Available online at *www.ujpronline.com*
Universal Journal of Pharmaceutical Research
An International Peer Reviewed Journal
ISSN: 2831-5235 (Print); 2456-8058 (Electronic)
Copyright©2024; The Author(s): This is an open-access article distributed under the terms of the CC BY-NC 4.0 which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited

RESEARCH ARTICLE

AMELOBLASTOMA IN POPULATION OF YEMEN: ANALYZING THE PREVALENCE AND CLINIC PATHOLOGIC FEATURES OF AMELOBLASTOMA IN A YEMENI POPULATION

Samar Sultan Al-Thobhani[1], Sam Abd Alkarem Da'er[1], Khaled A AL-Haddad[4], Khaled Abdulkarim Al-Moyed[3], Taghreed Ahmed M Al-Kibsi[1], Hassan Abdulwahab Al-Shamahy[2,3]

[1]*Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Sana'a University, Republic of Yemen.*
[2]*Department of Basic Sciences, Faculty of Dentistry, Sana'a University, Republic of Yemen.*
[3]*Medical Microbiology and Clinical Immunology Department, Faculty of Medicine and Health Sciences, Sana'a University.*
[4]*Orthodontics, Pedodontics and Prevention Department Faculty of Dentistry, Sana'a University, Yemen.*

Article Info:

Article History:
Received: 20 July 2024
Reviewed: 6 September 2024
Accepted: 16 October 2024
Published: 15 November 2024

Cite this article:
Al-Thobhani SS, Da'er SAA, AL-Haddad KA, Al-Moyed KA, Al-Kibsi TAM, Al-Shamahy HA. Ameloblastoma in population of Yemen: Analyzing the prevalence and clinic pathologic features of ameloblastoma in a Yemeni population. Universal Journal of Pharmaceutical Research 2024; 9(5): 24-29.
http://doi.org/10.22270/ujpr.v9i5.1195

***Address for Correspondence:**
Dr. Hassan A. Al-Shamahy, Faculty of Medicine and Heath Sciences, Sana'a University, Yemen. Tel: +967-1-239551;
E-mail: *shmahe@yemen.net.ye*

Abstract

Background and aims: Ameloblastoma is an uncommon tumor of odontogenic epithelium (ameloblasts, or the outer part of the teeth during development) that can be benign or malignant. It usually appears in the lower jaw rather than the upper jaw. The initial ameloblastoma is often treated with radical tumor resection. Analyzing the prevalence and clinic pathologic features of ameloblastoma in a Yemeni population was the goal.
Material and Methods: This retrospective cross-sectional study was carried out in all patients who were diagnosed with oral tumors at the targeted centers in Sana'a city (Al-Mamoon Center, Central Laboratory, and Al-Awlqy Laboratory Centers) in the period June 2020 to June 2022. This study is based on data taken from patients's files that include age, gender, location, and histopathology. The study used descriptive statistics and SPSS version 26 for data analysis, describing quantitative non-parametric data using median and parametric data using mean and standard deviation.
Results: The ameloblastoma tumor prevalence was 8.8% of all oral tumors (330 cases). The mean age of the ameloblastoma patients was 31.10±11.4 (± SD) years and ranged from 11 to 80 years, with 1:1.2 males to females. The majority of ameloblastoma cases occurred in the lower jaw (93.1%; N=27), and the posterior part of the lower jaw was the main site for ameloblastoma tumors (79.3%; N=23), and 86.2%; N=23 of ameloblastoma was epithelial origin and 13.8%; N=4 was variegated origin. In terms of histological type, 65.5%; N=19 of the cases were not diagnosed, and the remaining cases showed a rate of 24.1%; N=7 for a multicystic tumor and 10.3%; N=3 for a unicystic tumor. 96.6%; N=28 of ameloblastoma cases were benign tumors, and only 3.4%; N=1 case was a malignant tumor.
Conclusions: The prevalence of ameloblastoma was significant, and these findings increase the awareness level of determent type of lesion for better diagnosis, management, and preventing measures.
Keywords: Ameloblastoma, odontogenic tumors, oral tumors prevalence, Yemen.

