

PREVALENCE OF INTRA-OSSEOUS JAW LESIONS IN PAEDIATRIC POPULATION: A SINGLE-CENTRE RETROSPECTIVE STUDY

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ABSTRACT

The prevalence of intra-osseous jaw lesions differs in various populations; it remains a major concern for dentists and oral surgeons. Jawbones can be afflicted by a varied group of lesions and can present in diverse clinical patterns, hence adequate knowledge of the clinical and demographic characteristics of these lesions is necessary for the early detection and management. Hence, this study was designed to analyze the prevalence of intra-osseous jaw lesions in the pediatric population. The histopathology reports of all oral jaw lesions from the pediatric population, aged 0–14 years, between 1991 to 2023 period were retrospectively analyzed from the archives of the Department of our Institute and the data were analyzed through descriptive statistics. Our investigation underscores a predominance of intraosseous jaw lesions among males (53%) compared to females (47%), with the most commonly affected age group falling within the range of 6 to 11 years. The posterior mandible emerged as the primary location of these lesions, followed closely by the posterior maxilla. The histopathological examination further elucidates the landscape of these lesions, with radicular cysts comprising the majority (36%), trailed by dentigerous cysts (23%), odontogenic tumors (20%), and various other entities such as reactive/inflammatory (9%), fibro-osseous (7%), and neoplastic lesions (4%). In light of these findings, dental practitioners and specialists must have a complete understanding of the clinical and demographic characteristics associated with intraosseous jaw lesions in pediatric patients. Early recognition and accurate diagnosis are paramount for effective management and optimal patient outcomes.

Key words: Cysts, Tumors, Oral biopsies, Pediatric, Intra-osseous.

Introduction

The field of pathologies in the oral and maxillofacial region of the pediatric population encompasses a diverse spectrum of pathological entities, presenting a significant area of concern owing to their varied clinical and radiological manifestations [1]. Within the craniofacial framework, the jaw bones assume a central role, rendering them susceptible to a plethora of pathological conditions such as developmental anomalies, reactive/inflammatory processes, cystic and tumorous growths, fibro-osseous lesions, and neoplastic formations [2, 3].

Few lesions such as odontogenic cysts and tumors occurring in jaws are unique in their presentation as they arise exclusively from the remnants of the dental apparatus and are not encountered in other parts of the body [4, 5]. Odontogenic tumors can arise from the epithelium, ectomesenchyme, or a combination of both, with intricate inductive interactions occurring between these embryonic components. This dynamic interplay gives rise to a spectrum of clinical and radiological presentations, reflecting the diverse nature of these tumors [6, 7].

Neoplasms affecting children and adolescents include entities such as hamartomas, benign neoplasms, and malignant neoplasms which possess capabilities of

metastasis and present with poorer prognosis [8-12]. Fibro-osseous lesions represent a heterogeneous group of poorly defined entities, often presenting with a mixed radiological appearance. Their elusive nature poses a diagnostic challenge for clinicians, requiring a complex approach to accurately identify and characterize these lesions [13].

Intraosseous jaw lesions in pediatric populations show varied radiographic findings as either radiolucent lesions or radiopacities or present as both mixed characteristics. Differential diagnosis of such jaw lesions becomes more challenging using nonspecific radiographic findings alone owing to the presence of primary and mixed dentition in these particular age groups [3]. Prediction of biological behavior and prognosis of intraosseous jaw lesions especially showing neoplastic nature is difficult due to the rapid growth rate of jaws in the pediatric population.

The occurrence and distribution of jaw lesions in the pediatric population is vastly different than that seen in the adult population, necessitating oral health care providers' familiarity with the broad spectrum of pathologic entities affecting this age group. Comprehensive knowledge of the frequency of occurrence, clinical data, and pathologic profiles of lesions in the pediatric population are crucial for early diagnosis and management of these jaw lesions.

With this imperative in mind, this study analyses the prevalence of intra-osseous jaw lesions among pediatric patients visiting our center. By elucidating the landscape of these lesions in the pediatric population, we endeavor to contribute to improved diagnostic strategies and optimized patient care in this population.

Materials and Methods

Sample and data collection

The present study was conducted based on the retrospective analysis of histopathological records of oral jaw lesions in pediatric patients, in the age group of 0–14 years, between 1991–2023, for 33 years from the archives of the Department of Oral and Maxillofacial Pathology of our Institute. Institutional ethical approval from the Institutional Review Board (IRB) was obtained for the study (IRB Ref number 1322).

Inclusion criteria

1. Histopathology Records of all patients below 14 years.
2. Intra-osseous Jaw pathologies.

Exclusion criteria

1. Cases reported as normal dental follicles
2. Soft tissue pathologies that showed shallow erosion of superficial bone,
3. Patients above the age of 14 years.

Based on the histopathological diagnosis, biopsies were grouped under seven categories, namely Inflammatory and developmental odontogenic cysts, non-odontogenic cysts, odontogenic tumors, reactive/infectious lesions, fibro-osseous lesions, and neoplastic lesions. According to William *et al.* children were categorized into four age groups, toddlers (13 months - 2 years), early childhood (2-5 years), middle childhood (6-11 years), and early adulthood (12<18 years) [14]. The clinicopathologic data with histopathologically confirmed final diagnosis was collected and statistically analyzed.

