The incidence of Oro-maxillofacial lesions (10 years) in the department of Oral and Maxillofacial surgery, Mahidol University: Odontogenic cysts

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Abstract

Objective: The study aimed to determine the incidence of all odontogenic cysts in the patients along with type of cyst, gender, age of the patients, and site of lesion in a 10-year period (2003 - 2012) at the Oral and Maxillofacial Surgery clinic, Mahidol University.

Materials and methods: This study was a retrospective study, in which the pathologic records of patients with odontogenic cysts were obtained and data on the incidence and type of cyst, gender and age of the patients, and site of the lesion was analyzed.

Results: A total of 490 odontogenic cysts were noted (24.97%) during the study period. The incidence of the lesion in males was 256 and in females 234 with the ratio of M:F=1.09:1. The most common incidence of the cyst was the third decade of life. There were 49.18% of dentigerous cyst, 39.59% radicular cyst, 6.94% residual cyst, 0.82% glandular odontogenic cyst and paradental cyst, 0.61% lateral periodontal cyst, and 0.41% eruption cyst, but no gingival cyst of the newborn or gingival cyst of the adult was noted. The incidence of odontogenic cyst was more in mandible than maxilla, except radicular cyst and residual cyst.

Conclusion: Studies featuring the clinical and radiographic features of odontogenic cyst are relatively low, therefore, the knowledge about the incidence of odontogenic cyst by age, gender, and site can be help in diagnosis, and ensuring the most appropriate treatment is carried out.

Keywords: Cysts of the jaw, incidence, eruption cyst, radicular cyst, dentigerous cyst, radiographic feature, clinicopathologic feature, histopathologic feature

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Introduction

Cyst is a pathological lesion lined by an epithelium, which contains fluid or semifluid material. It is composed of 3 basic structures: lumen, epithelial lining, and capsule. It can occur in jawbone as well as soft tissue and can develop or expand from pressure in lumen and often damage surrounding tissue such as bone, teeth, etc. The treatment of cyst is either enucleation or marsupialization.

There are many types of cysts and different criteria for their classification. Cysts may be classified by their location or origin. Cysts of the jaw can be classified according to the type of origin, such as odontogenic cysts, non-odontogenic cysts, and pseudocysts.

Odontogenic cysts are jawbone cysts in which the lining is derived from epithelium involved in tooth development. The classification of odontogenic cysts, modified from the 2005 World Health Organization (WHO) classification, is summarized in Table 1.

Odontogenic cysts are the most common cysts of the oral and maxillofacial region. Dentists may detect them from radiograph investigations during routine dental treatment. Odontogenic cysts can show various clinical and radiographic features and it is important that the correct diagnosis and treatment is provided.

The purpose of this study was to study the incidence of different types of odontogenic cysts in a 10-year period from 2003 to 2012 at the Oral and Maxillofacial Surgery clinic, Mahidol University.

Materials and Methods

This retrospective study was approved by the chairman of the Department of Oral and Maxillofacial Surgery, Mahidol University and permission was obtained to study the pathologic records of patients with odontogenic cysts at the Oral and Maxillofacial Surgery clinic, Mahidol University in a 10-year period between 2003 and 2012. Data regarding the age and gender of the patient, site of lesion, and clinical and pathological diagnosis of the lesion, classified according to WHO classification (2005), was noted. Analysis was done based on the type of cyst, gender and age of the patients, and site of lesion as shown in Figure 1-3.

Results

In the 10-year study period, 1,962 cases were sent for biopsy at the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Mahidol University. A total of 490 odontogenic cysts (24.97%) were diagnosed (Figure 4).

