



Jaw Cysts: A Retrospective Study in a Turkish Subpopulation

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Research Article

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ABSTRACT

Objectives: Cysts observed in the jaws may be odontogenic or non-odontogenic, depending on the tissue of origin. Although there are different methods to diagnose these lesions, histopathological examination of tissue biopsy of the lesion is accepted as the 'gold standard' in cases where the diagnosis is insufficient. The aim of this study is to retrospectively evaluate the distribution of histopathologically diagnosed jaw cysts according to age, gender and anatomical localization.

Materials and Methods: Pathology results of 436 patients who applied to Zonguldak Bülent Ecevit University Faculty of Dentistry, Oral and Maxillofacial Radiology Clinic between 2016-2021 for any reason and underwent biopsy were retrospectively scanned using digital archives. While classifying the cyst, the criteria published by the World Health Organization (WHO) in 2017 were taken into account. Obtained results were recorded for statistical analysis. IBM SPSS 22.0 Software Package Program (IBM SPSS 22.0 Software Package Program, Inc. Chicago, IL, USA) was used as statistical software in the study.

Results: Of the 436 patients included in the study, 250 (57.3%) were male and 186 (42.7%) were female. The ages of the patients ranged between 7 and 82 years, and the mean age of the patients was 35.5±15.8. As a result of the findings, it was determined that the most common cysts were radicular cysts (53.7%). Radicular cysts were most commonly located in the posterior mandible and anterior maxilla anatomically.

Conclusions: Determining the prevalence, localization and distribution of jaw cysts with the findings obtained as a result of this retrospective study is of great importance in determining the diagnosis and treatment planning of these pathologies.

Keywords: Radicular cyst, biopsy, jaw, odontogenic, lesion.

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Introduction

Pathological spaces lined with epithelium, surrounded by connective tissue, and containing liquid, semisolid, or gaseous material are called cysts. Cysts observed in the jaw and surrounding tissues can be located in the bone as well as in the soft tissues.¹ Cysts observed in the jaw are classified as odontogenic or non-odontogenic according to the source of the epithelium. There are also cysts called pseudocysts that do not contain epithelium.² Odontogenic cysts originate from epithelial remnants (epithelial remnants of Malessez, enamel epithelial remnants, or dental lamina remnants) left over from tooth development. In cysts located in the mandible, the fact that the cyst is located above the mandibular canal generally leads to the opinion that it is odontogenic. In contrast, non-odontogenic cysts originate from epithelial remnants in the maxillary, frontal, and palatal processes.^{3,4}

Odontogenic cysts are classified as either inflammatory or developmental, depending on the cause of the proliferation of the epithelium from which they originate.⁵ Radicular, residual, and inflammatory

collateral (paradental) cysts are in the group of odontogenic inflammatory cysts. Developmental cysts include odontogenic keratocysts and dentigerous, lateral periodontal, calcified odontogenic, glandular odontogenic, and gingival cysts.⁶ Odontogenic keratocysts and calcified odontogenic cysts were excluded from the category of odontogenic tumors and included in the classification of odontogenic cysts in the classification published by the World Health Organization (WHO) in 2017, since there was not enough evidence to support the inclusion of neoplasm.⁷ The high recurrence rate and aggressive growth of odontogenic keratocysts increase the importance of these cysts.⁵ Jaw cysts usually grow slowly, and most exhibit similar clinical behaviors. Therefore, definitive diagnosis is accomplished through histopathological evaluation.⁸ The aim of this study was to retrospectively investigate the distribution of histopathologically diagnosed odontogenic and nonodontogenic cysts in a clinical archive according to age, gender, and location.

Materials and Methods

In this study, the pathology results of 436 patients preliminarily diagnosed with cysts who applied to Zonguldak Bulent Ecevit University's Faculty of Dentistry, Oral, and Maxillofacial Radiology Clinic between 2016–2021 and underwent biopsies were analyzed using digital archives. The study was approved by the university's Clinical Research Ethics Committee (Decision no.: 2022/11). Cyst diagnoses according to histopathology reports were made following the classification of odontogenic tumors and cysts published by the WHO in 2017.⁶

In panoramic radiographs, the cysts were included in the anterior region if they were between the mandibular and maxillary canine teeth and in the posterior region if they were located behind the premolars and posterior teeth. The anatomical localizations of the lesions were divided into four groups according to whether the cyst center was located in the mandible anterior, mandible posterior, maxilla anterior, or maxilla posterior. As a result of the scans, odontogenic keratocysts and radicular, paradental, dentigerous, calcified odontogenic, lateral periodontal, nasopalatine duct, and nasoalveolar cysts were detected.

