Original Article

Clinicoradiographical Features of Jaw Bone Lesions in a Group of Patients Attended Two Maxillofacial Centers in Sulaimani City

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Abstract

Objectives: This study aims to determine the distribution, clinical and radiographic features of different jaw lesions.

Methods: A descriptive study included 110 cases of jaw bone lesions collected along seven years from two major maxillofacial centers in Sulaimani governorate-Iraq.

Results: The sample predominated by males (59.1%), male to female ratio of 1.4:1., the most affected age group 21-40 years (40.9%), the most common presenting sign was swelling (74.5%) besides, the swelling was the most common chief complain (with pain 30%; or without pain 59.1%). Systemic symptoms like fever and weight loss were present in only four patients (3.6%). One-third of cases (33.6%) presented for the 2-12months duration. The mandible was affected in 56.4% of cases. Regarding the radiographic features, 80% of lesions were ≤5cm in maximum dimension, 69.1% of the lesions were radiolucent. Ill or well-defined borders were equally presented (47.3%). 39.9% of lesions related to the teeth (root apices, impactions, displacement, and resorption). Concerning the diagnosis, 48.2% of the lesions were diagnosed as a cyst, followed by tumors 29.1%.

Conclusions: Jaw lesions of different origins can share the same clinical and radiographic features; dental professionals should have information about the most common lesions to guide them toward proper investigations and management.

Keywords: *Cyst, Jaw bone, Lesions, Non-odontogenic, Odontogenic.*

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Introduction

Jaw lesions comprise diverse and extensive pathologies. Their classifications can be based on pathology (diagnosis), site, radiographic appearance, and origin. The best approach to understand the complex overlapping pathologies perceives all of the above classifications[1]. Patients with jaw lesions may present with nearly similar signs and symptoms of pain during mastication, swelling (painful or painless), tooth mobility, facial asymmetry, and sinus problems[2,3]. Some other lesions are asymptomatic and diagnosed by chance[2].

Due to the presence of an enormous number of physiologic, developmental, and pathologic alterations, the principal part of the dental practice is diagnosing a wide variety of lesions to ensure proper treatment[2]. An essential component in the diagnosis is knowledge of the disease rate[2]. Taking a pertinent case history, performing proper chair-side physical examinations, and inter-connection with radiographical findings are of great importance in making a diagnosis[4]. In some cases, diagnosis depends on clinical symptoms. However, in other instances, clinical outcomes are noncontributory as the lesion cannot be seen or palpated clinically despite that thorough clinical examination is obligatory in all cases. Imaging is crucial for a proper treatment plan and observing treatment response[2].

Radiographs play a significant role; on the one hand, they enable dental professionals to detect conditions that cannot be seen clinically and find many lesions that could otherwise go undetected. On the other hand, they give essential information about teeth and supporting jaw bones[5]. Many jaw lesions have an identical radiographical appearance, which makes it difficult to differentiate among them. For this reason, interconnecting patient's history, clinical examination, and radiographic features can help in narrowing the differential diagnosis, which further affects reaching a proper diagnosis and providing quality treatment to the patients[2,5]. Important details of hard tissue can be obtained from intraoral radiographs; however, small-sized films make it challenging for lesions larger than 3cm. Therefore, for evaluating larger lesions and assessing the facial and skull structures, extra-oral radiographs (Orthopantomograph, Cone beam-computed tomography, computed tomography) are used. These techniques are useful for providing information within the bone but not soft tissue[4].

Orthopantomograph (OPG) has the advantages of low radiation exposure to the patient; a wide area of facial bone and teeth can be visualized and has a lower cost than Cone-beam computed tomography (CBCT) and computed tomography (CT). On the other hand, CBCT is a useful imaging technique that enables volumetric visualization of the maxillofacial region's osseous structures at lower radiation doses and costs than CT. Furthermore, it is indicated to determine and diagnose a wide variety of infections, osteomyelitis, cysts, benign, malignant tumors, and trauma in the maxillofacial region despite a high radiation dose and costly for the patient[6].

