Spectrum of biopsied oral and maxillofacial lesions in a tertiary care hospital of Karachi, Pakistan

Syeda Hala Raza1, Sufyan Ahmed2, Maryam Zafar3

1-Postgraduate FCPS Resident, Department of Oral and Maxillofacial Surgery, Karachi Medical & Dental College & Abbasi Shaheed Hospital, Karachi, Pakistan. 2-Associate Professor, Department of Oral and Maxillofacial Surgery, Karachi Medical & Dental College, Abbasi Shaheed Hospital, Karachi, Pakistan.

Correspondence to: Dr Syeda Hala Raza, Email: halaraza@gmail.com

ABSTRACT

Objectives: The burden of benign and malignant maxillofacial lesions in developing countries has increased rapidly over the years. The objective of this study was to provide a spectrum of oral and maxillofacial lesions biopsied in a tertiary care hospital of Karachi, Pakistan and to contribute in baseline data of target population.

Patients and methods: This descriptive cross sectional study was made of biopsies performed in patients presenting to OPD of Oral and Maxillofacial Surgery Department, Abbasi Shaheed Hospital Karachi, Pakistan, between July 2018 till June 2020. A total of 652 patients belonging to either gender, 18-75 years of age, incisonal or excisional biopsy were included. Recurrent or previously diagnosed lesions and patients not willing to give informed consent were excluded. Data including age, gender, site and histopathological diagnosis was recorded on a performa. Descriptive statistical analysis was done using SPSS version 26.

Result: Out of 652 biopsies performed, (82.9%, n=641) belonged to soft tissues and (17.1%, n=111) were hard tissue lesions. The mean age of patients was 41.82 years, with a male to female ratio of 2.9:1. The most frequent sites biopsied were buccal mucosa (50.9%, n=332) and posterior mandible (10.6%, n=69). Oral squamous cell carcinoma (OSCC) (55.1%, n=359) was the most commonly reported soft tissue lesion with major involved sites buccal mucosa (74.4%, n=267), dentoalveolar mucosa (8%, n=29) and lateral border of tongue (7.2%, n=26) and for hard tissue the most common lesion was ameloblastoma of posterior mandible (3.5%, n=23).

Conclusion: This study provides useful information about distribution of oral and maxillofacial lesions and highlights OSCC as the single most frequent diagnosis involving a much younger male population.

Keywords

Biopsy, Maxillofacial lesions, Oral Squamous Cell Carcinoma, Tertiary care hospital

INTRODUCTION

A wide variety of lesions can develop in the oral and maxillofacial region, with diverse origins and heterogeneous characteristics, including both benign and malignant lesions. Performing a biopsy is one of the most important investigations in oral surgery. A biopsy shows the morphological characterization of the tissue and is considered to be the gold standard for obtaining a definitive diagnosis for many lesions. Although oral surgeons are very well versed in diagnosis of oral lesions but at times diagnosing a lesion can be challenging. Therefore, literature about prevalence of oral and maxillofacial lesions not only increases awareness of disease patterns within populations, but highlights the lesions that are most likely to be encountered in daily practice. Worldwide there have been few histological-based studies of oral and maxillofacial lesions that include a comprehensive spectrum both of oral lesions and patients of all ages. Majority of the published articles are designed to analyze only a specific lesion or disease, and limited to a certain age group or based on screenings or clinical surveys, without histological diagnostic confirmation. A 20-fold global variation in the incidence of these lesions is apparent in international databases. Two-thirds of the burden is within the developing world, where under-ascertainment of cases is significant. One previous study from Karachi reported 75% of oral and maxillofacial lesions as neoplastic and 25% non-neoplastic, with granuloma pyogenicum as commonest non neoplastic lesion (37.5%) and squamous cell carcinoma being commonest malignant neoplastic lesion (80%). The incidence of Oral Squamous Cell Carcinoma (OSCC) in Karachi is the highest reported worldwide. To enhance the quality of care provided it is also important to develop a pathology database at a single center as well as nation-wide of commonly occurring oral lesions in order to produce skilled and knowledgeable surgeons that can easily provide treatment of lesions considered rare according to international data. The aim of this study is to determine...
the frequency of biopsied oral and maxillofacial lesions, in population of a tertiary care hospital of Karachi Pakistan. The study will provide an important baseline data helpful in further management of lesions and for teaching purposes regarding the distribution of histologically diagnosed oral and maxillofacial lesions in target population.

