

Prevalence of Odontogenic Cysts and Tumors in Karachi, Pakistan

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ABSTRACT

Objective: The aim of the study was to determine the relative incidence of odontogenic cysts and tumors in Karachi-Pakistan.

Study design: This was a retrospective observational study of 100 cysts and 141 tumors that were included in the database of 6000 patients of histopathological diagnoses of Dow Diagnostic Reference and Research laboratory and The Laboratory, from 2001-2010. Following variables were recorded: gender, age and clinical characteristics of the lesions (size and location). A descriptive analysis was done using SPSS version 16.

Results: The incidence of the odontogenic cyst was 1.6% and 2.35% for the tumors. The cysts (61%) and tumors (63.1) were both more prevalent in males. Most frequent diagnosis was radicular cysts (53%) and odontogenic keratocystic tumor (27%). The most common location for cyst (51%) and tumors (68%) both was mandible. **Conclusion:** Knowledge of the biological and histological behavior of odontogenic cysts and their frequency are key aspects for ensuring early detection and adequate treatment.

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INTRODUCTION

A cyst is defined as a cavity with liquid, semi liquid or gaseous contents, enveloped by an epithelial tissue membrane.¹ The epithelium from which the odontogenic cysts arise from originates during dental embryogenesis.^{2,3} Although the prevalence of odontogenic cysts in several countries has been accounted for and different risk factors including dental trauma, gender, long term inflammatory processes, high caries index in early age and oral hygiene have been stated as contributing to these lesions, however there is still generally a lack of data.⁴ Of all the diagnosed oral lesions, about 7-13% of them are odontogenic cysts.^{5,6} Most of these cysts are found mostly in males.² Some studies show that maxilla is the most prevailing site for these cysts to arise,^{3,5} whereas some others accounted mandible as the most frequent site.⁷⁻⁹ The etiology of the odontogenic cysts can be revealed by the presence of odontogenic cells that have remained entrapped within the bone or the

gingiva that covers the maxilla or the mandible, such as the epithelial cell rests of Malassez, the dental lamina or the enamel organ, hence giving rise to developmental cysts. However in certain cases the cysts may form due to an inflammatory process.¹ (Table 1). Developmental as well as inflammatory cysts are lesions that have an epithelial origin that are characterized by slow growth and have a tendency to expand and in spite of their benign biological course, they can grow up to considerable sizes if they are not diagnosed in time and treated suitably.⁵ Although the diagnosis of odontogenic cysts is based on various clinical and radiological features, nonetheless the final diagnosis is ascertained on the histopathological study of the lesion.¹

Odontogenic tumors are rare and they specifically form in the jaw bones.¹⁰ Odontogenic tumours results from the epithelial and/or ectomesenchymal tissues that for the tooth. They comprise a heterogenous group of diseases that shows variable clinical as well as histopathological features.¹¹ 4% of all the tumours account for all the tumours as well as tumour like lesions of the orofacial lesion.¹² They are mainly found in the maxilla and the mandible but occasionally may be found in the gingiva.¹² The overall and relative frequency of individual odontogenic tumors differ from region to region. The difference in the frequencies that are reported could be due to geographic or cultural effect, although it remains unproved.¹⁰ The incidence

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of the odontogenic tumours is reported to be higher in Africans and hence a distinct racial predilection is suggested in the distribution of these orofacial lesions.¹² Knowledge of prevalence of various types of Odontogenic tumors and their clinical characteristics can be extremely valuable both for pathologists and clinicians when mounting a differential diagnosis, and may indicate the causes of these lesions.¹¹ World health organization (WHO) published the first edition of the “Histological Typing of Odontogenic Tumors” in 1971, then the second edition in 1992. The latter was widely cited when large series or isolated cases of odontogenic tumours were reported. However, there are still many controversies to be dealt with concerning the classification, terminology and diagnosis of these lesions because of their vast diversity. In 2005, the third edition of WHO histological typing of OTs was published in which definitions of some pathological entities have been changed and some new ones have been introduced.¹¹ The most up to date classification of the World Health Organization (WHO) reallocated keratocyst (keratinized primordial cyst) within the classification of maxillary tumors under the term “keratocystic odontogenic tumor”.¹⁴

MATERIALS AND METHODS

A retrospective study of 6000 peri- and intra oral lesions was conducted between January 2001- March 2011, based on the histopathological reports with the purpose of identifying patients with odontogenic cysts and tumors. The histopathological reports were retrieved from the files of Pathology laboratory at Dow diagnostic reference and research laboratory (DDRRL) and The Laboratory. The study data was collected by a single observer. The inclusion criteria involved histological confirmation of the odontogenic cysts and tumors. The criterion for exclusion was the absence of information concerning the site or the patient’s age. The cysts and tumors were classified using the latest WHO classification. The following variables were studied: type of cyst and tumor, anatomical location, size, age group and gender. The data obtained were subjected to descriptive statistical analysis using SPSS version 16.0.