INTRODUCTION

Odontogenic tumors are defined as unique neoplasms exclusively of the jaw bones and oral mucosa, which are derived from odontogenic epithelial tissue and/or odontogenic ectomesenchymal tissue or both that constitute the tooth-forming apparatus[1].
Ameloblastoma (AB) is one of the most common types of odontogenic tumors[2,3]. It's distinguished by local invasiveness, tooth displacement, malocclusion, and pathological fracture, with a predisposition for gross facial deformity, a high rate of recurrence, incidental metastasis, and malignant transformation[4]. It comprised approximately 1% of all jaw tumors and 11% of odontogenic tumors (OT)[2,5,6]. Manifestation of AB is generally limited, and symptoms are nonspecific. They usually show a painless swelling of the involved region of the jaw. Pain is caused by ulceration in the relative soft tissue[7]. Predominating is detected by chance in radiographs taken for other reasons or during routine examination[8,9]. While displaying histological characteristics of benignity, this particular condition

exhibits infiltrative growth patterns that possess significant local destructive capabilities. As a consequence, it frequently obligates radical therapeutic interventions. This tumor can continue if they are not surgically removed to grow to reach massive dimensions[1]. The ideal surgical approach for treating AB should aim to minimize the tumor reoccurrence, restore both functional and aesthetic aspects, and result in minimal morbidity in the donor site if any. The planning of the surgical procedure should take into consideration the patient's underlying health conditions, the size and location of the tumor, the available techniques for reconstruction, and the surgeon's level of expertise[10]. There is limited knowledge regarding potential etiological factors; occasionally, AB is associated with follicular cysts, impacted teeth, and ectopic teeth[7]. Information derived from every individual particular with regards to their health-related sufferer by AB is required to be reformulated, which should include age, gender, location, size of tumor, histologic type, radiologic form, treatment of AB, reconstruction, and pre-operative and post-operative complications were collected from medical reports and reviewed and analyzed retrospectively[11]. According to the archives of the National Information Center Library in Yemen, many studies have been conducted on cancers in Yemen, including the correlation of the Epstein-Barr virus with breast cancer[12], bladder cancer[13], renal tumors[14], tumors and histological recognition in the operated patients[15], and the prevalence of parotid tumors[16], but there has been no study conducted in Yemen to investigate the prevalence of ameloblastoma (AB) among the Yemeni population.

Therefore, this study aimed to know the prevalence of ameloblastoma (AB) among oral cancer patients and its association with gender and age group, to determine the locations of tumors in the jaws, to study the origin of ameloblastoma, to determine the histological type of ameloblastoma (multicystic tumor/unicystic tumor) and whether it is a benign or malignant tumor.

MATERIALS AND METHODS

Study design: A retrospective study.

Study population: All case reports of patients with oral tumors (reports of biopsies) at the targeted centers in Sana'a city (Al-Mamoon Center, Central Laboratory, and Al-Awlaqy Lab Centers) during the period of the study (June 2020-June 2022). Those laboratory centers were selected as they considered the main laboratory centers in Yemen, where most pathological lesion biopsies were transmitted.

Study site: This study was carried out in Sana'a city.

Sample size: 330 case reports of oral tumors were found, 29 of which were ameloblastomas.

Inclusion criteria: All biopsy reports of cases diagnosed as oral tumors; all biopsy reports with complete data, including age, gender, anatomical location, and histopathological pattern; all biopsy reports received during the period of the study (June 2020-June 2022).

Exclusion criteria: All biopsy reports with incomplete data of the inclusion criteria, all biopsy reports of cases diagnosed with pathological condition other than oral tumor, all biopsy reports not received during the period of the study (June 2020-June 2022).

Data collection: All biopsy reports that met the inclusion criteria were collected. Data were collected in a data sheet (case sheet), including age, gender, anatomical location, and histopathological pattern. The data collection sheet was designed to have a methodological recording.

Statistical method: Data were described using suitable descriptive statistics. Data analysis was achieved using SPSS version 26. The data were described in as numbers and percents. The quantitative non-parametric data were reported by described in terms of mean and standard deviation (after utilizing Shapiroe-Wilk for testing normality). The threshold of significance was fixed at the 5% level. When $p \leq 0.05$, results were considered significant.