Descriptive statistics were applied to the data obtained from the study, and the distribution of cysts according to age, gender, and anatomical region was examined. A one-way ANOVA test was used for group comparisons. The IBM SPSS 22.0 Software Package Program (IBM SPSS 22.0 Software Package Program, Inc., Chicago, IL, USA) was used as the statistical software in the study. A p-value of 0.05 was considered significant for all tests.

Results

Of the 436 histopathology reports obtained from the study, 250 were for males and 186 reported on females. When the distribution of all odontogenic and non-odontogenic cysts by gender was examined, the incidence rate in men (57.3%) was found to be higher than that in women (42.7%). Other than calcified odontogenic cysts, all types of cysts were more common in males. However, no statistically significant relationship was found between any cyst type and gender ($p > 0.05$). In Table 1, the incidence, distribution, and types of cysts are given according to gender.

In the study, 428 (98.6%) of 436 lesions diagnosed as cysts consisted of odontogenic cysts, and eight (1.4%) were non-odontogenic cysts. The three most common odontogenic cysts were radicular cysts (53.7%), dentigerous cysts (38.8%), and odontogenic keratocysts (2.5%), followed by other cysts. The non-odontogenic group included nasopalatine duct cysts (1.1%) and nasoalveolar cysts (0.3%) (Table 1).

While 295 (67.6%) cysts were located in the mandible, 141 (32.4%) were located in the maxilla. As for their locations in the jawbones, the cysts were most commonly found in the posterior mandible (63.5%), while they were also identified in the maxilla anterior (18.8%), maxilla posterior (13.8%), and mandible anterior (4.1%). According to these results, 136 of the most common radicular cysts and 123 of the dentigerous cysts were located in the posterior mandible (Table 2). The distribution of the cysts between the jaws is indicated in Figure 1.

The ages of the patients in the study ranged between 7 and 82 years, and the mean age was 35.5 ± 15.8 years. The most common age range of those who developed cysts was the third decade. Radicular cysts and dentigerous cysts were most common in the third decade, while odontogenic keratocysts were encountered more in the fourth and fifth decades. In the second decade, the incidence of dentigerous cysts was found to be higher than that of radicular cysts (Figure 2).

Discussion

Analyzing histopathological data on oral and maxillofacial lesions seen in particular populations is of great importance in establishing diagnosis and treatment protocols.⁹ Such data can be used to prevent future recurrences and morbidities.¹⁰ In this study, the biopsy results of individuals with odontogenic and non-odontogenic cysts were examined, and the distribution of different cyst types in terms of age, gender, and jaws was analyzed.

Consistent with the results of studies conducted in Turkey with different populations, it was determined in the present study that males were more affected by both odontogenic and non-odontogenic cysts, and the male/female ratio was determined as 1.34/1.¹¹⁻¹⁵ By contrast, Souza *et al.*¹⁶ and da Silva *et al.*⁹ stated that females were more affected by jaw cysts in studies conducted with a Brazilian population. It has been reported elsewhere that cysts are seen more frequently in men since the maxillary anterior region is frequently affected by trauma and poor oral hygiene.¹²

In most studies, radicular cysts are the most common jaw cysts, followed by dentigerous cysts and odontogenic keratocysts, and these results are consistent with the present study.^{1,10,13,17-19} Butt *et al.*²⁰ retrospectively analyzed 4,257 biopsy specimens obtained over 19 years. However, they reported that dentigerous cysts (31%) were the most common odontogenic cysts, followed by radicular cysts (22%). This may be due to the difficulty in sending periapical cysts/granulomas to the laboratory after tooth extraction, or it may be due to the lack of biopsy specimens from cases thought to be radicular cysts. They attributed this to the fact that dentigerous cysts usually appear as large lesions that mimic tumors

and that histopathological evaluation is needed for a definitive diagnosis.²⁰

Some report that odontogenic keratocysts are more common than dentigerous cysts. Koseoglu *et al.* identified 59% of odontogenic cyst cases as radicular cysts, 27% as odontogenic keratocysts, and 14% as dentigerous cysts.²¹ Tekkesin *et al.*²² conducted one of the studies with the largest number of patients in Turkey, where 5,088 odontogenic and nonodontogenic cyst biopsy specimens were obtained from 42,296 oral cases. In this study, 5,003 odontogenic cysts (11.8%) and 85 non-odontogenic cysts (0.2%) were diagnosed from all oral samples, and the second most common cyst type after radicular cysts (55.09%) was odontogenic keratocysts (20.6%).²² The authors reported that the Turkish population is likely to form aggressive cysts. It has been stated elsewhere that such heterogeneous results may vary depending on differences in study methodologies and accepted classifications.¹⁴

