Revista
ESTOMATOLÓGICA
Herediana
E-ISSN 2225-7616

ORIGINAL ARTICLE

DOI: https://doi.org/10.20453/reh.v35i4.5598

Comparative study of oral squamous cell carcinoma over three decades at a teaching dental center in Lima, Peru*

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ABSTRACT

Objective: To compare the frequency of oral squamous cell carcinoma in an oral and maxillofacial pathology laboratory at a teaching dental center of a Peruvian university across three decades (1991 -2020). **Materials and methods:** A cross-sectional, observational, descriptive, retrospective study was conducted. Age group, sex, clinical manifestations, anatomical location, and decade were analyzed. Collected data were coded to preserve patient anonymity and recorded on standardized data collection form. Statistical analysis was performed using STATA 16.0 software, applying the chi-square test and Fisher's exact test, with a 95% confidence level and $p < 0.05$. **Results:** A total of 735 records were included, the mean age was 53 years. The age group with the highest frequency was 70-79 years (n = 177). The main clinical manifestations were tumors (50.75 %) and ulcers (31.68 %). The most frequent anatomical sites were the upper and lower alveolar ridge/gingiva (35.80%) and the lateral border of the tongue (23.58%). **Conclusions:** An increase in oral squamous cell carcinoma was observed in the most recent decade (2011-2020), with a higher prevalence in females. The most frequent anatomical sites were the upper and lower alveolar ridge/gingiva and the lateral border of the tongue. The most common clinical manifestations were tumor, ulcer, and white plaque, in that order.

Keywords: squamous cell carcinoma; oral cancer; mouth neoplasms.

Received: July 15, 2024
Accepted: November 17, 2025
Online: December 30, 2025

Cite as:
Garay GD, Morón KJ, Sacsaquispe SJ. Comparative study of oral squamous cell carcinoma over three decades at a teaching dental center in Lima, Peru. Rev Estomatol Herediana. 2025; 35(4): 255-260. DOI: 10.20453/reh.v35i4.5598

* This article was based on the thesis by Gianella Dayana Garay Orihuela and Karina Julia Morón Ayala to obtain the professional degree of Dental Surgeon.

INTRODUCTION

Oral cancer ranks thirteenth among neoplasms worldwide and constitutes a public health problem, being more prevalent in men and older adults (1). In dentistry, oral squamous cell carcinoma (OSCC) is the most common tumor of the oral cavity, accounting for around 90% of cases (2,3). This neoplasm originates in the squamous cells of the mucosal epithelium and progresses through epithelial changes, infiltration, and invasion of surrounding tissues, eventually leading to metastasis (4). The most frequently affected anatomical sites include the lips, buccal mucosa, gingiva, floor of the mouth, and tongue. Its etiology is multifactorial, with tobacco and alcohol consumption being among the main risk factors (1). Other associated factors include lifestyle, genetics, viral infections such as herpes simplex virus (HSV) and human papillomavirus (HPV), sex, and age (5).

In Colombia and Peru, records show an increase in cases among men over 50, particularly in areas with limited access to dental care (6). In contrast, in Uruguay, squamous cell carcinoma of the head and neck shows a higher prevalence in men (7). However, a study conducted in Peru (2005-2016) reported a higher frequency in women in their fifth decade of life, with the tongue, palate, and alveolar ridge/gingiva being the most affected sites by oral squamous cell carcinoma (8). In this context, many countries have limited or incomplete clinical records, and the lack of oral screening programs contributes to underestimation and delayed diagnosis (9,10).

Currently, epidemiological studies on OSCC in Peru are scarce and mainly originate from public hospitals in Lima. Therefore, understanding its initial clinical manifestations is essential for early and timely diagnosis. The objective of this study was to compare the frequency of OSCC in the Oral and Maxillofacial Pathology Laboratory of the Teaching Dental Center of the Universidad Peruana Cayetano Heredia (TDC-UPCH) over a period of three decades (1991–2020).

MATERIALS AND METHODS

This was a cross-sectional, observational, analytical, and retrospective study. The study population consisted of complete anatomical pathology record cards with a diagnosis of OSCC registered between 1991 and 2020. Authorization was requested from the Oral and Maxillofacial Pathology Laboratory of the TDC-UPCH to access the database containing these clinical records. A total of 735 record cards were collected, constituting the initial population. Of these, 704 met the inclusion criteria, as they had a confirmed diagnosis of OSCC. Incomplete record cards or those corresponding to a different diagnosis were excluded.