Table 1 Classification of odontogenic cysts

Developmental origin
1. Dentigerous (follicular) cyst
2. Eruption cyst
3. Gingival cyst of the newborn
4. Gingival cyst of the adult
5. Lateral periodontal (botryoidodontogenic) cyst
6. Glandular odontogenic (sialo-odontogenic) cyst
Inflammatory origin
1. Radicular (periapical) cyst
2. Residual cyst
3. Paradental (buccal bifurcation) cyst

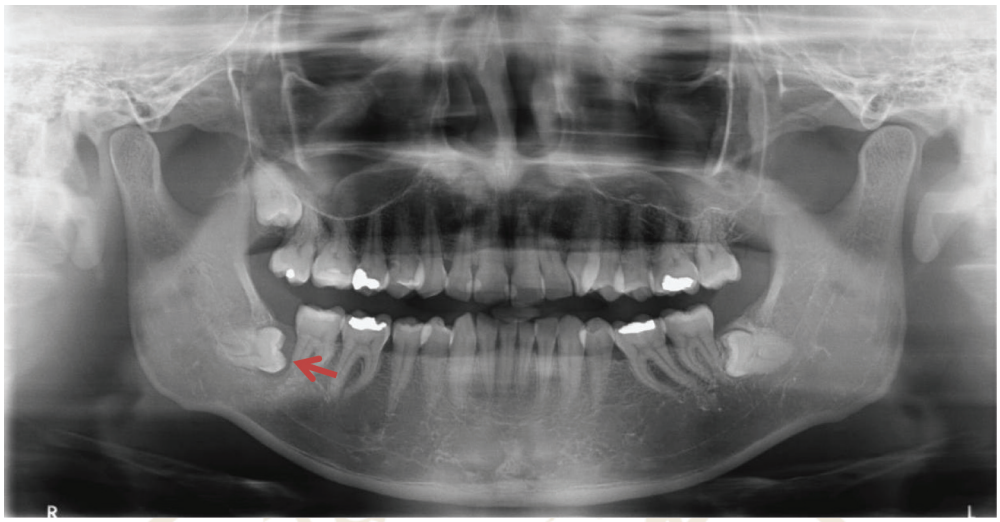

Figure 1 Radiographic features of a dentigerous cyst at the lower right third molar (48)

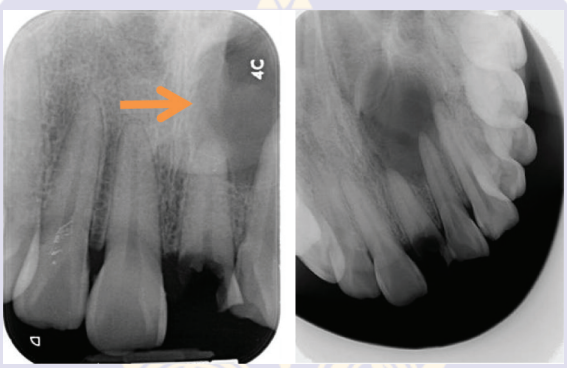

Figure 2 Radiographic features of a radicular cyst at the upper left lateral incisor (22)

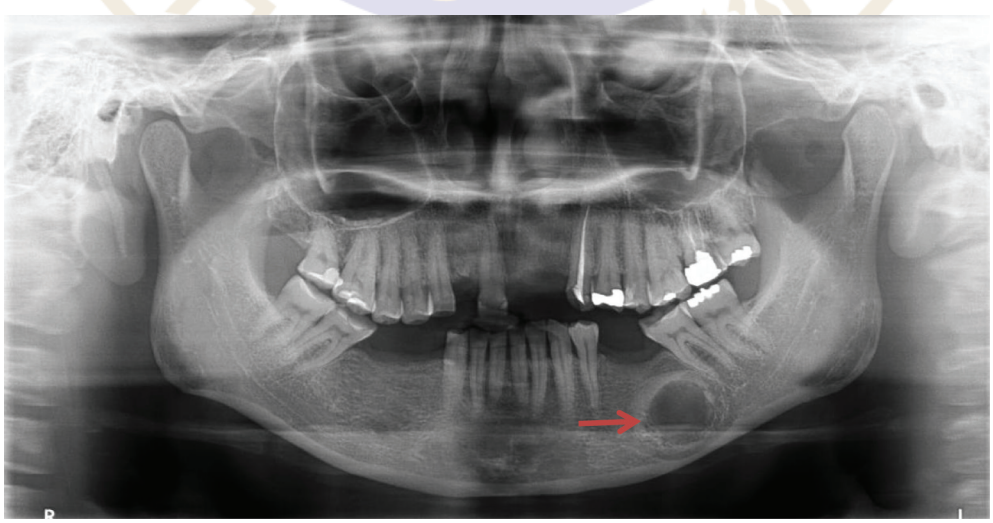

Figure 3 Radiographic feature of a residual cyst at the lower left second and first molar (35,36) area