**PATIENTS AND METHODS**

This descriptive cross-sectional study was carried out in a prospective manner for biopsies performed in patients presenting to Department of Oral and Maxillofacial Surgery Abbasi Shaheed Hospital / Karachi Medical and Dental College, Karachi Pakistan, between July 2018 till June 2020. During this period a total of 652 biopsies were performed. Inclusion criteria comprised of patients of either gender, aged 18 to 65 years, persistent lesion that cannot be clinically diagnosed, lesions with no identifiable cause that persist for more than 14 days despite local therapy and any lesion felt to have premalignant or malignant potential. Previously diagnosed or recurrent lesions and patients not willing to give informed consent were excluded from the study. Anterior maxilla is the part of maxilla extending from central incisor to canine region. Posterior Maxilla is part of maxilla extending from first premolar to maxillary tuberosity. Anterior mandible is the part of mandible extending from central incisor to canine region and posterior mandible is the part of mandible extending from first premolar up to condyle and coronoid process. Approval of the institutional ethical review committee was obtained. Incisional or excisional biopsy of the lesions under local or general anesthesia were performed by consultants and post graduate trainees for patients presenting at the Outpatient Department of Oral & Maxillofacial Surgery, Abbasi Shaheed Hospital / Karachi Medical and Dental College Karachi. The main presenting complaints were pain, swelling, ulcer, nodular growth and mobility of teeth. Informed consent was taken from each patient. Postoperatively patients were either admitted to ward or observed in O.P.D. Excised specimens were stored in biopsy bottle with 10% formalin and sent to laboratory with detailed history sheet for histopathological examination. Data including age, gender, anatomical site and histopathological diagnosis were recorded on a Performa. The descriptive statistical analysis of data obtained was performed to calculate frequency, percentages, means and cross tabulation between variables using SPSS version 26. The clinicopathological parameters i.e. histopathological diagnoses and anatomical site were compared for both genders using Chi square test. A p-value <0.05 was considered as statistically significant.

**RESULTS**

A total of 652 biopsies were performed. The mean age of patients was 41.8 years ±15.7, (range 18-75 years). In this study there was a marked male predominance (74.2%, n= 484) versus female (25.8 %, n=168). The male to female ratio was 2.9:1. A total of 652 (82.9%, n=541) of the biopsies corresponded to soft tissues whereas (17.1%, n=111) were from hard tissues. The most

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**Table 1. Anatomical site distribution of lesions percentages calculated out of a total 652 for both soft and hard tissues**

| Anatomical Site of lesion | Number of cases (n) | Percentage (%) | Type of lesion |
|--------------------------|--------------------|----------------|---------------|
| **Soft tissue**          |                    |                |               |
| Buccal mucosa            | 342                | 50.9           | 178           |
| M x dentoalveolar mucosa | 74                 | 11.2           | 32            |
| M x dentoalveolar mucosa | 11                 | 1.7            | 7             |
| Palatal mucosa           | 20                 | 3              | 8             |
| Retromolar trigone       | 30                 | 4.6            | 1             |
| Tongue                   | 5                  | 0.8            | 4             |
| Floor of mouth           | 10                 | 1.5            | 6             |
| Upper lip                | 5                  | 0.8            | 2             |
| Parotid gland            | 10                 | 1.6            | 7             |
| Submandibular gland      | 4                  | 0.6            | 3             |
| Minor glands (palatal mucosa) | 1   | 0.2           | 1             |
| Cheek                    | 11                 | 1.7            | 11            |
| Forehead                 | 1                  | 0.2            | 1             |
| **Hard tissue**          |                    |                |               |
| Anterior mandible        | 14                 | 2.2            | 1             |
| Posterior mandible       | 69                 | 10.6           | 68            |
| Anterior maxilla         | 18                 | 2.8            | 18            |
| Posterior maxilla        | 10                 | 1.5            | 10            |
| **Total**                | 652                | 100            | 288           |

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**Inclusion criteria**

- Patients presenting to Department of Oral and Maxillofacial Surgery Abbasi Shaheed Hospital / Karachi Medical and Dental College Karachi, between July 2018 till June 2020.
- Patients aged 18 to 65 years.
- Persistent lesions that cannot be clinically diagnosed.
- Lesions with no identifiable cause that persist for more than 14 days despite local therapy.
- Lesions felt to have premalignant or malignant potential.