In the present study, unlike other cysts, calcified odontogenic cysts were more common (60%) in females and in individuals in their third decade. Grosman *et al.* reported that nasoalveolar and paradental cysts are more common in females.¹ Franklin *et al.* concluded that dentigerous cysts, odontogenic keratocysts, and paradental cysts are more common in females, unlike in the present study.¹⁰ In the present study, paradental cysts were detected in five (1.1%) cases. All paradental cysts were seen in males and in the posterior mandible. Paradental cysts are inflammatory lesions that usually affect the distal or buccal surfaces of partially erupted mandibular third molars with a history of pericoronitis.²³ According to the results the authors obtained, the incidence of paradental cysts was higher (0.58%) compared to that found in Prockt *et al.*²³, but the incidence found in Jones *et al.*²⁴ (5.6%) was lower (3.8%) than that in Ochsenius *et al.*²⁵

In the present study, the mean age was 35.5 ± 15.8 years, which is lower than that in other studies.^{14,17,26} In the present study, radicular and dentigerous cyst cases were most common in individuals in their third decade. Tortorici *et al.* reported in their study that dentigerous cysts are seen at earlier ages than radicular cysts and are more common in the first two decades.²⁷ Demirkol *et al.*,¹⁵ on the other hand, reported that dentigerous cysts were more common in the third and fourth decades. They thought that this might be due to the slow and asymptomatic growth tendency of the lesions.¹⁵

In the present study, 295 (67.6%) cysts were located in the mandible and 141 (32.4%) in the maxilla. However, other studies have found the incidence of cysts in the maxilla to be higher than that in the mandible.^{1,16,28} Kambalimath *et al.* reported that approximately one-third (33.33%) of identified cysts were located in the mandibular posterior region and secondly in the maxillary anterior region (30%).²⁸ Kilinc *et al.* reported similar rates for odontogenic cysts in the

maxilla anterior (33.5%) and mandible posterior (33.3%).²⁹ However, in the present study and the general literature, cysts were most commonly localized in the posterior mandible (63.5%) and the maxilla anterior (18.6%).^{14,18,30}

In the present study, 58.1% of the radicular cysts were localized in the posterior mandible and 21.4% in the anterior maxilla. These results agree with studies in India²⁸ and the United Kingdom.²⁴ Contrary to these results, some researchers have reported that radicular cysts are more common in the anterior maxilla.^{5,7,10,31} Radicular cysts result from the proliferation of Malassez epithelial remnants as a result of chronic inflammation of the periradicular tissues. The prevalence of radicular cysts has been associated with a high incidence of caries in most countries where studies were conducted.^{13,24,30}

Dentigerous cysts are defined as cysts that affect the crown of an unerupted tooth and adhere to the cervical region.²³ Degeneration of dentigerous cysts into ameloblastoma, mucoepidermoid carcinoma, and squamous cell carcinoma has been reported in the literature, albeit rarely.³² In this study, dentigerous cysts affected males more often, and they were mostly seen in the posterior mandible (73.6%) and maxilla posterior (13.0%). Ansari *et al.*,⁵ Hosgor *et al.*,⁷ and Izgi *et al.*¹¹ reported that dentigerous cysts are more common in the posterior mandible, which is consistent with the present study. Jones *et al.* reported that the third molar teeth of the mandible are the most frequently impacted teeth and that the incidence of dentigerous cysts in the posterior mandible may be high because of this.³³ Contrary to the present study, Prockt *et al.*²³ detected a slightly higher number of dentigerous cysts in females (52%) and reported that they were located in the anterior maxilla second most frequently. They thought that this might be due to impacted maxillary canine teeth.²³

