A multicenter study of oral malignant tumors from Thailand

Kittipong Dhanuthai, Somsri Rojanawatsirivej, Ajiravudh Subarnbhesaj, Watcharaporn Thosaporn, Sompid Kintarak

Department of Oral Pathology, Faculty of Dentistry, Chulalongkorn University, Bangkok, Department of Oral Diagnosis, Khon Kaen University, Khon Kaen, Department of Oral Biology and Diagnostic Sciences, Chiang Mai University, Chiang Mai, Department of Stomatology, Prince of Songkla University, Songkhla, Thailand

INTRODUCTION

Oral cancer is the sixth most common cancer in the world. There were estimated 45,780 new cases of cancer in the oral cavity and pharynx in the United States in 2015. Of these, 8650 were expected to pass away from cancer. The most important risk factors for oral cancer, especially squamous cell carcinoma, are tobacco use and alcohol abuse, which have synergistic effect. Previous studies have shown that alcohol consumption is an independent risk factor for the development of cancer in a dose-dependent manner.

Apart from tobacco use and alcohol abuse, human papillomavirus (HPV) has recently received special attention. HPV-16, in

Abstract

Background: Oral malignant tumors in Thailand have not been extensively studied. Hence the following study was conducted.

Aims: To determine the prevalence and clinicopathologic data of the oral malignant tumors from Thailand.

Subjects and Methods: Biopsy records of the Oral Pathology Department, Chulalongkorn University; Department of Oral Biology and Diagnostic Sciences, Chiang Mai University; Department of Oral Diagnosis, Khon Kaen University and Department of Stomatology, Prince of Songkla University, were reviewed for lesions diagnosed in the category of oral malignant tumors from 2005–2014. Demographic data and site of the lesions were collected.

Statistical Analysis Used: Data were analyzed by descriptive statistics using SPSS software version 17.0.

Results: Of the 22,639 accessioned cases, 1411 cases (6.23%) were diagnosed as oral malignant tumors. The mean age of the patients was 59.13 ± 17.32 years. A total of 651 cases (46.14%) were diagnosed in males, whereas 759 cases (53.79%) were diagnosed in females. The male-to-female ratio was 0.86:1. The sites of predilection for oral malignant tumors were the gingiva, followed by tongue and alveolar mucosa. The three most common oral malignant tumors in the descending order of frequency were squamous cell carcinoma, non-Hodgkin lymphoma and mucoepidermoid carcinoma.

Conclusions: This study provides extensive data on the oral malignant tumors from several university biopsy services located in virtually all parts of Thailand. The data from the present study show some similarities with previous studies; however, differences such as gender and site of predilection still exist.

Key Words: Oral malignant tumors, retrospective study, Thailand
The aim of this research was to determine the prevalence and clinicopathologic data of the oral malignant tumors from Thailand.

SUBJECTS AND METHODS

The biopsy records of the Department of Oral Pathology, Chulalongkorn University; Department of Oral Biology and Diagnostic Sciences, Chiang Mai University; Department of Oral Diagnosis, Khon Kaen University and Department of Stomatology, Prince of Songkla University, were reviewed for malignant tumors within the oral cavity diagnosed from 2005 to 2014. This study was approved by the Human Ethics Committee of the Faculty of Dentistry, Chulalongkorn University (No. 090/2015).

Demographic data and site of the lesion were also collected. Sites of the lesion were subdivided into lip, tongue, floor of the mouth, gingiva, alveolar mucosa, palate, buccal/labial mucosa, tonsil, maxilla and mandible and others. Histopathological diagnoses were classified according to the WHO classification of head and neck tumors[15] and tumors of soft tissue and bone.[16] Histopathological diagnoses were classified into epithelial tumors, salivary gland tumors, hematologic tumors, bone tumors, mesenchymal tumors, odontogenic tumors and others. Data were analyzed by appropriate statistics using SPSS Statistics for Windows, Version 17.0. Chicago: SPSS Inc. A P < 0.05 was considered statistically significant.