**Exclusion criteria**

- Previously diagnosed or recurrent lesions.
- Patients not willing to give informed consent.
common anatomical site for soft tissue lesions was buccal mucosa (50.9%, n=332), followed by mandibular dentoalveolar mucosa (7.4%, n=48) and lower lip (5.8%, n=38). Most frequent site for hard tissue lesions was posterior mandible (10.6%, n=69) and anterior maxilla (2.8%, n=18) respectively. According to anatomical site the distribution of lesions is shown in Table 1. Total (59.2%, n=366) were incisional biopsies while (40.8%, n=266) were excisional biopsies. Forty seven different histopathological diagnoses were established.

Most of the soft tissue lesions were malignant (55.6%), and the most common was oral squamous cell carcinoma (55.1%, n=359). In a total of 359 analyzed lesions of OSCC (74.4%, n=267) were OSCC of buccal mucosa, more common on right side (39.5%, n=142) other involved sites in decreasing order of frequency include dentoalveolar mucosa (8%, n=29), lateral border of tongue (7.3%, n=26), retromolar trigone (3.3%, n=12), lower lip (3.3%, n=12), ventral surface of tongue(0.8%, n=3), upper lip (0.5%, n=2) and floor of the mouth (0.2%, n=1). Benign soft tissue lesions accounted for (27.2%, n=183), where (3.8%, n=25) were lobular capillary hemangioma (pyogenic granuloma) occurring mainly at dentoalveolar mucosa with a gender distribution of male (2.3%, n=15) and female (1.5%, n=10). (3.4%, n=22) were different types of fibrous hyperplasia, with predominant anatomical site buccal and dentoalveolar mucosa and more frequent in males (2%, n=13) than females (1.4%, n=9).

Pleomorphic adenoma was most common salivary gland tumor (1.2%, n=8) with a male predilection (0.9%, n=6) as compared to females (0.3%, n=2) and most common site was parotid gland. Few rare malignant neoplasms of salivary gland, odontogenic and mesenchymal origin were also observed. Table 2 shows the distribution of all soft tissue lesions.

As regards to the hard tissue lesions (17.1%, n=111) most common were ameloblastoma (3.5%, n=23), followed by odontogenic keratocyst (2.6%, n=17) both occurring in posterior mandible. Other hard tissue lesions and their distribution, according to gender, mean age and predominant location are presented in Table 3.

Table 2. Distribution of soft tissue lesions according to number, percentage, age, gender and predominant site

| Diagnosis                  | n (%)  | Age range | Mean age ± SD | Female | Male | Predominant site |
|----------------------------|--------|-----------|---------------|--------|------|-----------------|
| OSCC                       | 359 (55.1) | 23-75     | 46.62 ±12.80  | 74     | 285  | Buccal mucosa   |
| Mucoepidermoid Carcinoma   | 4 (0.6) | 20-57     | 42.75 ±16.87  | 1      | 3    | Parotid gland   |
| Acinic Cell Tumor          | 1 (0.2) | 70        | 70            | 0      | 1    | Parotid gland   |
| Salivary Lymphoma          | 1 (0.2) | 50        | 50            | 0      | 1    | Buccal mucosa   |
| Synovial Sarcoma           | 1 (0.2) | 21        | 21            | 1      | 0    | Buccal mucosa   |
| Lobular Capillary Hemangioma| 25 (3.8) | 18-75     | 34.88 ±18.04  | 10     | 15   | Dentoalveolar mucosa |
| Fibroepithelial Polyp/ Fibroma/ Epulis/ Peripheral Ossifying Fibroma | 22 (3.4) | 18-51     | 32.05 ±10.91  | 9      | 13   | Buccal mucosa, Dentoalveolar mucosa |
| Squamous Papilloma         | 9 (1.4) | 30-68     | 30.75 ±13.50  | 1      | 8    | Buccal mucosa   |
| Malignant                  |        |           |               |        |      |                 |
| Nerve sheath Dysplasia     | 1 (0.2) | 19        | 19            | 0      | 1    | Buccal mucosa   |
| Lipoma                     | 7 (1.1) | 23-72     | 45.75 ±20.21  | 2      | 5    | Buccal mucosa,Cheek |
| Gingival Hyperplasia       | 7 (1.1) | 19-75     | 37.14 ±19.77  | 2      | 5    | Dentoalveolar mucosa |
| Aphthous Ulcer             | 5 (0.7) | 32-62     | 49.20 ±11.17  | 1      | 4    | Buccal mucosa   |
| Dermoid Cyst               | 4 (0.6) | 23-42     | 31 ±8.21      | 0      | 4    | Cheek           |
| Giant Cell granuloma       | 3 (0.5) | 21-40     | 32.67 ±10.21  | 1      | 2    | Dentoalveolar mucosa |
| Sebaceous Cyst             | 3 (0.5) | 26-52     | 39.67 ±13.05  | 2      | 1    | Cheek           |
| Epidermal inclusion cyst   | 1 (0.2) | 19        | 19            | 0      | 1    | Buccal mucosa   |
| Pilomatrixoma              | 1 (0.2) | 20        | 20            | 0      | 1    | Buccal mucosa   |
| Cavernous Hemangioma       | 1 (0.2) | 24        | 24            | 0      | 1    | Cheek           |
| Neurotic Lymph node        | 1 (0.2) | 30        | 30            | 0      | 1    | Cheek           |
| Neuraoma                   | 1 (0.2) | 60        | 60            | 0      | 1    | Buccal mucosa   |
| Mucocele                   | 21 (3.2) | 18-43     | 23 ±6.59      | 6      | 15   | Lower Lip       |
| Pleomorphic Adenoma        | 8 (1.2) | 23-54     | 34.13 ±12.57  | 2      | 6    | Parotid gland   |
| Ranula                     | 2 (0.3) | 18-19     | 18.50 ±6.71   | 1      | 1    | Floor of mouth  |
| Syringadenitis             | 2 (0.3) | 42        | 42            | 0      | 2    | Submandibular gland |
| Total                      | 541 (82.9) | 18-75     | 44.37 ±14.77  | 127    | 414  |                 |