Ethical approval: Ethical approval was obtained from the Medical Ethics Committee of the Faculty of Dentistry, Sana'a University, reference number 6/2020, dated June 1, 2020, and all data, including the patient's identity, were kept confidential.

RESULTS

Oral tumor type distribution: The result of oral tumor type distribution showed that the largest number of patients were squamous cell carcinoma (SCC), with a total number of (N=111; 33.6%) of the total patients, followed by lymphoma with a total number of (N=41;12.4%). Ameloblastoma **(**AB) tumor was in third place with a total number of (N=29; 8.8%) of the total patients. The last group was with (Warthing's tumor), (lymphoma), and (clear cell carcinoma of odontogenic origin), with a total number of (N=1; 0.3%) of the total patients (Table 1).

Prevalence of ameloblastoma: The largest number of non-AB oral tumors was 91.2%; N=301, while the remaining 8.8%; N=29 were AB tumors. The malignant type of ameloblastoma was only (N=1; 0.5%), while N=211; 99.5% had other oral malignancies, of the total (212) patients with oral malignant tumors. The distribution result showed that the benign type of ameloblastoma was (N=28; 23.7%), while other benign tumors were in (N=90; 76.3%) of the total (118) patients with benign tumors (Table 2).

Gender distribution of AB cases: N=16; 55.2% of the AB cases were male, and the remaining (N=13; 44.8%) were females.

Age distribution of AB cases: The age ranged from 11 to 80 with a mean±SD of 31.10±11.4 years. Nine cases of AB were in the age group 21–30 years (31.0%), followed by the age group 31–40 years with (N=8 cases; 27.6%), and only (N=2 cases; 6.9) in the age group more than 50 years (Table 3).

Site distribution of AB cases: Most of the AB cases were in the mandible (N=27 cases, 93.1%) of the total AB cases, and only (N=2 cases;6.9%) were in the maxilla.

Table 1: Distribution of different oral tumors among Yemeni population attending to the main pathological diagnostic laboratory.

Tumor types	N (%)
Squamous cell carcinoma (SCC)*	111(33.6)
Lymphoma	41 (12.4)
Ameloblastoma (AB)	29 (8.8)
Odontogenic Fibroma	17 (5.2)
Pleomorphic adenoma	15 (4.5)
Spindle cell tumar	11 (3.3)
Giant cell grannloma	8 (2.4)
Round cell tumor	8 (2.4)
Fibro osseons	8 (2.4)
Malignant undifferentiated tumor	8 (2.4)
Pyogenic Granuloma	7 (2.1)
Verrucons carcinoma *	7 (2.1)
Adenoid cystic carcinoma*	7 (2.1)
Basal cell carcinoma*	7 (2.1)
Fibro myxomatous tumor	5 (1.5)
Lipoma	5 (1.5)
Papilloma	5 (1.5)
Capillary hemangioma benigh	5 (1.5)
Lymphangioma	5 (1.5)
Cemento-ossifying fibroma	4 (1.2)
Mucoepidermoid carcinoma*	4 (1.2)
Odontogenic Myxoma	3 (0.9)
Wing sarcoma*	3 (0.9)
Osteosarcoma*	2 (0.6)
Osteoma	2 (0.6)
Warthing tumor	1 (0.3)
Paraganglioma	1 (0.3)
Clear cell odontogenic carcinoma*	1 (0.3)
Total	330 (100)

*Malignant

The origin distribution of AB: Most of the AB tumors originated from the epithelial tissue (N=25 cases, 86.2%), while (N=4 cases; 13.8%) of AB were mixed originated tissue.

AB histological feature: The result of the AB histology feature illustrated in Table 4. The greatest number of the AB cases was in (Unk) with a total number of (N=19; 65.5%), followed by solid multicystic (N=7 cases; 24.1%) of the total cases, while follicular and plaxiform were less frequent (N=3 cases, 10.3% for each one). Unicystic feature present in (N=3 cases;10.3%), mural and luminal in (N=1 case; 3.4%) for each feature (Table 4).

Site of AB in mandible: The result of the site of AB in mandible was that most of AB was in the posterior region of the mandible (body-Ramus-Post-Angle) with (N=23; 79.3%), while Ant only represents (N=2; 6.9%) cases. Body site occurred in (N=10 cases; 34.5%). Also, Ramus site of AB occurred in (N=7 cases; 24.1%) and Post site occurred in (N=5 cases; 17.2%), while (N=4 cases; 13.8%) site occurred in unk. The last site was angle, which occurred in (N=1 case; 3.4%) of the total patients (Table 5).

