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Original Research

## The incidence of oral squamous cell carcinoma (OSCC) and its relationship with orofacial pain in oral cancer patients in West Java Province, Indonesia



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### ABSTRACT

**Objectives:** Oral carcinoma including oral squamous cell carcinoma (OSCC) is known for its detrimental and lethal effect. Therefore, a study regarding its epidemiology and related factors is of importance. The current study aimed on revealing the incidence of OSCC and its correlation with orofacial pain in Indonesia's patient sample.

**Methods:** Nine hospitals that are located at the province of West Java, Indonesia were randomly selected. From these hospitals, we collected a number of patients who visited the Oral Surgery outpatient clinic from July 2014 to June 2015 and were diagnosed with OSCC. The location of OSCC, age, sex, and the presence of orofacial pain were collected and cross tabulated. Significant correlation was analyzed by using Pearson correlation.

**Results:** Based on its location, the most commonly found OSCC in an Indonesian sample is located in the buccal area (26 cases) with a percentage of 27.4%. Eighty-four patients out of ninety-five patients with OSCC experienced pain due to the development of OSCC. There was a significant association between the anatomic site of OSCC and orofacial pain ( $p=0.00$ ) whilst a significant and positive correlation was found between orofacial pain experienced by OSCC patient ( $p=0.03$ ) and age. As for sex and the location of the OSCC, no significant correlations were found.

**Conclusion:** The high number of OSCC cases accompanied with orofacial pain in West Java Province, Indonesia indicated an immediate yet effective treatment requirement for OSCC in Indonesia.

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### 1. Introduction

Cancer, based on the data released by the Center for Disease Control and Prevention (CDC), USA, in 2013, is still the second leading cause for death [1], and includes oral carcinoma. Based on its location and clinicopathological consideration, there are three types of oral carcinomas, which are carcinomas of the oral cavity, carcinomas of the lip vermilion, and carcinomas arising in the oropharynx [2]. According to the World Health Organization's (WHO)

Classification of Tumors of the Oral Cavity and Oropharynx, the types of oral carcinoma include the following: malignant epithelial tumors, salivary gland tumors, soft tissue tumors, hematomalymphoid tumors, mucosal malignant melanoma, and secondary tumors [3].

Based on the histological appearance, the most frequent type of oral carcinoma is oral squamous cell carcinoma (OSCC). It was reported that 90% of oral carcinomas are OSCC [4,5]. Histologically, there are several types of OSCC, which are conventional, verrucous, spindle, basaloid, adeno-squamous, papillary, and muco-epidermoid and acantholytic type [6,7]. Sites of the oral region in which OSCC are most likely to be found are the tongue and floor of the mouth, with a percentage of 20–40% and 15–20%, respectively [8].

The significance of oral carcinoma including OSCC includes its mortality, survival rate, and dysfunction related to treatment [9–11], as the treatment of oral cancer might cause changes in the facial appearance of the patient. There is some variability concerning survival rate of OSCC, depending on the severity and location of

\* Asian AOMS: Asian Association of Oral and Maxillofacial Surgeons; ASOMP: Asian Society of Oral and Maxillofacial Pathology; JSOP: Japanese Society of Oral Pathology; JSOMS: Japanese Society of Oral and Maxillofacial Surgeons; JSOM: Japanese Society of Oral Medicine; JAMI: Japanese Academy of Maxillofacial Implants.

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the cancer. A 50% 5-year survival rate for oral carcinoma has been revealed for some countries, with hypopharyngeal tumor showing the lowest survival rate [11,12]. As for age and sexual incidence, OSCC is found to be more prevalent in men compared to women [11,13,14], and its incidence is more likely to increase with age [13], which happened in the majority after the age of 50 years [11,15].

Another aspect of oral carcinoma including OSCC that is considered to be detrimental is the orofacial pain resulting from the extension and severity of the carcinoma as well as the one resulting from the treatment of oral carcinoma. Orofacial pain in an oral carcinoma patient is believed to be excruciating. This might be due to the fact that 45% of our somatosensory cortex is dedicated to the face, mouth, and oral structures. So, it is highly understandable that if pain occurred in these structures, it will have great impact on the individual [16]. An evaluation of the pain occurring in oral carcinoma patients including OSCC patients in previous studies showed that the pain limited the patient's oral function and physical activity [17–19], and caused eating difficulty, swallowing, and speech [17,18,20], as well as a decreased quality of life [20].

