

A Retrospective Analysis of Jaw Cyst According to New World Health Organization Classification (2022)

Dünya Sağlık Örgütü'nün Yeni Sınıflandırmasına (2022) Göre Çene Kistlerinin Retrospektif Analizi

^{ib} Mehmet Zahit BAŞ^a, ^{ib} Aslı BAŞKAN ÖNAL^b, ^{ib} Musa ERDEM^c

^aPrivate Dentist, İstanbul, Türkiye

^bUniversity of Health Sciences Faculty of Dentistry, Department of Oral and Maxillofacial Surgery, İstanbul, Türkiye

^cÜsküdar University Faculty of Dentistry, Department of Oral and Maxillofacial Surgery, İstanbul, Türkiye

ABSTRACT Objective: To determine the demographic characteristics of jaw cysts among patients treated in the Department of Oral and Maxillofacial Surgery, Hamidiye Faculty of Dentistry, University of Health Sciences. **Material and Methods:** A retrospective observational study was performed on 253 jaw cysts diagnosed in 251 patients in the database. Patients were treated in the Department of Oral and Maxillofacial Surgery, Hamidiye Faculty of Dentistry, University of Health Sciences, between 2018-2022. Data on demographic information, radiographic evaluations, clinical findings, histopathological examination results and localization of the pathology were identified and categorized from the archive search. A descriptive analysis of the study variables was performed using the SPSS for Windows Version 21.0 package program. **Results:** The mean age at lesion presentation was 38.73 years (range 6-81). Cysts were more common in males. The most common lesion was radicular cyst and the least common lesion was nasopalatine duct cyst. The most common site of jaw cysts was the mandible and especially the mandibular posterior region. The least common site of jaw cysts was the mandibular anterior region. **Conclusion:** The most commonly diagnosed lesion is the radicular cyst. Jaw cysts showed a higher incidence in the mandible, especially in the posterior mandible, and were slightly more common in males. For treatment and early diagnosis of jaw cysts, their biological and histological behavior should be known.

Keywords: Jaw cysts; radicular cyst; dentigerous cyst; odontogenic cyst; World Health Organization

ÖZET Amaç: Sağlık Bilimleri Üniversitesi Hamidiye Diş Hekimliği Fakültesi Ağız ve Çene Cerrahisi Ana Bilim Dalı'nda tedavi gören hastalarda çene kistlerinin demografik özelliklerini belirlemektir. **Gereç ve Yöntemler:** Veritabanında 251 hastada teşhis edilen 253 çene kisti üzerinde retrospektif gözlemsel bir çalışma yapıldı. Hastalar, Sağlık Bilimleri Üniversitesi Hamidiye Diş Hekimliği Fakültesi Ağız ve Çene Cerrahisi Ana Bilim Dalı'nda 2018-2022 yılları arasında tedavi edildi. Demografik bilgiler, radyografik değerlendirmeler, klinik bulgular, histopatolojik muayene sonuçları ve patolojinin lokasyonuna ilişkin veriler arşiv aramasından tanımlandı ve kategorilere ayrıldı. Çalışma değişkenlerinin tanımlayıcı analizi SPSS Windows Sürüm 21.0 paket programı kullanılarak yapıldı. **Bulgular:** Lezyon sunumundaki ortalama yaş 38,73 yıldır (aralığı 6-81). Kistler erkeklerde daha yaygındır. En yaygın lezyon radiküler kist ve en az yaygın lezyon nazopalatin kanal kistiydi. Çene kistlerinin en yaygın yeri mandibula ve özellikle mandibular posterior bölgeydi. Çene kistlerinin en az yaygın yeri mandibular anterior bölgeydi. **Sonuç:** En sık teşhis edilen lezyon radiküler kisttir. Çene kistleri mandibulada, özellikle posterior mandibulada daha yüksek bir insidans gösterdi ve erkeklerde biraz daha yaygındır. Çene kistlerinin tedavisi ve erken teşhisi için biyolojik ve histolojik karakterleri bilinmelidir.