In the present study, the incidence of odontogenic keratocysts was found to be lower (2.5%) than in other studies.^{1,17,24,25,33} Odontogenic keratocysts were most commonly detected in men and in the posterior mandible, consistent with other studies.^{11,14,16,25} In the present study, odontogenic keratocysts were detected most frequently in those in their fourth and fifth decades. However, Kambalimath *et al.* reported that odontogenic keratocysts were more common in the second and third decades.²⁸ Some studies, including research conducted in Iranian³⁴ and Brazilian¹ populations, are in accordance with this result. In the present study, the most common non-odontogenic cyst type was nasopalatine duct cysts, and all of these cases were located in the anterior region of the maxilla. These results are similar to those of Grossman *et al.*¹

Conclusions

In this study, biopsy results of Turkish patients with jaw cysts who applied to a clinic within a 5-year period

were evaluated. Jaw cysts were most common between the ages of 21 and 30 and mostly affected males. The mandible posterior and maxilla anterior were the regions where the cysts were most frequently localized. The present study was carried out in a single center, and patients with histopathology results were included in the study. Therefore, multicentre and more comprehensive patient groups are needed to obtain detailed information

about the demographic characteristics of patients with odontogenic cysts.

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Table 1. Distribution of cysts by age and gender

Histopathological Diagnosis	Frequency (n, (%))	Male (n, (%))	Female (n, (%))	M/F Ratio	Average Age	p value
Odontogenic Inflammatory Cysts						
Radicular Cyst	234 (53.7%)	140 (59.8%)	94 (40.2%)	1.49/1	37.9±16.3	
Inflammatory Collateral Cyst (Paradental Cyst)	5 (1.1%)	5 (100.0%)	-	M	39.8±17.6	
Odontogenic Developmental Cysts						
Dentigerous Cyst	169 (38.8%)	87 (51.5%)	82 (48.5%)	1.06/1	30.8±13.9	
Odontogenic Keratocyst	11 (2.5%)	8 (72.7%)	3 (27.3%)	2.67/1	42.4±12.9	
Calcified Odontogenic Cyst	5 (1.1%)	2 (40.0%)	3 (60.0%)	0.67/1	31.0±19.2	
Lateral Periodontal Cyst	4 (0.9%)	3 (75.0%)	1 (25.0%)	3/1	51.7±12.6	
Non-Odontogenic Cysts						
Nasopalatine Duct Cyst	5 (1.1%)	3 (60.0%)	2 (40.0%)	1.5/1	49.0±14.6	
Nasoalveolar Cyst	3 (0.3%)	2 (66.7%)	1 (33.3%)	2/1	43.7±17.9	
Total (n, (%))	436 (100.0%)	250 (57.3%)	186 (42.7%)	1.34/1	35.5±15.8	0.252

Table 2. Distribution of cysts according to anatomical localizations

Histopathological Diagnosis	Mandible (n, (%))		Maxilla (n, (%))		Total (n, (%))
	Anterior	Posterior	Anterior	Posterior	
Radicular Cyst	11 (4.7%)	136 (58.1%)	50 (21.4%)	37 (15.8%)	234 (100.0%)
Inflammatory Collateral Cyst (Paradental Cyst)	0 (0.0%)	5 (100.0%)	0 (0.0%)	0 (0.0%)	5 (100.0%)
Dentigerous Cyst	4 (2.4%)	123 (72.8%)	20 (11.8%)	22 (13.0%)	169 (100.0%)
Odontogenic Keratocyst	0 (0.0%)	8 (72.7%)	2 (18.2%)	1 (0.9%)	11 (100.0%)
Calcified Odontogenic Cyst	0 (0.0%)	4 (80.0%)	1 (20.0%)	0 (0.0%)	5 (100.0%)
Lateral Periodontal Cyst	2 (50.0%)	1 (25.0%)	1 (25.0%)	0 (0.0%)	4 (100.0%)
Nasopalatine Duct Cyst	0 (0.0%)	0 (0.0%)	5 (100.0%)	0 (0.0%)	5 (100.0%)
Nasoalveolar Cyst	0 (0.0%)	0 (0.0%)	3 (100.0%)	0 (0.0%)	3 (100.0%)
Total (n, (%))	18 (4.1%)	277 (63.5%)	82 (18.8%)	60 (13.7%)	436 (100.0%)