Despite its detrimental effect, and for some malignant cases, lethal, the prevalence, demographical characteristic, as well as orofacial pain in OSCC patients have not been well explored in Indonesia. Therefore, the current study aimed to reveal the incidence of OSCC, its association with demographical characteristics such as age and sex, as well as orofacial pain associated with OSCC in an Indonesian patient sample.

## 2. Material and method

The current study was a retrospective study and was conducted in the West Java Province (with a size of 37,173.93 km<sup>2</sup>), Indonesia after ethical clearance was obtained. Six representative regencies (out of 18 regencies) and three cities (out of nine cities) that were located in the province were selected by using the Cluster Sampling method. Nine public hospitals that acted as the Province's Referral Hospital were randomly chosen. All hospitals were type C (Indonesian Minister of Health Classification) hospitals, which means that all of them are located in a regency or a city and meet the following criterion: the hospital should have acquired at least four Basic Medical Specialist Services. This type of government hospital accepted referred patients directly from Community Health Centers that are located in every district in the regency or city, as Community Health Centers are not allowed to treat cancer patients. The fact that these hospitals are the first referral hospital was the reason for their selection, as they will represent the true incidence of OSCC. Type B or type A hospitals only treat OSCC patients who cannot be treated in type C hospitals, and therefore, will not reveal the true incidence of OSCC in the province.

From these hospitals, the medical records of patients who visited the Oral Surgery Outpatient Clinic from July 2014 to June 2015 and diagnosed with OSCC were collected. The presence of orofacial pain was also recorded. The orofacial pain recorded was merely the presence of orofacial pain without accounting the level of pain experienced by the patient. The incidence and location of OSCC, age, sex, and the presence of orofacial pain were then accounted, cross tabulated, and analyzed. A Pearson correlation analysis was carried out to evaluate the relationship between the demographical variables of the OSCC patients and orofacial pain. Odds Ratio (OR) as well as Relative Risk (RR) was also analyzed.

## 3. Results

The result of the study showed that from the nine hospitals investigated in the study, 111 new cases of OSCC were reported for the duration of 1 year, and that the most common OSCC in an

**Table 1**

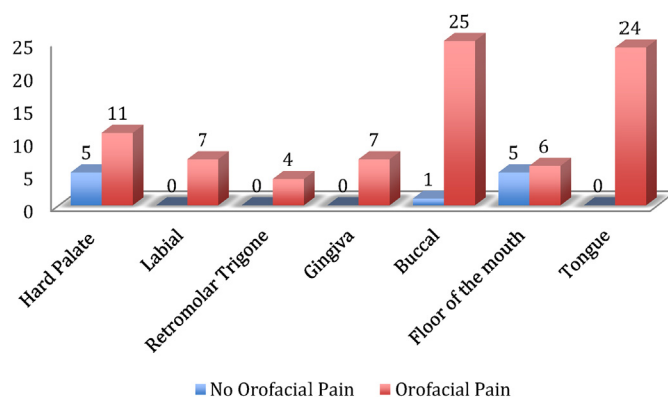
Number of new cases, sex-based distribution and types of oral squamous cell carcinoma based on its location in the oral area encountered from July 2014 to June 2015 in nine representative hospitals in West Java Province, Indonesia.

No.	Location	Number of new cases	Sex	
			Male	Female
1	Hard palate	16	7	9
2	Labial	7	4	3
3	Retromolar trigone	4	2	2
4	Gingiva	7	4	3
5	Buccal	26	5	21
6	Floor of the mouth	11	8	3
7	Tongue	24	9	15
Total		95	39	56

Indonesian patient sample were located in the buccal area and the tongue (Table 1). As not all medical records investigated indicated the type of OSCC histologically, the classification of OSCC in the current study is based on its anatomic site. Unlike the findings of previous studies [6,8], the OSCC cases revealed in the West Java Province were more likely to be found in women, as seen with 56 (58.9%) new cases.

Another finding of the study includes the orofacial pain experienced by the patient and its correlation with the anatomic site of OSCC encountered (Fig. 1). There was a significant association between the anatomic site of the OSCC and the presence of orofacial pain ( $p=0.00$ ). Orofacial pain experienced by OSCC patients was then analyzed for its correlation with age. There was a significant correlation between age and orofacial pain ( $p=0.03$ ) experienced by OSCC patients. It was a positive correlation, which means that the higher the age, it is more likely for the OSCC patient to experience orofacial pain. The demographical characteristic of OSCC patients concerning age and sex as well as orofacial pain is listed in Table 2.