| Female | Male |
|--------|------|
| 41     | 205  |
| 20     | 225  |
| 12     | 125  |
| 0      | 2    |
| 0      | 1    |
| 3      | 8    |
| 2      | 1    |
| 5      | 5    |
| 4      | 4    |
| 9      | 9    |
| 0      | 0    |
| 1      | 1    |
| 8      | 8    |
| 1      | 1    |
| 0      | 0    |
| 1      | 1    |
| 2      | 2    |
| 1      | 1    |
| 2      | 2    |
| 1      | 1    |
| 3      | 3    |
| 5      | 5    |
| 6      | 6    |
| 2      | 2    |
| 3      | 3    |
| 1      | 1    |
| 2      | 2    |
| 1      | 1    |
| 0      | 0    |
| 1      | 1    |
| 2      | 2    |
| 1      | 1    |
| 0      | 0    |
| 1      | 1    |
| 0      | 0    |
| 1      | 1    |
| 2      | 2    |

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T he patients were divided into two groups according to gender (i.e. male and female) and stratified for clinicopathological features i.e. anatomical site and histopathological diagnosis. Both of the parameters showed statistical difference when compared with gender (p<0.002) and (p<0.001) respectively.

**DISCUSSION**

In this study, most patients 23.6% belonged to 4\textsuperscript{th} decade of life, followed by 5\textsuperscript{th} and 3\textsuperscript{rd} decades of life, which is in line with age distribution seen in other studies of our region.\textsuperscript{10,11} There was a higher incidence of biopsied lesions in males (74.2%, n=484) as compared to females (25.8%, n=168).

In this study OSCC forms the predominant type accounting for 55.1% of all lesions. Total (40.9%, n=267) was OSCC buccal mucosa with the most common subsite right buccal mucosa (21.7%, n=142) as compared to left side (19.1%, n=125). OSCC lateral border of tongue (4%, n=26) dentoalveolar mucosa (4.45%, n=29). One previous report supports these results in this region of the world.\textsuperscript{12} In present study maximum number of cases were detected in 31 to 40 years age group and the mean age at diagnosis was 46.6 years. Western literature and previous studies from Pakistan, report majority of cases age incidence to be 5\textsuperscript{th} decade of life.\textsuperscript{10,12,16} These findings suggest that with passing years not only the incidence of OSCC is increasing but alarmingly it is affecting a much younger population. In current study male to female ratio for OSCC was (3.9:1; 79.4% to 20.6%), similar to international research and other studies in Pakistan which show male predominance.\textsuperscript{10,13}

