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Research Paper

Clinicopathological Profile of Odontogenic Cysts and Tumors in an Iranian Population: A 12-Year Retrospective Study

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ABSTRACT

Background: Odontogenic cysts and tumors constitute a heterogeneous group of lesions arising from the tooth-forming apparatus. Their relative frequency varies across geographic regions and ethnic populations. Data from central Iran remain limited. This study aimed to determine the frequency and clinicopathological profile of jaw cysts and tumors in Kashan over a 12-year period and to examine associations with demographic and clinical variables, with particular attention to changes following the establishment of a dental school.

Methods: We performed a retrospective cross-sectional analysis of pathology records from patients diagnosed with jaw cysts or tumors at Shahid Beheshti, Yathrebi, and Milad hospitals in Kashan (Central Iran). We extracted demographic data, lesion site, histological type, and referring clinician. Lesions were categorized according to contemporary WHO criteria. We assessed associations using Chi-square or Fisher's exact tests (SPSS v20; significance set at $p < 0.05$).

Results: Of 168 cases, 56% were female and 44% male; the majority (53%) were aged 31–60 years. Cysts predominated (46.4%), followed by soft-tissue lesions (26.8%), tumors (14.9%), and osseous lesions (11.9%). Odontogenic cysts accounted for 75 of 78 cysts. Statistically significant associations were observed between lesion type and age group ($p = 0.001$), sex ($p = 0.01$), treating clinician ($p = 0.001$), and anatomical site ($p = 0.001$). No significant association was found between the date of referral and lesion type ($p = 0.23$).

Conclusion: In this 12-year clinicopathological survey from Kashan, Iran, odontogenic cysts were the most common jaw lesions. Female sex, mandibular location, and dentist referral were significantly associated with lesion type. The marked increase in case detection after 2015 illustrates the positive impact of expanded dental infrastructure on the identification of these lesions. Alignment of future Iranian studies with the WHO classification, together with multicenter collaboration, will strengthen the evidence base needed for improved diagnosis and resource allocation.

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Introduction

Odontogenic tumors form a complex group of lesions with varied histological and clinical features; some are true neoplasms that rarely turn malignant, while others are hamartomas. Non-odontogenic tumors arise from non-dental tissues. They are classified into three groups [1-3]: (A) pure odontogenic epithelial tumors without ectomesenchyme; (B) mixed tumors of odontogenic epithelium and ectomesenchyme, with or without dental hard tissue formation; and (C) primarily ectomesenchymal tumors in which any odontogenic epithelium present plays no pathogenic role [4-6]. Jaw cysts typically enlarge slowly and asymptomatically, often discovered incidentally on routine radiographs [7, 8]. Odontogenic cysts, among the most common jaw lesions, originate from activated odontogenic epithelium trapped in bone or gingiva. Per the WHO classification, they are categorized as inflammatory or developmental [9]. Although benign, they can reach substantial size, requiring precise diagnosis for appropriate surgical management [2, 9]. Odontogenic tumors derive from the epithelium, ectomesenchyme, or mesenchyme of tooth-forming tissues and comprise a heterogeneous spectrum of hamartomas, benign neoplasms, and rare malignancies [10].

The radicular cyst is the most common inflammatory odontogenic cyst; it occurs predominantly in the third to sixth decades of life, more frequently in males, and is usually associated with the roots of infected or necrotic teeth. Other jaw cysts include the odontogenic keratocyst and the dentigerous (follicular) cyst [11]. In a 38-year study by Tamiolakis et al., using the latest WHO classification, 5,249 jaw-cyst diagnoses were retrieved; the most frequent cysts were radicular cysts, followed by dentigerous cysts and odontogenic keratocysts [12]. In a study by Bianco et al. at Ankara University, 65.19% of 739 biopsied specimens were follicular cysts [13]. In a 10-year study of an Iranian population involving 8,520 cases, Sharifian et al. reported that 14.4% were odontogenic keratocysts [14].

