JOURNAL OF ORAL MEDICINE SURGERY PATHOLOGY BIOLOGY

Common odontogenic cysts in Zones of India: A retrospective metaanalysis

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Keywords: Odontogenic cysts; non-odontogenic cysts; radicular cysts, residual cysts; dentigerous cysts; odontogenic keratocyst (Keratocystic odontogenic tumor)

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How to cite this article: PC Anila Namboodiripad and Susan Thomas. Common odontogenic cysts in Zones of India: A retrospective metaanalysis. Journal of Oral Medicine Surgery Pathology Biology. Jul-Dec 2016; 1(2): 18-26

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Running Title: Odontogenic Cysts

Clinical significance: The survey would help all the surgeons to identify the predominant odontogenic cysts prevalent in their geographic region.

ABSTRACT

Background: Odontogenic cysts are uncommon neoplastic lesions that sometimes behave aggressively and reach a large size. The information on the prevalence of these cysts is available from different parts of the world but unfortunately very little information about its prevalence in a heavily populated country like India, is unavailable.

Aims and Objectives: This study aims to review articles, published in authentic journals; the relative frequency and distribution of odontogenic cysts and also the age, sex, and the location of the common odontogenic cysts: the radicular, dentigerous, and odontogenic keratocyst (KCOT) of the oral cavity, in the four zones of India; namely the Northern, Southern, Eastern and the Western zones.

Materials and Methods: The Pubmed and Scopus indexed articles available online from the period of 2011 to 2016 were reviewed, and all accessions of odontogenic cysts were listed. Demographic data such as the age, sex, site and the type of odontogenic cysts, were noted, as well as the frequency of occurrence in the different parts of India.

Results: The Pub Med and Scopus indexed search fora 6-year period from 2011 to 2016, reported 37 cases of the odontogenic cysts from the four zones of India. Evidence showed that the radicular cyst was the most commonly reported cyst with a prevalence of 48.6%, pan-India, followed by the odontogenic keratocyst/ keratocystic odontogenic tumor (29.7%)(OKC) cases and 21% of the dentigerous cysts. The radicular cysts were predominantly reported from the South and Western India whereas OKC was the most predominant cyst reported from the North India. The North and South India showed a male preponderance 7 (18.9%) and 14 (37.8%)
as compared to the West India, where cysts were seen more in females 6(16.2%) than males. The maxillary jaw (16.2%, 27.02%, and 13.5%) was the predominantly affected site of odontogenic cysts, as compared to the mandible. The radicular cyst and the dentigerous cyst were seen predominantly in males (62.5% and 75%) respectively. In the case of the OKC or Keratocystic odontogenic tumor, there was an almost equal male to the female prevalence of 50%. The mean age of occurrence, of all the odontogenic cysts pan-India, was, 28.38%, which, ranged from less than 4 years to about 80 years.

Conclusion: Among cystic lesions of the jaws in adult and child populations of India, most are inflammatory in origin followed by OKC and the dentigerous cysts. This data helps the oral health professionals to diagnose lesions based on the demographic data, enabling them to make a rapid, prompt and an accurate diagnosis and prevent the widespread tissue destruction that may be associated with it

INTRODUCTION

India is the second most populated country in the world. Studies on odontogenic cysts published from many parts of the world show a distinct geographic variation; but there is little data available in the English-language literature, of the relative frequency of odontogenic cysts in different parts of India. [1]

Available literature on the relative frequency of odontogenic cysts are mostly from Brazil, Turkey and very few studies have been reported among Asians, especially from the Indian subcontinent. Hence, this study was undertaken, to determine the clinical and epidemiological presentation of this varied group of lesions seen in different parts of India, over the period of last six years, from 2011 to 2016.

Odontogenic lesions that affect the jaws are relatively common in the clinical setting among the Indian population. [2] However; there is not much data available on the sociodemographic features and the prevalence of these lesions in this population. There has been a large amount of reported data on the malignant lesions of the head and neck area, especially the squamous cell carcinoma, due to its high incidence of morbidity and

mortality. Since the prognosis of odontogenic cyst is relatively better, compared to oral cancer, little data on the odontogenic cyst is available. [1]

Odontogenic cysts arise from the structures comprising the odontogenic apparatus, or its remnants that are entrapped within the bone or the soft tissues, such as the gingiva. They can be classified into either inflammatory or developmental according to their pathogenesis. They exhibit a slow growth predominantly but may show a tendency to expand, if not diagnosed with time and appropriate treatment implemented.[2]

MATERIALS AND METHODS

A retrospective study was conducted on the odontogenic cysts that were reported in the Pubmed indexed and Scopus indexed journals, spanning the last 6 years, from 2011 to 2016. Its prevalence and clinical features were noted.The obtained data was reviewed for age, gender and anatomical location.