The study is conducted to determine the main demographical and radiological presentation of different jaw bone lesions in patients attending Maxillofacial Centers in Shar and Teaching hospitals in Sulaimani city over seven years, and to compare the findings with other national and international studies.

Patients and Methods

This study is a descriptive retrospective-prospective study. The retrospective part included all patients whose radiographs and case history could be retrieved from 2013 to 2018. The prospective included new cases of jaw lesions attended the two mentioned hospitals in 2019. The study was reviewed and approved by the Ethics Committee of the Kurdistan Board for Medical Specialties. Permission was taken from the hospital to take documented files, written informed consent was taken from patients. Patients who have no radiographs for clinically apparent jaw lesions were excluded.

Reported data included: Demographic data (age, sex, occupation of the patients), and clinical presentations with signs and symptoms as oral (swelling, pain, ulcer, exposed bone, asymmetry, inability to chew, etc.), systemic (fever, malaise, weight loss) and radiographs (periapical, OPG, CBCT, CT). Characteristics of jaw lesions assessed according to; anatomical site, border, density, extension (size was written either on reports or the images), relation to the teeth, and associated anatomical structures besides the differential diagnosis. The clinical and final histopathological diagnosis was also reported.

The clinical examinations were collected from the archived reports written by board candidates and maxillofacial surgeons.

Statistical analysis

Data were tabulated in excel sheets. The statistical study was performed by the SPSS software package (version 16.0). Tables illustrated frequency distribution, percentages, and relations of studied parameters. The relation between age, sex, duration, size, density, location, and symptoms were examined by the Chi-square test and Spearman's correlation. Statistical significance was defined as p-value < 0.05.

Results

This sample included 110 Cases, 65 (59.1%) male, and 45(40.9%) female with a male to female ratio of 1.4:1. The most affected age group was (21-40) years constituting 40.9% of the total sample, mainly males. The least registered group was above 60 years (n= 12, 10.9%). One-third of cases (33.6%) were presented after two months to one year, and the other third, 32.8%, presented within less than a month (7.3% within one week and 26.3% within one month) (Table 1).

The majority of patients were unemployed (63.6%). The most common complaint of patients having bone lesions was swelling (n= 65, 59.1%, figure 1 A, and B), mainly in males, followed by pain (with or without swelling; n= 33, 30%) mostly in females. Concerning sign, swelling predominated by (74.5%, Figure 1), followed by bone lesions with non-detectable signs and symptoms (15.5%). Cervical lymph node enlargement and associated systemic symptoms each constituted 3.6% of cases (Table 1).

Intraosseous lesions were slightly more frequent in the mandible and at the posterior region of both jaws. Two cases showed lesions in both upper and lower jaws (Table 2). From the radiographic point of view, changes presented more frequently as radiolucent (69.1%, figure 2 A-F), only 6.4% showing completely radiopaque changes (Figure-2I), and the remaining lesions were mixed (Figure 2, G-H). There was an equal frequency to see small lesions (<20mm, Figure 2 B) and lesions measuring (21-50mm, Figure 2C-F), each presented in 40%, and only 18.2% lesions were larger than 50mm (Figure 2A). Similarly, the well or ill-defined borders of the pathological lesion showed a similar percentage (47.3%) (Table 2). Regarding the radiographic imaging technique, almost half of the cases (46.4%) were assessed by OPG, and CBCT assessed CT assessed the other 22.7% of cases and 8.2%. Only 4.5% of cases were observed with a periapical radiograph. As for the relation between the lesion and anatomical structures, it was found 31.8% of them were not related, whereas 22.7% of cases lesions associated with the apex of the roots (Figure 2), followed by cortical bone destruction and impaction (10.9% and 10% respectively). The maxillary sinus association was more than mandibular canal involvement (7.35 vs. 5.5%) (Table 2).