Anahtar Kelimeler: Çene kemiği kistleri; radiküler kist; dentijeröz kist; odontojenik kistler; Dünya Sağlık Örgütü

Correspondence: Musa ERDEM

Üsküdar University Faculty of Dentistry, Department of Oral and Maxillofacial Surgery, İstanbul, Türkiye

E-mail: musa.erdem@uskudar.edu.tr

Peer review under responsibility of Türkiye Klinikleri Journal of Dental Sciences.

Received: 21 Nov 2024

Received in revised form: 24 Mar 2025

Accepted: 07 Apr 2025

Available online: 30 May 2025

2146-8966 / Copyright © 2025 by Türkiye Klinikleri. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).



Odontogenic cysts used to be classified as inflammatory and developmental cysts according to the World Health Organization (WHO) 2017 classification. However, in the classification published in March 2022, they were categorized under a single heading as “jaw cysts”. The new classification of jaw cysts includes radicular cyst (RC), inflammatory col-lateral cysts, gingival cysts, dentigerous cyst (DC), orthokeratinized odontogenic cyst (OOC), lateral pe-riodontal cyst/botryoid odontogenic cyst, calcified odontogenic cyst (COC), glandular odontogenic cyst, odontogenic keratocyst (OCC), surgical ciliary cyst and nasopalatine duct cyst (NPDC).¹

Demographic profiles of cysts in the maxillofa-cial region have been included in studies conducted on various age groups in European and non-European countries.²

In the literature, studies on the prevalence of jaw cysts in the population of the western regions of Türkiye are limited.²⁻⁵ Therefore, the aim of this study was to compile and compare the age, gender and lo-calization of different types of jaw cysts with studies conducted in our country.

MATERIAL AND METHODS

In this study, patients who applied to the Faculty of Dentistry of the University of Health Sciences between 2018-2022; and who were treated in the department of oral and maxillofacial surgery were included. This study was approved by the University of Health Sci-ences, Hamidiye Scientific Research Ethics Commit-tee (date: June 9, 2023; no: 12/21). The Helsinki Declaration guided the conduct of this study. Data on demographic information, radiographic evaluations, clinical findings, histopathological examination results,

and localization of the pathology were identified and categorized from the archive.

Histopathologic evaluation, clinical and radio-graphic findings were evaluated together for the definitive diagnosis of cysts.

The area of involvement in each jaw was divided into 3 regions. These are anterior area (central, lat-eral, and canine teeth), premolar area and molar area. In cases involving more than one area, all relevant areas were included.

Statistical analyses were performed with the SPSS for Windows Version 21.0 package program (IBM Corp. released in 2012, Armonk, NY: IBM Corp.). Numerical variables were summarized with mean±standard deviation. Categorical variables were given in numbers and percentages.

RESULTS

253 cysts were diagnosed in four years. Of the in-cluded patients, 85 (33.2%) were female and 166 (66.8%) were male (Table 1). Two different maxil-lary cysts were detected in different sites at the same time in 1 female and 1 male patient. 159 (63.3%) radicular cysts, 56 (22.3%) dentigerous cysts, 33 (13.1%) odontogenic keratocysts, 3 (1.2%) na-sopalatine duct cysts were identified by histopatho-logic examination. 38.17% were seen in the maxilla and 61.82% in the mandible. The most common site was mandibular molar (43.24%), the 2nd most com-mon was maxilla anterior (20.27%), and the least common was mandibular anterior (6.75%) (Table 2).