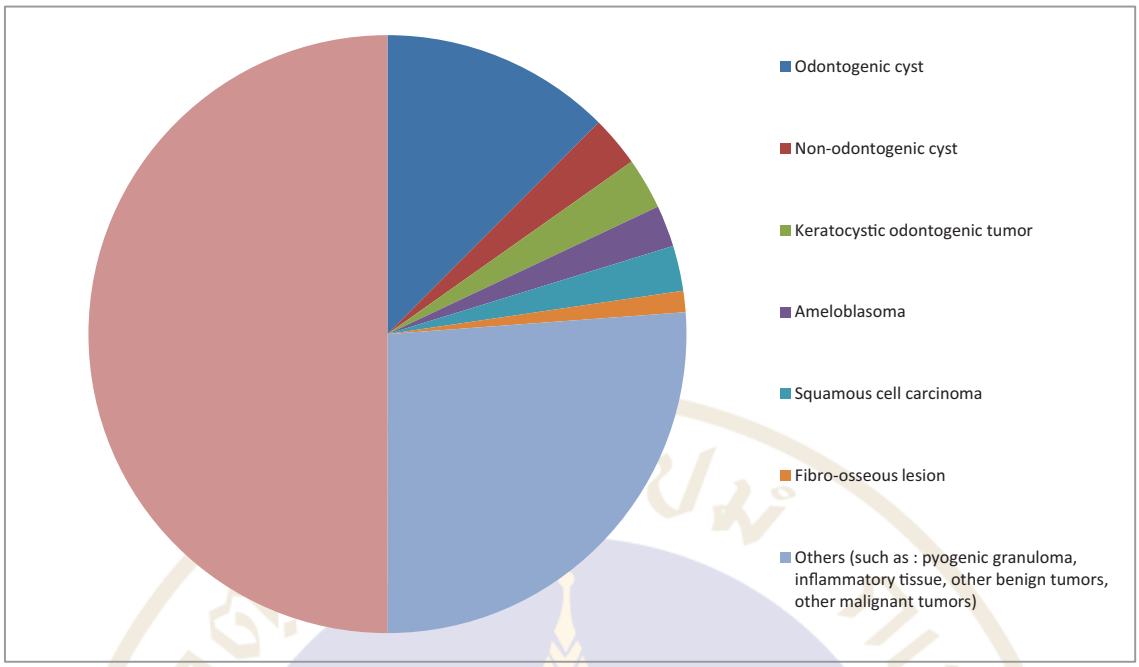

Figure 4 Incidence of oral and maxillofacial lesions in percentage during the 10-year study period.

Table 1 Frequency of oral and maxillofacial lesions

Lesions	Cases	Percent (%)
Odontogenic cyst	490	24.97
Non-odontogenic cyst	107	5.45
Keratocysticodontogenic tumor	109	5.56
Ameloblasoma	88	4.49
Squamous cell carcinoma	96	4.89
Fibro-osseous lesion	45	2.30
Others (such as: pyogenic granuloma, inflammatory tissue, other benign tumors, other malignant tumors)	1,027	52.34
Total	**1,962**	**100**

490 odontogenic cysts were classified using WHO classification (2005). The types of odontogenic cysts are shown in Table 2.

Cases

The most frequently observed odontogenic cysts were dentigerous cyst and radicular cyst. However, no gingival cyst of the newborn and gingival cyst of the adult was found in the study (Table 2).

Gender

Among the 490 odontogenic cysts that were found, 256 cysts were found in male and 234 cysts were found in female (M:F=1.09:1). All types of odontogenic cysts were found more in male than female patients, except radicular cyst and paradental cyst. (Table 3)

Age

The age range of patients with odontogenic cysts was 4-97 years, with a mean age of 39. Nine patients did not have data about age. The range age of most of the patients with odontogenic cysts was 20-29 years (Figure 5).

