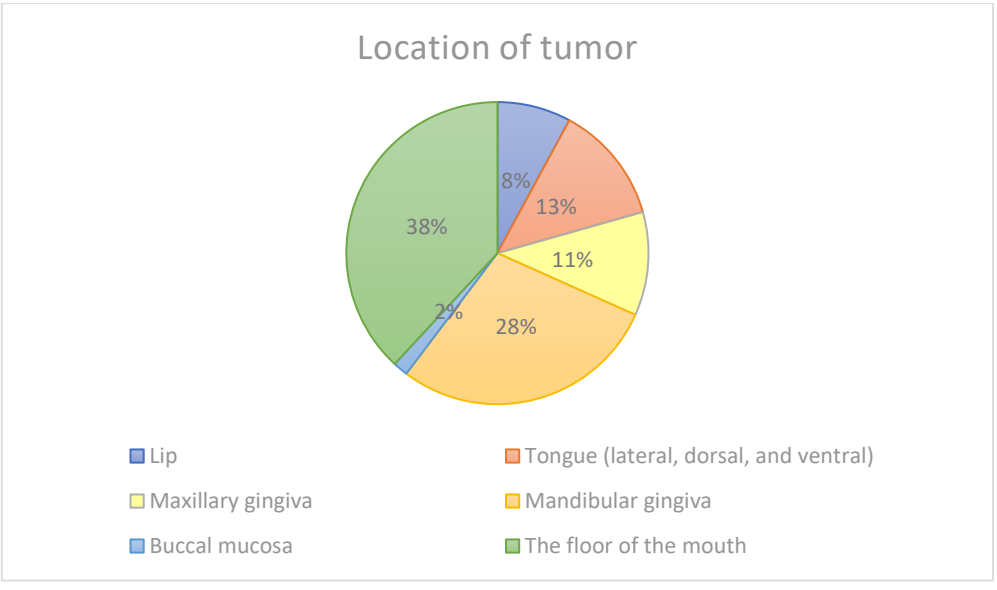

Figure 2. Distribution of intraoral location of the lesions in patients with OSCC in Zahedan, southeast of Iran, 2021-2023

Table 3. Distribution of duration of the presence of the lesion in the mouth before searching for treatment among patients with OSCC according to smoking and age in southeast of Iran

Treatment-seeking Delay (m)		No. (%)					P
		<1	1-3	3-6	6-12	Total	
Age (y)	≤50	4(14.2)	16(57.2)	7(25)	1(3.6)	28(100)	0.012
	>50	3(8.6)	10(28.5)	20(57.2)	2(5.7)	35(100)	
Smoking	Yes	2(4.5)	16(34.5)	25(56.0)	2(4.5)	45(100)	0.019
	No	5(27.8)	10(55.5)	2(11.2)	1(5.5)	18(100)	

Note: Chi-square or Fisher's exact test, as appropriate; Significance in 0.05.

4. Discussion

This cross-sectional study provides updated information on the epidemiology of OSCC in Southeast Iran. The mean age of patients was 54.2 years, which is lower than that reported in some Brazilian series (12, 13) but higher than findings from Canada (14). Women represented 54% of cases, a proportion differing from several reports where men predominated (12, 14, 15). However, studies from South Asia have also reported higher prevalence among women (16), possibly reflecting cultural practices that discourage smoking among women but allow SLT use. Such explanations should be interpreted cautiously given our descriptive design.

Snuff use was the most frequently reported risk factor (67.3%), consistent with studies demonstrating the role of SLT in oral cancer (15-18). In our series, the floor of the mouth was the most common tumor site (38.1%), aligning with some prior findings (19, 20), although other populations have reported the tongue or lip as more common locations.

Delayed presentation was frequent: 42.9% of patients, mainly older individuals and smokers, sought treatment only after 3–6 months. Such delays highlight the lack of awareness regarding early signs of OSCC and the absence of systematic screening programs in Iran. Pain as a presenting symptom was more often reported by younger patients and women, which may reflect differences in health-seeking behavior or symptom perception rather than biological variation. The predominance of Baluch patients (81.0%) in this cohort likely reflects the regional catchment population rather than ethnicity as an independent risk factor. Future analytic studies, such as case–control designs, are required to clarify potential associations.

The present findings highlight the importance of early detection and culturally sensitive risk-reduction strategies in regions with high prevalence of SLT use. For clinicians, careful inspection of high-risk sites such as the floor of the mouth and mandibular gingiva is warranted, even in relatively young patients or those presenting with non-specific symptoms such as burning sensation. Integrating routine oral cancer screening into dental vis-

Table 4. Distribution of symptoms among OSCC patients by age and smoking status.

Symptoms at the Time of Examination		No. (%)					P
		Pain	Pain and Burning Sensation	Pain, Burning Sensation, and Hemorrhage	Without Symptoms	Total	
Sex	Male	7(24.1)	9(31)	9(31)	4(13.8)	29(100)	0.020
	Female	15(44.1)	1(2.9)	12(35.3)	6(17.6)	34(100)	
Age (y)	≤50	12(42.9)	0	11(39.3)	5(17.9)	28(100)	0.023
	>50	10(28.6)	10(28.6)	10(28.6)	5(14.3)	35(100)	

Note: Chi-square or Fisher's exact test, as appropriate; Significance at 0.05.

its, combined with brief chairside counseling on naswar and other risk habits, could reduce diagnostic delays and ultimately improve prognosis.

Strengths of the present study include complete case ascertainment during the study period and pathology-confirmed diagnoses. Limitations include the single-center design, modest sample size, reliance on self-reported behaviors (subject to recall and social desirability bias), lack of detailed exposure frequency/duration, and absence of multivariable analysis.

These findings emphasize the need for public health programs promoting awareness of OSCC risk factors, particularly SLT, and the benefits of early diagnosis. Establishing oral cancer screening in dental clinics and integrating culturally tailored cessation programs into community health strategies could help reduce diagnostic delays and disease burden in Southeast Iran (10).

5. Conclusions

In this cross-sectional study from Southeast Iran, most OSCC cases presented at relatively advanced stages with large lesions and frequent involvement of the floor of the mouth. High rates of self-reported SLT use were observed, alongside substantial delays in seeking care, particularly among older patients and smokers. While causality cannot be inferred, these findings highlight the need for public awareness programs, culturally tailored tobacco cessation initiatives, and improved referral systems to facilitate earlier diagnosis and management of OSCC in underserved regions.

Ethical Considerations

This study was approved by the Ethics Committee of Zahedan University of Medical Sciences, Zahedan, Iran (Code: IR.ZAUMS.REC.1400.100).

Funding

This research was financially supported by Zahedan University of Medical Sciences, Zahedan, Iran.

Author's Contributions

Amir Reza Khazaei: Conceptualization; Supervision; Formal Analysis Amir Masoud Khazaei: Investigation, Writing–Original Draft Alireza Gholami: Resources, Data Curation Sirus Risbaf: Project Administration, Writing–Review & Editing Khashayar Moravej: Methodology, Writing–Review & Editing.

Conflict of Interest

The authors declared no conflict of interest.

Availability of Data and Material

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Acknowledgement

The authors thank Zahedan University of Medical Sciences for their approval to conduct this project.

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