There was no significant correlation between sex and the location of OSCC with orofacial pain. Despite the absence of significant correlations, an Odds Ratio (OR) of 2.8 was revealed, which means that OSCC male patients have 2.8 times the odds of experiencing orofacial pain compared to OSCC female patients, and that OSCC male patients are 0.9 times at risk (RR) of having orofacial pain compared to OSCC female patients.



**Fig. 1.** The number of OSCC patients with orofacial pain based on the anatomical site of OSCC.

Of the ninety-five patients with OSCC, eighty-four (88.4%) patients revealed that they experienced orofacial pain due to OSCC. The group of patients that showed the highest number of patients who experienced orofacial pain due to OSCC comprised female patients who were aged between 51 and 60 years. Orofacial pain was more prevalent in female (52 patients) than in male patients.

**Table 2**  
Demographical characteristics and the presence of orofacial pain experienced by OSCC patients based on age and sexual categories.

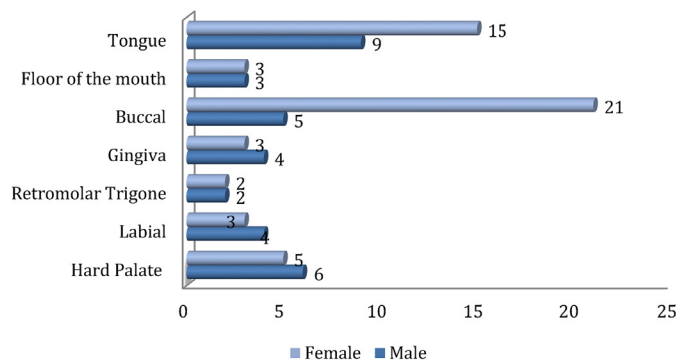
Age categories	Sex		Orofacial pain	
	Male	Female	Male	Female
0–10 years old	2	0	1	0
11–20 years old	2	2	1	2
21–30 years old	0	3	0	3
31–40 years old	7	11	4	9
41–50 years old	8	7	8	7
51–60 years old	<b>9</b>	<b>19</b>	<b>8</b>	<b>17</b>
61–70 years old	8	6	7	6
71–80 years old	3	6	3	6
>80 years old	0	2	0	2
Total	39	56	32	52
Percentage	41.1%	<b>58.9%</b>	38.1%	<b>61.9%</b>

The bold values are the highest values for their categories.

The distribution of orofacial pain in male and female patients can be seen in Fig. 2.

**4. Discussion**

The current study focused on the arising of new cases of OSCC in West Java Province, Indonesia over the period of July 2014 to June 2015, as OSCC is known as the most common type of oral carcinoma that occurred in the oral cavity [7,21,22]. According to previous studies, the most common sites of OSCC are the tongue, oropharynx, lip, floor of the mouth, gingiva, hard palate, and buccal mucous [6,23,24], and the classification of OSCC in the current study was based on this classification. Despite this, some variability was also found when it comes to anatomic site. For example, the most common site of OSCC in the Asian region is the buccal mucosa, due to tobacco chewing, whilst for the European and US patients, the most common anatomic site for OSCC is the tongue [11]. In the current study, the tongue is one of the two most common sites for oral carcinoma with 24 (25.3%) patients having or have had OSCC in this particular area, whilst OSCC in the buccal area was found in 26 (27.4%) patients. Despite the variability, some findings of the current study are still in line with previous studies as mentioned above.



**Fig. 2.** The distribution of orofacial pain in male and female patients in different locations of the oral squamous cell carcinomas.

Another demographic factor evaluated in the current study is the involvement of age in the prevalence of oral carcinoma. In the current study, age was categorized into nine categories (Table 2) and it was revealed that the percentage of OSCC is higher in those who were in the age category of 51–60 years. This particular finding is inline with a previous research that showed that OSCC is more likely to happen in those who are middle aged or above [2,13]. A

study in Mexico by Hernández-Guerrero et al. showed that OSCC was experienced by those who were aged more than 40 years [25], whilst a study by Andisheh-Tadbir et al. about the epidemiology of OSCC showed that OSCC is more likely to be experienced by those who aged more than 60 years [26].