Table 2 Number and distribution of patients according to their age and the site of the odontogenic cysts

Lesions	Case		Age (years)		Site (cases)	
	Total	Percent	Range	Mean	Max	Mand
Developmental origin						
Dentigerous cyst	241	49.18	4-80	31	87	148
Eruption cyst	2	0.41	7-9	8	0	2
Lateral periodontal cyst	3	0.61	50-64	51	0	3
Glandular odontogenic cyst	4	0.82	12-67	52	0	4
Gingival cyst of the newborn	none	-	-	-	-	-
Gingival cyst of the adult	none	-	-	-	-	-
Inflammatory origin						
Radicular cyst	194	39.59	7-97	38	123	70
Residual cyst	34	6.94	15-87	47	19	15
Paradental cyst	4	0.82	21-39	35	0	4
Unclassified odontogenic cyst	8	1.63	44-62	51	3	4
Total	**490**	**100**	**4-97**	**39**	**232**	**250**

Table 3 Distribution of odontogenic cysts based on gender

Lesions	Cases		
	Male	Female	M: F
Dentigerous cyst	133	108	1.23:1
Eruption cyst	2	0	2:0
Lateral periodontal cyst	2	1	2:1
Glandular odontogenic cyst	4	0	4:0
Radicular cyst	92	102	1:1.11
Residual cyst	18	16	1.13:1
Paradental cyst	1	3	1:3
Unclassified odontogenic cyst	4	4	1:1
Total	**256**	**234**	**1.09:1**

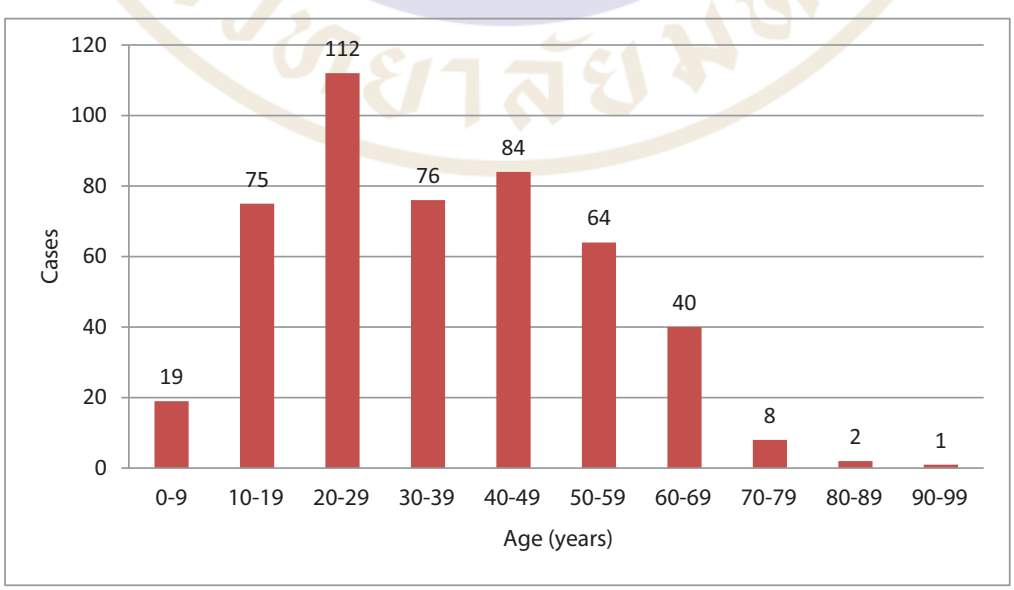

Figure 5 Age range of patients with odontogenic cysts

Table 4 shows that the most frequently observed age range of each type odontogenic cyst was different: 49.37% of the dentigerous cysts was observed at 10-29 years, 100% of the eruption cyst was found in the age range 0-9 years, and 100% of the lateral periodontal cyst was found in age range 40-69 years. Similarly, 75% of the glandular odontogenic cyst was found in age range 60-69 years, 70.10% of the radicular cyst was found in age range 20-49 years, 27.59% of the residual cyst in 40-49 years and 50% of the paradental cyst in 30-39 years.