Data collection was conducted through the review of anatomical pathology record cards corresponding to the three decades under study (1991–2020). To preserve patient anonymity, each record was assigned a code. The following study variables were recorded: age group, sex, clinical manifestation, anatomical site, and decade. Subsequently, the information was entered into a data collection form and analyzed using STATA version 16.0. A descriptive analysis of qualitative variables was performed. Associations between variables were assessed using the chi-square test and Fisher's exact test, with a confidence level of 95% and a p-value < 0.05.

The study was approved by the Institutional Research Ethics Committee of UPCH and authorized by the Oral and Maxillofacial Pathology Laboratory of the TDC-UPCH.

RESULTS

The frequency of OSCC was found to increase progressively over the three decades of study. The highest number of cases was observed in the 70–79 age group across all three decades: 21 cases (3.01%) in 1991–2000, 69 cases (9.89%) in 2001–2010, and 87 cases (12.46%) in 2011–2020. Furthermore, during the 2001–2010 and 2011–2020 decades, a significant increase in cases was observed in the 50–59 age group compared with the 1991–2000 decade. In contrast, few cases of OSCC were recorded in children and young adults (Figure 1).

Table 1 shows that, in both sexes, the number of OSCC cases increased progressively over the decades. The female sex presented a higher frequency of cases in the 2001–2010 and 2011–2020 periods compared with the male sex; however, this difference was not statistically significant (chi-square test, p = 0.232).

Table 2 shows that, as initial clinical manifestations, white plaque was more frequent than red plaque across all three decades. Among the most advanced clinical cases, tumor, ulcer, and white plaque were the main manifestations, in that order (chi-square test, p value = 0.271), with no statistical significance observed.

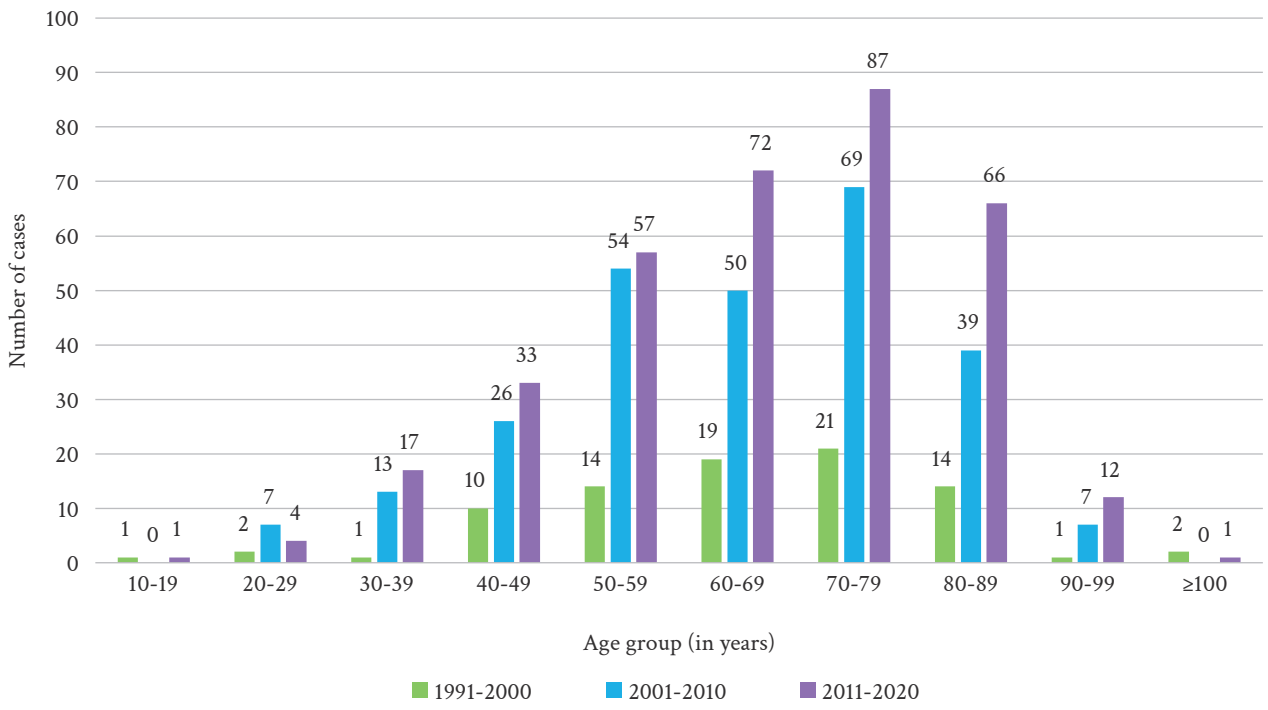

Figure 1. Frequency of oral squamous cell carcinoma by age group across decades.