Regarding the histopathology, lesions were diagnosed as a cyst (48.2%, Table 2). The inflammatory odontogenic cysts had the highest occurrence rate (30%). It is followed by developmental odontogenic cysts (14.4%) and, to a lesser extent, by non-odontogenic cyst (1.8%, nasopalatine duct cyst). The odontogenic tumor (ameloblastoma and calcifying epithelial odontogenic tumor) observed in 13.6%, and other tumors accounted (15.5%). There remaining (22.7%) included other lesions (fibro-osseous lesions, traumatic bone cyst, aneurysmal bone cyst, and other conditions (Bisphosphonate related jaw necrosis, Squamous cell carcinoma, osteomyelitis, plasma cell disorders).

Statistical analysis showed that the age grouping was differed concerning the signs and symptoms (0.003, and 0.018 respectively) and had a significant direct correlation with lesion density (r=0.195, p=0.041) and diagnosis category (r=0.227, p= 0.017). The highest rate for the occurrence of cyst and tumors were in patients younger than or equal to 40 years. The remaining variables had no significant variation related to sex or age of the patients.

Furthermore, the patient's complaint significantly differed regarding the lesion duration. The large-sized boney lesions (>20.1mm) were less frequently associated with pain (n=13), especially when compared with its association with swelling alone (n=46). The remaining symptoms were unrelated to patient complaints. Besides, the size of these lesions was related to their site (r=0.199*, p=0.037).

Discussion

Comparative studies of oral and maxillofacial lesions have been performed in many different countries[7]. This study is the first study in Sulaimani governorate that included all registered cases in two major maxillofacial centers of this city that describes the clinical and radiographic presentations of a series of different jaw bone lesions along seven years (2013-2019), including almost all groups of jaw lesions, unlike previous studies that specify a single bone disease, such as inflammatory periapical pathologies[8-10], odontogenic cysts[11,12], odontogenic tumors[13-16]. Some other studies included cystic lesions of any origin[17] or a combination of odontogenic cysts and tumors[18]. Other studies reviewed a specific pathological condition, such as ameloblastoma[19], odontogenic keratocyst[20-22], and glandular odontogenic cyst[23]. Researches performed on cysts and tumors that arise from odontogenic and non-odontogenic origin showed male predominance[16,24-27],

Table 1: The frequency distribution of clinical features and diagnosis category for patients having jaw bones lesions.

Feature	Sub-groups	Total		Feature	Sub-groups	Total	
		No.	%			No.	%
Age	1-20	27	24.5	Symptoms	Pain	33	30.0
	21-40	45	40.9		Swelling	65	59.1
	41-60	26	23.6		Accidental finding	7	6.4
	> 60	12	10.9		Soreness	3	2.7
Sex	Male	65	59.1		Inability to chew	1	.9
	Female	45	40.5		Follow up	1	.9
Duration	Accidental	6	5.5	Sign	No sign	17	15.5
	< week	8	7.3		Exposed bone	6	5.5
	>week - 1month	29	26.3		Ulcer	3	2.7
	>1- 2 months	19	17.3		Swelling	82	74.5
	>2 months- 1 year	37	33.6		Pus discharge	1	0.9
	>1 year	11	10.0		Asymmetry	1	0.9
Occupation	Child	1	0.9	Systemic Symptom	No	106	96.4
	Employed	10	9.1		Yes	4	3.6
	Unemployed	70	63.6	LN	Yes	4	3.6
	Student	29	26.4		No	106	96.4

Table 2: Frequency distribution of radiographical features and diagnosis category for patients having jaw bones lesions.