Statistical analysis

The data regarding the prevalence of various intra-osseous lesions in our pediatric sample population was tabulated in a Microsoft master Excel sheet. The collected data underwent further analysis utilizing descriptive statistics, by calculating the frequencies and percentages.

Results and Discussion

Amongst 6600 cases reported from the archives of our institute, over 33 years, pediatric lesions comprised of 4.86% of all cases. Paediatric intra-osseous jaw lesions constituted about 2% of the total cases (n=138). Demographic data regarding gender distribution, age group involved and the site of occurrence with frequency percentage is summarized in **Table 1**.

Table 1. Summary of demographic data regarding gender distribution, age group involved and the site of occurrence with frequency percentage

Gender	Total Number (n =138)	Percentage
Male	73	53%
Female	65	47%
Age		
Toddlers - 13 months to 2 years	1	1%
Early Childhood - 2 to 5 years	4	3%
Middle Childhood - 6 to 11 years	68	49%
Early adolescence - \geq 12 years	65	47%
Site		
Anterior Maxilla	22	17%
Posterior Maxilla	36	26%
Anterior Mandible	20	14%
Posterior Mandible	60	43%

Prevalence of intra-osseous jaw lesions was predominant in males (53%) as compared to females (47%). Majority of the lesions were observed in early adolescence and middle childhood age groups of about 49% and 47% respectively. The most frequently involved site was mandibular posterior area with a frequency percentage of (43%) followed by posterior maxilla (26%), anterior maxilla (17%) and anterior mandible (14%).

Table 2 provides the frequency of occurrence of various intraosseous jaw lesions, while **Table 3** presents the site-wise distribution of these lesions, expressed in both frequency and percentage. Among all the lesions, Inflammatory odontogenic cyst i.e. radicular cyst (36%) was the foremost, with next common being developmental odontogenic cysts (23%), odontogenic tumors (20%), reactive /inflammatory lesions (9%), fibro-osseous lesions (7%), neoplastic lesions (4%) and the least reported being non odontogenic cysts (1%).

Table 2. Frequency percentage of various intraosseous jaw lesions

Lesions	Total Number of Cases (n = 138)	Percentage
Reactive/ inflammatory lesions	13	9%
Developmental odontogenic cyst	32	23%
Inflammatory odontogenic cyst	49	36%
Non odontogenic cyst	2	1%
Odontogenic tumours	28	20%
Fibro-osseous lesions	9	7%
Neoplastic lesions	5	4%

Table 3. Frequency percentage of site wise distribution of various intraosseous jaw lesions

Lesions	Anterior Maxilla	Posterior Maxilla	Anterior Mandible	Posterior Mandible
Reactive/inflammatory lesions	3 (21%)	4 (29%)	2 (14%)	5 (36%)
Odontogenic cyst	9 (12%)	20 (26%)	12 (15%)	37 (47%)
Non odontogenic cyst	-	-	2 (100%)	-
Odontogenic tumours	10 (33%)	6 (20%)	1 (3%)	13 (43%)
Fibro-osseous lesions	-	6 (67%)	2 (22%)	1 (11%)
Neoplastic lesions	-	-	1 (20%)	4 (80%)

Among the developmental odontogenic cysts, dentigerous cyst, odontogenic keratocyst were commonly encountered, whereas Ameloblastoma followed by Odontome were the frequently reported odontogenic tumours. Among the various reactive/inflammatory lesions, periapical granuloma and central giant cell granuloma (CGCG) were commonly reported. Also, fibrous dysplasia was the most frequent fibro-osseous lesion found in the pediatric group.

Posterior mandible was the most prevalent site for all the groups of paediatric jaw lesions with inflammatory odontogenic cysts being the most common in posterior mandible and then we had odontogenic tumors and reactive/inflammatory lesions.

Distribution of lesions in different age groups is given in **Table 4.** Among these odontogenic cysts (60%), neoplastic lesions (60%) and reactive lesions (53%) were the most prevalent in middle childhood, whereas in the early adolescence age group, fibro-osseous lesions and odontogenic tumors were the most prevalent with a frequency percentage of about 89% and 70% respectively.

Table 4. Distribution of intraosseous jaw lesions in different pediatric age groups

Lesions	Toddlers (13 months - 2 years)	Early childhood (2 - 5 years)	Middle childhood (6 - 11 years)	Early adolescence (≥ 12 years)
Reactive/inflammatory lesions	-	1 (7%)	8 (53%)	6 (40%)
Odontogenic cyst	1 (1%)	1 (1%)	50 (60%)	32 (38%)
Non odontogenic cyst	-	-	1 (50%)	1 (50%)
Odontogenic tumours	-	-	9 (30%)	21 (70%)

Fibro-osseous lesions	-	-	1 (11%)	8 (89%)
Neoplastic lesions	-	2 (40%)	3 (60%)	-

The prevalence of different paediatric lesions is significantly impacted by the geographic and ethnological differences observed in the global population. The majority of the information on paediatric jaw pathologies in India has been centred on the population of South India. Therefore, the goal of our study intended to add to this existing data which will help researchers, general dentists and specialists to ensure better treatment planning and management for pursuing good oral health care.