With respect to anatomical site, an increase in the number of OSCC cases was observed in the maxillary and mandibular alveolar ridge/gingiva and in the lateral border of the tongue over the three decades (Fisher's exact test, p-value < 0.0001), showing a statistically significant association between the variables analyzed.

Table 1. Comparison of sex on the frequency of oral squamous cell carcinoma.

Decade	Female		Male		Total	
	n	%	n	%	n	%
1991-2000	39	5.55	44	6.26	83	11.79
2001-2010	148	21.05	118	16.79	266	37.84
2011-2020	203	28.88	151	21.48	354	50.28
Total	390	55.48	313	44.52	703	100.0

Chi-square test (p-value = 0.232).

Table 2. Comparison of the frequency of clinical manifestations of oral squamous cell carcinoma (OSCC).

Clinical manifestation of OSCC	Decade						Total	
	1991-2000		2001-2010		2011-2020			
	n	%	n	%	n	%	n	%
White plaque	16	2.27	44	6.25	48	6.82	108	15.34
Red plaque	1	0.14	7	0.99	8	1.14	16	2.27
Tumor	49	6.96	130	18.47	178	25.28	357	50.71
Ulcer	17	2.41	86	12.22	120	17.05	223	31.68
Total	83	11.79	267	37.93	354	50.28	704	100.0

Chi-square test (p-value = 0.271).

Table 3. Comparison of the frequency of the anatomical site of oral squamous cell carcinoma.

Anatomical site	Decade						Total	
	1991-2000		2001-2010		2011-2020			
	n	%	n	%	n	%	n	%
Dorsal surface of the tongue	0	0.0	9	1.28	2	0.28	11	1.56
Ventral surface of the tongue	1	0.14	11	1.56	10	1.42	22	3.13
Lateral border	16	2.27	58	8.24	92	13.07	166	23.58
Floor of the mouth	5	0.71	20	2.84	16	2.27	41	5.82
Alveolar ridge	33	4.69	87	12.36	132	18.75	252	35.80
Gingiva	2	0.28	10	1.42	16	2.27	28	3.98
Lip mucosa	6	0.85	10	1.42	8	1.14	24	3.41
Buccal mucosa	4	0.57	20	2.84	46	6.53	70	9.94
Retromolar trigone	2	0.28	12	1.70	12	1.70	26	3.69
Hard palate	7	0.99	26	3.69	12	1.70	45	6.39
Soft palate	5	0.71	4	0.57	7	0.99	16	2.27
Oral mucosa	2	0.28	0	0.0	1	0.14	3	0.42
Total	83	11.79	267	37.93	354	50.28	704	100.0

Fisher's exact test (p-value < 0.0001).

DISCUSSION

According to the Pan American Health Organization (PAHO), in 2019, oral cancer in Peru reached an incidence of 1.6 cases per 100,000 inhabitants, placing the country in the quintile 2 compared with other nations (11). According to the National Institute of Neoplastic Diseases (INEN), oral cancer has shown a progressive increase in incidence in Peru between 2000 and 2019 (12). This neoplasm is associated with an unfavorable prognosis and high mortality, partly due to its limited early symptomatology and high vascularization. In addition, it presents a high incidence in countries such as Pakistan, Brazil, India, and France (5).

In dentistry, OSCC is the most frequent malignant neoplasm of the oral cavity and represents a significant public health challenge in Peru. Although it is potentially curable at early stages, most cases are diagnosed at advanced stages, resulting in a high clinical burden and elevated treatment costs. A study conducted in a Peruvian hospital reported an OSCC frequency of 1.87% (8), whereas this study demonstrated an increasing trend in the frequency of this cancer from 1991 to 2020. Nevertheless, these data reflect only the reality of the university dental center analyzed. On the other hand, a retrospective study conducted in 17 centers across Latin America reported a mean age at diagnosis of 62.8 years, with male predominance (55.8%) (13).

In this study, the mean age was 53 years, with a range from 14 to 102 years. Across the three decades analyzed, the 70–79 age group showed the highest frequency of cases, whereas a lower number of cases was observed in the 10–19 age group. Several studies report variations in age distribution. For example, Torres-Morales et al. (14) reported a mean age of 60–69 years with male predominance, while García San Juan et al. (15) and Álvarez et al. (7) reported a mean age of 62 years. These latter findings are more consistent with the results of this study, although the mean age may vary depending on sample size and characteristics.