Feature	**Sub-groups**	**Total**		Feature	**Sub-groups**	**Total**	
		No.	%			No.	%
Site#	Maxilla	46	41.8	Maxilla	Anterior	15	13.6
	Mandible	62	56.4		Posterior	31	28.2
Size*	Unknown	2	1.8	Mandible	Anterior	17	15.5
	<1-20mm	44	40.0		Posterior	45	40.9
	21-50mm	44	40.0	Associated Structure	None	35	31.8
	> 50mm	20	18.2		Roots apices	25	22.7
Density	Lucent	76	69.1		Cortical bone destruction	12	10.9
	Opaque	7	6.4		Impaction*	11	10
	Mixed	27	24.5		Maxillary sinus	8	7.3
Border	Well-defined	52	47.3		Inferior alveolar canal	6	5.5
	Ill-defined	52	47.3		Root resorption	4	3.6
	well- corticated	6	5.4		Teeth displacement	4	3.6
Imaging technique	OPG	51	46.4		Coronoid process	2	1.8
	CBCT	25	22.7		Condylar	2	1.8
	CT	9	8.2		Floating teeth	1	0.9
	Lateral oblique	1	0.9	Pathology	Cyst	53	48.2
	Periapical	5	4.5		Tumor	32	29.1
	Combination	19	17.3		Others	25	22.7

Table 3: Frequency distribution of clinical-radiographical features in relation to symptoms.

		Symptoms						p-value*
		Pain	Swelling	Accidental	Follow up	Inability to chew	Soreness	
Sex	male	13	43	5	0	1	3	0.41
	female	20	22	2	1	0	0	
Age	1-20	2	23	2	0	0	0	.000
	21-40	10	27	5	1	1	1	
	41-60	15	10	0	0	0	1	
	> 60	6	5	0	0	0	1	
Duration	Accidental	2	0	4	0	0	0	0.001
	< week	3	4	1	0	0	0	
	1month	11	15	1	0	0	1	
	2 month	3	15	1	0	0	0	
	1 year	11	24	0	0	0	2	
	>1 year	2	7	0	1	1	0	
Size	Non	0	1	0	0	0	1	0.22
	0-2	20	18	6	0	0	0	
	2.1-5	8	32	0	1	1	2	
	>50	5	14	1	0	0	0	
Density	Lucent	20	48	6	1	0	1	0.21
	Opaque	4	2	0	0	1	0	
	Mixed	9	15	1	0	0	2	
Site	Upper	14	28	2	0	0	2	0.7
	Lower	19	37	5	1	1	1	

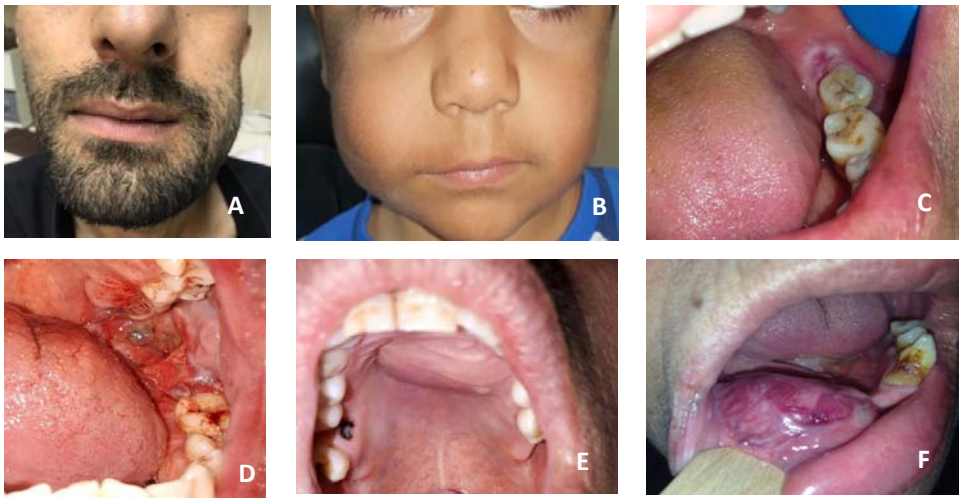

Figure 1: Clinical findings of different jaw lesions. An extraoral swelling involves the mandible (A) and maxilla (B). An intraoral ulcer (C). Exposed alveolar bone (D). Palatal swelling (E). A massive ulcerated intraoral swelling (F).