Patient age is crucial in the clinical diagnosis of these lesions. Because odontogenic cysts and tumors can disrupt dento-skeletal growth, knowing their prevalence and encouraging patients to undergo radiography and histopathological examination enable early detection and timely treatment [15]. Information such as sex, age, lesion type, and site is critical for diagnosis and treatment planning. Therefore, careful clinical examinations and accurate documentation in the medical record are essential. Moreover, because the oral cavity is a common site for many diseases, diagnosis based solely on clinical appearance is often difficult; histopathological studies of oral lesions are of considerable importance [16]. In a Mexican population study by Ledesma-Montes et al., the periapical cyst was the most frequent cyst type [17]; Sharifian et al. likewise found the radicular cyst to be the most common cyst in an Iranian population [14]. In an Egyptian study by Tawfik et al., ameloblastoma was the most common tumor [18], whereas Kambalimath et al. reported odontogenic keratocyst as the most frequent odontogenic tumor [19].

Although numerous studies have been conducted in neighboring cities and various countries, differences in the reported frequencies of cysts persist. To the best of our knowledge, no previous study in Kashan has investigated the frequency of jaw cysts or their associations with factors such as age and sex. Therefore, the present study was designed to: (1) determine the frequency and clinicopathological profile of odontogenic cysts and tumors in Kashan over a 12-year period; (2) examine associations between lesion type and demographic and clinical variables; and (3) assess the impact of the establishment of expanded dental services (after 2015) on case detection rates.

Materials and Methods

Study Design and Setting

This cross-sectional study reviewed consecutive pathology records of patients diagnosed with jaw cysts or tumors at the pathology departments of Shahid Beheshti, Yathrebi, and Milad hospitals in Kashan, Iran, from January 2010 to December 2021. The study protocol was approved by the Ethics Committee of Kashan University of Medical Sciences (IR.KAUMS.NUHEPM.REC.1400.051). Patient confidentiality was maintained throughout.

Inclusion and Exclusion Criteria

Inclusion criteria included a definitive histopathological diagnosis of a cyst or tumor of the jaws by board-certified pathologists. Records with incomplete demographic or diagnostic information were excluded. Of the initial records screened, records with incomplete demographic or diagnostic data were excluded, resulting in a final analyzed cohort of 168 cases.

Sample Size

Sampling was exhaustive (census of eligible records). A minimum sample size of 200 was calculated a priori based on a previously reported 15.3% prevalence of cysts among biopsied specimens [20],

assuming 95% confidence and 5% precision. After exclusion of incomplete records, the final analyzed cohort comprised 168 cases meeting all inclusion criteria. Although the final sample was smaller than the a priori estimate, the exhaustive sampling and achieved sample size remained adequate for the primary descriptive and association analyses.

Data Collection

A standardized checklist was used to extract age, sex, year of referral (before versus after 2015, corresponding to the establishment of expanded dental services), referring clinician (dentist versus non-dentist physician), anatomical site (tongue, maxilla, mandible, or other including cheek, floor of the mouth, and salivary gland regions), and histopathological diagnosis. Lesions were grouped into four broad categories: osseous lesions (including non-odontogenic bone tumors and fibro-osseous lesions), soft-tissue lesions (including inflammatory, infectious, and neoplastic soft-tissue lesions of the oral cavity), tumors, and cysts. Lesions were further subclassified as odontogenic versus non-odontogenic cysts and, where applicable, as developmental versus inflammatory odontogenic cysts. Tumor subtypes were recorded as mixed or epithelial when specified. Histopathological diagnoses were based on the WHO classification criteria available during the study period (prior to the 2022 revision); re-review of slides under the 2022 WHO classification was not feasible.

Statistical Analysis

Descriptive statistics (frequencies and percentages) were calculated. Associations between lesion type and categorical variables were evaluated with the Chi-square test or Fisher's exact test when expected cell counts were low. Analyses were performed with SPSS version 20 (IBM Corp., Armonk, NY, USA). A two-sided p-value < 0.05 was considered statistically significant.

Results

Demographic Characteristics

Among the 168 patients, 94 (56%) were female, and 74 (44%) were male. Age distribution was as follows: 1–30 years, 59 (35.1%); 31–60 years, 89 (53.0%); and >60 years, 20 (11.9%). Only 9 cases (5.4%) were recorded before 2015, whereas 159 (94.6%) occurred after 2015, coinciding with the expansion of dental services in the region (Table 1).