Site of lesion

All types of the odontogenic cysts were found in the mandible than the maxilla, except radicular cyst and residual cyst (Table 2). Most of the dentigerous, glandular odontogenic, and paradental cysts were found at the mandibular molar region. Eruption cysts were found at the mandibular premolar and molar regions. Most of the lateral periodontal cysts were found at the mandibular premolar region and most of the radicular and residual cysts were found at the maxillary anterior region (Table 5).

Discussion

Previous studies[9,10,14-24] have found 6.7-17.2% of all oral and maxillofacial lesions to be odontogenic cysts, (Table 6) but in this study the incidence of odontogenic cyst was 24.61%, which was more than previous literature. Similar studies in children[11-13] have found odontogenic cysts to be between 0.8 and 45.9%. This variation in the incidence may have

Table 4 Distribution of the patients based on the odontogenic cysts and age range

Lesions	Age (years)							
	0-9	10-19	20-29	30-39	40-49	50-59	60-69	>70
Dentigerous cyst	15	57	60	29	28	28	15	5
Eruption cyst	2	0	0	0	0	0	0	0
Lateral periodontal cyst	0	0	0	0	1	1	1	0
Glandular odontogenic cyst	0	1	0	0	0	0	3	0
Radicular cyst	2	16	45	43	44	26	15	3
Residual cyst	0	1	6	1	8	6	4	3
Paradental cyst	0	0	1	2	0	1	0	0
Unclassified odontogenic cyst	0	0	0	1	3	2	2	0
Total	**19**	**75**	**112**	**76**	**84**	**64**	**40**	**11**

Table 5 Distribution of the patient based on the site of the odontogenic cyst

Lesions	Maxilla					Mandible				
	A	P	M	NA	Total	A	P	M	NA	Total
Dentigerous cyst	51	8	27	1	87	8	23	116	1	148
Eruption cyst	-	-	-	-	0	-	1	1	-	2
Lateral periodontal cyst	-	-	-	-	0	1	2	-	-	3
Glandular odontogenic cyst	-	-	-	-	0	1	-	3	-	4
Radicular cyst	91	17	15	-	123	21	14	35	-	70
Residual cyst	9	6	4	-	19	2	5	8	-	15
Paradental cyst	-	-	-	-	0	-	1	3	-	4
Total	**151**	**31**	**46**	**1**	**229**	**33**	**46**	**166**	**1**	**246**

A: Anterior region, P: Premolar region, M: Molar region, NA: non-classified

been due to the differences in the classification of odontogenic cysts and study design.

In this study, odontogenic cysts occurred more in male than female, which is in agreement with previous studies[9, 14-21] but in contrast with the studies by Grossmann et al (2007)[22] and Acikgoz et al (2012).[20] According to Selvamani et al (2012),[9] Grossmann et al (2007)[22] and Acikgoz et al (2012),[20] odontogenic cysts were found more frequently between 20 and 29 years of age, which was similar to this study. In addition, odontogenic cysts occurred in mandible more frequently than in maxilla, which is similar to the studies by Avelar et al (2009)[19] and Johnson et al (2013)[21]. However, these results were different from the studies by Selvamani et al (2012),[9] Ochsenius et al (2007),[17] and Grossmann et al (2007).[22]

The most frequently observed odontogenic cysts in this study were dentigerous cyst (49.18%), and radicular cyst (39.59%), but in previous studies[9,10,14-24] radicular was noted to be the most incident. This difference in incidence may have been because many dentists do not regularly send all carious extracted teeth with periapical lesion for histopathological examination. Moreover, radicular cyst may be treated as an endodontic lesion so the incidence of radicular cyst can be less than dentigerous cyst. Furthermore, in this study dentigerous cysts was diagnosed more often during radiographic investigations undertaken before orthodontic treatment for surgical teeth removal. Mosqueda et al (2002)[15] found the incidence of dentigerous cyst (66.8%) to be more than radicular cyst (47.9%).The high incidence was associated with radiographic investigations undertaken for failed teeth eruptions.[15]