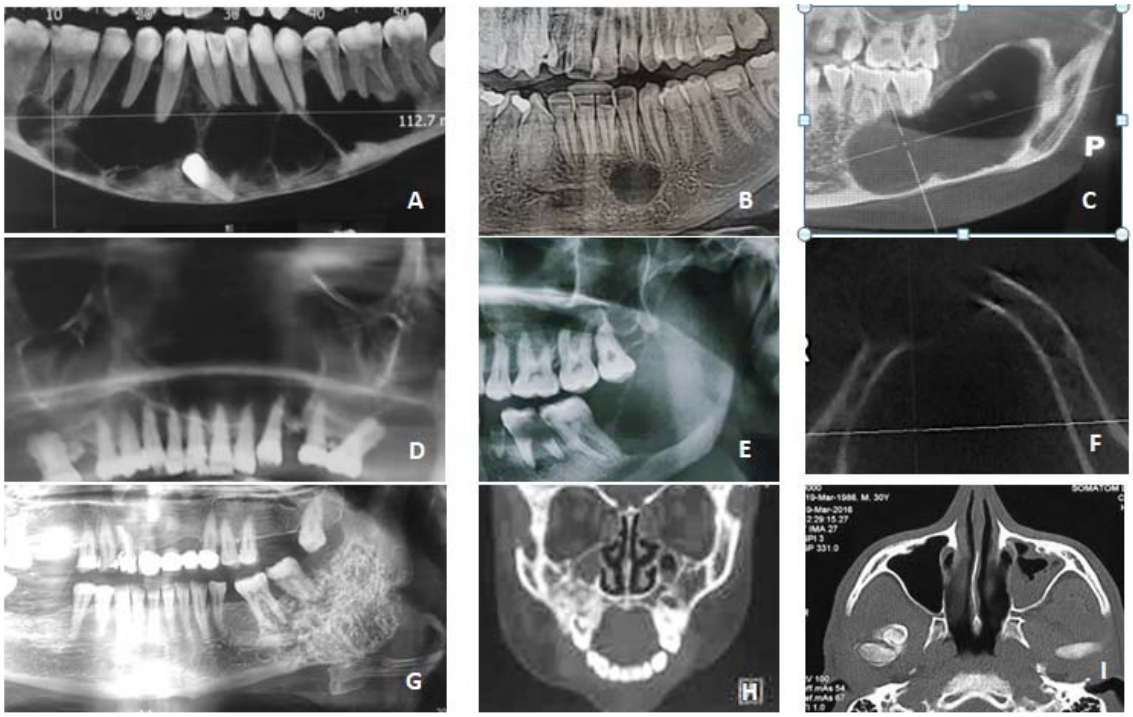

Figure 2: Radiographical features of different jaw lesions. (A) panoramic view of CBCT, dentigerous cyst; a large, well-defined radiolucency associated with an impacted tooth. (B) OPG, traumatic bone cyst; a small, well-defined radiolucent lesion. (C) CBCT, keratocyst; a well-defined radiolucent lesion. (D) OPG, radicular cyst; a large well-defined radiolucent lesion. (E) OPG, osteosarcoma, a large ill-defined radiolucent lesion in the angle of mandible extended to involve the ramus. (F) CBCT, giant cell lesion; a large ill-defined radiolucent lesion. (G) OPG, the mixed radiolucent-radiopaque lesion (Pindborg tumor). (F) Coronal CT mixed radiolucent-radiopaque lesion (fibrous dysplasia). (I) Axial CT, osteoma, radiopaque lesion on the condyle.

which is nearly identical to our finding of 59.1%. This result may be attributed to the fact that male is more prone to trauma because of having harder jobs than female. On the contrary, other studies on contrast have female predilection[28,29].

