

Original Article

Demographic distribution of odontogenic cysts in Isfahan (Iran) over a 23-year period (1988-2010)

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ABSTRACT

Background: Odontogenic cysts are relatively common lesions which can cause different complications. As demographic information is lacking in Iran and specially in Isfahan, the aim of this study was to determine the prevalence of odontogenic cysts according to age, gender and affected area among patients referring to the Oral Pathology Department of the Dental School of Isfahan University of Medical Sciences (Iran) over a 23-year period.

Materials and Methods: A total of 7412 diagnosed lesions recorded in the Oral Pathology Department archives of Isfahan Dental School between 1988 and 2010 were reevaluated, then odontogenic cysts were separated through reviewing microscopic slides according to the 2005 World Health Organization classification and variables such as age, gender, the infected jaw, and its specific region were obtained by SPSS Version 16.0 from the recorded database.

Results: 21.62% of the lesions were odontogenic cysts, of which 48.72% were inflammatory and 51.28% were developmental cysts. These cysts were more common in the mandible. The mean age of patients was 29.53 ± 16.1 . Male to female ratio was 1.31:1. The four most frequent odontogenic cysts were radicular cysts (35.12%), dentigerous cysts (25.77%), odontogenic keratocysts (22.58%) and residual cysts (12.98%).

Conclusion: Odontogenic cysts are fairly frequent jaw lesions (21.62%), of which radicular cyst was the most common cyst. The four most common lesions constituted a sum of 96.45% of the total. In general, the prevalence rates in our study are similar to the studies from other geographic parts of the world but with a lower incidence of inflammatory cysts, higher prevalence of dentigerous cysts and residual cysts and also mandibular predominance for residual cysts.

Key Words: Dentigerous cyst, odontogenic cyst, odontogenic keratocyst, radicular cyst, residual cyst

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INTRODUCTION

Odontogenic cysts are caused from odontogenic epithelium in the process of dental apparatus development and can be originated from one part of dental organ. This type of cyst includes 90% of jaw

cysts. Odontogenic cysts are divided into two groups: Developmental and inflammatory. Inflammatory cysts have an inflammatory reason but the cause of the developmental type is unknown.^[1,2]

Odontogenic cysts can cause bone inflation, teeth mobility, fistula formation, pain, parasthesia, and mucofacial fold swelling.^[3] Odontogenic cysts like odontogenic keratocysts (OKCs), calcifying odontogenic cysts and glandular odontogenic cysts can have recurrence and aggressive growth behavior.^[4-6] Some cysts like OKC have tumoral behavior.^[7] Metastases can be made in odontogenic cysts including, OKCs, radicular and dentigerous

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cysts.^[8] Also, malignant changes like primary intraosseous carcinoma^[9] and squamous cell carcinoma^[10,11] might arise in these lesions. It derives from the above that we need to diagnose these lesions accurately and as soon as possible to have a suitable treatment which can be facilitated through the knowledge of the origin, clinico-pathological characteristics and biological behavior of these lesions.^[6,12]

Studies carried out in Isfahan had mostly been scattered, and were on a limited number of dysfunctions. Thus, the purpose of this study was evaluating odontogenic cysts regarding prevalence rate, age, gender, and involved regions for patients referring to the Oral Pathology Department of the Dental School of Isfahan University of Medical Sciences (Iran) between 1988-2010. As this Oral Pathology Department is the sole center for such evaluations for patients from all regions of Isfahan and Chaharmahal Bakhtiari provinces, it may be concluded that the acquired results can be generally applied to all these regions. In this study, a comparison has also been made of the results obtained with those of other geographic regions.

MATERIALS AND METHODS

This study was a retrospective descriptive re-evaluation based on diagnosis documents (including complete files, microscopic slides, panoramic radiographs, computer scanings, etc..) of patients referring to the Oral Pathology Department of the Dental School of Isfahan University of Medical Sciences between 1988 and 2010.