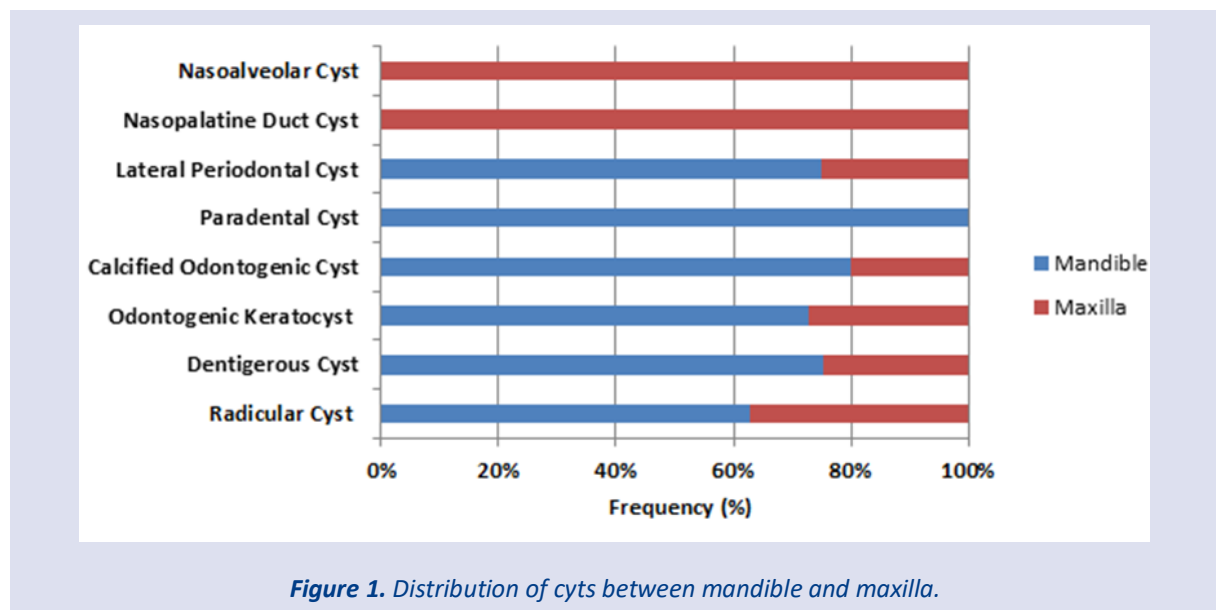


Figure 1. Distribution of cysts between mandible and maxilla.

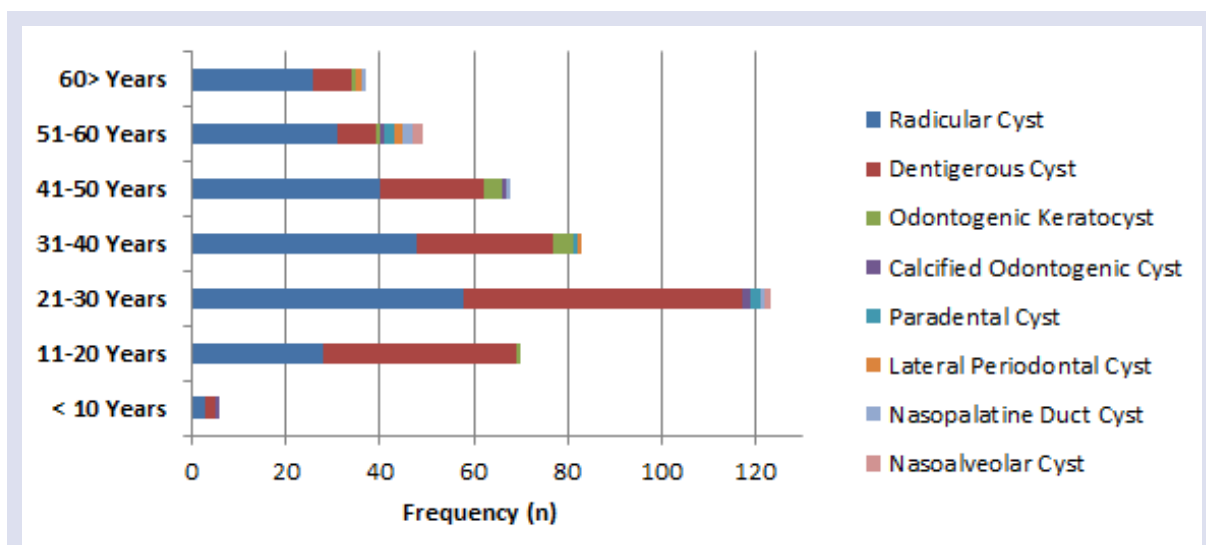


Figure 2. Distribution of cyts between age groups.

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