Behavior of AB: The greatest number of AB tumors was benign, counting (N=28 cases; 96.6%); malignant AB tumors occurred only in (N=1 case:3.4%) of the total 29 patients.

DISCUSSION

One of the most prevalent odontogenic epithelial tumors, AB can exhibit a variety of biological characteristics, including simple cystic expansion, malignant transformation, and aggressive solid masses with a high risk of recurrence and local invasiveness. The AB continues to be a hotly debated topic due to its extreme biologic behavior. The purpose of the current investigation was to ascertain the prevalence of AB in Yemeni society. There were two primary factors that went into choosing this topic: First, the National Information Center Library's archive in Yemen indicates that no prior research on the same topic has been done among Yemenis.

Table 2: Prevalence of ameloblastoma among oral tumors and Odontogenic tumors.

Oral tumors	N (%)
AB	**29 (8.8)**
Others	301 (91.2)
Total	330 (100)
Malignant tumors	
AC	1 (0.5)
Others	211 (99.5)
Total	212 (100)
Benign tumors	
AB	**28(23.7)**
Others	90 (76.3)
Total	118 (100)

Odontogenic tumors	N (%)
Ameloblastoma (AB)	25 (42.4)
Odontogenic Fibroma	17 (28.8)
Fibro myxomatous tumor	5 (8.5)
Cemento-ossifying fibroma	4 (6.8)
Odontogenic Myxoma	3 (5.1)
AB Fibroma	3 (5.1)
Clear cell odontogenic carcinoma	1 (1.7)
AB fibroma odontoma	1 (1.7)
Total	59 (100)

In addition, the lesion linked to impacted teeth is more common in our social circles. Research on this potentially fatal lesion is necessary to determine its severity and possible asymptomatic characteristics. The study's second goal is to distinguish between the lesions that affect Yemeni patients and the incidence of AB in those patients based on factors such as age, gender, location, and histology. As a result, this study conducted independent research (in Yemen) with the goal of creating a database of oral and maxillofacial surgery and comparing the information with numerous reports from other parts of the globe.

Table 2 of the current study shows that the prevalence of ameloblastoma (AB), which accounts for 42.4% of odontogenic tumors (OT), was 8.8% of tumors involving the maxillofacial region. 8.8% of AB out of all oral cancers fall into the previously observed range of 1–18% as reported by Siar *et al.*[17], in the Malaysian population and by Valente Pires *et al.*[18], in Barazil. With a frequency of 42.4% of epithelial AB and 49.2%

of all AB, ameloblastoma was found to be the most common odontogenic tumor in the current investigation.

Table 3: Distribution of different age groups of ameloblastoma patients.

Age	N (%)
1 - 10 years	0 (0.0)
11 - 20 years	5 (17.2)
21 - 30 years	9 (31)
31 - 40 years	8 (27.6)
41 - 50 years	5 (17.2)
More than 50 years	2 (6.9)
Total	29 (100)

These findings are consistent with previous reports[19,20]. Nonetheless, Taher *et al.*[21], found a lower prevalence (34.6%) of AB among odontogenic malignancies. Furthermore, 16.30% of AB to odontogenic tumors were found in the Barazil investigation[18]. According to reports, AB is more common in Nigeria and accounts for 63% of all OT in Southwest Nigeria. Adebayo *et al.*[22], conducted a five-year retrospective assessment in North-West Nigeria and discovered that 73% of all odontogenic tumors were AB[22]. With a little male predilection, the gender distribution of the patients was sixteen men (55.2%) and thirteen girls (44.8%), or a ratio of 1.2:1. These results corroborate those of another investigation[7,23,24] that discovered a male with modest predominants by ratio 1.2:1. On the other hand, Chae *et al.*[25], reported that the female tendency was (2,67:1). But according to most writers[2,6,9,26-29] there was no sex predominance.