As far as the age presentation of the jaw lesions in our study, the most common age is between 21-40 years of life, comparable to previous studies[11,24,25,28,30]. This finding may be attributed to the fact that the jaw lesions mainly arise from odontogenic epithelium/mesenchyme and are mostly inflammatory in origin, which is strongly related to the teeth, which are prone to trauma and pulp necrosis because of dental caries. Besides, in older age, the teeth may be extracted and replaced with any kind of prosthesis, and the possibility of cyst formation is much less common. However, the occurrence of the malignant lesions of the jaw, either primary or metastatic, is much more common in the elderly. The duration that pathological conditions were present before seeking medical opinion was mostly between 2 months to 1 year.

This finding is in close agreement with that study performed in the UAE population[31] and lower than that reported by Kebede et al. for odontogenic tumors in the Ethiopian community[24]; this may be due to lack of pain and the time that lesions needed to grow to show a swelling which becomes a matter of concern to the patient. The prevalence of jaw lesion was high in the unemployed population, even though most tumors (odontogenic and non-odontogenic) are developmental. However, the possibility of neglecting oral care and the annual visit to the dentist is higher in this group, mainly because of low socioeconomic status.

Concerning the presenting signs and symptoms, the swelling was the most clinically detectable feature of radiographed jaw lesions and the most common complaint of patients. This finding was in line with Awan et al., for the clinical presentation of odontogenic jaw cysts in Pakistan[26,29]. Systemic symptoms like fever, weight loss, and malaise were uncommon complaints among our patients and were usually related to aggressive diseases like malignancy.

In agreement with several published studies[27,32,33], the radiographic analysis of the lesions for the more affected site was mandible, with the posterior region being more frequently affected in both upper and lower jaw.

However, other studies have reported that the maxilla was affected more often. In these studies, higher propensity was given to the inflammatory cyst, which usually affects anterior maxilla due to trauma and pulp necrosis[26,34].

The lesions' size was mostly between <1-5cm, which was harmonious with Ali et al. findings in their clinical-radiographic study of odontogenic cysts[27]. The majority of previous studies were performed for odontogenic and non-odontogenic cyst and tumors in which the density of lesions was mainly radiolucent[4,27,29]. Our study was comparable to most of them, and radiolucent lesions comprised most cases with only a small percentage representing the opaque lesions. This finding can be explained on the basis that the inflammatory cysts of the jaws are the most common occurring lesions; besides, opacities within a lesion needs time to precipitate enough amount of calcification to be detectable by radiographs. On the other hand, the lesions' borders were not greatly different in their presentation in being well- or ill-defined. Indeed, this finding does not coincide with the standard radiographical features of cystic lesions that are described to have well-defined borders. This dissimilarity may be due to the presence of inflammation that alters the radiographical findings. This inflammation was also a reason for developing pain in painless lesions for many months and even years.

Dealing with the imaging technique, OPG was recommended for nearly half of cases, as it has a low coast and more readily available in the centers, and a wide area of the jaw can be seen with OPGs. On the other hand, CT and CBCT are of high clinical value because of its efficiency in showing three-dimensional jaws, thus detecting vague lesions that cannot be detected otherwise[35]. However, CBCT was only recommended when more details were needed, as it is quite expensive even for one quadrant of the jaw. Similarly, CT was rarely recommended because of the high cost and high radiation dose. Combined radiographic techniques were used more often for operational purposes as when either the lesion's size or the exact extension of the lesion and relation of the lesion to the surrounding structures could not be detected entirely from the first radiograph.

The relation of the lesion to the vital structures is another entity that was registered. These lesions did not affect surrounding structures in one-third of the cases; however, root apices were involved within the lesion in 22.7%. In general, the tooth's involvement with the pathological changes, including (root apices, impaction, root resorption, tooth displacement), is 39.9%. This finding is much lower than that of Araujo et al.[29] because our study included all types of jaw lesions, not only tumors and cyst.

Concerning the pathological aspect, the lesions were categorized into three main groups. The prevalence of cyst (radicular) comprised half of the cases, and the result is consistent with a slightly higher or lower frequency to many other studies performed in different populations[12,30,36] followed by the tumor, which is also the same in previous researches[31,32].