Several international and Indian studies have reported that biopsies in paediatric group account for less than 10% of all cases referred for histopathological diagnosis [15]. Urs *et al.* reported the occurrence of these lesions to about 4.55%, these reports were in accordance with our study with a prevalence of 2.09% of cases [16]. Thereby, improving the access to diagnostic facilities and promoting early screening strategies can help reduce diagnostic delay and enhance early diagnosis in paediatric cases to facilitate prompt treatment.

Different intraosseous lesions among different age groups were categorized according to William *et al.* [14] It was seen that, most of the lesions were commonly found between 6-14 years, i.e. in the middle childhood and early adolescent group. Majority of the literature has shown male predominance which was similar to our study [16, 17] However, reports by Gultelkin *et al.* and Jones *et al.* few studies have shown equal gender predominance [4, 18].

Mandibular posterior region was the most frequent site affected as per our study and these results substantiate the existing literature, while an international study has shown maxilla as the most prevalent site, topographic and ethnic disparity could be the reason [19].

Odontogenic cysts

Based on the present study, we found that the inflammatory odontogenic cyst i.e., radicular cyst (36%) was the foremost and seconded by development odontogenic cysts (23%) which was in accordance to the observations of Krishnan *et al.* [20].

Nevertheless, contrary findings have been reported by several studies [21-23] wherein the authors have reported that developmental odontogenic cyst namely dentigerous cyst were the common odontogenic cyst among the paediatric group. The high prevalence of radicular cyst could be attributed to lack of oral hygiene awareness and maintenance that may progress to dental caries.

Additionally, it also highlights the possibility of diagnostic delay and neglect towards treatment at an early stage. The

high prevalence of radicular cysts highlights the significance of maintaining good oral hygiene practices and raising awareness regarding the sequelae and consequences of untreated/ delayed management of dental caries. This emphasizes the need for proactive oral health education and regular dental care among pediatric population.

Odontogenic tumours

According to Saxena *et al.* [24], it has been reported that Ameloblastoma was the most commonly encountered odontogenic tumour in pediatric population which was in accordance with the results of our study. Majority of them were Unicystic Ameloblastoma with posterior mandibular region being the most commonly involved site. This was in concordance with previous studies [13, 16].

We found, odontome to be the second most commonly occurring odontogenic tumour, however in few studies, Adenomatoid odontogenic tumour were second most common odontogenic tumour. Radiographic diagnosis during routine oral examination in case of missing tooth/delayed eruption might be crucial to rule out odontome as the clinical presentation is usually asymptomatic.

Reactive/ inflammatory lesions

The common reactive lesions observed were Periapical granuloma and CGCG which was in accordance to the report by Kaffe *et al.* [25]. This again highlights the lack of awareness on the maintenance of the oral health which could be a major cause for infection within the oral cavity.

Fibro-osseous lesions

The commonly encountered fibro-osseous lesion was fibrous dysplasia which presented predominantly in the early adolescence group, followed by juvenile ossifying fibromas (JOF), which was in concordance to the findings of Krishnan *et al.* [20] Genetic mutations of *GNAS* (guanine nucleotide-binding protein / α -subunit) at birth is the possible cause for fibrous dysplasia [26]. However, few studies have reported that JOF's were the most frequent types seen in pediatric population. This could be a crucial factor for considering it as a potential differential diagnosis, particularly for asymptomatic swellings in the maxilla. This ensures the need for comprehensive clinical assessments and appropriate imaging techniques for accurate diagnosis and timely management.

Conclusion

This study highlighted the frequently occurring intraosseous jaw lesions in pediatric group in this particular geographical location. Males and posterior mandible were the most prevalent gender and site encountered in pediatric population. Inflammatory odontogenic cyst i.e., radicular cyst and odontogenic tumors like ameloblastoma were the most common intraosseous jaw lesions. The prevalence of odontogenic cyst was seen more in the middle childhood

group as this age group is more prone to dental caries / trauma, which can initiate and promote formation of odontogenic cyst and tumors if untreated.

Enhanced access to diagnostic facilities and early screening strategies are pivotal to prevent diagnostic delays among the paediatric population. Hence, dentists should understand and be familiar with the clinical and demographic characteristics of these lesions for thorough clinical evaluation and use of suitable imaging methods to ensure precise diagnosis and proper management.

Limitations and future scope

The limitation of our present study was that it was a single centre retrospective study with data limited to a particular institution. The study was conducted based only on the gold standard "histopathological diagnosis". More studies with a larger population involving multiple centres, considering both clinical, radiological and histopathological parameters have to be performed in the future to get a comprehensive outline of the occurrence of intraosseous jaw lesions among pediatric population.

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