The age range of participants in the current study was 11–80 years. The second decade (31%) and the third decade (27.6%) had the highest prevalence of AB. According to Siar *et al.*[17], the Malaysian patients showed the highest in the second decade, which is comparable to our finding. Numerous research[6,9,23,26,29-31] that documented the peak age of AB incidence in the third decade of life were similar to our study. Zaidi *et al.*[2], reported a rise in peak incidence to the fourth decade. It is important to note that Hendra *et al.*[27], looked into the prevalence of AB worldwide.

Table 4: Distribution of ameloblastoma by histological feature.

	AB histology feature	N (%)	Total N (%)
Multicystic 7(24.1%)	Follicular	3 (10.3)	7 (24.1)
	Plexiform	3 (10.3)	
Unicystic 3(10.3%)	Mural	1 (3.4)	3 (10.3)
	Luminal	1 (3.4)	
	Unk	19 (65.5)	19 (65.5)
	Total	29 (100)	29 (100)

According to Hendra *et al.*[27], the incidence peaked in Europe and North America between the fifth and sixth decades, whereas it was lowest in Africa and South America during the third decade. Socioeconomic factors may be the cause of these variations in peak occurrence, as noted by Reichart *et al.*[32], in developing nations, AB tends to occur at a younger age, accelerated aging due to malnutrition, and challenges in accessing the healthcare system, all of which affect peak occurrence. Regarding the anatomical position of AB, where AB in the mandible 93.1% outweighed those in the maxilla 6.9% and posterior of the jaw (body 34.5%, Ramus 24.1%, posterior area 17.2%, and angle 3.4%), this study showed commonalities with most prior investigations. As shown in Table 4[6,9,29,30,33,34], the total (79.3%) is more than the anterior of the mandible (6.9%).

Table 5: Location of AB tumors in mandible.

Location in mandible		N (%)	Total N (%)
Ant		2 (6.9)	2 (6.9)
Post	Body	10 (34.5)	23 (79.3)
	Ramus	7 (24.1)	
	Post	5 (17.2)	
	Angle	1 (3.4)	
Unknown		4 (13.8)	4 (13.8)
Total		29 (100)	29 (100)

The maxilla is most commonly affected in the mandible, with all cases (6.9%) finding in the posterior region and none in the anterior, which may be due to the previously mentioned small sample size. The primary lesion in the current investigation was epithelial origin, with the majority of research (86.2%) pointing to similar findings[35] citing a small number of mixed lesion instances without any meaningful analysis. Regretfully, the majority of biopsy reports (65.5%) did not include information regarding the histological characteristics or the type of AB. Nonetheless, it was discovered that the conventional/ multicystic type (24.1%) had the highest number among the remaining reports (34.5%), followed by the unicystic type (10.3%).

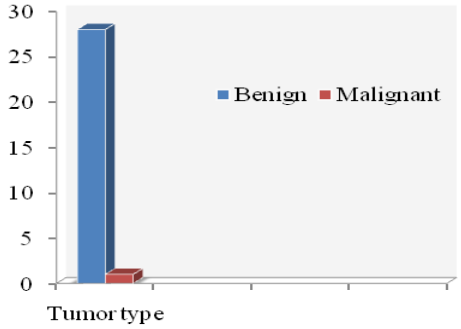

Figure 1: The distribution of AB according to behavior (benign/malignant).

The most common types were plexiform (10.3%) and follicular (10.3%), followed by mural (3.4%) and luminal (3.4%). This result is consistent with the findings of other investigations[25-27,30,31,36-38]. While the predominant site of AB was the posterior region, which was thought to be the right or left side, the lesion site in the current study, which was located in the mandible, was localized in the posterior region (body, ramus, and angle), which is identical with most studies[7,27]. Only one case of amelobastic carcinoma (AC), a malignant kind of lesion, was found in this investigation (3.4%); yet, as previously described[27], the benign variety predominates with the greatest number of cases. Remarkable: a male patient's front mandibular region was the site of an exclusive case of malignant AB in the fifth decade. However, this result can be flawed since the MA was misdiagnosed; a CT scan requires additional testing to identify this. Additionally, the patient in the second decade experienced one case recurrence four times over the course of seven years, with the location being in the mandibular, in contrast to Liu *et al.*[39], who reported the existence of recurring 17.2% of the total 1626 cases.