Conclusions

Many lesions of different origins can affect jawbones. These lesions are of different origins and can share the same clinical and radiographic features. Radiograph aids in reaching a provisional diagnosis, but histopathology is the best approach for final diagnosis for most cases. Dental professionals should have information about the most common lesions to guide them toward proper investigations and management.

References

1. Eldaya R, Eissa O, Herrmann S, Pham J, Calle S, Uribe T. Mandibular lesions: a practical approach for diagnosis based on multimodality imaging findings. Contemp.Diagn.Radiol. 2017;40(6):1-7.
2. Dantu R, Puranik SR. Prevalence of jaw lesions in Bagalkot population a clinical and radiographic study. Int J Community Med Public Health. 2017;4(11):4296-302.
3. Kumavat PV, Gadgil NM, Dhusia H, Agarval S, Margam SS, Chaudhari CS. A clinical, radiological and histological study of jaw lesions from pathologist's view. IJPO. 2016;3(3):414-20.
4. Odai E, Ogbeide E. Clinico-radiological presentations of maxillofacial hard-tissue swellings in a tertiary health facility in West African suburb. BJSTR. 2017;1(3):689-92.
5. Giju Georji SP. Unicystic jaw lesions: a radiographic guideline. JIAOMR. 2010;22(4):S31-6.
6. Stuart C.White, Michael J.Pharoah. Oral Radiology. 4th ed. John Scbrefer: Mosby; 2000. 205 p.
7. Becconsall-Ryan K, Love RM. Range and demographics of radiolucent jaw lesions in a New Zealand population. J Med Imaging Radiat Oncol. 2011;55(1):43-51.