The ages of the patients ranged from 6-81 years. The mean age of RC was 38.05±16.16, DC was 37.57±17.11, OCC was 42.39±16.26, NPDC was

TABLE 1: Distribution of jaw cysts according to gender

Cyst type	Female	Male	Female:male ratio	Total
RC	54	105	1:1.8	159 (63.3%)
DC	19	37	1:1.9	56 (22.3%)
OCC	11	22	1:2	33 (13.1%)
NPDC	1	2	1:2	3 (1.2%)
Total	85 (33.2%)	166 (66.8%)	1:1.9	251

RC: Radicular cyst; DC: Dentigerous cyst; OCC: Odontogenic keratocyst; NPDC: Nasopalatine duct cyst

TABLE 2: Distribution of jaw cysts according to their localization

Cyst type	Maxilla			Mandible		
	Anterior	Premolar	Molar	Anterior	Premolar	Molar
RC	49	20	22	12	24	63
DC	4	1	3	2	3	43
OCC	4	2	5	6	8	22
NPCD	3	-	-	-	-	-
	60	23	30	20	35	128
Total: 296		113			183	

RC: Radicular cyst; DC: Dentigerous cyst; OCC: Odontogenic keratocyst; NPCD: Nasopalatine duct cyst

TABLE 3: Average age and age range at which jaw cysts occur

Cyst type	$\bar{X} \pm SD$	$\bar{X} \pm SD$	$\bar{X} \pm SD$
	of all patients (age range)	of female patients (age range)	of male patients (age range)
RC	38.05±16.16 (11-81)	32.18±16.14 (14-71)	41.06±15.40 (11-81)
Dentigerous cyst	37.55±17.09 (6-68)	35.16±16.67 (9-68)	38.81±17.43 (6-67)
OCC	42.39±16.27 (15-75)	43.09±22.40 (15-75)	42.04±12.79 (25-71)
NPCD	61±13 (53-76)	76 (76)	53.50±0.70 (53-54)
Total	38.73±16.53	34.57±17.22	40.94±15.76

SD: Standard deviation; RC: Radicular cyst; DC: Dentigerous cyst; OCC: Odontogenic keratocyst; NPCD: Nasopalatine duct cyst

61±13, while the mean age of all cysts was 38.73±16.53 (Table 3).

DISCUSSION

The WHO classification was categorized under a single title as “jaw cysts” with the classification published in March 2022. We used this current classification in our study. In the literature review, the studies conducted according to the new classification are limited.⁶⁻⁸

Our study is a retrospective study covering an interval of 6 years. In the literature, long-term evaluations consisting of a significant number of pathologies stand out.⁹⁻¹¹ When we look at the articles from our country, Tekkesin et al. presented a 40-year retrospective study.⁴ Other studies have been short-term studies.^{2,3,12,13} We attribute this to the recent history of the digital records system in Türkiye and the lack of history of dentistry faculties.

In this study, cysts were seen more frequently in men than in women, which is consistent with the literature.^{4,10,13} Some studies have claimed that the reason why oral cysts are more common in men is that

their oral hygiene is worse than in women.^{11,14}

Similar to some other studies, cysts were observed more frequently in maxilla, especially anterior region, in this study.^{13,15-17} Moreover, radicular cyst was the most common in the maxillary anterior region in accordance with the literature.^{13,17} On the contrary, Izgi et al. and Nuñez-Urrutia et al. reported that they were observed more frequently in the mandible.^{14,18} There is no clear explanation about this difference in the literature.

The most common cyst observed in our study was RC, followed by DC, OCC, NPDC respectively. In this regard, the results of Tamiolakis et al. and Açıkgöz et al. were consistent with the results of the present study.^{2,9} Furthermore, RC was the most common cyst in many different studies.^{17,19,20} RC was not included in some studies.²¹⁻²³ In the study by Tekkesin et al. OCC was the second most frequently observed after RC.⁴ In our study, the mean age at which cysts were observed was in the 30s, similar to many studies.^{4,10,21,24}

In this study, the most common cysts, RCs, were observed more frequently in men, consistent with many

previous studies.^{4,13,18} The high prevalence of RCs has been attributed to poor oral health conditions in the general population and the lack of adequate public incentives to prevent oral infections.²⁵ However, the higher prevalence of RCs in males has been attributed to the fact that men generally have worse oral hygiene habits than women. As in this study, some other studies have reported that radicular cysts are more frequently located in the anterior region of the maxilla.^{13,15,17} This RC distribution is thought to be due to lesions resulting from trauma-induced loss of vitality of the anterior teeth.¹⁵ In some studies, it was determined that RC was usually seen in the 4th decade. The results of this study also confirmed this.^{4,13,15}