Limitation of the study

The fact that the current study is retrospective in nature and that medical records sometimes, if at all, do not adequately record factors even in situations that could be described is one of its main weaknesses. It is difficult to interpret results using historical data since it is impossible to know for sure if the patients being diagnosed are typical of all (seemingly) comparable individuals. Retrospective studies continue to have a number of significant drawbacks, such as inadequate recording, missing data, and incomplete or absent documentation, but as a methodology, they still have a number of benefits.

CONCLUSIONS

The prevalence of ameloblastoma (AB) in the Yemeni population is as follows: ameloblastoma constitutes 8.8% of all oral tumors, 23.7% of benign tumors, 49.2% of dental tumors, and 0.5% of malignant cancers. Melanoma was found to be most common in the second and third decades of life; the mandible was the most common site of ameloblastoma, accounting for 93.1% of cases. The most common histological types of ameloblastoma were follicular and plexiform variants.

ACKNOWLEDGEMENTS

The authors would like to thank Yemen and the Faculty of Dentistry at Sana'a University for their kind cooperation.

DATA AVAILABILITY

The accompanying author can provide the empirical data that were utilized to support the study's conclusions upon request.

AUTHOR'S CONTRIBUTIONS

Al-Thobhani SS: Writing the original draft, methodology, investigation. **Da'er SAA:** Conceptualization**. AL-Haddad KA:** Writing, review and editing, **Al-Moyed KA:** Formal analysis, data processing. **Al-Kibsi TAM, Al-Shamahy HA:** Formal analysis, data processing, conceptualization. Final article was checked and approved by all authors.

CONFLICT OF INTEREST

There are no conflicts of interest in regard to this project.

REFERENCES

1. Qiao X, Niu X, Liu J, Chen L, Guo Y, Zhong M. Pathogenesis and characteristics of large ameloblastoma of the jaw: A report of two rare cases. J Int Med Res 2021 May; 49(5):3000605211014803. *https://doi.org/10.1177/03000605211014803*
2. Zaidi A, Srinivasan R, Rajwanshi A, Dey P, Gupta K. Ameloblastoma diagnosis by fine-needle aspiration cytology supplemented by cell block samples. Diagn Cytopathol 2021 Mar;49(3):E93-E98. *https://doi.org/10.1002/dc.24600*
3. You Z, Sun L, Yan X, Zhang J, Du J, Li T, Zhao H. Clinicopathologic study on a rare variant of ameloblastoma with basal cell features. Oral Dis 2019 Apr; 25(3):788-795. *https://doi.org/10.1111/odi.13018*
4. Adisa AO, Osayomi T, Effiom OA *et al*. A geographical analysis of ethnic distribution of jaw ameloblastoma in Nigerians. Afr Health Sci 2019; 19: 1677-1686. *https://doi.org/10.4314/ahs.v19i1.44*
5. Seno S, Kitajima K, Inokuchi G, *et al*. FDG-PET findings of Ameloblastoma: a case report. Springerplus. 2015 Jun 11; 4:250. *https://doi.org/10.1186/s40064-015-0998-3*
6. Yang R, Liu Z, Peng C, Cao W, Ji T. Maxillary ameloblastoma: Factors associated with risk of recurrence. Head Neck 2017 May;39(5):996-1000. *https://doi.org/10.1002/hed.24720*
7. Kreppel M, Zöller J. Ameloblastoma-clinical, radiological, and therapeutic findings. Oral Dis 2018 Mar;24(1-2):63-66. *https://doi.org/10.1111/odi.12702*
8. Abdalla-Aslan R, Friedlander-Barenboim S, Aframian DJ, Maly A, Nadler C. Ameloblastoma incidentally detected in cone-beam computed tomography sialography: A case report and review of the literature. J Am Dent Assoc 2018 Dec; 149(12):1073-1080. *https://doi.org/10.1016/j.adaj.2018.09.003*
9. Bonitz L, Chhatwani S, Hassfeld S, *et al*. Complex treatment of huge, massive growing ameloblastoma in teenage, a case report. Oral and Maxillofacial Surgery Cases 2021; 7, 100226 *https://doi.org/10.1016/j.omsc.2021.100226*
10. Neagu D, Escuder-de la Torre O, Vázquez-Mahía I, *et al*. Surgical management of ameloblastoma. Review of literature. J Clin Exp Dent 2019 Jan 1;11(1):e70-e75. *https://doi.org/10.4317/jced.55452*
11. Ruslin M, Hendra FN, Vojdani A, *et al*. The Epidemiology, treatment, and complication of ameloblastoma in East-Indonesia: 6 years retrospective study. Med Oral Patol Oral Cir Bucal. 2018 Jan 1;23(1):e54-e58. *https://doi.org/10.4317/medoral.22185*
12. Al-Shiabani RK, Al-Jaufy AY, Al-Moyed KA, Al-Shamahy HA. Correlation of epstein-barr virus with breast cancer: A case control study. Universal J Pharm Res 2024; 9 (1):1-6. *https://doi.org/10.22270/ujpr.v9i1.1063*
13. Okbah AA, Al-Ankoshy AAM, Al-Shamahy HA. Bladder cancer: Differentiation of types, age, sex distribution and