Orofacial pain experienced by the patient due to the OSCC was found to be higher in female patients (61.9%) compared to male patients (38.1%). Despite the higher percentage, there was no significant difference when it comes to sex and oral cancer pain. This particular finding is inline with previous studies that revealed that cancer pain was not significantly related to sex [27–29], although it is important to note that the result of previous studies regarding sex differences in cancer patients is still a controversy. Several studies did find that sex is related to cancer pain and women are more likely to experience cancer pain or have more risk to experience severe cancer pain [30,31].

There was a significant correlation between age and the orofacial pain experienced by the oral cancer patients with a positive correlation. It means that the higher the age, it is more likely that the patient will experience higher degree of pain. This particular finding of the current study is inline with the finding of a previous study by Closs et al. that revealed that cancer pain prevalence is higher in those in the higher age group [32]. A slightly different finding was showed in a study by Green and Hart-Johnson that stated there were no differences in cancer pain based on age, although the younger age group experienced more pain flares [33]. Another international study conducted by Caraceni and Portenoy concluded that higher degree of pain is more likely to be experienced by those who were aged younger than 60 years [34].

As for the location of OSCC and orofacial pain, the significant association between these factors is interesting to note; when the seven locations of the OSCC were evaluated for orofacial pain, almost all of the patients complained of orofacial pain (Fig. 1). Another important fact to be noted is that regardless of the sex and age evaluation of the orofacial pain, pain was experienced by the OSCC patient in the first place, which indicated that the management of orofacial pain in OSCC patients is of importance, and that the management of OSCC in Indonesia should also be directed toward the management of the orofacial cancer-related pain.

**5. Conclusion**

The current study showed that the most common OSCC found in an Indonesian sample is located in the buccal and tongue squamous cell carcinoma, with the OSCC occurring more in women than in men. Despite the variability, the fact that it is more likely to be found in those who were aged 51–60 years old is in line with previous studies. The presence of orofacial pain in 88.4% of the total sample patients showed that the management of orofacial pain in oral carcinoma patients is of importance. Further study in this area is needed.

**Ethical approval**

Ethical approval was gained prior to the start of the study.

**Conflict of interest**

There is no conflict of interest in the current study.