RESULTS

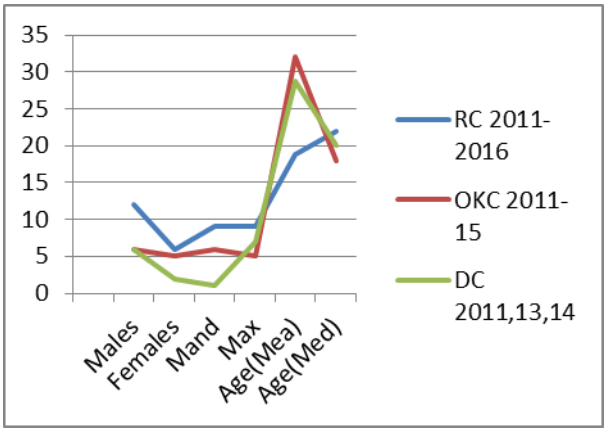
Thirty-seven cases of odontogenic cysts had been reported from the four zones of India: North, South, East, and West, from 2011 to 2016. Among them, 48.6% were cases of radicular cysts, 21% comprised of dentigerous cysts, and 29.7% of OKC. Sixty-four percent of the cases were seen in males, and rest occurred in females. With a 56.8%, prevalence, the maxilla was predominantly affected site by the odontogenic cysts. (Table 1) and (Graph 1)

Table 1: Distribution of the odontogenic cysts; radicular, odontogenic keratocyst and dentigerous cysts, and their clinical presentation. [8-24]

TABLE 1

Cyst	Year	Males	Females	Mand	Max	Age(Mea)	Age(Med)
RC	2011-2016	12(32.4)	6(16.2)	9(24.3)	9(24.3)	18.9(2.0)	22(2.4)
OKC	2011-15	6(16.2)	5(13.5)	6(16.2)	5(13.5)	32(3.5)	18(2)
DC	2011,13,14	6(16.2)	2(5.4)	1(2.7)	7(18.9)	28.7(3.1)	20(.2)
Total%		24(64.9)	13(35.13)	16(43.24)	21(56.8)	79.6(8.8)	60(6.6)

Radicular cysts and dentigerous cysts were predominantly found in males; 32.4% and 16.2% respectively. The male and female predilection in the case of odontogenic keratocyst, on the other hand, showed a close ratio of 1.2:1; 16.2% males to 13.5% females. (Table2). The maxillary to mandibular prevalence in the case of the dentigerous cyst ranged from 18.9% to 2.7%, whereas in the case of the odontogenic keratocyst and periapical cyst the maxillary to mandibular involvement was very close, from 16.2% to 13.5% in the former and 24.3% equal occurrence in the latter. (Table 3)



Graph 1: Odontogenic cysts, year of reporting and clinical details

Table 2: Shows the distribution of the Radicular cyst, DC-Dentigerous cyst, cysts in the males and females (RC-OKC-Odontogenic keratocyst

TABLE 2

Cyst	Year	Males	Females	Mand	Max
RC	2011-2016	12	6	9	9
OKC	2011-15	6	5	6	5
DC	2011,13,14	6	2	1	7

Table 3: Shows the % of the cysts in maxilla and mandible (RC-Radicular cyst, DC-Dentigerous cyst, OKC-Odontogenic keratocyst)

TABLE 3

Cyst	RC(Mand)	(Max)	DC(Mand)	(Max)	OKC(Mnd)	(Max)
Total %	9(24.3)	9(24.3)	1(2.7)	7(18.9)	6(16.2)	5(13.5)

Zone	Cases	Sex (M)	Sex (F)	Site(Mand)	Site(Max)	Age (Yrs)Mean	Med(Yrs)
North	10(27.02)	7(18.9)	3 (8.1)	4 (10.8)	6 (16.2)	30.7 (3.39)	13(1.43)
South	18(48.6)	14(37.8)	4 (10.8)	8 (21.6)	10(27.02)	23.2(2.6)	21(2.32)
East	0	0	0	0	0	0	0
West	9(24.3)	3 (8.1)	6 (16.2)	4 (10.8)	5(13.5)	22.25(2.46)	20(2.21)
Total%	37(100)	24(64.9)	13(35.1)	16(43.2)	21(56.8)	75.6(8.4)	54(6)

TABLE 4

Table 4: Shows the distribution of the odontogenic cysts reported from the different zones of India, the age of occurrence, sex predilection, and the site of occurrence.