RESULTS

A total of 100 specimens out of a total of 6000 oral biopsies evaluated histopathologically were designated as odontogenic cysts corresponding to 1.6% of all the lesion that were referred for histopathological examination during the examined time period (2001-2010). Five variants were identified. The most commonly diagnosed odontogenic cyst was the radicular cyst representing 53% of the total (n=53). Figure 1

shows the frequency of different odontogenic cysts diagnosed in both the jaws. The most common site for the cysts was mandible (n=51). The gender distribution showed a male predilection (n=61) which corresponds to a male: female ratio of about 1.5:1. The mean patient age at which they presented with the disease was 28.5 years with a range of 7-80 years. The odontogenic cysts appeared most frequently in the second and the third decades of life. The extension of these cysts ranged from 10-60mm, with a mean size of 25.3mm.

The 141 odontogenic tumors constituted 2.35% of all the lesions referred for histopathological evaluation during the ten year study period. The relative frequency for different types of odontogenic tumors is presented in figure 2. Of the 141 cases, 78.8% were benign and 21.3% were malignant. The most frequent benign tumor was keratocystic odontogenic tumor (27%) which according to the latest WHO classification of odontogenic tumors was included here. The second most common tumor was ameloblastoma (24.8%). This was followed by odontogenic fibroma (18.4%). Two malignant odontogenic tumors found in this series were primary intraosseous squamous cell carcinoma (20.6%) and primary intraosseous squamous cell carcinoma derived from keratocystic odontogenic tumor (0.7%).

The 141 tumors were found in 89 males and 52 females, hence showing a preponderance of odontogenic tumors in males. The age of the patient at diagnosis ranged from 4-80 years with a mean age of 34 years and peaked at the third to fifth decade. The tumors showed strong preference for mandible (69.5%). Lesion size for tumors ranged from 5mm to 100mm with a mean size of 28.2mm.

Table 1:WHO classification of odontogenic cysts 2005

EPITHELIAL CYSTS		NON-EPITHELIAL CYSTS	
Odontogenic cysts		Non-odontogenic cysts	Traumatic bone cyst
Developmental	Inflammatory		
Gingival cyst of newborn	Radicular cyst	Nasolabial cyst	Aneurysmal bone cyst
primordial cyst			
Follicular cyst	Residual cyst	Nasopalatine cyst	Stafne cavity
Eruption cyst			
Lateral periodontal cyst			
Adult gingival cyst	Paradental cyst		
Odontogenic-glandular cyst			

Table 2: WHO classification of odontogenic tumours-2005

MALIGNANT TUMORS	
<i>ODONTOGENIC CARCINOMAS</i>	
Metastasizing (malignant) ameloblastoma	
Ameloblastic carcinoma - primary type	
Ameloblastic carcinoma - secondary type (dedifferentiated), intraosseous	
Ameloblastic carcinoma - secondary type (dedifferentiated), peripheral	
Primary intraosseous squamous cell carcinoma – solid type	
primary intraosseous squamous cell carcinoma derived from keratocystic odontogenic tumour	
Primary intraosseous squamous cell carcinoma derived from odontogenic cysts	
Clear cell odontogenic carcinoma	
Ghost cell odontogenic carcinoma	
<i>ODONTOGENIC SARCOMAS</i>	
ameloblastic fibrosarcoma	
Ameloblastic fibrodentino-and fibro-odontosarcoma	
BENIGN TUMORS	
<i>ODONTOGENIC EPITHELIUM WITH MATURE, FIBROUS STROMA WITHOUT ODONTOGENIC ECTOMESENCHYME</i>	
Ameloblastoma, solid/multicystic type	
Ameloblastoma, extraosseous/peripheral type	
Ameloblastoma, desmoplastic type	
Ameloblastoma, unicystic type	
Squamous odontogenic tumour	
Calcifying epithelial odontogenic tumour	
Adenomatoid odontogenic tumour	
Keratocystic odontogenic tumour	
<i>ODONTOGENIC EPITHELIUM WITH ODONTOGENIC ECTOMESENCHYME, WITH OR WITHOUT HARD TISSUE FORMATION</i>	
Ameloblastic fibroma	
Ameloblastic fibrodentinoma	
Ameloblastic fibro-odontoma	
Odontoma	
complex type	
compound type	
Odontoameloblastoma	
Calcifying cystic odontogenic tumour	
Dentinogenic ghost cell tumour	
<i>MESENCHYME AND/OR ODONTOGENIC ECTOMESENCHYME WITH OR WITHOUT ODONTOGENIC EPITHELIUM</i>	
Odontogenic fibroma	
Odontogenic myxoma/myxofibroma	
Cementoblastoma	

Table 5: comparison of the incidence of the different types of odontogenic cysts with some of the most important published series.