According to the results, the 2nd most common cyst in the jaws is DC. There are many studies in the literature that support this result.^{13,18-21} DC are more frequently observed in males than females. In the results, they are more frequently localized in the posterior region of the mandible. This is followed by the anterior region of the maxilla. These findings are consistent with previous studies.^{13,19} The most important reason of the development of dentigerous cysts is the impacted lower 3rd molars and upper canines.^{2,17,22} This information was sufficient to describe the regions where DC is more common.

In 2005, WHO classified the OCC lesion as odontogenic tumor [keratocystic odontogenic tumor, (KCOT)] and removed it from the cyst classification.²⁶ However, in January 2017, KCOT was reclassified as OCC within cysts.²⁷ In the study, the 3rd most frequently observed cyst is OCC. When the results are examined, it is noticed that it is frequently seen in male and in the posterior region of the mandible, as in other studies.^{4,18,20} The average age group in which OCC is seen is in the 4th decade, which is consistent with previous studies.¹⁸⁻²¹

Tekkesin et al. reported that OCC (2nd most common) was observed at a higher frequency than DC (3rd most common).⁴ According to their results, they claimed that the risk of developing aggressive cysts is higher in the Turkish population. On the contrary, as in our study, other studies conducted in our country reported that the incidence of OCC ranked 3rd or 4th

among all jaw cysts.^{3,5,18} OCC is a lesion that is relatively difficult to management and requires follow-up. We thought that this difference might be that Tekkesin and her colleagues worked in an old and well-established health center in the region and this type of patients are referred more frequently.

Nasopalatine canal cyst, also known as incisive canal cyst, is the most common nonodontogenic cyst in the maxilla. Although the exact etiology or pathogenesis of NPDC is unknown, it is thought to originate from the epithelial remnants of the nasopalatine duct.²⁸ In the literature, the prevalence of NPDC is higher in males, and in our case, it was seen in 3 cases among all cysts, and in accordance with the literature, it was observed more in males than females. In our country, Tekkesin et al. reported the prevalence of NPDC as 1,5%, Hosgor et al. 6,5%, Kilinc et al. 3,2%, but Kilinc et al. did not include NPDC in their study.^{4,5,13} In our study, NPDC was diagnosed in 3 cases and a prevalence of 1.19% was observed. In general, the prevalence of NPDC showed low rates among all jaw cysts and this finding is consistent with the world literature.^{9,22,25}

The study was conducted in a newly established dentistry faculty. Therefore, it has some limitations. The data in the study covered a 5-year period. Therefore, a limited number of cases were examined. Another limitation is that rare jaw cysts such as glandular odontogenic cyst, botryoid odontogenic cyst, and calcified odontogenic cyst, which are included in the WHO classification of jaw cysts, were not encountered in the data in the study. Therefore, they could not be evaluated.

CONCLUSION

According to the findings of our study, the distribution of jaw cysts is similar to previous studies in the literature.

The WHO evaluation of all jaw cysts under a single roof will enable such studies to be conducted in a healthier way.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct con-

nection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Mehmet Zahit Bař; **Design:** Mehmet Zahit Bař; **Control/Supervision:** Mehmet Zahit Bař; **Data Collection and/or Processing:** Mehmet Zahit Bař, Aslı Bařkan Önal; **Analysis and/or Interpretation:** Mehmet Zahit Bař, Aslı Bařkan Önal, Musa Erdem; **Literature Review:** Mehmet Zahit Bař, Aslı Bařkan Önal; **Writing the Article:** Mehmet Zahit Bař, Aslı Bařkan Önal, Musa Erdem; **Critical Review:** Musa Erdem, Mehmet Zahit Bař; **References and Fundings:** Mehmet Zahit Bař, Musa Erdem; **Materials:** Aslı Bařkan Önal.

