



Original article

Odontogenic cysts: A retrospective clinical analytic study of 632 cases diagnosed in Benghazi- Libya

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ABSTRACT

Background: Odontogenic cysts (OCs) are the most common cause of chronic swellings of the jaws as well as the most frequent lesions encountered in oral cavity. Clinical data about the OCs in the Libyan population is scant. Therefore, the objective of this study was to determine the prevalence of all histologically diagnosed OCs and demographics of OCs of Libyan sample over a 28-year period and to compare results with other international studies.

Material and Methods: All entries for odontogenic cysts occurring during 1990–2018 inclusive at oral Pathology department, faculty of dentistry, Benghazi University, Libya, were retrieved and analysed for demographic data; mainly sex, age and site.

Results: A total of 8995 oral biopsies, 7.03% were odontogenic cysts. Radicular cyst was the most common odontogenic cyst comprising 52.53% of cases, followed by dentigerous cyst (15.03%), odontogenic keratocyst (10.28%) and residual cysts (7.91%). There were 363 specimens for males (57.4%) and 265 for females (41.9%). Odontogenic cysts occurred in a mean age of 30.2 years. The most common location was maxillary anterior-premolar region (35.9%).

Conclusions: These data are important to assess geographic differences in the prevalence of lesions and to allow clinicians to make realistic judgments in counselling patients before biopsy about the probability of diagnosis and risks associated with nonspecific clinical or radiographic lesions.

Keywords: odontogenic cysts, Libyan patients.

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INTRODUCTION

Odontogenic cysts (OCs) are unique as they only affect the oral and maxillofacial region only. According to the most recent World Health Organization classification, OCs are classified into two main groups

inflammatory and developmental groups; reflecting their pathogenesis^{1,2}.

Both developmental and inflammatory odontogenic cysts may develop from epithelium remnants of

the tooth forming apparatus that were entrapped centrally within the bone or peripherally in the gingival tissues ¹⁻⁴. The prevalence of odontogenic cysts has been investigated in many countries in the past including Libya ⁵⁻¹⁴. Among jaw cysts, many share similar clinical and radiographic signs, however, some of these are known to have an aggressive behaviour and propensity to recur so correct diagnosis of these lesions is very essential ³⁻⁵.

For this reason, knowledge on the prevalence of odontogenic cysts, age distribution and their commonest affected site might help practitioners to de-

termine a likely clinical diagnosis. Hence surgically excised tissue should be duly studied histopathologically and properly diagnosed to ensure appropriate treatment.

In Libya, data about odontogenic cysts is scanty ⁷ therefore, the aim of our study was to assess the prevalence of all histologically diagnosed odontogenic cysts along with the age, sex and anatomical location of the lesions over a period of 28 years and compare the findings with other studies carried out in Libya and in other parts of the world according to the new WHO classification. ¹

MATERIALS AND METHODS

The diagnoses of 632 consecutively accessioned oral biopsies from the files of the Oral Medicine, Oral Pathology, Oral diagnosis and Radiology department, of the University of Benghazi, Libya, from 1990 to 2018 were reviewed. All cases of odontogenic cysts were retrieved. The clinical data and histopathological diagnoses of all the cases for which there was any doubt about the listed diagnoses were reviewed. All odontogenic cysts were classified based on 2017 WHO typing. ¹ These odontogenic cysts were assessed for age, sex, site distribution and the cyst association with impacted/unerupted tooth.

RESULTS

During the 28-year period, a total of 8995 specimens were histopathologically examined in the department of Oral Medicine, Oral Diagnosis and Oral Pathology Department of the faculty of Dentistry, of the University of Benghazi from which 632 (7.03%) specimens were histopathologically diagnosed as odontogenic cysts. The prevalence of different types of OCs is shown in (Table 1).

