

Prevalence of Odontogenic Cysts in a Group of Libyan Population: A Retrospective Study

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ABSTRACT

Background: Odontogenic cysts (OCs) are commonly encountered lesions affecting the human jaws having special clinical and radiographic features depending on cyst type. The aim of this study was to determine the prevalence of odontogenic jaw cysts in a Libyan population in Benghazi and to compare these data with previously published reports from Libyan and other geographic areas. **Materials and Methods:** This is a descriptive study where screening of 2189 biopsies (retrieved from the archives of The Department of Oral Pathology/ University of Benghazi, Libya) was performed for the sake of recognizing the three cysts chosen for the purpose of this study. **Results:** Out of the screened lesions, 276 cases (12.6%) were diagnosed as odontogenic cysts in the period from 2006 to 2019. Of those, 67.39% were inflammatory and 32.61% were developmental in nature. Radicular cysts (60.5%) were the most frequent cysts followed by dentigerous cysts (14.8%) and keratocysts (14.5%). The mean ages of the patients were 32.3, 29.7, and 33.2 years, respectively. Occurrence of the cysts was noticed more in the maxilla than in the mandible (1.3:1). The overall male-to-female ratio was 1.1:1. **Conclusions:** The prevalence of odontogenic cysts was similar to that reported in a previous study in Libya and other countries irrespective to WHO (2017) classification of odontogenic cysts.

KEYWORDS: *Cysts, odontogenic, prevalence*

INTRODUCTION

Odontogenic cysts (OCs) are defined as cysts developing from the remnants of the odontogenic apparatus, which remain trapped within the gingival tissue or bone,^[1] such as the epithelial remains of Malassez, the dental lamina (cell rests of Serres), or the enamel organ. They are the most commonly encountered cysts in the orofacial region.^[1,2]

According to the World Health Organization (WHO), OCs are further categorized, based on their pathogenesis, into developmental and inflammatory cysts. Inflammatory cysts are associated with inflammation, whereas developmental cysts are mostly of unknown etiology.^[3]

Inflammatory cysts include radicular cyst (RC), residual cyst, and paradental cyst, whereas dentigerous cyst (DC), odontogenic keratocyst (OKC), calcifying OCs, gingival


cyst, and glandular OC are developmental in nature.^[3] Odontogenic cysts are often discovered incidentally on imaging during routine dental examination^[4] and thus are encountered relatively commonly in the dental clinic. Often these cysts are generally symptomless unless they enlarge in size and may thus give rise to symptoms. The slow-growing feature of OC may lead to delay in diagnosis and treatment, thereby facilitating growth to adjacent regions such as the maxillary sinus and mandibular nerve.^[5] Clinical and radiological presentations are special for many cysts; nevertheless, clinical misdiagnosis is possible and understanding the clinicopathologic features of these lesions helps in early diagnosis and proper management.^[6] These clinical

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parameters may vary according to geographic areas and ethnicities.

The present study aimed to determine the prevalence of odontogenic cysts during 13 years in the period from 2006-2019 in Benghazi city, which represents the eastern region of the Libyan state and compare the results with a similar study conducted previously from Libya and other different geographical regions of the world.

MATERIALS AND METHODS

This retrospective study was carried out using oral biopsy specimens retrieved from the archives of Oral Pathology Department of the University of Benghazi, Libya, from 2006 to 2019. The ethical committee of the institutional review board has approved the study protocol. The age, gender, anatomical site, and the cyst association with impacted teeth of all cases were compiled from the clinical data sent together with the biopsy records. Histopathology slides stained with hematoxylin and eosin were collected and re-evaluated according to the recent definitions outlined by the WHO in 2017. Lesions with histological findings that were either not compatible with odontogenic cysts or

with doubtful diagnosis were excluded from this study. Similarly, odontogenic cysts with insufficient biopsy material were excluded from the study. Afterward, the demographics were registered in checklists. The patients were divided into different age groups of (≤ 20), (21-50), and (≥ 51) years old. According to the anatomical sites, the following distribution was defined: each jaw (maxillary-mandibular) was divided into an anterior and a posterior zone. The anterior zone included the incisors, canines, and premolars, and the posterior zone consisted of the molars and ramus/tuberosity. In case, a tooth was included in the cyst material; then, irrespective of the extent of the cyst, it was classified in the zone in which the tooth was located. The collected data were analyzed by descriptive statistics using SPSS (version 18).