In this study, 7412 microscopic slides prepared between 1988 and 2010 were stained with hematoxylin-eosin and re-evaluated by co-worker pathologists of the center. Lesions which were compatible with the World Health Organization (WHO) published in 2005 [Table 1] were included in our study. Radiographs were also used to confirm the diagnosis. Then, variables such as age, gender, infected jaw, and specific region of these odontogenic cysts were obtained from recorded files by two dentistry scholars.

In this evaluation, extracted information was subjected to descriptive statistical analysis, using SPSS software Version 16.0. The following locations were examined: Anterior region (central, lateral and canine), posterior region (premolar, molar and posterior to them), mandible, and maxilla.

RESULTS

Among 7412 recorded lesions in the Oral Pathology Department over 23 years, 1603 cases (21.62%) were related to odontogenic cysts (male to female ratio was 1.31:1). The mean age of patients was 29.53 ± 16.1 , with peak involvement in the second decade of life. Six hundred and forty-one (48.12%) of odontogenic cysts were inflammatory and 691 (51.87%) were developmental cysts. Table 2 shows the frequency of the cysts.

Altogether 746 (46.54%) odontogenic cysts were reported in the maxilla, 418 (56.03%) in men and 328 (43.97%) in women. Also, 857 (53.46%) odontogenic cysts were recorded in the mandible, 492 (57.41%) in men and 365 (42.59%) in women. Inflammatory cysts were more prevalent in the maxilla 441 (56.46%), and developmental cysts were more prevalent in the mandible 517 (64.11%). Also, 540 cysts were seen in the anterior zone (33.69%), 895 cysts in the posterior (55.83%), and 168 items in both zones (10.48%). Table 3 shows the distribution of the odontogenic cysts according to site.

Prevalence of the cases was: Radicular cysts 466 (34.98%), dentigerous cysts 350 (26.27%), OKCs 307 (23.04%) and residual cysts 208 (12.98%) constituting 1331 (96.45%) of the total number. The frequency of these four common cysts is shown in Figure 1 based on age decades and genders. According to this figure, radicular cyst was more prevalent in the third decade, dentigerous cyst in the second decade, OKC between second and third decades and residual cyst in the fifth decade of life.

Table 1: Categories of odontogenic cysts modified from the 2005 WHO classification

Developmental
Dentigerous cyst
Eruption cyst
Odontogenic keratocyst
Orthokeratinized odontogenic cyst
Gingival (alveolar) cyst of the newborn
Gingival cyst of the adult
Lateral periodontal cyst
Calcifying odontogenic cyst
Glandular odontogenic cyst
Inflammatory
Periapical (radicular) cyst
Residual periapical (radicular) cyst
Buccal bifurcation cyst (paradental)