The mean age of occurrence of (OCs) is 30 years, whoever, 110 (17.40 %) cases were diagnosed in children under 17 years whereas 499 (79%) were detected in adults of 17 years or above. The minimum age recorded in this series was 5 years and the maximum age was 84 years. There were 363 (57.4 %) specimens from males and 265 (41.9%) from females and in 4 cases (0.6%) the gender was not provided with the clinical data.

The most prevalent site of presentation was maxillary anterior-premolar region mesial to the first molar teeth forming 227 (35.9%), followed by mandibular posterior region 177 cases (28%), and in 19 cases (3%) the site was missing. (Table 1) displays the distribution of odontogenic cysts by frequency for all ages over the 28-year period. (Table 2) and (Table 3) summarize the distribution of all odontogenic

The following demographics and clinical data were obtained from medical files: sex, age, and lesion site. In this latter variable, both jaws (upper and lower) were divided into anterior zone and posterior zone. The anterior zone included the incisors, canines and premolars in case of maxilla or mandible; while the posterior zone consisted of the molars and ramus/tuberosity. For statistical analysis, all the descriptive and quantitative data analysis were performed using the Statistical Package for the Social Sciences (SPSS) software, version 21.0, SPSS Inc., Chicago, IL, USA).

cysts in paediatric and adult populations respectively.

With respect to histopathological type, radicular cyst was the most common odontogenic cyst forming 52.53% of odontogenic cysts. Dentigerous cyst was the second most common odontogenic cyst and accounted for 15.03% of odontogenic cysts. The largest group of patients was with radicular cyst (Table 1) which consisted of 332 cases (52.53%) of all odontogenic jaw cysts with a mean age at presentation of 30.2 years with male: female ratio of 1.2:1 (Figure 1).

Maxilla was the most commonly affected area with 213 cases (65.3%), of which 155 cases (47.5% of all radicular cysts) occurred in the anterior maxilla (Figure 2). Radicular cysts accounted for higher proportion in adults (272 cases, 86.1%) than in children (44 cases, 13.9%). Residual cysts accounted for 50 cases (7.91%) with a male: female ratio of 1.72:1 and the most common site of presentation in the maxillary molar region (44.9 %) followed by maxillary the anterior-premolar region (28.6%) (Figure 2).

There were 95 cases of dentigerous cyst (15.03%) with a mean age at presentation of 26.6 years and a male to female ratio of 1.53:1 (Figure 1). Ninety one cases (95.8%) of all OCs, the age were confirmed. Dentigerous cysts were more common in

adults (67 cases) than in paediatric patients (24 cases) accounting for 73.6% and 26.4% of the total cases respectively. Mandibular posterior region was the most common site (40.2%) followed by maxillary anterior-premolar region (37%) (Figure 2). OKC was the third most common diagnosed cyst with 65 (10.28%) cases with a mean age at presentation of 31.8 years and a male to female ratio of 1.09:1 (Fig. 1). Ten cases of OKC (15.38%) were diagnosed in paediatric patients; which accounted for 9.09% of all OCs in the patients of 16 years or younger (Table 2). The mandibular posterior region was the most site

affected (Figure 2). Because of the lack of precise clinical information in many cases, 66 (10.44%) cysts were considered as unclassified odontogenic cysts due to histopathological diagnostic difficulties in differentiating between the true inflammatory and the inflamed developmental cyst. The remaining 24 odontogenic cysts (3.79%) included 11 (1.74%) calcifying odontogenic cysts, 3 (0.47%), LPCs, 3 (0.47%) paradental cysts, 3 (0.47%), Orthokeratinized odontogenic cysts, 3 (0.47%) glandular odontogenic cysts and 1 (0.16%) eruption cyst.