RESULTS

Among the 2189 analyzed biopsy reports, 276 cases of OCs (12.6%) were diagnosed in the period between 2006 and 2019 at the Department of Oral Medicine, Oral Diagnosis and Oral Pathology Department, Faculty of Dentistry, Benghazi University. The patients' ages ranged

Table 1: Distribution of OC according to age and gender

Cyst type	Number	Percent	Mean age (-/+SD)	Male	Female	M:F
Inflammatory Cysts						
Radicular cyst (RC)	167	60.5	32.3 (14.2)	87	80	1.1:1
Residual cyst	17	6.14	43.1 (12.6)	11	6	1.83:1
Paradental cyst	2	0.75	21.5 (2.1)	1	1	1:1
Total	186	67.39		99	87	1.38:1
Dentigerous cyst (DC)	41	14.8	29.7 (18)	23	18	1.27:1
Odontogenic Keratocyst (OKC)	40	14.5	33.2 (13.4)	19	21	0.9:1
Glandular Odontogenic cyst (GOC)	2	0.75	63.5 (4.9)	1	1	1:1
Calcifying odontogenic cyst (COC)	5	1.81	22.4 (7.5)	3	2	1.5:1
Orthokeratinized odontogenic cyst	2	0.75	46.5 (16.2)	0	2	0
Total	276	100	32 (14.5)	145	131	1.1:1

Table 2: Distribution of OC according to site

Cyst type	Anterior maxilla	Posterior maxilla	Anterior mandible	Posterior mandible
Inflammatory cysts				
Radicular cyst (RC)	80	29	26	32
Residual cyst	7	2	4	4
Paradental cyst	0	2	0	0
Total	87	33	30	36
Dentigerous cyst (DC)	8	11	9	13
Odontogenic keratocyst (OKC)	4	9	6	21
Glandular Odontogenic cyst (GOC)	0	1	1	0
calcifying odontogenic cyst (COC)	2	1	0	2
Orthokeratinized odontogenic cyst	1	0	0	1
Total	102	55	46	73
Maxilla: Mandible		157		119
			1.3:1	

Table 3: Distribution of OC according to age group

Cyst type	≤20 years	21-50 years	≥51 years
Inflammatory Cysts			
Radicular cyst (RC)	38	104	25
Residual cyst	3	8	6
Paradental cyst	1	1	0
Total	42	113	31
Dentigerous cyst (DC)	16	17	8
Odontogenic keratocyst (OKC)	8	26	6
Glandular Odontogenic cyst (GOC)	0	0	2
calcifying odontogenic cyst (COC)	2	3	0
Orthokeratinized odontogenic cyst	0	1	1
Total	68	160	48

between 7 and 69 years with a mean age of 32 years for total OCs [Table 1]. Out of the total cases of OCs, 160 were found in patients aged 21-51 years of age.

The gender distribution among all cysts showed a slight male predilection with 145 male cases compared to 131 females with ratio 1.1:1, whereas the male-to-female ratio in OKCs was 0.9:1 [Table 1]. OCs were more commonly located in maxilla (n = 157, 56.8%) than in mandible (n = 119, 43.2%) [Table 2].

The majority of DCs (n = 13) and OKCs (n = 21) were detected in the posterior mandible, whereas inflammatory cysts, that is, RCs (n = 80) and residual cysts (n = 7), were found more in the anterior maxilla [Table 3].

The most common odontogenic cysts diagnosed were inflammatory cysts (67.39%), including RC (60.5%), residual cysts (6.14%), and paradental cysts (0.75%) followed by DCs (14.8%) and OKC (14.5%).

DISCUSSION

Odontogenic cysts (OCs) are common lesions affecting the jaws.^[7]

In the current study, we analyzed the demographic profile of OCs diagnosed in University of Benghazi, Libya, during the period of 2006 to 2019. Among all the analyzed biopsies, 276 cases were diagnosed as OCs (12.6%), which matches the findings of a previous study from Libya, where 326 OCs represented 14.8% of 2190 biopsies accessed for 15 years (1990-2005).^[8] Similar results have been reported in previous studies involving populations from UK,^[7] Chile,^[9] Brazil,^[10,11] Iran,^[12] Greece,^[13] Canada,^[14] and India.^[15,16] Some studies, however, have shown substantially higher frequencies compared with our results; for example, in Turkey, 63.19% of the examined oral lesions were OCs.^[17] On the other hand, the findings of OCs in some countries were reported to be very low

compared to ours, for example, in Ibadan, Nigeria, where the OCs percentage was only 3.9%.^[18] Such variations in the reported prevalence of OCs might be explained by differences in the study design and the racial characteristics of the population studied, or due to different kinds of samples being addressed to histopathological diagnosis in different cultures.

In some studies, most OCs occurred in the mandible as shown by Izgi *et al.*,^[17] Olusanya *et al.*,^[18] and Franklin *et al.*,^[19] whereas the most common anatomical location of our samples was the maxilla, in particular the anterior region. This disparity in the reported locations might be attributed to our finding that RCs (which occur mostly in the maxilla) were the most frequent among the studied biopsies, and hence, an overall impression of the maxilla being the most common location for jaw cysts is apparent.