RESULTS

Of the 22,639 accessioned cases, 1411 cases (6.23%) were diagnosed in the category of oral malignant tumors. The prevalence ranged from 4.79% from Chulalongkorn University to 11.50% from Khon Kaen University. The age of the patients in the present study ranged from 3 to 101 years, with a mean ± standard deviation = 59.13 ± 17.32 years. Patients in the seventh and eighth decades of life constituted 43.30% of all the patients [Figure 1].

Regarding gender, most institutions showed a female predilection, except Chulalongkorn University. Overall, the male-to-female ratio of the patients in the present study was 0.86:1 [Table 1].

Regarding the anatomical location, the majority of the oral lesions (84.46%) were extraosseous. The lesions had intrabony locations in 15.54% of the cases. The five most common anatomical locations in the descending order of frequency were gingiva (18.53%), tongue (14.97%), alveolar mucosa (12.83%), labial/buccal mucosa (12.05%) and palate (11.48%). The majority of the malignant epithelial tumors were encountered at the gingiva followed by the tongue while most of the malignant salivary gland tumors were found on the palate. The site of predilection for malignant hematologic tumors was the mandible. Malignant bone tumors occurred in the mandible much more than in the maxilla. The sites of predilection for malignant mesenchymal tumors were the alveolar mucosa and the gingiva. Malignant odontogenic tumors were encountered in the mandible more than in the maxilla and other sites combined. Several sites such as lung, thyroid gland, breast, kidney liver, colon, pancreas and bile duct were the primary sites for the metastatic tumors to the oral cavity in the present study, but the most common ones were the thyroid gland and the lung.

Most of the oral malignant tumors (1023 cases, 72.50%) fell in the epithelial tumor category, followed by salivary gland tumor category (164 cases, 11.62%), hematologic tumor category (117 cases, 8.29%), bone tumor category (41 cases, 2.91%), mesenchymal tumor category (31 cases, 2.20%), others category (20 cases, 1.42%) and odontogenic tumor category (15 cases, 1.06%) [Table 2]. The most common...
oral malignant tumor was squamous cell carcinoma which constituted 92.96% of all epithelial tumors and 67.40% of all oral malignant tumor cases. The second most prevalent oral malignant tumor was lymphoma which accounted for 86.32% of the hematologic tumors and 7.16% of all oral malignant tumor cases. Within the lymphoma group, diffuse large B-cell lymphoma was the predominant subtype. The third most prevalent oral malignant tumor was mucoepidermoid carcinoma which constituted 51.83% of all salivary gland tumors and 6.02% of all oral malignant tumor cases.

**DISCUSSION**

The prevalence of oral malignant tumors from the present study was 6.23% which was comparable to the prevalence of 8.0% and 8.2% from Libya [17,18] but was higher than the prevalence (of 0.15%) from Australia [19] and lower than the prevalence (of 14.82%) from the UAE [20] from Nigeria (18.0%) [21] and from Zimbabwe (24.8%) [22]. The disparity in the prevalence might be attributable to the difference in the distribution of risk factors in each geographical area [20,21]. This study is based on the results of the histopathological diagnoses, so it cannot be compared with most published population-based cancer registered data. The mean age of the patients with oral malignant tumors in this study was 59.13 years, which is similar to the findings in the UAE (54.9 years) [20], Iran (61.2 years) [23], Malaysia (61.2 years) [24], Jordan (62.5 years) [25] and Japan (65.2 years) [26] but higher than the findings in Nigeria (42.2 years) [21] and Libya (46.0 years) [17,18]. Many patients with oral malignant tumors from this study were females with the male-to-female ratio of 0.86:1 which was comparable to the neighboring country, Malaysia (0.92:1) [24] but contrary to most previous reports which consistently showed a male predominance [13,17,18,22,23,25-29]. The plausible explanation for this may due to the fact that more female patients attend dental clinics, hospitals and universities than male patients and females have longer life longevity than males since the prevalence of oral malignant tumors in the present study peaks in the seventh and eighth decades of life.