When divided into four zones; North, South, East, and West, it was found that South India presented with 48.6% cases of odontogenic cysts; the North India, 27.02% cases; and West India, 24.3% cases. There was 5.4 % radicular, 8.1% dentigerous and 13.5% odontogenic keratocyst reported from the North India and reports from South India, showed a higher prevalence of radicular cyst (27.02%) as compared to the dentigerous (10.8%) and the odontogenic keratocyst (10.8%); West India reported 16.2% prevalence of radicular as compared to the dentigerous (2.7%) and odontogenic keratocyst (5.4%). No reports of the odontogenic cysts have been reported from the East of India due to reasons unknown. In the north and south of India, radicular cysts were seen more in males with a prevalence of (18.9%) and (37.8%) respectively, whereas it was more common in the females in the West India (16.2%). The median age of occurrence of RC was 13 years in the North India, and the age of occurrence was more or less the same range in the South and West India (20-21 years). The maxillary jaw was

found to be more frequently affected by the radicular (16.2%), dentigerous (27.02%) and odontogenic keratocyst (13.5%) in the north, south, and west India. (**Table 4) (Graph 2**)

Graph 2: Zonal prevalence of cysts and their clinical details

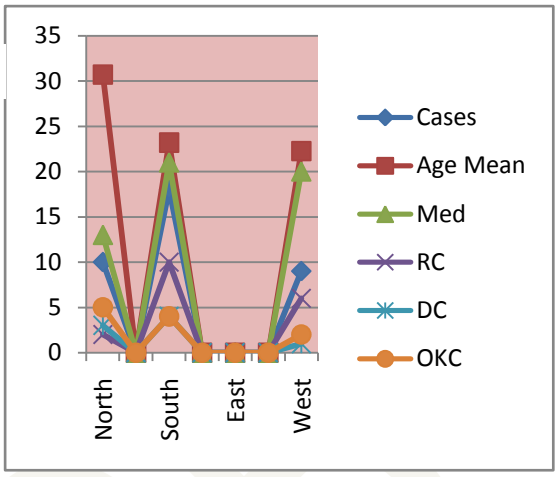


Table 5: Showing the zone wise distribution of the radicular, dentigerous and odontogenic keratocysts and the age predilection[8-24]

TABLE 5

Zone	Cases	Age Mean	Med	RC	DC	OKC
North	**10(27.02)**	**30.7 (3.39)**	**13(1.43)**	**2(5.4)**	**3(8.1)**	**5(13.5)**
South	**18(48.6)**	**23.2(2.6)**	**21(2.32)**	**10(27.02)**	**4(10.8)**	**4(10.8)**
East	**0**	**0**	**0**	**0**	**0**	**0**
West	**9(24.3)**	**22.25(2.46)**	**20(2.21)**	**6(16.2)**	**1(2.7)**	**2(5.4)**
Total%	**37(100)**	**75.6(8.4)**	**54(6)**	**18(48.6)**	**8(21.6)**	**11(29.7)**