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## References

- [1] (CDC) CfDCaP. Leading causes of death; 2015. Retrieved from <http://www.cdc.gov/nchs/fastats/leading-causes-of-death.htm>.
- [2] Neville BW, Day TA. Oral cancer and precancerous lesions. *Cancer J Clin* 2002;524:195–215.
- [3] Tapia JL, Goldberg LJ. The challenges of defining oral cancer: analysis of an ontological approach. *Head Neck Pathol* 2011;54:376–84.
- [4] Markopolous AK. Current aspects on oral squamous cell carcinoma. *Open Dent J* 2012;6:126–30.
- [5] Johnson NW, Jayasekara P, Amarasinghe AA. Squamous cell carcinoma and precursor lesions of the oral cavity: epidemiology and etiology. *Periodontology* 2000 2011;57:19–37.
- [6] Minhas S, Kashif M, Altaf W, Nagi AH. Oral squamous cell carcinoma: epidemiological, clinical, and histological features. *Rawal Med J* 2016;41:81–5.
- [7] Scully C, Bagan J. Oral squamous cell carcinoma overview. *Oral Oncol* 2009;454–5:301–8.
- [8] Feller L, Lemmer J. Oral squamous cell carcinoma: epidemiology, clinical presentation, and treatment. *J Cancer Ther* 2012;3:263–8.
- [9] Sugerman PB, Savage AW. Current concepts in oral cancer. *Aust Dent J* 1999;443:147–56.
- [10] OCF. Oral Cancer Facts; 2015. Retrieved from <http://www.oralcancerfoundation.org/facts/>.
- [11] Warnakulasuriya S. Global epidemiology of oral and oropharyngeal cancer. *Oral Oncol* 2009;45:309–16.
- [12] Silverman S. Demographics and occurrence of oral and pharyngeal cancers: the outcomes, the trends, the challenge. *J Am Dent Assoc* 2001;132(Suppl. 1):7S–11S.
- [13] (NIDCR) NIDaCR. Oral cancer incidence (new cases) by age, race, and gender; 2014. Retrieved from <http://www.nidcr.nih.gov/DataStatistics/FindDataByTopic/OralCancer/OralCancerIncidence.htm>.
- [14] Patel MM, Pandya AN. Relationship of oral cancer with age, sex, site distribution and habits. *Indian J Pathol Microbiol* 2004;472:195–7.
- [15] Su CC, Lin YY, Chang TL, Chiang CT, Chung JA, Hsu YY, et al. Incidence of oral cancer in relation to nickel and arsenic concentrations in farm soils of patients' residential areas in Taiwan. *BMC Public Health* 2010;1067.
- [16] Okeson JP. Bell's oral and facial pain. 7th ed. USA: Quintessence Publishing Co, Inc; 2014.
- [17] Chen SC, Liao CT, Chang JTC. Orofacial pain and predictors in oral squamous cell carcinoma patients receiving treatment. *Oral Oncol* 2011;472:131–5.
- [18] Eipstein JB, Hong C, Logan RM, Barasch A, Gordon SM, Oberlee-Edwards L, et al. A systematic review of orofacial pain in patients receiving cancer therapy. *Support Care Cancer* 2010;1023–31.
- [19] Epstein JB, Elad S, Eliav E, Jurevic R, Beniel R. Orofacial pain in cancer: Part II. Clinical perspectives and management. *J Dent Res* 2007;866:506–18.
- [20] Eipstein JB, Robertson M, Emerton S, Philips N, Stevenson-Moore P. *J Sci Spec Head Neck* 2000;235:389–98.
- [21] Mirbod SM, Ahing SI. Tobacco-associated lesions of the oral cavity: Part II. Malignant lesions. *J Can Dent Assoc* 2000;66:308–11.
- [22] Bagan JV, Scully C. Recent advances in Oral Oncology: epidemiology, aetiopathogenesis, diagnosis, and prognostication. *Oral Oncol* 2007;44:103–8.
- [23] McDowell JD. An overview of epidemiology and common risk factors for oral squamous cell carcinoma. *Otolaryngol Clin North Am* 2006;39:277–94.
- [24] Harrison LB, Sessions RB, Hong WK. *Head and neck cancer: a multidisciplinary approach*. USA: Lippincott Williams and Wilkins; 2009.
- [25] Hernández-Guerrero JC, Jacinto-Alemán LF, Jiménez-Farfan MD, Macario-Hernández A, Hernández-Flores F, Alcántara-Vázquez A. Prevalence trends of oral squamous cell carcinoma. Mexico City's General Hospital experience. *Med Oral Patol Oral Cir Bucal* 2013;182:e306–11.
- [26] Andisheh-Tadmir A, Mehrabani D, Heydari ST. Epidemiology of squamous cell carcinoma of the oral cavity in Iran. *J Craniofac Surg* 2008;196:1699–702.
- [27] van den Beuken-van Everdingen MH, de Rijke JM, Kessels AG, Schouten HC, van KM, Patijn J. High prevalence of pain in patients with cancer in a large population-based study in The Netherlands. *Pain* 2007;132:312–20.
- [28] Turk DC, Okifuji A. Does sex make a difference in the prescription of treatments and the adaptation to chronic pain by cancer and non-cancer patients? *Pain* 1999;82:139–48.
- [29] Edrington JM, Paul S, Dodd M, West C, Facione N, Tripathy D, et al. No evidence for sex differences in the severity and treatment of cancer pain. *J Pain Symptom Manag* 2004;28:225–32.
- [30] Valeberg BT, Miaskowski C, Hanestad BR, Bjordal K, Paul S, Rustoen T. Demographic, clinical, and pain characteristics are associated with average pain severity groups in a sample of oncology outpatients. *J Pain* 2008;19.
- [31] Reyes-Gibby CC, Aday LA, Anderson KO, Mendoza TR, Cleeland CS. Pain, depression, and fatigue in community-dwelling adults with and without a history of cancer. *J Pain Symptom Manag* 2006;32:118–28.
- [32] Closs SJ, Chatwin J, Bennet MI. Cancer pain management at home (II): does age influence attitudes towards pain and analgesia? *Support Care Cancer* 2009;177:781–6.
- [33] Green CR, Hart-Johnson T. Cancer pain: an age-based analysis. *Pain Med* 2010;1110:1525–36.
- [34] Caraceni A, Portenoy RK. An international survey of cancer pain characteristics and syndromes. *Pain* 1999;823:263–74.