KAYNAKLAR

1. Soluk-Tekkesin M, Wright JM. The World Health Organization classification of odontogenic lesions: a summary of the changes of the 2022 (5th) edition. *Türk Patoloji Derg.* 2022;38(2):168-84. PMID: 35578902; PMCID: PMC9999699.
2. Açıkğöz A, Uzun-Bulut E, Özden B, Gündüz K. Prevalence and distribution of odontogenic and nonodontogenic cysts in a Turkish population. *Med Oral Patol Oral Cir Bucal.* 2012;17(1):e108-15. PMID: 21743428; PMCID: PMC3448196.
3. Topal O. Çenelerdeki kistlerin retrospektif olarak değeriendirilmesi. Necmettin Erbakan Üniversitesi Uluslararası Diř Hekimliği Kongresi. 1. Baskı. Ankara: Türkiye Klinikleri; 2022. p.78-84.
4. Tekkesin MS, Olgac V, Aksakallı N, Alattı C. Odontogenic and nonodontogenic cysts in İstanbul: analysis of 5088 cases. *Head Neck.* 2012;34(6):852-5. PMID: 21850702.
5. Hosgor H, Tokuc B, Kan B, Coskunes FM. Evaluation of biopsies of oral and maxillofacial lesions: a retrospective study. *J Korean Assoc Oral Maxillofac Surg.* 2019;45(6):316-23. PMID: 31966976; PMCID: PMC6955426.
6. Çubuk S, Çolak MY. A retrospective analysis of benign paediatric jaw lesions according to new World Health Organization classification. *J Craniomaxillofac Surg.* 2022;50(6):523-31. PMID: 35599042.
7. Crasnean E, Ban A, Hedeşiu M, Roman R, Dinu C, Băciuț M, et al. Benign pediatric jawbone lesions: a 10-year clinical and radiological pilot study. *Children (Basel).* 2023;10(2):335. PMID: 36832466; PMCID: PMC9954982.
8. Malas V, Rasmussen L. Odontogenic cysts: presentation of a simplified classification system. *Clin Surg.* 2024;9:3718. <https://www.clinicsinsurgery.com/open-access/odontogenic-cysts-presentation-of-a-simplified-classification-system-9764.pdf>
9. Tamiolakis P, Thermos G, Tosios KI, Sklavounou-Andrikopoulou A. Demographic and clinical characteristics of 5294 jaw cysts: a retrospective study of 38 years. *Head Neck Pathol.* 2019;13(4):587-96. PMID: 30758760; PMCID: PMC6854185.
10. Tortorici S, Amodio E, Massenti MF, Buzzanca ML, Burruano F, Vitale F. Prevalence and distribution of odontogenic cysts in Sicily: 1986-2005. *J Oral Sci.* 2008;50(1):15-8. PMID: 18403878.
11. Meningaud JP, Oprean N, Pitak-Amnop P, Bertrand JC. Odontogenic cysts: a clinical study of 695 cases. *J Oral Sci.* 2006;48(2):59-62. PMID: 16858133.
12. Baykul T, Koçer G, Çına Aksoy M, Kayaaltı Özarslan S, Kahraman H, al. Isparta ve çevresinde görülen çene kistlerinin retrospektif değeriendirilmesi. *Med J Suleyman Demirel Univ.* 2009;16:6-9. <https://dergipark.org.tr/tr/download/article-file/196775>
13. Kilinc A, Gundogdu B, Saruhan N, Yalcin E, Ertas U, Urvasizoglu G. Odontogenic and nonodontogenic cysts: an analysis of 526 cases in Turkey. *Niger J Clin Pract.* 2017;20(7):879-83. PMID: 28791984.
14. Nuñez-Urrutia S, Figueiredo R, Gay-Escoda C. Retrospective clinicopathological study of 418 odontogenic cysts. *Med Oral Patol Oral Cir Bucal.* 2010;15(5):e767-73. PMID: 20383117.
15. Buaoud MM, Musrati A, Hagstrom J. Prevalence of odontogenic cysts in a group of Libyan population: a retrospective study. *Niger J Clin Pract.* 2023;26(8):1152-6. PMID: 37635610.