In this study, the most common odontogenic cysts was dentigerous cysts (49.18%) which was higher compared to other previous studies which have reported its incidence as 11.4-35.5%.[14,18] The incidence of dentigerous cysts was more in male (55.19%) than in female (44.81%), which

Table 6 Previous studies on odontogenic cysts

Odontogenic cyst	This study		Australia 2013[21]		India 2012[9]		Brazil 2009[19]		Chile 2007[17]		UK 2006[16]		Mexico 2002[15]	
	N	%	n	%	N	%	N	%	N	%	N	%	N	%
Dentigerous cyst	241	49.18	121	22.4	31	20.3	156	30.7	546	18.5	1292	18.1	283	33.0
Radicular cyst	194	39.59	247	45.7	106	69.3	265	52.2	1494	50.7	3724	52.3	342	39.9
Residual cyst	34	6.94	-	-	5	3.3	30	5.9	328	11.2	573	8.0	19	2.2
Paradental cyst	4	0.82	-	-	-	-	28	5.5	113	3.8	402	5.6	12	1.4
Glandular odontogenic cyst	4	0.82	7	1.3	-	-	4	0.8	1	0.03	11	0.2	2	0.2
Lateral periodontal cyst	3	0.61	14	2.6	2	1.4	9	2.3	17	0.6	28	0.4	7	0.8
Eruption cyst	2	0.41	-	-	-	-	8	1.6	11	0.4	15	0.2	7	0.8
Gingival cyst of the newborn	-	-	-	-	-	-	-	-	3	0.1	1	0.0	-	-
Gingival cyst of the adult	-	-	-	-	1	0.7	5	1.0	10	0.3	16	0.2	-	-
Unclassified	8	1.63	151	28.0	-	-	-	-	-	-	210	2.9	-	-
OKC					8	5.2			421	14.3	828	11.6	184	21.5
COC											21	0.3		
Total	490	24.33	540		145	6.7	507	9.94	2944	10	7121	12.8	856	8.4

was in agreement with previous studies.[9,14-19,23] Most dentigerous cysts occurred between 10 and 29 years, which was similar to reports by Ledesma-Montes et al (2000)[14], Ochsenius et al (2007)[17], Grossmann et al (2007)[22], Prockt et al (2008)[24], Avelar et al (2009)[19] and Acikgozet al (2012)[20]. The mandible (62.82%) was the common site of the odontogenic cyst, especially mandibular third molars, which was similar to the previous studies,[9,16,17,19,20,22-24] that stated that mandibular third molars were the most commonly impacted teeth and dentigerous cyst enclosed the crown of an unerupted tooth.

Among all odontogenic cysts diagnosed in this study, 39.59% were radicular cysts, which was similar to Ledesma-Montes et al (2000)[14] (38.8%) and Mosqueda et al (2002)[15](39.9%). Radicular cysts occurred in female (52.58%) more than in male (47.42%), similar to previous studies.[14,15,17,22,24] On the other hand, findings of Jones et al (2006),[16] Tortorici et al (2008),[18] Avelar et al (2009),[19] Acikgoz et al (2012),[20] Selvamani et al (2012),[9] and Johnson et al (2013)[21] were different from the observations made in this study which showed a higher incidence of the cyst in males. In this study, most radicular cysts occurred in patients who were between 20 and 49 years and the results corresponded with previous studies.[9,14,16,17,19,22,24] It occurred with a high predominance in maxilla (63.73%) especially in the anterior maxilla, which was also in agreement the other studies.[9,16-20,22,24] This may have been due to esthetic factors and long-term inflammation with no adequate endodontic treatment.

Residual cysts had an incidence of 6.94% in this study, which was similar to previous studies that have reported the incidence to be between 2.2% and 13.7%.[9,14-17,19,20,23,24] These cysts occurred more frequently in male (52.94%) than in female (47.06%), consistent with previous studies.[9,16,17,19,23,24] Most residual cysts occurred between the age of 40-49 years, similar to findings of Ochsenius et al (2007).[17] The residual cysts often develops after extraction and are found in routine radiographic examinations, with or without symptoms. Ochsenius et al (2007)[17] and Acikgoz et al (2012)[20] also reported that the radicular cysts occurred more in the maxilla.