The most common soft tissue lesions were reactive lesions group, lobular capillary hemangioma (pyogenic granuloma) forming 3.8% of the biopsied lesions, next comes various types of fibrous hyperplasia 3.4% , all located mainly on dentoalveolar and buccal mucosa. Similar findings were reported in a study by Soyle and coworkers, in which most common lesions were pyogenic granuloma followed by fibrous hyperplasia.\textsuperscript{14} On the contrary, other authors reported that fibroepithelial polyps were the most commonly identified lesions as compared to pyogenic granuloma.\textsuperscript{1,15,16} Regarding mucosal lesions, the frequent types were proliferative verrucous leukoplakia 1.7% and leukoplakia 1.5% respectively. Leukoplakia was seen in males over 35 years of age. Previous studies also document leukoplakia to be more prevalent among other premalignant lesions.\textsuperscript{1,17} In this series third most common was squamous papilloma 1.4%. However, one study revealed a little different prevalence among mucosal lesions, squamous papilloma was more common as compared to leukoplakia.\textsuperscript{18}

Many studies have reported a high incidence of mucous retention cysts.\textsuperscript{19} In this study mucocele represented 3.2% of the biopsies reviewed. Literature shows pleomorphic adenoma as the commonest benign salivary gland tumor.\textsuperscript{15} In current study there were 1.2% cases of pleomorphic adenoma, mainly in parotid gland with a male to female ratio of 3:1. Most patients with pleomorphic adenoma belonged to 3\textsuperscript{rd} decade of life. These findings are quite similar to a study by Saleh et al which reported a slight male predilection of benign tumors, also in a younger age group.\textsuperscript{20} Malignancies of salivary gland in present study included mucoepidermoid carcinoma 0.6% and acinic cell tumor.
0.3%. Sialadenitis was 0.3% only seen in submandibular gland. Among hard tissue lesions 12.8% were located in mandible, while 4.3% were present in maxilla. The single most common odontogenic tumor was ameloblastoma, 32 cases in a total of 111 hard tissue lesions, of which 3.5% were solid multicystic ameloblastoma and 1.4% were unicystic ameloblastoma. It mostly affected males and was more common in the 3rd decade of life. In contrast a study conducted in Saudia Arabia, showed ameloblastoma to be more common in females.26 Various studies from Pakistan, Mexico, Japan, Nigeria, and Jordan suggest radicular cyst as the most common jaw cyst followed by dentigerous and O K C.21 This study reports slightly different figures; most frequent representative was odontogenic keratocyst 2.6% followed by radicular cyst 2.3 % and dentigerous cyst 1.2%. Other odontogenic tumors were rare including odontogenic ghost cell tumor. Another significant observation is the frequency of mucormycosis (1.7%), a serious invasive fungal infection in maxilla. Eleven out of 111 hard tissue lesions were diagnosed, this shows increased number of mucormycosis in target population. Similarly, according to a study in recent years there has been a rise globally in incidence of mucormycosis, but in the Asian continent it is reported to be highest.22 Only 4 cases of osteomyelitis (0.6%) with a mean age of 64.25 years and a female to male ratio of 3:1 were described in this study. These findings are consistent with studies worldwide.23

As this is a single centre study, the data in this study may not represent national epidemiology of oral and maxillofacial lesions. The pathological diagnoses are included from patients who underwent biopsy. Other cases with limited access to standard treatment, who did not undergo biopsy are missing in our study. It was not a very large population based study, but nevertheless it may help in monitoring disease patterns and changing trends. The data from this study may provide information regarding spectrum of common maxillofacial lesions for future research and planning.

**CONCLUSION**

This study provides information about distribution of oral and maxillofacial lesions and highlights OSCC as the single most frequent diagnosis involving a much younger male population. This data will be helpful for comparison with other countries.