8. Bhaskar SN. Oral surgery—oral pathology conference no. 17, Walter Reed Army Medical Center: Periapical lesions—types, incidence, and clinical features. Oral Surg Oral Med Oral Pathol Oral Radiol Endod.1966;21(5):657-71.
9. Spatafore CM, Griffin JA, Keyes GG, Wearden S, Skidmore A. Periapical biopsy report: an analysis over a 10-year period. J Endod. 1990;16(5):239-41.
10. Nair PR, Pajarola G, Schroeder HE. Types and incidence of human periapical lesions obtained with extracted teeth. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1996;81(1):93-102.
11. Bataineh AB, Ma'amon AR, Qudah MAA. The prevalence of inflammatory and developmental odontogenic cysts in a Jordanian population: a clinicopathologic study. Quintessence Int. 2004;35(10):815-9.
12. Jones A, Craig G, Franklin C. Range and demographics of odontogenic cysts diagnosed in a UK population over a 30-year period. J Oral Pathol Med. 2006;35(8):500-7.
13. Mosadomi A. Odontogenic tumors in an African population: analysis of twenty-nine cases seen over a 5-year period. Oral Surg Oral Med Oral Pathol Oral Radiol Endod.1975;40(4):502-21.
14. Günhan Ö, Erseven G, Ruacan Ş, Celasun B, Aydintug Y, Ergun E, et al. Odontogenic tumours. A series of 409 cases. Aust.Dent.J. 1990;35(6):518-22.
15. Lu Y, Xuan M, Takata T, Wang C, He Z, Zhou Z, et al. Odontogenic tumors: a demographic study of 759 cases in a Chinese population. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1998;86(6):707-14.
16. Ladeinde AL, Ajayi OF, Ogunlewe MO, Adeyemo WL, Arotiba GT, Bamgbose BO, et al. Odontogenic tumors: a review of 319 cases in a Nigerian teaching hospital. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2005;99(2):191-5.
17. Kreidler JF, Raubenheimer EJ, van Heerden WF. A retrospective analysis of 367 cystic lesions of the jaw—the Ulm experience. J Craniomaxillofac Surg. 1993;21(8):339-41.
18. Daley TD, Wysocki GP, Pringle GA. Relative incidence of odontogenic tumors and oral and jaw cysts in a Canadian population. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1994;77(3):276-80.
19. Reichart P, Philipsen H, Sonner S. Ameloblastoma: biological profile of 3677 cases. Eur J Cancer B Oral Oncol. 1995;31(2):86-99.
20. Brannon RB. The odontogenic keratocyst: a clinicopathologic study of 312 cases. Part I. clinical features. Oral Surg Oral Med Oral Pathol. 1976;42(1):54-72.
21. Myoung H, Hong S-P, Hong S-D, Lee J-I, Lim C-Y, Choung P-H, et al. Odontogenic keratocyst: review of 256 cases for recurrence and clinicopathologic parameters. Oral Surg Oral Med Oral Pathol. 2001;91(3):328-33.
22. Zhao Y-F, Wei J-X, Wang S-P. Treatment of odontogenic keratocysts: a follow-up of 255 Chinese patients. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2002;94(2):151-6.
23. Sittitavornwong S, Koehler JR, Said-Al-Naief N. Glandular odontogenic cyst of the anterior maxilla: case report and review of the literature. J Oral Maxillofac Surg. 2006;64(4):740-5.
24. Kebede B, Tare D, Bogale B, Alemseged F. Odontogenic tumors in Ethiopia: eight years retrospective study. BMC Oral Health. 2017;17(1):54.
25. Naz I, Mahmood MK, Akhtar F, Nagi AH. Clinicopathological evaluation of odontogenic tumours in pakistan-A seven years retrospective study. Asian Pac J Cancer Prev. 2014;15(7):3327-30.
26. Awan MUA, Babar A, Ibrahim MW. Pattern and presentation of odontogenic jaw cysts: A clinical experience. Pak Armed Forces Med J. 2017;67(1):102-06.
27. Ali K, Munir F, Rehman A, Abbas I, Ahmad N, Akhtar MU. Clinico-radiographic study of odontogenic cysts at a tertiary care centre. J Ayub Med Coll Abbottabad. 2014;26(1):92-4.
28. Avelar RL, Antunes AA, de Santana Santos T, de Souza Andrade ES, Dourado E. Odontogenic tumors: clinical and pathology study of 238 cases. Braz J otorhinolaryngol. 2008;74(5):668-73.
29. Araujo JP, Lemos CA, Miniello TG, Alves FA. The relevance of clinical and radiographic features of jaw lesions: A prospective study. Braz Oral Res. 2016;30(1):e96.
30. Meningaud J-P, Oprean N, Pitak-Arnnop P, Bertrand J-C. Odontogenic cysts: a clinical study of 695 cases. J Oral Sci. 2006;48(2):59-62.
31. Al-Rawi NH, Awad M, Al-Zuebi IE, Hariri RA, Salah EW. Prevalence of odontogenic cysts and tumors among UAE population. J Orofac Sci. 2013;5(2):95.
32. Johnson NR, Savage NW, Kazoullis S, Batstone MD. A prospective epidemiological study for odontogenic and non-odontogenic lesions of the maxilla and mandible in Queensland. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2013;115(4):515-22.
33. Lawal AO, Adisa AO, Olusanya AA. Odontogenic tumours: A review of 266 cases. J Clin Exp Dent. 2013;5(1):e13-7.
34. Grossmann SM, Machado VC, Xavier GM, Moura MD, Gomez RS, Aguiar MCF, et al. Demographic

profile of odontogenic and selected non-odontogenic cysts in a Brazilian population. Oral Surg Oral Med Oral Pathol. 2007;104(6):e35-e41.
35. Estrela C, Bueno MR, Azevedo BC, Azevedo JR, Pécora JD. A new periapical index based on cone beam computed tomography. J Endod. 2008;34(11):1325-31.
36. Avelar RL, Antunes AA, Carvalho RW, Bezerra PG, Neto PJO, Andrade ES. Odontogenic cysts: a clinicopathological study of 507 cases. J Oral Sci. 2009;51(4):581-6.