Regarding sex, OSCC showed a higher prevalence in women (55.48%) across the three decades overall, with male predominance observed only during the 1991–2000 period. García San Juan et al. (15) reported that in 2018, oral cancer was three times more frequent in men. Torres-Morales et al. (14) reported a male predominance of 61.90% for OSCC, and other authors, such as Rodríguez et al. (16), also reported a higher prevalence in men. However, Delesma (8) described a higher frequency of OSCC in women, a finding that is consistent with the results of this study.

According to the World Bank, Peru's population in 2022 was 34,049,588 inhabitants, of whom 17,192,503 were women, and 16,857,086 were men (17). This indicates that in recent years, women have constituted a slight majority of the population and tend to seek health-care services more frequently for medical checkups. In general terms, women tend to adopt relatively healthier lifestyles and show greater preventive awareness, which could influence their greater representation in clinical records.

A comparison by decades of clinical manifestations observed in OSCC cases showed that during the 1991–2000 period, a relatively low number of cases was recorded for the four clinical manifestations evaluated. However, during the 2011–2020 period, a marked increase was observed, reaching up to three times the number of cases. The most frequent clinical manifestation was tumor (50.71%), followed by ulcer (31.68%), white plaque (15.34%), and red plaque (2.27%). These findings may be attributed both to a real increase in the occurrence of such lesions and to improvements in clinical recording and diagnostic practices in more recent years.

The most frequent anatomical sites over the three decades were the maxillary and mandibular alveolar ridge/gingiva and the lateral border of the tongue. Furthermore, during the 2011–2020 decade, the number of cases increased fivefold compared with 1991–2000, which represents a relevant finding. Torres-Morales et al. (14) reported that the most affected sites were the tongue and the floor of the mouth, whereas Delesma (8) found that the tongue and hard palate were the most frequently involved sites. De la Fuente et al. (18) reported that OSCC in the lingual region occurred more frequently in men (61.4%). Conversely, Rodríguez et al. (16) reported that in men, the highest incidence was located in the lip and oral cavity. Only one case was identified in a 14-year-old, reinforcing the notion that OSCC is rare in adolescents and presents clinical characteristics different from those observed in adults (19).

The results reported by Barros et al. (20) indicate that deficiencies persist in both knowledge and clinical practice among dental surgeons regarding the early detection of oral and oropharyngeal cancer, particularly in the identification of risk factors and the performance of a comprehensive clinical examination. These limitations may contribute to delayed diagnoses, negatively affecting patient prognosis.

The main limitation of the study is that the data were collected by different professionals at different times and using different criteria for the selection of anatomical sites.

CONCLUSIONS

This study demonstrates a marked increase in OSCC in recent years, particularly during the 2011–2020 decade. The highest number of cases was observed in patients aged 70–79, with an increase from the age of 50 onwards across the three decades analyzed. The main anatomical sites affected were the alveolar ridge/gingiva and the lateral border of the tongue.

Conflict of interest:
The authors declare no conflict of interest.

Funding:
Self-funded.

Ethics approval:
This study was approved by the Ethics Committee of the Universidad Peruana Cayetano Heredia under Certificate CIEI-E-065-20-24, dated February 29, 2024.

Authorship contribution:
GDGO: conceptualization, methodology, writing of the original draft, writing – review & editing.
KJMA: research, *software*, visualization.
SSC: writing – review & editing.