Table 1: Distribution of odontogenic cysts according to age, and sex 1990–2018

Diagnosis	All cases	%	Age known	Age range	Mean age	SD	No. of male	No. of female	M:F ratio
Radicular cyst	332	52.53	316	07-80	30.29	12.85	178	138	1.29
Dentigerous cyst	95	15.03	91	06- 66	26.63	14.63	55	36	1.53
odontogenic keratocyst	65	10.28	65	10-65	31.80	15.06	34	31	1.09
calcifying odontogenic cyst	11	1.74	11	13-34	21.45	7.37	8	3	2.67
Residual cyst	50	7.91	49	17-84	43.08	16.31	31	18	1.72
Unclassified cyst	66	10.44	64	05-73	25.08	15.78	36	28	1.29
Eruption cyst	1	0.16	1	00	11	00	1	0	
Glandular odontogenic cyst	3	0.47	3	18-67	48.33	26.50	1	2	0.5
Lateral perio-dontal cyst	3	0.47	3	18-42	33.33	13.3	2	1	2
Paradental cyst	3	0.47	3	08-23	17.00	7.94	2	1	2
Orthokeratinized odontogenic cyst	3	0.47	3	20-58	33.67	21.13	2	1	2
Total	632	100	609				350	259	

Table 2: Distribution of odontogenic cysts according to age, and sex in children 1990–2018

Diagnosis	Total	Age range (years)	Age mean	Age SD	No. of male	No. of female	M:F ratio
Radicular cyst	44	7 - 16	13.3	2.51	28	16	1.75
Dentigerous cyst	24	6 - 16	11.50	3.15	17	7	2.43
odontogenic keratocyst	10	10 - 16	14.00	2.00	6	4	1.5
Residual cyst	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unclassified cyst	25	5 - 16	11.24	3.23	14	11	1.27
Orthokeratinized odontogenic cyst	5	13 - 16	15.20	1.30	3	2	1.5
Total	108				68	40	

Table 3: Distribution of odontogenic cysts according to age, and sex in adult populations

Diagnosis	Total	Age range (years)	Age mean	Age SD	No. of males	No. of females	M:F ratio
Radicular cyst	272	17- 80	33.04	11.69	150	122	1.23
Dentigerous cyst	67	17 - 66	32.05	13.25	38	29	1.31
odontogenic keratocyst	55	18 - 65	34.58	14.40	28	27	1.04
Residual cyst	49	17 - 84	43.08	16.31	31	18	1.72
Unclassified cyst	39	17 -73	33.95	14.12	22	17	1.29
Orthokeratinized odontogenic cyst	6	19-34	26.67	5.96	5	1	5
Total	488				274	214	