WHO: World health organization

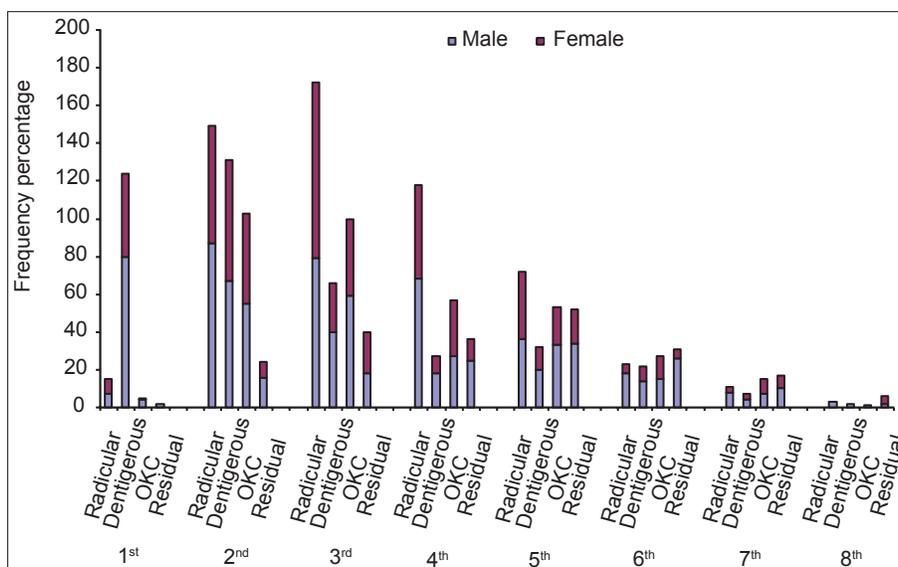


Figure 1: Comparative figure of frequency percentage of the four most frequently found cysts (radicular cyst, dentigerous cyst, OKC and residual cyst) according to gender and age in decades

Table 2: The frequency of the odontogenic cysts

	Total N (%)	Female N (%)	Male N (%)	Mean age (SD)
Inflammatory cysts				
Radicular cyst	563 (35.12)	257 (45.65)	306 (54.35)	40.55 (16)
Residual cyst	208 (12.98)	75 (36.06)	133 (63.94)	29.17 (13.16)
Paradental cyst	10 (0.62)	6 (60)	4 (40)	22.1 (6.5)
Developmental cysts				
Dentigerous cyst	413 (25.77)	167 (40.44)	246 (59.56)	22.06 (16.48)
OKC	362 (22.58)	160 (44.2)	202 (55.8)	31.52 (15.13)
Calcifying odontogenic cyst	21 (1.31)	11 (52.38)	10 (47.62)	34.9 (21.28)
Lateral periodontal cyst	13 (0.81)	8 (61.54)	5 (38.46)	34.31 (20.02)
Glandular odontogenic cyst	7 (0.44)	6 (85.71)	1 (14.29)	50 (11.5)
Orthokeratinized odontogenic cyst	4 (0.25)	2 (50)	2 (50)	32 (6.73)
Eruption cyst	(100)	-	1 (100)	7
Gingival cyst of the adult	1 (100)	1 (100)	-	43
Total	1603 (100)	693 (43.23)	910 (56.77)	29.53 (16.1)

Table 3: The distribution of the odontogenic cysts according to site

	Mandible			Maxilla		
	Anterior and posterior N (%)	Posterior N (%)	Anterior N (%)	Anterior and posterior N (%)	Posterior N (%)	Anterior N (%)
Radicular cyst	21 (3.73)	155 (27.53)	47 (8.35)	62 (11.01)	91 (16.16)	187 (33.22)
Dentigerous cyst	10 (2.42)	203 (49.15)	34 (8.23)	15 (3.63)	45 (10.9)	106 (25.67)
OKC	19 (5.25)	188 (51.93)	35 (9.67)	9 (2.49)	54 (14.92)	57 (15.74)
Residual cyst	7 (3.37)	84 (40.38)	16 (7.69)	11 (5.29)	50 (24.04)	40 (19.23)
COC	2 (9.52)	6 (28.57)	3 (14.29)	6 (28.57)	-	4 (19.05)
Lateral periodontal cyst	2 (15.38)	5 (38.46)	1 (7.69)	2 (15.39)	-	3 (23.08)
Paradental cyst	-	10 (100)	-	-	-	-
Glandular odontogenic cyst	1 (14.29)	-	3 (42.85)	-	1 (14.29)	2 (28.57)
Ortho-keratinized odontogenic cyst	1 (25)	2 (50)	1 (25)	-	-	-
Eruption cyst	-	-	-	-	1 (100)	-
Gingival cyst of the adult	-	-	1 (100)	-	-	-
Total	63 (3.93)	653 (40.73)	141 (8.8)	105 (6.55)	242 (15.1)	399 (24.89)

The most diagnosed lesion was radicular cyst constituting 563 (35.12%) of odontogenic cysts (male to female ratio was 1.19:1). The most prevalent site for this cyst was in the upper anterior zone including 187 (33.21%) cases.