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REFERENCES

1. World Health Organization. Oral health [Internet]. WHO; 2022, 17 de marzo. Available from: https://www.who.int/news-room/fact-sheets/detail/oral-health
2. Montalban Y, Vázquez E, Meriño YP, Lotti R. [Clinical and epidemiological characterization of squamous cell carcinoma of the tongue]. Rev Cubana Otorrinolaringol Cir Cabeza Cuello [Internet]. 2022; 6(3): e363. Available from: http://revotorrino.sld.cu/index.php/otl/article/view/363 Spanish.
3. Santelices MJ, Cárcamo M, Brenner C, Montes R. [Oral cancer. Review of the Chilean literature]. Rev Méd Chile [Internet]. 2016; 144(6): 766-770. Available from: http://doi.org/10.4067/S0034-98872016000600011 Spanish.
4. Tarle M, Lukšić I. Pathogenesis and therapy of oral carcinogenesis. Int J Mol Sci [Internet]. 2024; 25(12): 6343. Available from: https://doi.org/10.3390/ijms25126343
5. Li Y, Hecht SS. Carcinogenic components of tobacco and tobacco smoke: a 2022 update. Food Chem Toxicol [Internet]. 2022; 165: 113179. Available from: https://doi.org/10.1016/j.fct.2022.113179
6. Torres Y, Rodríguez O, Herrera R, Burgos GJ, Mesa R. [Prognostic factors for oral cancer. Literature review]. Mediciego [Internet]. 2016; 22(3): 67-77. Available from: https://revmediciego.sld.cu/index.php/mediciego/article/view/419 Spanish.
7. Álvarez D, Munyo A, Borche G, D'Albora R, Rodríguez V, Cuello M. [Head and neck cancer in Uruguay. Survival analysis in two reference centers]. Rev Méd Urug [Internet]. 2018; 34(1): 21-28. Available from: https://revista.rmu.org.uy/index.php/rmu/article/view/38 Spanish.
8. Delesma AF. [Prevalence of squamous cell carcinoma in the Head and Neck Surgery Service of the National Hospital Dos de Mayo during the period 2005-2016]. Rev Odontol Sanmarquina [Internet]. 2018; 21(2): 113-118. Available from: http://doi.org/10.15381/os.v21i2.14776 Spanish.
9. World Health Organization. Tobacco [Internet]. WHO; 2025, 25 de junio. Available from: https://www.who.int/news-room/fact-sheets/detail/tobacco
10. González-Moles MÁ, Aguilar-Ruiz M, Ramos-García P. Challenges in the early diagnosis of oral cancer, evidence gaps and strategies for improvement: a scoping review of systematic reviews. Cancers [Internet]. 2022; 14(19): 4967. Available from: https://doi.org/10.3390/cancers14194967
11. Organización Panamericana de la Salud. Burden of Cancer [Internet]. OPS; 2021. Available from: https://www.paho.org/en/enlace/burden-cancer
12. Instituto Nacional de Enfermedades Neoplásicas (PE). [Casos nuevos de cáncer registrados en el INEN, según el sexo, 2000-2019] [Internet]. Lima: INEN; 2022. Available from: https://portal.inen.sld.pe/wp-content/uploads/2022/08/Casos-nuevos-registrados-en-el-INEN-2000-2019.pdf
13. Gilligan G, Panico R, Lazos J, Morelatto R, Belardinelli P, Criscuolo MI, et al. Oral squamous cell carcinomas and oral potentially malignant disorders: a Latin American study. Oral Diseases [Internet]. 2024; 30(5): 2965-2984. Available from: https://doi.org/10.1111/odi.14778
14. Torres-Morales Y, Rodríguez-Martín O, Rodríguez-Rodríguez N, Viera-Morales KB, Díaz-Hernández MJ, Marichal-Martínez YA. [Prognostic factors for oral squamous cell carcinoma]. Mediciego [Internet]. 2020; 26(2): e1273. Available from: https://www.medigraphic.com/cgi-bin/new/resumen.cgi?IDARTICULO=98851 Spanish.
15. García C, Salas M, Gil JM. [Some considerations on etiology and pathophysiology of oral epidermoid carcinoma]. Medisur [Internet]. 2018; 16(1): 63-75. Available from: https://pesquisa.bvsalud.org/portal/resource/pt/biblio-894806 Spanish.
16. Rodríguez BV, Agustin P, Pérez-de-Oliveira ME, Ajudarte M, Kowalski LP, Curado MP. Epidemiology and survival outcomes of lip, oral cavity, and oropharyngeal squamous cell carcinoma in a southeast Brazilian population. Med Oral Patol Oral Cir Bucal [Internet]. 2022; 27(3): e274-e284. Available from: https://doi.org/10.4317/medoral.25147
17. Banco Mundial. Población, total - Perú [base de datos en Internet]. Washington (DC): Banco Mundial; 2022. Available from: https://datos.bancomundial.org/indicador/SP.POP.TOTL?locations=PE
18. De la Fuente M, Díaz M, Martínez B. [Squamous cell carcinoma of the tongue: A five-year survival study]. Rev Clín Periodoncia Implantol Rehabil Oral [Internet]. 2016; 9(1): 74-78. Available from: http://doi.org/10.1016/j.piro.2016.01.001 Spanish.
19. Acero J, Pastor Á, Haddad A, Baranda E, Bueno Á, Picón M, et al. [Epidermoid carcinoma of the oral cavity in pediatric age. Apropos of a case. Review of the literature]. Lat Am J Oral Maxillofac Surg [Internet]. 2022; 2(1): 6-11. Available from: https://doi.org/10.35366/103403 Spanish.
20. Barros AT, Silva CC, Dos Santos VC, Panjwani CM, Barbosa KG, Ferreira SM. Knowledge of oral and oropharyngeal cancer by dental surgeons: an integrative review. Rev Bras Enferm [Internet]. 2021; 74(1): e20200080. Available from: https://doi.org/10.1590/0034-7167-2020-0080