Most of the oral malignant tumors in the present study were encountered at the gingiva which was not in accordance with most previous reports which revealed that tongue was the most common site for oral malignant tumors [13,20,25,26,28]. However, Chizogwa [22] also reported that gingiva was the most common site for oral malignant tumors, followed by the tongue. Khan et al. [24] revealed that oral mucosa was the most common site for oral malignant tumors, followed by the tongue. The reasons why the tongue and the cheek are the predilection sites for oral malignant tumors are that the carcinogen in the oral cavity that is mixed with saliva has the tendency to pool at the bottom of the mouth, and these sites are covered by thin and nonkeratinized mucosa. As a consequence, they provide less protection against the carcinogen [30]. The most prevalent oral tumor at the gingiva was squamous cell carcinoma. The practice of betal quid/tobacco chewing in Southeast Asia might contribute to the high prevalence of oral malignant tumors, especially squamous cell carcinoma, at the gingiva and buccal mucosa due to the contact with the carcinogens in those areas for a long period.

Epithelial tumor category constituted the largest category of all the oral malignant tumors, followed by the salivary gland tumor category. This finding was in accordance with previous studies [13,17,18,20,24]. Nonetheless, the studies by Ajayi et al. [21] and Rawashdeh and Matalka [25] revealed that sarcoma was the second most common category. Within the epithelial tumor category, squamous cell carcinoma was the most common tumor and the most common oral malignant tumor as in previous studies [13,17,18,20,27,29]. Within the salivary gland tumor category,

---

**Table 1: Gender distribution from participating institutions**

| Institution              | Male | Female | Male:Female ratio |
|--------------------------|------|--------|-------------------|
| Chiang Mai University    | 103  | 127    | 0.81:1            |
| Chulalongkorn University | 190  | 186    | 1.02:1            |
| Khon Kaen University     | 208  | 288    | 0.72:1            |
| Prince of Songkla University | 149 | 158    | 0.94:1            |
| Total                    | 650  | 759    | 0.86:1            |

**Table 2: Histopathological diagnosis of oral malignant tumors**

| Tumors                              | n (%) |
|-------------------------------------|-------|
| Epithelial tumors                   |       |
| Squamous cell carcinoma             | 1023  | (72.50) |
| Verrucous carcinoma                 | 38    | (2.69)  |
| Metastatic carcinoma                | 23    | (1.63)  |
| Undifferentiated carcinoma          | 6     | (0.43)  |
| Others                              | 5     | (0.35)  |
| Salivary gland tumors               |       |
| Mucoepidermoid carcinoma            | 85    | (6.02)  |
| Adenoid cystic carcinoma            | 48    | (3.40)  |
| Adenocarcinoma                      | 12    | (0.85)  |
| Carcinoma ex pleomorphic adenoma    | 5     | (0.35)  |
| Polymorphous low-grade adenocarcinoma| 9   | (0.64)  |
| Others                              | 9     | (0.64)  |
| Hematologic tumors                  |       |
| Lymphoma                            | 117   | (8.29)  |
| Myeloma                             | 101   | (7.16)  |
| Myeloma                             | 14    | (0.99)  |
| Leukemia                            | 2     | (0.14)  |
| Bone tumors                          |       |
| Osteosarcoma                        | 41    | (2.91)  |
| Ewing’s sarcoma                     | 8     | (0.57)  |
| Chondrosarcoma                      | 6     | (0.43)  |
| Mesenchymal tumors                  |       |
| Fibrosarcoma                        | 31    | (2.20)  |
| Rhabdomyosarcoma                    | 5     | (0.35)  |
| Leiomyosarcoma                      | 4     | (0.28)  |
| Kaposi’s sarcoma                    | 4     | (0.28)  |
| Others                              | 13    | (0.92)  |
| Odontogenic tumors                  |       |
| Clear cell odontogenic carcinoma    | 15    | (1.06)  |
| Ameloblastic carcinoma              | 7     | (0.50)  |
| Ameloblastic carcinoma              | 3     | (0.21)  |
| Others                              | 5     | (0.35)  |
| Others                              | 20    | (1.42)  |
the most prevalent tumor was mucoepidermoid carcinoma. Mucoepidermoid carcinoma was consistently ranked as the most common intraoral salivary gland tumor. However, some studies showed that adenoid cystic carcinoma was the most prevalent intraoral malignant salivary gland tumor.