Clinical and Histopathological Profile

Dentists referred 135 patients (80.4%), while non-dentist physicians referred 33 (19.6%). The mandible was the most frequent site (40.5%), followed by "other" sites (30.3%), maxilla (23.2%), and tongue (6.0%). Overall lesion distribution was: cysts 78 (46.4%), soft-tissue lesions 45 (26.8%), tumors 25 (14.9%), and osseous lesions 20 (11.9%). Of the cysts, 75 (96.2% of cysts; 44.6% of total cases) were odontogenic, and 3 (3.8% of cysts; 1.8% of total cases) were non-odontogenic. Among odontogenic cysts, 36 were developmental, and 37 were inflammatory. Tumor subtypes included 7 mixed and 4 epithelial neoplasms (Table 2).

Table ١. Demographic characteristics of patients.

Variable		Frequency (%)
Sex	Female	94 (56%)
	Male	74 (44%)
Age group (years)	1–30	59 (35.1%)
	31–60	89 (53.0%)
	>60	20 (11.9%)
Date of referral	Before 2015	9 (5.4%)
	After 2015	159 (94.6%)

International Journal of
Medical Toxicology & Forensic Medicine

Table 2. Clinical characteristics of patients.

Variable		Frequency (%)
Treating clinician	Physician	33 (19.6%)
	Dentist	135 (80.4%)
Site of lesion	Tongue	10 (6.0%)
	Maxilla	39 (23.2%)
	Mandible	68 (40.5%)
	Other	51 (30.3%)
Type of lesion	Osseous	20 (11.9%)
	Soft tissue	45 (26.8%)
	Tumor	25 (14.9%)
	Cyst	78 (46.4%)
Type of cyst	Odontogenic	75 (44.6%)
	Non-odontogenic	3 (1.8%)
Type of odontogenic tumor	Developmental	36 (21.4%)
	Inflammatory	37 (22.0%)
Tumor subtype	Mixed	7 (4.2%)
	Epithelial	4 (2.4%)

International Journal of
Medical Toxicology & Forensic Medicine

Associations with Lesion Type

Statistically significant associations were identified

between lesion type and age group (p = 0.001), sex (p = 0.01), treating clinician (p = 0.001), and anatomical site (p = 0.001). Cysts were more frequent in males (59.5%) and in the mandible (63.2%), whereas soft-tissue lesions predominated among females and at the tongue or "other" sites. Dentists referred a markedly higher proportion of cysts (54.1%) than non-dentist physicians (15.2%). No significant association was observed between referral period (before versus after 2015) and lesion type (p = 0.23) (Table 3).

Discussion

Analysis of the present study's findings revealed statistically significant associations between age group, sex, diagnosis by dentist versus non-dentist physician, and lesion site and lesion type. In contrast, no significant association was observed between the date of referral and lesion type. In a study by Ledesma-Montes et al., pathology records of the jaws, face, and oral cavity were reviewed, and 304 odontogenic cysts were identified. These cysts were more frequent in males than in females. The most common odontogenic cysts, in descending order, were periapical cysts, dentigerous cysts, and odontogenic keratocysts [17]. In the present study, the most frequent odontogenic cyst was likewise the periapical (radicular) cyst; however, females outnumbered males. In Tawfik et al., 82 odontogenic tumors were reported: 96.3% were benign, and 3.7% were malignant. Ameloblastoma was the most common type, followed by odontoma and odontogenic myxoma. The mean age of patients was 29 years (range 4–80 years) [18]. In the present study, benign tumors also predominated over malignant ones. The most frequent tumor was odontoma (7 cases), followed by ameloblastoma (4 cases). The mean age of patients likewise fell within the adult range. Sharifian et al. [14] studied 1,227 odontogenic cysts (14.4%) in Iran, mostly in males, with equal maxillary/mandibular involvement and a mean age of 28. In the present study, cysts were the largest category (75 cases) but were more common in females and the mandible. The cyst prevalence order matched Johnson et al. [21] (radicular > dentigerous > keratocyst), though odontoma was the most frequent tumor here. In addition, Kambalimath et al. [19] reported 180 odontogenic cysts among 980 biopsies (mean age 32; 58% male), with radicular cysts most common and the mandible as the main site. Also, Izgi et al. [22] reported 487 odontogenic cysts, mostly in males aged 50–60 years and in the posterior mandible.

Table 3. Frequency distribution of lesion type according to study variables in patients.