Dentigerous cyst was seen in 413 (25.77%) cases, with male to female ratio of 1.47:1. The most affected site was lower posterior zone, 203 (49.15%), followed by upper anterior zone, 106 (25.67%). The next prevalent cyst was OKC including 362 (22.58%) cases with male to female ratio of 1.26:1. The most prevalent site was lower posterior zone with 187 (51.65%) cases.

The fourth and last prevalent lesion was residual cyst constituting 208 (12.98%) cases of the total. Male to female ratio was 1.77:1. Also, the most prevalent site was lower posterior zone, 84 (40.38%).

Other recorded odontogenic cysts included 21 calcifying odontogenic cysts (1.31%) with peak involvement between second and third decades, 13 lateral periodontal cysts (0.81%) which were more prevalent in the third decade, 10 paradental cysts (0.62%) with peak involvement in the third decade, 7 glandular cysts (0.46%) all between fourth and seventh decades, 4 orthokeratinized cysts (0.25%) equally in third and fourth decades, 1 eruption cyst (0.06%) in a 7-year-old child (male) and 1 gingival cyst of the adult (0.06%) in a 43-year-old woman.

There were no cases of malignancy or neoplastic changes reported in the odontogenic cyst walls.

DISCUSSION

As many odontogenic cysts have similar clinical, radiographic and histologic characteristics, information about the prevalence of odontogenic cysts according to age, gender and affected area can direct dentists and specially pathologists to an early and correct diagnosis for appropriate treatment.^[6,13] As this information is lacking in Iran and specially in Isfahan we planned this research to have guidelines for our dentists and also compared our data with the other parts of the world.

The Oral Pathology Department of the Isfahan Dental School is an educational center in which any case is evaluated and diagnosed by several pathologists and specialists in oral medicine with their scholars. So all the recorded files had complete information about the patients and their lesions, and we did not have any concern about missing data.

In all, 7412 specimens were received over a 23-year period (1988-2010); among which, 1603 odontogenic cysts (21.62%) were diagnosed. This finding is higher than most of the studies^[6,12-16] and is lower than a study from Spain^[12] but in general, this prevalence is in the range 0.8% to 45.9% which was mentioned by Skinner *et al.*,^[17] and Gultelkin *et al.*^[18] Male predominance in our study is consistent with most studies from other countries^[6,14,16,19,20] but is inconsistent with the study done by Grossmann *et al.*,^[15] Souza *et al.*,^[21] and Prockt *et al.*^[22]

The most involved sites were, respectively, posterior zone of mandible (42.73%) and anterior zone of maxilla (28.2%) which is like the other studies^[4,14,21] and is different from studies done in Kaunas^[3] and Jordan.^[23]

Developmental cysts (51.28%) were more than inflammatory (48.27%) cysts. This finding is similar to some studies^[6,16,20] and is different from others.^[13,14,19,21,23] According to the study of Mosqueda *et al.*,^[6] and Souza *et al.*,^[21] the socioeconomic conditions can be the reason behind developmental predominance in our study. Radicular cysts, dentigerous cysts, OKCs and residual cysts were the most common odontogenic cysts, constituting a sum of 96.45% of the total which is similar to the other studies.^[6,15,19,20]

Radicular cysts were found to be the most prevalent diagnosed lesions. The importance of this finding according to the study by Meningaud *et al.*,^[19] is that most of these cysts are caused by advanced lesions, and thus in many cases may be prevented. In this study, radicular cysts constituted 34.98% of all odontogenic cysts. The result obtained here is approximately similar to that acquired by Mosqueda *et al.*,^[6] (39.9%), Ledesma-Montes *et al.*,^[20] (38.8%) but in general this finding is lower than the other studies. The reason may be that most of the patients of this center are cases which are referred from other centers (private oral pathology diagnostic services, urban and rural centers around Isfahan), so this center mostly has more complicated cases. It is noticeable that most of the radicular cysts were in the upper anterior zone. So it may be concluded that a main reason for a greater case prevalence is people's concern about their facial appearance, especially in the upper anterior zone.^[13]