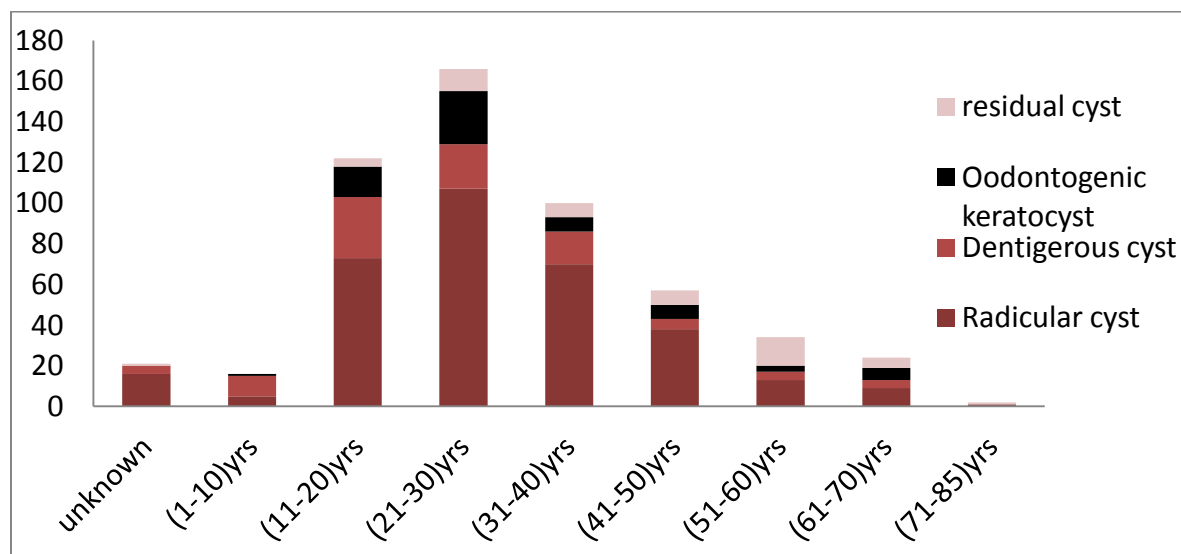


Figure 1: Age distribution of odontogenic cysts

DISCUSSION

Odontogenic cysts (OCs) are common jaw lesions derive their lining from tooth apparatus or its remnants. This study examined the distribution of odontogenic cysts which accounted for 632 of 694 jaw cysts in 8995 patients seen in this department over 28-year period. In a study carried out at the Oral and Maxillofacial Surgery of this faculty.⁷ It has been reported that the total number of OCs operated on at this department in 15 years period was 326 lesions

represented 14.8% of 2190 biopsies and surgical specimens accessioned during a 15 year period. In that report, radicular cyst was the most frequently encountered cyst (68.1%), followed by the dentigerous cyst (15%) and OKC (14.1%). In the present study, residual cyst constitutes 7.91% of all OCs. However, Jones et al⁵ and Ochsenius et al,⁸ had found that residual cyst make up to 8%, and 11.2% of the total number of OCs in their samples respectively. On

the other hand, other previous studies by Mosqueda et al,¹¹ and Souza et al,¹³ residual cyst represented only 2.2% and 4.9% of OCs respectively.

In this study, a total of 8995 submitted specimens from many sources received over 28 years period (1990-2018); among these, 632 odontogenic cysts were diagnosed in 7.03% of all biopsies. From the current literature, it's clear that odontogenic cysts account for 0.8% to 45.9% of all submitted specimens.⁵ The relative frequency of OCs of relevant studies reported by Johns et al,⁵ Mosqueda et al,¹¹, El Gehani et al,⁷ and de Souza et al¹³ are 12.8%, 11.5%, 14.8%, and 11% respectively.

Radicular cyst is the most common jaw cyst; as it comprised about 52.53% of all odontogenic cysts in this study. The proportion of 52.53% for radicular cysts lies within the range of 50.7% reported by Oschenius⁸, 53.5% as it was reported by Meningaud⁹ and 54.7% as reported by Açıkgöz et al.¹⁰ Interestingly, Johns et al,⁵ reported the same figure (52.3%). In Libya, Orofi et al⁷ found that these cystic lesions represented 68.1% but it represented 61.4% by de Souza et al. Nevertheless, in this figure, residual cysts were included. In our series, the total of radicular and residual cysts was 60.44%. Radicular cysts occurred over a wide age range, with a peak of incidence in the third decade with male to female ratio of 1.3:1. The maxillary anterior area was the most common affected site (47.5%) followed by mandibular posterior area (21.5%). This distribution is comparable to that found by Orafi et al, (48.6%)⁷ and Johns et al, (52.8%)⁵.

Dentigerous cyst constitutes the second most common diagnosed lesion in our series with a total frequency of 15.03%, which is the same result from most studies (El Gehani 15%, Johns 18.1%, and Oschenius 18.5%). In contrast, higher frequencies were reported by Mosqueda (33%),¹¹ Daley et al (24.08%)⁶ and Açıkgöz (26.6%),¹⁰ dentigerous cyst is detected over a wide age range, with a peak of incidence in the second and third decades. In our series, the mandibular posterior region was the most common site (40.2%) followed by the anterior maxilla (37%). This is perhaps not a surprising finding given the fact that lower third molar and upper canine are the most commonly impacted teeth^{3,4}. Eruption cyst was relatively rare odontogenic cyst with only one case (0.16%) occurred in a child under 16 years of age (Table 1).