Similar to our study, others, for example, El Gehani *et al.*,^[8] Souza *et al.*,^[11] Baghaei *et al.*,^[12] and Awan *et al.*,^[20] have shown that RCs tend to be found in the anterior area of the maxilla, whereas OKCs and DCs are almost always located in the posterior area of the mandible. This usual distribution of RCs in the anterior area of the jaw is possibly due to the higher frequency of the anterior teeth being involved in traumatic lesions, which can subsequently lead to loss of vitality of teeth in that region. DCs, on the other hand, are most probably located in the posterior area of the jaw as the latter is associated with failure of teeth to erupt, that is, third molars.

For gender distribution of OCs in our study population, there is a slight predominance of males compared to females (1.1:1). This small increase in tendency to develop OCs in men could be due to their higher susceptibility to trauma and poorer status of oral hygiene compared to women,^[21] and both factors may lead to cyst formation. Similar results have been shown in the earlier population from Libya by El Gehani^[8] and in different countries such as Iran,^[12] Greece,^[13] Canada,^[14] Pakistan,^[20] Turkey,^[17,22] and Jordan.^[23] Such results are contradictory to what was reported in Brazil where Farias *et al.*^[24] recorded more prevalence of OCs in women than men.

A review of the literature revealed that the mean age of OCs occurrence was between the second and fifth decades of life, which was similar to the findings of our study.^[8,14,15,24]

The distribution of inflammatory and developmental cysts in the present study (67.39% and 32.61%, respectively) is in line with other studies from Turkey^[22] and south India.^[16] On the other hand, the figures from

a Mexican population sample showed a predominance of developmental cysts, which is possibly attributed to the socioeconomic conditions of the population or the fact that inflammatory cysts were not yet prepared for pathological examination.^[25]

The WHO categorizes radicular and residual cysts as one entity as the latter is a remnant of the former.^[3] Nevertheless, in this study, the residual and radicular cysts were retained as two separate entities to render our results comparable to other studies. In this regard, we found RCs the most frequent OCs (60.5%), which was similar to various studies,^[8,10,13,14,20] as opposed to Baghaei *et al.*^[12] and Ochsenius *et al.*,^[9] who identified DC as the most common OC. Residual cysts were found as the fourth common cyst (6.14%), similar to studies from Libya,^[8] Greece,^[13] and south India.^[16]

The second most common odontogenic cyst in our study was dentigerous cyst (14.8%), which is similar to the previous studies from Libya^[8] (15%), Greece^[13] (14.5%), UK^[7] (18.1%), and Chile^[9] (18.8%). However, DCs were reported to have a higher prevalence than RCs (60.5% vs. 37.1%) in Northern Nigeria,^[26] probably because RCs are not usually sent for pathological examinations.

According to the World Health Organization (2017),^[3] eruption cyst is classified as a variant of the soft tissue of DCs, and the literature reported these lesions as low in prevalence,^[27] possibly due to their asymptomatic nature and tendency for spontaneous resolution. Due to their low prevalence and temporary nature, they are not biopsied, and thus, we did not record any eruption cysts in our study.

The OKC is an aggressive lesion with a marked tendency for recurrence. In 2017, WHO classified it as cystic lesion rather than tumor.^[3] In the present study, OKC was found as the third most common odontogenic cyst (14.5%) and was frequently located in the posterior region of the mandible, which is in accordance with earlier studies by El Gehani *et al.* (14.1%),^[8] Ochsenius *et al.* (14.3%),^[9] Izgi *et al.* (13.7%),^[17] and Awan *et al.* (15%).^[20] However, in the study of Savithri *et al.*,^[16] the OKC was the second most common jaw cyst after RCs, whereas Tamiolakis *et al.*^[13] reported that residual cyst was more common than OKC. The most common age group in patients with OKCs was 21-50 years old, which is similar to the findings in the previous study from Libya.^[8]

The calcifying odontogenic cyst (COC) is characterized by odontogenic epithelium containing “ghost cells.” Recently, this lesion was reclassified as a cystic lesion by the WHO^[3] and represents 2% of all odontogenic pathological changes of the jaws.^[28] Our results are in

line with WHO as these cysts represented only 1.8% of our study population.

In the present study, only two paradental cysts (0.75%) were diagnosed. Paradental cyst is an inflammatory odontogenic cyst usually associated with distal and buccal aspects of partially erupted mandibular third molars. Its prevalence has been reported to vary between 1 and 5% in all odontogenic cysts.^[29]

The glandular OC is a rare lesion, and it exhibits slow and invasive growth causing little cortical expansion. Its reported frequency in the literature ranges from 0.12% to 0.13% of all jaw cysts and has a high recurrence potential.^[30] We reported two cases (0.75%) of GOC in our series, so the amount is slightly higher than the reported average value.

CONCLUSIONS

The present results show close similarity in the frequency of OCs in the Libyan population compared with a study conducted before in the same country. Additionally, our results are in the range reported in other populations around the world, irrespective of the changes in WHO classification, with inflammatory cysts being identified as the most frequent OC. Radicular cysts, dentigerous cysts, and odontogenic keratocysts are the most common OCs.

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Conflicts of interest

There are no conflicts of interest.

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