The male predominance in radicular cysts is inconsistent with studies done in Mexico,^[6,20] Chile^[13] and Brazil^[15] but is consistent with the findings of other

studies.^[3,14,16,19-21] In the study by Meningaud *et al.*, it has been deduced that the probability of neglect of hygiene and also having trauma to the maxillary anterior teeth is more in men.^[19] This cyst was more common in the third decade, like the study done by Regezi *et al.*^[4] and Rengaswamy^[24] but is different from others.^[15,21,22]

Dentigerous cyst is the most prevalent developmental odontogenic cyst.^[1] This cyst constituted 25.77% of all odontogenic cysts. This result is similar to the studies of Souza *et al.*,^[21] (20.1%) and Prockt *et al.*,^[22] (22.2%) but is different from the studies of Mosqueda *et al.*,^[6] (33%), Ochsenius *et al.*,^[13] (18.5%), Jones *et al.*,^[14] (18.1%), Grossmann *et al.*,^[15] (17.3%) and Rengaswamy (17.6%).^[24] The reason for a greater prevalence of this cyst in comparison with many other studies can be related to the fact that many patients postpone the extraction of their impact teeth until it becomes annoying. This reason is less common in developed countries, because of regular examinations, which are routinely done every 6 months. Male predominance for this lesion is similar to the other studies.^[6,13-16,21]

Like the studies from Chile,^[13] Brazil^[15] and West Malaysia^[24] dentigerous cyst was mostly seen in the second decade of life. Also, the most prevalent sites were the lower posterior zone and upper anterior zone.^[14,21,22] The reason for this finding, according to the study by Jones *et al.*,^[14] and Prockt *et al.*,^[22] is that lower third molars and upper canines are the most common impacted teeth.

OKC was the third most prevalent case, with a frequency of 22.58% which is similar to that reported by Mosqueda *et al.*, in Mexico^[6] (21.49%) but is different from the study done by Ochsenius in Chile^[13] (14.3%), Jones *et al.*, in UK^[14] (11.6%) and Souza *et al.*, in Brazil^[21] (6.4%). The male predominance in our study is consistent with the findings of other researchers.^[6,13-15,19-21] Also, the peak incidence of OKC was found between the second and third decades of life which is similar to the study done by Grossmann *et al.*,^[15] but is different from others.^[13,21,24] The most common place for this lesion is the lower posterior zone.^[6,13,15,19-21]

Residual cyst was the fourth more frequent odontogenic cyst, constituting 12.98% of all cysts. This rate is fairly higher than many studies^[6,12,13,21] but is lower than the study from West Malaysia^[24] (21.4%). As residual cysts are those which remain in the jaw after the carious tooth has

been extracted^[13] and these cysts were found to be high in our study, it is very important to care about the surgical procedures according to Bhaskar's recommendation.^[25]

In our study, like most studies,^[6,13,21,22,26] this cyst was more common in males. The most common region for residual cyst was the lower posterior zone which is different from the other studies that present maxilla as the most common place for residual cyst.^[13,15,21,22,24] Also, residual cyst was more common in the fifth decade of life which is similar to the study from Chile^[13] and is different from the study from Brazil^[22] and West Malaysia.^[24]

CONCLUSION

Odontogenic cysts are relatively frequent jaw lesions (22.43%), of which radicular cyst was the most common cyst. The four most common odontogenic cysts constituted a sum of 96.45% of the total. In general, the prevalence rates in our study are similar to the studies from other geographic parts of the world but with a lower incidence of inflammatory cysts, higher prevalence of dentigerous cysts and residual cysts and also mandibular predominance for residual cysts. So, further studies should be done specially in Iran, to prepare regional guidelines for our dentists, to have an early and correct diagnosis.

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