Odontogenic keratocyst has previously been designated as a neoplasm and included as keratocystic odontogenic tumour.^{15, 16} According to the new WHO classification,¹ this lesion is redesignated as benign developmental cysts and has restored the term odontogenic keratocyst. In the current study,

odontogenic keratocysts was the third most common diagnostic lesion (n=65) (10.28%). Previous studies^{5,11} reported prevalence rates of odontogenic keratocysts ranging from 4.8% to 21.5%. The distribution in the present study (10.28%) was most similar to those reported by Jones, El Gehani, and Oschenius^{5, 7, 8}. Gorlin and Goltz syndrome was diagnosed in 5 patients.

Calcifying odontogenic cyst (COC) is a member of the "family" of ghost cell lesions. The most significant change affecting odontogenic cysts was the reincorporation of COC in the new cyst classification when it had been defined in 2005 as benign cystic neoplasm of odontogenic origin^{1, 17, 18}. The previous studies demonstrated that the COC counted for less than 1%^{5,19}. In the present series, calcifying odontogenic cysts comprise about 1.74% of all odontogenic cysts.

Three cases of lateral periodontal cyst were identified. Lateral periodontal cyst (LPC) is an uncommon development odontogenic cyst, representing about 0.47% of all OC. It develops in the alveolar bone along the lateral root surface of an erupted and vital tooth.^{5, 20} In our series, the relative frequency for lateral periodontal cysts was 0.47%.

Paradental cyst was a term first fully described by Craig in 1976^{21, 22}. It is an inflammatory odontogenic cyst occurring on the lateral root surface of a partly erupted vital tooth, and arising secondary to inflammatory stimulus associated with pericoronitis. In the present series, only three paradental cysts were diagnosed.

The orthokeratinized odontogenic cyst (OOC) is an uncommon developmental odontogenic cyst, which has always been regarded as a variant of OKC^{2, 4, 23} under the new WHO Classification, OKC has now finally been recognised as a distinct entity^{1, 7}. only three OOCs were diagnosed, representing (0.47%) of all specimens. The glandular odontogenic cyst is uncommon lesion representing 0.2% of all odontogenic cysts. Our study revealed three cases, making this cyst a rare lesion relative to other odontogenic cysts. One out of 3 was located peripherally. The present study is the largest series of OOCs of Libyan population described in the literature.

Conclusion: This study presents a series of OCs in a sample of Libyan population, where the prevalence of jaw cysts accounts for (7.03%) which is within the range that reported in many other studies worldwide. Dental team should be aware of the incidence of odontogenic cysts and their clinic-pathologic features, including most common site and age distribution. This knowledge would allow for early and accurate diagnosis and treatment of these lesions.