In this study, the incidence of paradental cyst was 0.82%, which was agreement with previous studies which have noted the incidence to be between 0.48% and 5.6%.[10,15-17,19,22,24] It occurred more in female (75%) and in male (25%), which was similar to observations of Ochseniuset al (2007),[17] but different from studies by Mosqueda et al (2002),[15] Jones et al (2006)[16] and Avelar et al (2009).[19] The mean age of the patient with paradental cyst was 35 years. This value was different from previous studies that have observed the age range to be between 20 and 29 years.[16,19,22] In this study, paradental cysts occurred only in mandible, especially around partially erupted mandibular third molars. Moreover, no paradental cyst was found at buccal surface of mandibular molar (buccal bifurcation cyst). The buccal bifurcation cyst has a low incidence and is only diagnosed from clinical and radiographic features.

Glandular odontogenic cyst was also found in 4 cases (0.82%) in this study, which was consistent with Avelar et al (2009),[19] who reported its incidence as 0.7%, whereas other previous studies have reported of an incidence range of 0 to 0.2%.[10,15-17,22,23] The glandular odontogenic cyst was observed only in male patients (100%), which was similar to the observations of Meningaudet al (2006)[23] and Johnson et al (2013).[21] The mean age of patients was 52 years. Although this was in agreement with Johnson et al (2013) who reported the mean age of patient as 55 years[21], it was different from previous studies that have noted the mean age as 40-49 years. In this study, glandular odontogenic cyst was found only in mandible, especially at the posterior mandible.

These observations were in agreement with previous studies,[21-23] but in contrast with the observations of Jones et al (2006)[16] where it was only seen at the anterior mandible.

This study found 0.61% incidence of lateral periodontal cysts (3 cases) similar to the study by Ochsenius et al (2007)(0.6%)[17] and other previous studies which have reported its incidence as 0.2% - 2.6%.[9,10,14-16,19,22-24] Although no predilection for the gender was noted in the previous studies,[9,15-17,19,24] in this study the lateral periodontal cysts was seen more in male (66.67%), with a mean age of 51 years. This was similar to observations of Jones et al (2006) (48.2 years).[16] In this study, lateral periodontal cysts were found only in mandible, similar to the studies by Prockt et al (2008),[24] Ochsenius et al (2007),[17] and Grossmann et al (2007).[22]

This study found 0.41% incidence of eruption cysts (2 cases), similar to previous studies were its incidence has been noted between 0.14% and 1.55%,[10,14-17,19,22,24]. It was found only in males, similar to the findings of Prockt et al (2008).[24] In previous articles the eruption cysts was observed most frequently between 0 and 9 years, which was in agreement with this study where the mean age of the patient was 8 years. In this study eruption cysts was found only in the mandible, which was in contrast with Ochsenius et al (2007)[17] and Prockt et al (2008),[24] where the eruption cysts was only found in the maxilla. The eruption cysts has been reported to have a low incidence in the literature, which may be due to the lack of proper histopathological examinations of the lesions and its spontaneous resolution during dental eruption.

The gingival cysts of the newborn are often found in children between 0 and 3 months. No gingival cyst of the newborn and gingival cyst of the adult were found in this study. The gingival cysts of the newborn can have spontaneous resolution. Furthermore, the incidence of gingival cysts in the adult are generally low (0.03-0.9%).[9,10,16,17,19,22]

In conclusion, cysts of the jaw have similar clinical and radiographic features; therefore, the knowledge about the incidence of odontogenic cysts may be helpful in accurate diagnosis and treatment planning. This study showed the overall incidence of odontogenic cysts at the Oral and Maxillofacial Surgery clinic, Faculty of Dentistry, Mahidol University in a 10-year period between 2003 and 2012. The most incident odontogenic cyst was dentigerous cyst, followed by radicular cyst and residual cyst. Paradental cyst, glandular odontogenic cyst, lateral periodontal cyst, and eruption cyst had low incidences and no observations of gingival cyst of the newborn and gingival cyst of the adult were made.

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