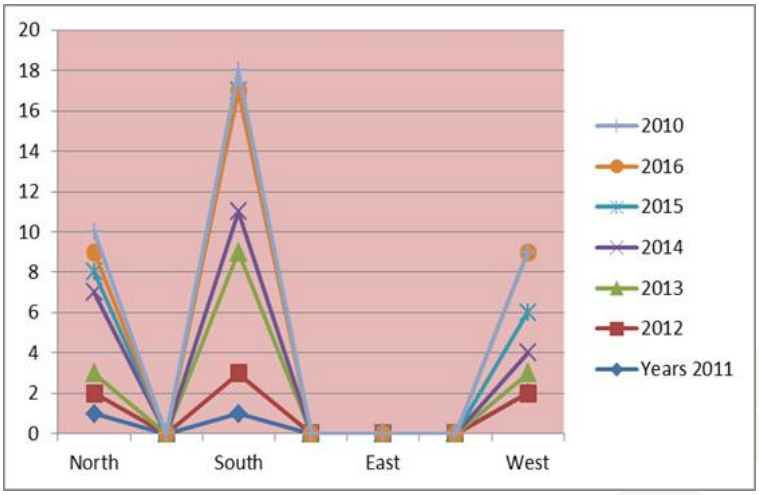
TABLE 6

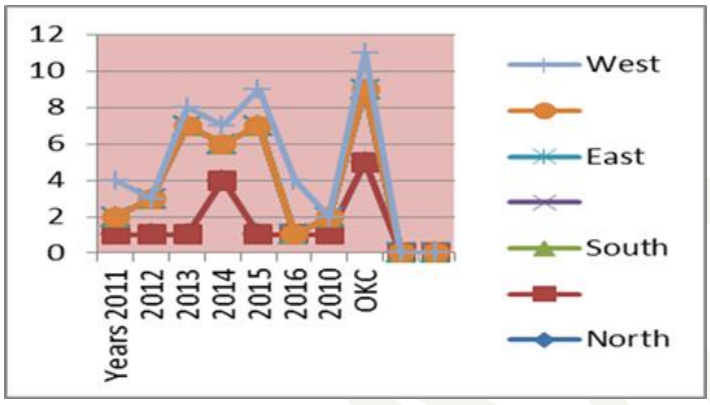
Table 6: Odontogenic cysts (RC, DC, and OKC) and its occurrence in various zones of India.[8-24]

Zone	RC	DC	OKC
North	**2 (5.4)**	**3 (8.1)**	**5(13.5)**
South	**10 (27.02)**	**4 (10.8)**	**4 (10.8)**
East	**0**	**0**	**0**
West	**6(16.2)**	**1(2.7)**	**2(5.4)**
Total%	**18(48.64)**	**8(21.6)**	**11(29.7)**

Graph 3: Showing the zone wise distribution of the radicular, dentigerous and odontogenic keratocyst and the year of occurrence

GRAPH 3





Graph 4: Showing the distribution of the cysts and its predominant year of occurrence

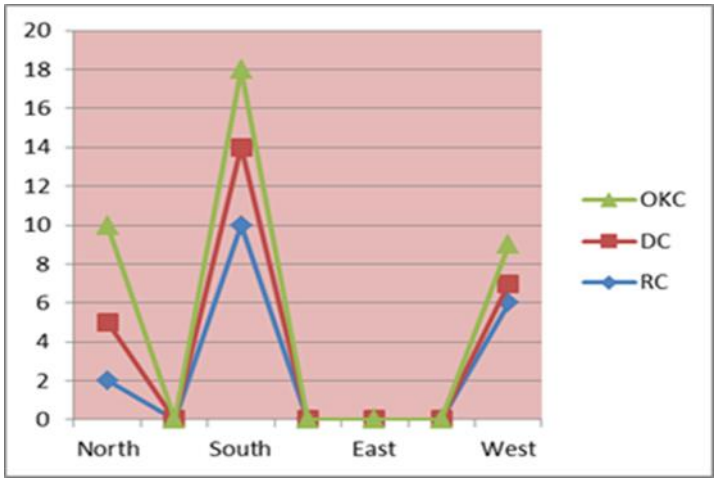
GRAPH 4

DISCUSSION

Odontogenic cysts are pathological cavities containing fluid, semifluid or gaseous material. It is never filled with pus. It may or may not be lined by an epithelium. 3Most odontogenic cysts are identified more by their site than by any histologic features. Therefore, the oral surgeon must make available to the pathologist, appropriate history, and radiographs, while submitting specimens for examination.[4] Cysts may be true or false: type. It could be either odontogenic or non-odontogenic or developmental or inflammatory in nature. Among them the inflammatory cyst, the radicular cyst is the most common odontogenic cyst affecting the oral cavity. It normally arises de-novo or as sequelae of periapical granuloma or an abscess. The inflammatory components cause the stimulation of the rests of Malassez present in the periapical area, resulting in the formation of this cyst. The radicular cyst is usually asymptomatic unless infected. In some cases, it is discovered accidently during a routine radiographic examination.

Graph 5: Odontogenic cysts namely the radicular, dentigerous and OKC in Zones of India and the distribution of the odontogenic cysts [8-2]

GRAPH 5



The radiographic picture shows a well- defined unilocular radiolucency. Multilocular radiolucent radicular lesions have also been reported but are extremely rare. 5Prevalence of periapical cyst in our study from India was 48.6%. 6 They are reported to be rare in young patients, but surprisingly the findings were contrary, in this study from India. [6]There were 8 cases of periapical cysts reported in the pediatric patients ranging from 4 years to 13 years of age.