Variable		Osseous		Soft tissue		Tumor		Cyst	
		N	%	N	%	N	%	N	%
Age group	1–30	4	6.7	28	47.4	7	11.8	20	33.9
	31–60	15	16.9	10	11.2	13	14.6	51	57.3
	>60	1	5.0	7	35.0	5	25.0	7	35.0
p-value					**0.001**				
Sex	Female	13	13.8	32	34.0	15	16.0	34	36.2
	Male	7	9.5	13	17.6	10	13.5	44	59.5
p-value					**0.01**				
Year of referral	Before 2015	3	33.3	3	33.3	1	11.1	2	22.2
	After 2015	17	10.7	42	26.4	24	15.1	76	47.8
p-value					**0.23**				
Treating clinician	Physician	6	18.2	15	45.5	7	21.2	5	15.2
	Dentist	14	10.4	30	22.2	18	13.3	73	54.1
p-value					**0.001**				
Site of lesion	Tongue	1	10.0	8	80.0	1	10.0	0	0.0
	Maxilla	8	20.5	7	17.9	6	15.4	18	46.2
	Mandible	10	14.7	4	5.9	11	16.2	43	63.2
	Other	1	2.0	26	51.0	7	13.7	17	33.3
p-value					**0.001**				

The present study matched cyst order and mandibular predilection, but cysts were more frequent in females.

Beyond the clinical and histopathological dimensions, jaw cysts and tumors can exert a profound psychosocial impact on patients. Although these lesions are often asymptomatic in their early stages, their diagnosis and treatment may affect patients' self-perception, dental aesthetics, and overall oral health-related quality of life. Recent evidence indicates that perceived dental aesthetics is significantly associated with psychosocial well-being and quality of life, with dimensions such as dental self-confidence, social impact, and psychological impact playing key roles [23]. The marked increase in case detection after 2015 coincided with the expansion of dental services in Kashan. This finding underscores the importance of accessible diagnostic infrastructure for early clinical intervention. Future studies should incorporate patient-reported outcome measures to evaluate how timely diagnosis and treatment of odontogenic lesions influence oral health-related quality of life in Iranian populations. Additionally, future investigations should move toward molecular characterization of these lesions. Although odontogenic tumors are predominantly benign, identifying shared immunometabolic mechanisms may open new avenues for risk stratification or adjunctive therapy in aggressive or recurrent cases [24]. Such translational research would require multicenter collaboration and integration of molecular diagnostics, which were not available in the current retrospective setting. It is also worth noting that oral and maxillofacial lesions may be influenced by broader systemic and behavioral factors, including substance use, which can alter both clinical presentation and disease course [25]. Although such data were not systematically recorded in the present retrospective cohort, this represents an important avenue for future research in the region.

Several limitations must be acknowledged. First, the retrospective design relies on the completeness and accuracy of archived pathology reports; missing clinical or radiographic detail is inevitable. Second, the sample size (N = 168), while sufficient for the primary aims, was smaller than the a priori calculated minimum of 200 because incomplete records were excluded, limiting subgroup analyses of rare entities and slightly reducing statistical power. Third, the uneven distribution of cases across time periods (only 9 cases before 2015 versus 159 after 2015) restricts temporal comparisons. Fourth, detailed histopathological subtyping (e.g., exact counts of radicular versus dentigerous versus OKC) was not uniformly recorded for every case, precluding direct numerical comparison with recent large series. Fifth, the study is confined to a single geographic region and three hospitals, therefore, generalizability to the entire Iranian population is restricted. Finally, the 2022 WHO classification was published after the study period; re-review of slides under the new criteria was not feasible.

Conclusion

In this first 12-year clinicopathological survey from Kashan, Iran, odontogenic cysts constituted the predominant jaw lesions. Female sex, mandibular location, and dentist referral were significantly associated with lesion type. Age group was also significantly associated with lesion type. The marked increase in case detection after 2015 illustrates the positive impact of expanded dental infrastructure on the identification of these lesions. Alignment of future Iranian studies with the 2022 WHO classification, together with multicenter collaboration, will strengthen the evidence base needed for improved diagnosis, prevention, and resource allocation.

Ethical Approval

This study was conducted after obtaining ethics approval (IR.KAUMS.NUHEPM.REC.1400.051. The questionnaires were completed anonymously, with students' informed consent.

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Conflicts of Interest

The authors report there are no competing interests to declare.

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