**REFERENCES**

1. Monteiro LS, Albuquerque R, Paiva A, Peña M, oral J, Amaral JB, Lopes CA. A comparative analysis of oral and maxillofacial pathology over a 16-year period, in the north of Portugal. Int Dent J. 2017;67(1):38-45.
2. Ergun S, Özçel S, Koray M, Kürklü E, Ak G, Tanyeri H. Dentists’ knowledge and opinions about oral mucosal lesions. Int J Oral Maxillofac Surg. 2009;38(12):1283-8.
3. Mendez M, Carrard VC, Has A N, Lauzen ID, Barbachan JJ, Rados PV, et al. A 10-year study of specimens submitted to oral pathology laboratory analysis: lesion occurrence and demographic features. Braz Oral Res. 2012;26(3):235-41.
4. Pentenero M, Broccoli R, Carbone M, Conrotto D, Gandolfo S. The prevalence of oral mucosal lesions in adults from the Turin area. Oral Dis. 2008;14(4):356-66.
5. de Vasconcelos Carvalho M, Iglesias DP, do Nascimento GJ, Sobral AP. Epidemiological study of 534 biopsies of oral mucosal lesions in elderly Brazilian patients. Gerodontology. 2011;28(2):111-5.
6. Ha WN, Kelloway E, Dost F, Farah CS. A retrospective analysis of oral and maxillofacial pathology in an Australian paediatric population. Aust Dent J. 2014;59(2):221-5.
7. Shaftique S, Härder SM, Ali Z. Histological patterns and clinical presentation of oral squamous cell carcinoma. J Pak Dent Assoc. 2010;19(3):171-6.
8. Ariyawardana A, Johnson N W. Trends of lip, oral cavity and oropharyngeal cancers in Australia 1982-2008: overall good news but with rising rates in the oropharynx. BMC Cancer. 2013;13(1):333.
9. Swaminathan R, Rama R, Shanta V. Lack of active follow-up of cancer patients in Chennai, India: implications for population-based survival estimates. Bull World Health Organ. 2008;86(7):509-15.
10. Bukhari U, Sonia SA, Khohoro Y. Histopathological audit of oral epithelial lesions. Pakistan Oral & Dental Journal. 2014;34(3):457-61.
11. Bhurgri Y, Bhurgri A, Perez S, Bhurgri M, Kayani N, Ahmed R, et al. Cancer profile of Hyderabad, Pakistan 1998-2002. Asian Pac J Cancer Prev 2005; 6:474-80.
12. Akram S, Mirza T, Mirza MA, Qureshi M. Emerging patterns in clinicopathological spectrum of Oral Cancers. Pak J Med Sci. 2013;29(3):783-787.
13. Badar F, Mahmod S. Epidemiology of cancers in Lahore, Pakistan, among children, adolescents and adults, 2010–2012: a cross-sectional study part 2. BM J Open. 2017;7(12):1-15.
14. Soyele O O, Ladeji AM, Adebiyi KE, Adesina OM, Aborisade AO, et al. Pattern of distribution of reactive localised hyperplasia of the oral cavity in patients at a tertiary health institution in Nigeria. Afr Health Sci. 2019;19(1):1687-94.
15. Urooj A, Mirza T, Agha MA, Razool S. Frequency of head and neck lesions according to histopathologic diagnosis. J Dow Univ Health Sci. 2011;5(2):70-3.
16. Alhindawi NA, Sindi AM, Binmadi NO, Elias WY. A retrospective study of oral and maxillofacial pathology lesions diagnosed at the Faculty of Dentistry, King Abdulaziz University. Clin Cosmet Investig Dent Clinical. 2019;11:45.
17. Verma S, Sharma H. Prevalence of Oral mucosal lesions and their association with Pattern of tobacco use among patients visiting a dental institution. Indian J Dent Res 2019;30:652-5.
18. Totoricci S, Corrao S, N Atoli G, Difalco P. Prevalence and distribution of oral mucosal non-malignant lesions in the western Sicilian population. M inerva Stomatol. 2016;65(4):191-92.
19. Fierro C, Almendros Márqués N, Berini Aytes L, Gay Escoda C. Prevalence of biopsied oral lesions in a Department of Oral Surgery (2007-2009). J Clin Exp Dent 2011;3(2):e73-7.
20. Saleh SM, Idris AM, Vani NV, Tubaigy FM, Alharbi FA, et al. Retrospective analysis of biopsied oral and maxillofacial lesions in South-Western Saudi Arabia. Saudi Med J. 2017;38(4):405.

21. Awan MU, Babar A, Ibrahim MW. Pattern and presentation of odontogenic jaw cysts: A clinical experience. Pak Armed Forces Med J. 2017;67(1):102-06.

22. Prakash H, Chakrabarti A. Global epidemiology of mucormycosis. J Fungi (Basel). 2019;5(1):26.

23. Park MS, Eo MY, Myoung H, Kim SM, Lee JH. Early diagnosis of jaw osteomyelitis by easy digitalized panoramic analysis. Maxillofac Plast Reconstr Surg. 2019;41(1):6.