REFERENCES

1. El-Naggar A K, Chan J K, Grandis J R, Takata T, Slootweg P J, editors. WHO classification of head and neck tumours. International Agency for Research on Cancer; 2017.
2. Kramer I R, Pindborg J J, Shear M. The WHO histological typing of odontogenic tumours. A commentary on the second edition. *Cancer*. 1992 Dec 15;70(12):2988-94.
3. Shear M, Speight P. Cysts of the oral and maxillofacial regions. John Wiley & Sons; 2008 15.
4. Neville B W, Damm D D, Allen C M, Bouquot JE. Oral and Maxillofacial Pathology. Elsevier Brasil; 2009.
5. Johns A V, Craig GT, Franklin CD. Range and demographics of odontogenic cysts diagnosed in a UK population over a 30-year period. *J Oral Path and Med*. 2006 Sep; 35 (8):500-7.
6. Daley TD, Wysocki GP, Pringle GA. Relative incidence of odontogenic tumors and oral and jaw cysts in a Canadian population. *O Surg, O Med, O Path*. 1994; 1;77(3):276-80.
7. El Gehani R, Krishnan B, Orafi H. The prevalence of inflammatory and developmental odontogenic cysts in a Libyan population. *Liby J Med*. 2008 Jan 1;3(2):75-7.
8. Ochsenius G, Escobar E, Godoy L, Peñafiel C. Odontogenic cysts: analysis of 2.944 cases in Chile. *Medicina Oral, Patología Oral y Cirugía Bucal*. 2007 Mar;12(2):85-91.
9. Meningaud J P, Oprean N, Pitak-Arnnop P, Bertrand JC. Odontogenic cysts: a clinical study of 695 cases. *J O Sci*. 2006;48(2):59-62.
10. Açikgöz A, Uzun-Bulut E, Özden B, Gündüz K. Prevalence and distribution of odontogenic and nonodontogenic cysts in a Turkish population. *Medicina oral, patologia Oral cirugia bucal*. 2012 Jan;17(1):e108.
11. Mosqueda-Taylor A, Irigoyen-Camacho ME, Diaz-Franco M A, Torres-Tejero MA. Odontogenic cysts. Analysis of 856 cases. *Medicina oral: organo oficial de la Sociedad Espanola de Medicina Oral y de la Academia Iberoamericana de Patologia Medicina Bucal*. 2002;7(2):89.
12. Tortorici S, Amodio E, Massenti M F, Buzzanca ML, Burruano F, Vitale F. Prevalence and distribution of odontogenic cysts in Sicily: 1986-2005. *Journal of Oral Science*. 2008; 50(1):15-8.
13. de Souza L B, Gordon-Nunez M A, Nonaka CF, de Medeiros MC, Torres TF, Emiliano GB. Odontogenic cysts: demographic profile in a Brazilian population over a 38-year period. *Medi Oral, Patolo Oral Cirugia bucal*. 2010 Jul 1;15(4):e583-90.
14. Jones A V, Franklin C D. An analysis of oral and maxillofacial pathology found in children over a 30-year period. *International Journal of Paediatric Dentistry*. 2006 ;16(1):19-30.
15. Barnes L, Eveson J W, Sidransky D, Reichart P, editors. Pathology and genetics of head and neck tumours. IARC; 2005.
16. Martin L, Speight P M. Odontogenic cysts. *Diagnostic Histopathology*. 2015 Sep 1;21 (9):359-69.
17. Martin L H, Speight P M. Odontogenic cysts: an update. *Diagnostic Histopathology*. 2017 Jun 1;23(6):260-5.
18. Ledesma-Montes C, Gorlin R J, Shear M, Prae Torius F, Mosqueda-Taylor A, Altini M, Unni K, Paes de Almeida O, Carlos-Bregni R, Romero de León E, Phillips V. International collaborative study on ghost cell odontogenic tumours: calcifying cystic odontogenic tumour, dentinogenic ghost cell tumour and ghost cell odontogenic carcinoma. *J O Path & Med*. 2008 May; 37(5):302-8.
19. Arruda JA, Silva L V, Silva L, Monteiro J L, Álvares P, Silveira M, Sobral A P. Calcifying odontogenic cyst: A 26-year retrospective clinicopathological analysis and immunohistochemical study. *J Clin Exper Dent*. 2018 Jun;10(6):e542.
20. de Andrade M, Silva A P, de Moraes Ramos-Perez FM, Silva-Sousa YT, da Cruz Perez DE. Lateral periodontal cyst: report of case and review of the literature. *Oral and maxillofacial surgery*. 2012 Mar 1;16(1):83-7.
21. Craig GT. The paradental cyst. A specific inflammatory odontogenic cyst. *Br Dent J*. 1976 Jul 6;141 (1):9-14. doi:10.1038/sj.bdj.4803781.
22. Philipsen H P, Reichart P A, Ogawa I, Sueti Y, Takata T. The inflammatory paradental cyst: a critical review of 342 cases from a literature survey, including 17 new cases from the author's files. *J of oral Path & Med*. 2004 Mar; 33(3):147-55.
23. Wright JM. The odontogenic keratocyst: orthokeratinized variant. *Oral Surgery, Oral Medicine, Oral Pathology*. 1981 Jun 1;51(6):609-18..