Odontogenic cyst	Ledesma et al 2001 (2) 304 cases	Mosqueda Taylor et al 2002 (6) 856 cases	Ochsenius et al 2007 (5) 2944 cases	Nunez-Urrutia et al 2010 (1) 418 cases	Butt et al 2011 100 cases
Radicular cyst	38.8%	39.9%	50.7%	50.2%	53%
Follicular cyst	35.5%	33%	18.5%	21.8%	34%
Paradental cyst	/	1.4%	3.8%	20.8%	7%
Residual cyst	4.9%	2.2%	11.2%	4.3%	4%
Periodontal lateral cyst	1%	0.8%	0.6%	1.7%	/
Odontogenic kerato cyst	18.7%	21.5%	14.3%	1%	/
Adult gingival cyst	/	/	0.3%	0.2%	2%

Figure 1: frequency of different types of odontogenic cysts

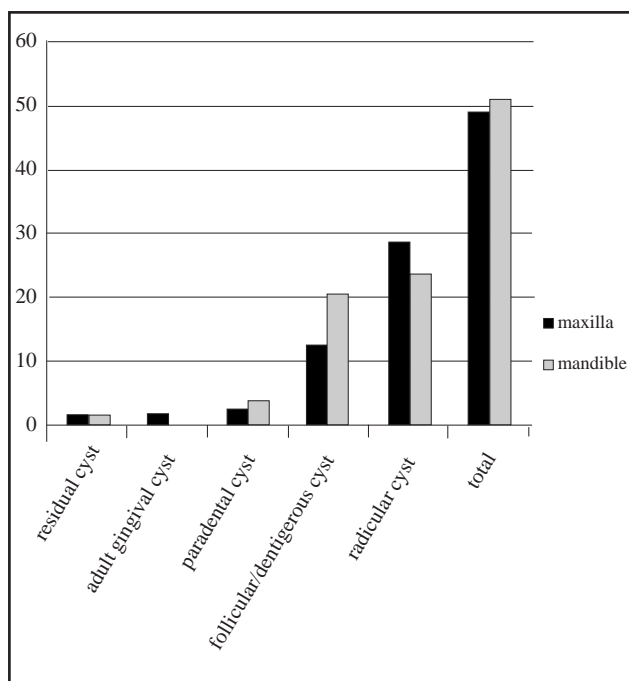
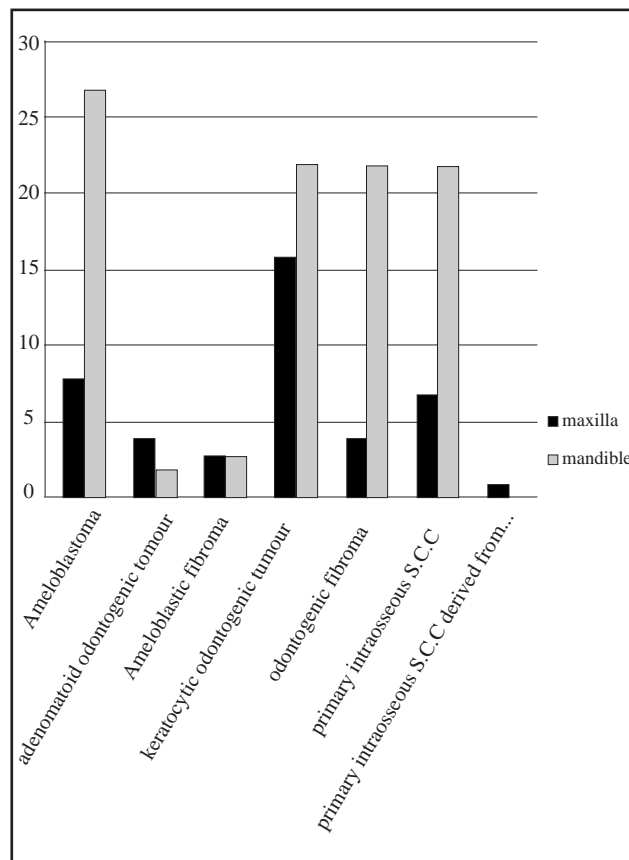