16. Bataineh AB, Rawashdeh MA, Al Qudah MA. The prevalence of inflammatory and developmental odontogenic cysts in a Jordanian population: a clinicopathologic study. *Quintessence Int.* 2004;35(10):815-9. PMID: 15553292.
17. Ochsenius G, Escobar E, Godoy L, Peñafiel C. Odontogenic cysts: analysis of 2,944 cases in Chile. *Med Oral Patol Oral Cir Bucal.* 2007;12(2):E85-91. PMID: 17322811.
18. Izgi E, Mollaoglu N, Simsek MB. Prevalence of odontogenic cysts and tumors on turkish sample according to latest classification of world health organization: a 10-year retrospective study. *Niger J Clin Pract.* 2021;24(3):355-61. PMID: 33723109.
19. Khosravi N, Razavi SM, Kowkabi M, Navabi AA. Demographic distribution of odontogenic cysts in Isfahan (Iran) over a 23-year period (1988-2010). *Dent Res J (Isfahan).* 2013;10(2):162-7. PMID: 23946730; PMCID: PMC3731954.
20. Sharifan MJ, Khalili M. Odontogenic cysts: a retrospective study of 1227 cases in an Iranian population from 1987 to 2007. *J Oral Sci.* 2011;53(3):361-7. PMID: 21959665.
21. Franklin JRB, Vieira EL, Brito LNS, Castro JFL, Godoy GP. Epidemiological evaluation of jaw cysts according to the new WHO classification: a 30-year retrospective analysis. *Braz Oral Res.* 2021;35:e129. PMID: 34878084.
22. Grossmann SM, Machado VC, Xavier GM, Moura MD, Gomez RS, Aguiar MC, et al. Demographic profile of odontogenic and selected nonodontogenic cysts in a Brazilian population. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2007;104(6):e35-41. PMID: 17942344.
23. Jaeger F, de Noronha MS, Silva ML, Amaral MB, Grossmann SM, Horta MC, et al. Prevalence profile of odontogenic cysts and tumors on Brazilian sample after the reclassification of odontogenic keratocyst. *J Craniomaxillofac Surg.* 2017;45(2):267-70. PMID: 28089087.
24. de Souza LB, Gordón-Núñez MA, Nonaka CF, de Medeiros MC, Torres TF, Emiliano GB. Odontogenic cysts: demographic profile in a Brazilian population over a 38-year period. *Med Oral Patol Oral Cir Bucal.* 2010;15(4):e583-90. PMID: 20038885.

-
25. Johnson NR, Savage NW, Kazoullis S, Batstone MD. A prospective epidemiological study for odontogenic and non-odontogenic lesions of the maxilla and mandible in Queensland. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2013;115(4):515-22. PMID: 23522645.
26. Bhargava D. Odontogenic keratocyst (OKC)-reverting back from tumour to cyst: Keratocystic odontogenic tumour (KCOT)-a cyst to a tumour. *Oral Maxillofac Surg* 16, 163-70 (2012). *Oral Maxillofac Surg.* 2023;27(1):175-6. PMID: 35066648.
27. Wright JM, Vered M. Update from the 4th edition of the World Health Organization classification of head and neck tumours: odontogenic and maxillofacial bone tumors. *Head Neck Pathol.* 2017;11(1):68-77. PMID: 28247226; PMCID: PMC5340735.
28. Elliott KA, Franzese CB, Pitman KT. Diagnosis and surgical management of nasopalatine duct cysts. *Laryngoscope.* 2004;114(8):1336-40. PMID: 15280704.

ARTICLE IN PRESS