associated variants with gradation. Universal J Pharm Res 2022; 6 (6): 1-8. *https://doi.org/10.22270/ujpr.v6i6.701*

14. Okbah AA, Al-Shamahy HA, Al-Shamahi EH, Al-Ankoshy AAM. Renal lesions: Differentiation of malignant and benign tumors, sex and age distribution and variables associated with renal cell carcinoma. Universal J Pharm Res 2022; 7(2):1-8. *https://doi.org/10.22270/ujpr.v7i2.754*
15. El-Zine MAY, Ali MAA, Al-Shamahy HA. Prevalence of cns tumors and histological recognition in the operated patients: 10 years experience in Yemen. Universal J Pharm Res 2021; 6(2): 1-8. *https://doi.org/10.22270/ujpr.v6i2.563*
16. Al-Kibsi TAM, Qirshi HGMAA, Al-Shamahy HA. Prevalence of parotid tumors among Yemeni patients in Sana'a city, Yemen. Universal J Pharm Res 2024; 9(4): 1-6. *https://doi.org/10.22270/ujpr.v9i4.1156*
17. Siar CH, Ng KH. Epithelial-to-mesenchymal transition in ameloblastoma: focus on morphologically evident mesenchymal phenotypic transition. Pathol 2019 Aug;51(5):494-501. *https://doi.org/10.1016/j.pathol.2019.04.004*
18. Valente pires AL, Nascimento ISB, Assis AL, *et al*. Prevalence of tumours of the maxillomandibular complex diagnosed in a reference center in Brazil. Brazilian J Oral Sci 2021; 20, e211817. *https://doi.org/10.20396/bjos.v20i00.8661817*
19. Jaya Singh, Shruti Singh, Shaleen Chandra, Fahad M. Samadi. Prevalence and distribution of odontogenic cysts and tumors in north indian population: A database study with systematic review. Int J App Biol Pharm Technol 2020; 11: 46-59.
20. Mehngi R, Rajendra K, Bhagwat P, Hegde SS, Sah D, Rathod VS. Clinical and histopathological analysis of odontogenic tumors in Institution-A 10 years retrospective study. J Contemp Dent Pract. 2018 Oct 1; 19(10):1288-1292. PMID: 30498188.
21. Taher SR, Hassan NE, El sheikh SM, El Dibany RMJAD. A clinicopathological study of orofacial swellings (a prospective study) 2016; 41, 299-305
22. Adebayo ET, Ajike SO, Adekeye EO. A review of 318 odontogenic tumors in Kaduna, Nigeria. J Oral Maxillofac Surg 2005 Jun; 63(6):811-9. *https://doi.org/10.1016/j.joms.2004.03.022*
23. Carvalho KM, Dhupar A, Spadigam A, Syed S. Ameloblastoma: A 16-year clinicopathological study on Goan population. Indian J Pathol Microbiol 2017 Apr-Jun;60(2):157-160. *https://doi.org/10.4103/0377-4929.208374*
24. GHAZI OM J B DS. Frequency of central odontogenic tumors: a retrospective study in an Iraqi population utilizing 2022 WHO head and neck tumors classification. Brazilain dental Sciences 2023; 27 (4): 1-6. *https://doi.org/10.4322/bds.2023.e3645*
25. Chae MP, Smoll NR, Hunter-Smith DJ, Rozen WM. Establishing the natural history and growth rate of ameloblastoma with implications for management: systematic review and meta-analysis. PLoS One 2015 Feb 23; 10(2):e0117241. *https://doi.org/10.1371/journal.pone.0117241*