In the present study, there were 416 cases (1.84%) of non-squamous cell oral malignant tumors which was comparable to 1.68% reported by Mohtasham et al. from Iran but lower than 8.70% by Khan et al. from Malaysia, 13.97% by Ariyoshi et al. from Japan, 15.20% by Rawashdeh and Mataleka from Jordan, 24.49% by Anis and Gaballah from the UAE, 26.2% by Chidzonga from Zimbabwe and 36.72% by Ajayi et al. from Nigeria.

CONCLUSIONS

Although the prevalence of oral malignant tumors in Thailand is not high compared to others, oral malignant tumors pose significant mortality and morbidity in the patients, especially when discovered late in the course of the disease. This study highlights some anatomical locations such as the tongue and the gingiva where oral malignant tumors are frequently encountered. As a result, clinicians should pay attention to not only teeth but also oral mucosa, especially in the high prevalence area as well since early detection of precancerous lesions or cancers in the early stage increases the chance of patient being cured and greatly reduces the mortality and morbidity. This study provides extensive data on the oral malignant tumors from several university biopsy services locating in virtually all parts of Thailand. The data from the present study show some similarities with previous studies; however, differences such as gender and site of predilection still exist.

Acknowledgments

We would like to thank all the staff from the participating institutions for their contribution to this research.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Warnakulasuriya S. Causes of oral cancer – An appraisal of controversies. Br Dent J 2009;207:471-5.
2. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2015. CA Cancer J Clin 2015;65:5-29.
3. Castellsagué X, Quintanar MJ, Martínez MC, Nieto A, Sánchez MJ, Juan A, et al. The role of type of tobacco and type of alcoholic beverage in oral carcinogenesis. Int J Cancer 2004;108:741-9.
4. Pelucchi C, Gallus S, Garavello W, Bosetti C, La Vecchia C. Cancer risk associated with alcohol and tobacco use: Focus on upper aero-digestive tract and liver. Alcohol Res Health 2006;29:193-8.
5. Boeing H. EPIC Working Group on Dietary Patterns. Alcohol and risk of cancer of the upper gastrointestinal tract: First analysis of the EPIC data. IARC Sci Publ 2002;156:151-4.
6. Freedman ND, Schatzkin A, Leitzmann MF, Hollenbeck AR, Abnett CC. Alcohol and head and neck cancer risk in a prospective study. Br J Cancer 2007;96:1469-74.
7. Goldstein BY, Chang SC, Hashibe M, La Vecchia C, Zhang ZF, Alcohol consumption and cancers of the oral cavity and pharynx from 1988 to 2009: An update. Eur J Cancer Prev 2010;19:431-65.
8. D’Souza G, Kreimer AR, Viscidi R, Pawlita M, Falkhy C, Koch WM, et al. Case-control study of human papillomavirus and oropharyngeal cancer. N Engl J Med 2007;356:1944-56.
9. Chaturvedi AK, Engels EA, Anderson WF, Gillison ML. Incidence trends for human papillomavirus-related and -unrelated oral squamous cell carcinomas in the United States. J Clin Oncol 2008;26:612-9.
10. Zhang SK, Zheng R, Chen Q, Zhang S, Sun X, Chen W. Oral cancer incidence and mortality in China, 2011. Chin J Cancer Res 2015;27:44-51.
11. Casto BC, Sharma S, Fisher JL, Knobloch TJ, Agraval A, Weghorst CM. Oral cancer in Appalachia. J Health Care Poor Underserved 2009;20:274-85.