While describing the common odontogenic cysts in relation to the different zones, it was found that South India reported about 10(27.02%) cases of the radicular cyst; West India about 6 (16.2%) cases and North India reported a meager 2(5.4%) cases of radicular cysts from 2011 to 2016. East India did not report any occurrence of cysts, for which the reason is unknown. The cyst was found topredominantly occur in the maxillary arch, especially in the anterior region, in the geographical area, spanning the south, north, and west of India. The mean age of occurrence of all the cysts ranged from 30.7 years in North India to 22.25 in Western India. The maximum age of occurrence of odontogenic cysts ranged from 80 years of age (dentigerous cyst), and the youngest was 4 years of age (periapical cyst), both reported from North India and both seen in males. The males were more commonly affected in the North and South India whereas the female cases predominated in the Western India.

OKC or the Keratocystic odontogenic tumor has shown a prevalence of 29.7% in our literature search. Odontogenic keratocyst is benign but locally aggressive lesions and they tend to recur after conservative surgical treatment. Hence, it is mandatory that they must be distinguished from other cysts of the jaw. [7]Themale to a female occurrence of this lesion varies from 1.2: 1 for males as compared to the females. The cyst is found to occur equally in our study in both maxilla and mandible with the mandible being slightly more affected at a ratio of 1.2:1. A bi-modal age of occurrence has been reported to occur peaking at 25 and 34 years, and 55 and 64 years of age, with the mean age of occurrence being 41 years. [1] Our study findings showed a mean age of 32(3.5%) years with a patient as young as 11 years to a patient as old as 65 years. The dentigerous cysts (DC) constitute the next predominant cyst though they are comparatively rare as compared to the other cysts- 17.33%. [6]A dentigerous cyst is an odontogenic cyst associated with the crown of the impacted or unerupted teeth. Such a cyst is initially asymptomatic unless infected, and can be discovered only on routine radiographic examination. [7] The DC is assumed to occur due to the periapical inflammation of non-vital deciduous teeth; which lies in proximity to the follicles of the unerupted permanent teeth that may initiate this type of cyst formation.

	Years						
Zone	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2010**
North	**1**	**1**	**1**	**4**	**1**	**1**	**1**
South	**1**	**2**	**6**	**2**	**6**	**0**	**1**
East	**0**	**0**	**0**	**0**	**0**	**0**	**0**
West	**2**	**0**	**1**	**1**	**2**	**3**	**0**
Total%	**4(10.8)**	**3(8.1)**	**8(21.6)**	**7(18.9)**	**9(24.3)**	**4(10.8)**	**2(5.4)**

Table 7: Distribution of the cysts in various zones of India from 2011 to 2016

TABLE 7

[8]Dentigerous cysts were found in relation to maxillary canine rather than the 3rd molar of the same arch, as per the data from around the world and also from India. The age of occurrence was found to be in the 20-30 year age group as per earlier studies. The lesion is normally identified on a routine radiographic examination for unerupted maxillary canines. Very rarely, there is a swelling and associated symptom.The cyst has a tendency to expand rapidly leading to pathological fracture of the jawbones. [8]The teeth affected in order of frequency include the mandibular third molars, maxillary canines, mandibular second premolars and maxillary third molars. They may also affect supernumerary teeth; however, they are only rarely associated with primary teeth. [6]The prevalence of the dentigerous cyst in our study was about 8 (21.6%). It was more predominant in the maxillary anterior region, 7(18.9%) cases, as compared to the mandibular third molars. Mandibular 3rdmolar involvement was seen in only one case. Six (16.2%) cases were predominant in males in the age group between 7 years (only one case reported in a child) to 80 years with a mean age of 29 years

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CONCLUSION

The highest incidence of odontogenic cysts as per our study is the inflammatory cyst, followed by the odontogenic keratocyst (Keratocystic odontogenic tumor) and the dentigerous cyst. The cysts were predominantly reported from South India rather than the other zones of India, the reason for which needs to be speculated. The team of dentists needs to be aware of the prevalence of odontogenic cysts, their clinicopathologic features, their site of occurrence and the age distribution within their clinical zones?. This information would help them in making an early and accurate diagnosis and facilitate prompt treatment to avoid unnecessary complications.

Footnotes:

Declaration of conflict: No conflict of interest regarding the article

Source of funds: The authors have received no funds for the study.

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