26. Intapa C. Analysis of prevalence and clinical features of ameloblastoma and its histopathological subtypes in southeast myanmar and lower Northern Thailand populations: A 13-year retrospective study. J Clin Diagn Res. 2017 Jan; 11(1):ZC102-ZC106. *https://doi.org/10.7860/JCDR/2017/23629.9295*
27. Hendra FN, Van Cann EM, Helder MN, *et al*. Global incidence and profile of ameloblastoma: A systematic review and meta-analysis. Oral Dis 2020 Jan;26(1):12-21. *https://doi.org/10.1111/odi.13031*
28. Medina A, Velasco Martinez I, McIntyre B, Chandran R. Ameloblastoma: clinical presentation, multidisciplinary management and outcome. Case Reports Plast Surg Hand Surg 2021 Feb 22;8(1):27-36. *https://doi.org/10.1080/23320885.2021.1886854*
29. Jayasooriya PR, Abeyasinghe WAMUL, Liyanage RLPR, Uthpali GN, Tilakaratne WM. Diagnostic enigma of adenoid ameloblastoma: literature review based evidence to consider it as a new sub type of ameloblastoma. Head Neck Pathol 2022 Jun;16(2):344-352. *https://doi.org/10.1007/s12105-021-01358-w*
30. Evangelou Z, Zarachi A, Dumollard JM, *et al*. Maxillary ameloblastoma: A review with clinical, histological and prognostic data of a rare tumor. *In vivo* 2020 Sep-Oct;34(5):2249-2258. *https://doi.org/10.21873/invivo.12035*
31. Patsa S, Jadav RB, Halder GC, Ray JG, Datta S, Deb T. Demographic and histopathological variation of ameloblastoma: A hospital-based study. J Oral Maxillofac Pathol. 2016 May-Aug;20(2):230-3. *https://doi.org/10.4103/0973-029X.185937*
32. Reichart PA, Philipsen HP, Sonner S. Ameloblastoma: biological profile of 3677 cases. Eur J Cancer B Oral Oncol. 1995 Mar;31B(2):86-99. *https://doi.org/10.1016/0964-1955(94)00037-5*
33. Barrett AW, Sneddon KJ, Tighe JV, *et al*. Dentigerous Cyst and Ameloblastoma of the Jaws. Int J Surg Pathol. 2017 Apr;25(2):141-147. *https://doi.org/10.1177/1066896916666319*
34. Shi HA, Ng CWB, Kwa CT, Sim QXC. Ameloblastoma: A succinct review of the classification, genetic understanding and novel molecular targeted therapies. Surgeon 2021 Aug; 19(4):238-243. *https://doi.org/10.1016/j.surge.2020.06.009*
35. Raj A, Ramesh G, Nagarajappa R, Pandey A, Raj A. Prevalence of odontogenic lesions among the Kanpur population: an institutional study. J Exp Ther Oncol 2017 May;12(1):35-42. PMID: 28472562.
36. Ghai S. Ameloblastoma: An updated narrative review of an enigmatic tumor. Cureus 2022 Aug 6; 14(8):e27734. *https://doi.org/10.7759/cureus.27734*
37. Siar CH, Lau SH, Ng KH. Ameloblastoma of the jaws: A retrospective analysis of 340 cases in a Malaysian population. J Oral Maxillofac Surg 2012 Mar;70(3):608-15. *https://doi.org/10.1016/j.joms.2011.02.039*
38. Giraddi GB, Arora K, Saifi AM. Ameloblastoma: A retrospective analysis of 31 cases. J Oral Biol Craniofac Res 2017 Sep-Dec;7(3):206-211. *https://doi.org/10.1016/j.jobcr.2017.08.007*
39. Liu W, Zheng C, Zhang X, Hu H. Recurrence and malignant risk of ameloblastoma: A demographic study of 1626 cases from east China. Oral Oncol 2024 Jan; 148:106651. *https://doi.org/10.1016/j.oraloncology.2023.106651*