Figure 2: Frequency of different types of odontogenic tumors



DISCUSSION

When comparing the results obtained with those published by other authors, a number of differences have been noted (Table 3). In our series the most commonly diagnosed odontogenic cyst was the radicular cyst (53%) – an observation that corresponds with the literature^{1,2,5,6} Radicular cystic lesions results due to pulpal necrosis and hence are considered to be inflammatory by nature.⁵ The consulted literature showed no significant differences in distribution by patient gender, despite the variability in sample sizes.^{1,3,6} The second most frequently diagnosed lesion was the follicular/dentigerous cyst, representing 34% of the total, which is again coincident with the figures found in the literature.^{2,6} Follicular cyst is associated to the crown of the permanent teeth and impacted odontomas, and in lesser fraction of the cases it can involve the impacted deciduous teeth.^{1,16} A follicular space of over 3 mm should be clinically considered as a dentigerous or follicular cyst, since histologically epithelial thickening is usually noted as a result of the inflammatory changes induced by the accumulation of fluid between the crown and the dental follicle.¹ Follicular cysts have a strong predilection for the mandible as was confirmed in our study as well (61.7% of all the follicular cysts).^{1,2,5,6} Although usually unilateral, multiple cases of bilateral FCs in nonsyndromic patients have been reported.¹ These lesions are characterized by slow and asymptomatic growth and thus these cysts can reach large sizes before they are diagnosed.¹

Paradental cysts are inflammatory lesions that usually affect either the vestibular or the distal surfaces of the partially erupted third molars that have a history of pericoronitis.¹⁷ These cysts occurs as characteristic “croissant” shaped radiolucencies. These cysts usually manifest in patients in the third decade, however pediatric cases have also been documented.¹⁸ These cysts develop near the cervical margin of the lateral portion of the root as a result of periodontal pocket inflammation.¹ World Health Organization classifies an infected mandibular buccal cyst as a variant of paradental cysts,⁵ we did not find a single case diagnosed as such in our study, neither were they mentioned in the literature reviewed for comparison.^{1,2,5,6} This implies that either their prevalence is very low or the fact that are diagnosed as such on the basis of clinical radiology and not sent for histopathology examination.⁵ In our series paradental cysts was the third most common type of odontogenic cyst. This is in concordance with the results reported by Mosqueda-Taylor et al⁶ with a frequency of 1.4% for paradental cysts and Ochsenius et al⁵ with a proportion of 3.8%.

The fourth common cyst in our series was the residual cyst. Residual cyst is an inflammatory odontogenic cyst resulting from incomplete resection of cystic tissue in the periapical zone of a previously extracted pathological tooth. The literature reviewed shows that they are most frequently found between the third and fourth decades of life,¹ whereas in our series it occurred in the sixth and the eighth decade of life. In our series no predilection for either jaw was observed (50%). Adult gingival cysts were the lesions with lowest prevalence (2%), which confirmed the findings of those of the consulted literature.^{1,5} The greater prevalence in the male gender in some studies may be explained by the fact that men as a matter of course have worse oral hygiene habits and are more prone to trauma than females.¹⁷

Table 5: comparison of the incidence of the different types of odontogenic cysts with some of the most important published series.

Literature search shows that there are no other published series regarding odontogenic tumors from other southern Asian countries, such as Afghanistan, Bangladesh, Bhutan, Nepal, and Pakistan, except for a single report from Sri Lanka. However, there is availability of data on odontogenic tumors for both western and northern China as well as Japan in the eastern Asian region.¹⁰ The relative frequency of the odontogenic tumors in the present study is 2.35% of the total biopsied specimens, which is in concordance with the prevailing frequency in Asia of 2.4%.¹⁰

The present study found Keratocystic odontogenic tumor to be the most frequent odontogenic tumor comprising for 27% of all the odontogenic tumors. The keratocysts showed a male predilection with a male female ratio of 2:1. Mandibular keratocysts were more common.

These were closely followed by Ameloblastomas which accounted for 24.8% of all lesions. Ameloblastomas also showed a male predilection and were more common in mandible. Some studies propose that ameloblastomas are more common in blacks than whites.¹¹ However, Simon et al¹⁹ in their study showed that the calculated incidence of ameloblastoma in an exclusively black African population did not differ from that of European countries.

These were followed by intraosseous squamous cell carcinoma (20.6%) and odontogenic fibroma.(18.4%). Only two malignant variants of odontogenic tumors were found in this series. Other odontogenic tumors were present in a very low percentage of all oral biopsies evaluated for tumors.

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