12. Vallecillo Capilla M, Romero Old MN, Olmedo Gaya MV, Reyes Botella C, Bustos Ruiz V. Factors related to survival from oral cancer in an Andalusian population sample (Spain). Med Oral Patol Oral Cir Bucal 2007;12:ES18-23.
13. Bhattacharjee A, Chakraborty A, Purkayastha P. Prevalence of head and neck cancers in the north east-an institutional study. Indian J Otolaryngol Head Neck Surg 2006;58:15-9.
14. Sasahara T, Kikita T, Kuniyasu H. Update of molecular pathology in oral cancer: A review. Int J Oncol 2014;44:431-6.
15. Barnes L, Eveson JW, Reichart P, Sidransky D. Pathology and Genetics of Head and Neck Tumours. Lyon: IARC Press; 2005. p. 163-328.
16. Fletcher CD, Unni KK, Mertens F. Pathology and Genetics of Tumours of Soft Tissue and Bone. Lyon: IARC Press; 2002. p. 9-322.
17. BenNasir E, El Mistiri M, McGowan R, Katz RV. Oral cancer in Libya and development of regional oral cancer registries: A review. Saudi Dent J 2015;27:171-9.
18. Subhashraj K, Orafi M, Nair KV, El-Gehani R, Elarbi M. Primary malignant tumors of orofacial region at Benghazi, Libya: A 17 years review. Cancer Epidemiol 2009;33:332-6.
19. Do LG, Spencer AJ, Dost F, Farah CS. Oral mucosal lesions: Findings from the Australian National Survey of Adult Oral Health. Aust Dent J 2014;59:114-20.
20. Anis R, Gaballah K. Oral cancer in the UAE: A multicenter, retrospective study. Libyan J Med 2013;8:21782.
21. Ajayi OF, Adeyemo WL, Ladeinde AL, Ogunlewe MO, Effiom OA, Omtila OG, et al. Primary malignant neoplasms of orofacial origin: A retrospective review of 256 cases in a Nigerian tertiary hospital. Int J Oral Maxillofac Surg 2007;36:403-8.
22. Chidzonga MM. Oral malignant neoplasia: A survey of 428 cases in two Zimbabwean hospitals. Oral Oncol 2006;42:177-83.
23. Sargeran K, Murtooma H, Safavi SM, Vehkalahti M, Teronen O. Malignant oral tumors in Iran: Ten-year analysis on patient and tumor characteristics of 1042 patients in Tehran. J Craniofac Surg 2006;17:1230-3.
24. Khan AR, Anwar N, Manan AH, Narayan KA. Case series analysis of oral cancer and their risk factors. Malaysia Dent J 2008;29:46-50.
25. Rawashdeh MA, Mataleka I. Malignant oral tumors in Jordanians, 1991-2001. A descriptive epidemiological study. Int J Maxillofac Surg 2004;33:183-8.
26. Ariyoshi Y, Shimahara M, Omura K, Yamamoto E, Mizuki H, Chiba H, et al. Epidemiological study of malignant tumors in the oral and maxillofacial region: Survey of member institutions of the Japanese Society of Oral and Maxillofacial Surgeons, 2002. Int J Oral Oncol 2008;13:220-6.
27. Howell RE, Wright BA, Dewar R. Trends in the incidence of oral cancer in Nova Scotia from 1983 to 1997. Oral Surg Oral Med Oral Pathol Oral Radiol...
28. Brandizzi D, Gandolfo M, Velazco ML, Cabrini RL, Lanfranchi HE. Clinical features and evolution of oral cancer: A study of 274 cases in Buenos Aires, Argentina. Med Oral Patol Oral Cir Bucal 2008;13:E544-8.

29. Fierro-Garibay C, Almendros-Marques N, Berini-Aytes L, Gay-Escoda C. Prevalence of biopsied oral lesions in a department of oral surgery. J Clin Exp Dent 2011;3:e73-7.

30. Johnson NW. Orofacial neoplasms: Global epidemiology, risk factors and recommendations for research. Int Dent J 1991;41:365-75.

31. Mohtasham N, Saghravanian N, Goli M, Kadeh H. Oral non squamous cell malignant tumors in an Iranian population: A 43 year evaluation. Asian Pac J Cancer Prev 2015;16:8215-20.