Original Article

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Age and Sex Related Prevalence of Odontogenic Cysts in North Indian Population: An Eight-Year Experience

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Abstract

Aims and Objectives: The present study aims at evaluation of age, sex and site of occurrence related prevalence of Radicular cyst, Dentigerous cyst, Odontogenic keratocyst (OKC), Lateral Periodontal cyst, Residual cyst, Adult Gingival cyst, Calcifying odontogenic cysts. *Materials and Methods:* During 8 year period (From 2010 to 2017), 1000 patients with cystic lesions of the jaws were analysed. All patients underwent clinical examination and plain film radiography (panoramic, periapical, and occlusal views). Some of them were referred for CBCT or computed tomography (CT) with a multiplanar reconstruction program (MPR). Age, sex, type of cyst and location were recorded in designed performa. The treatment modalities used for the management of cysts are marsupialisation, enucleation with bone grafting or resection under local or general anaesthesia depending on the case. *Results:* The odontogenic cysts occurs more commonly in male inmandibular anterior region and maxillary posterior region than female. However, mandibular posterior region and maxillary anterior region have more predilection for females than males. The calcifying odontogenic cyst, residual cysts and odontogenic keratocyst are more common in male than female. The adult gingival cyst, lateral periodontal cyst, radicular cyst and dentigerous cyst are more common in female than male. Maxillary anterior region and mandibular posterior regions is most predilected site in 18-35 years age group. The 51-60 years of age groupin mandibular anterior region and maxillary posterior region in 36 to 50 years is most predilected site of occurrence for odontogenic cysts Calcifying epithelial odontogenic cyst (7.9%) is most common in 18 to 35 years of age group. Adult Gingival Cyst is most common in 36 to 50 years of age group. Residual cyst (51.3%) is most common in 51 to 60 years of age group.Lateral periodontal cyst (48.7%) most common in 51 to 60 years of age group. The odontogenic keratocyst (26.9%) is most common in 36 to 50 years. Dentigerous cyst (97.0%) is more common in below 18 years of age group. Radicular cyst (52.5%) is more common with18 to 35 years.

Keywords: Cyst; Jaw Bone; Prevalence; Odontogenic; Nonodontogenic.

Introduction

Odontogenic cysts (OC'S) are pathological cavities lined with odontogenic epithelium which loom in both jaws and intermittently in the oral soft tissues principally the gums [1]. Odontogenic cysts dawn at any age and remain asymptomatic and therefore unnoticed for long periods of time. In most cases, routine x-rays reveal conjecture of OC'S existence. Their origin is closely related to dental ontogeny. 90% of OC'S are formed from odontogenic epithelium or its embryonic remnants nevertheless in most cases their etiology is still unknown [2,5]. Odontogenic cyst (OC's) are divided into two groups on the basis of their origin: developmental and inflammatory. OC's are unique in that they only affect the oral and maxillofacial region which are characterized by resorption of bone and develop from the components of the odontogenic epithelium or its residuals which remain trapped within the gingival tissue or bone [6].

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Inflammatory cyst is associated with inflammation while developmental cyst is of unknown etiology [7]. Radicular and dentigerous cysts are relatively common and can be easily diagnosed [8]. Clinical and radiological presentations are almost similar for many of these cysts hence clinical misdiagnosis is possible. Some of these are known to have an aggressive behavior and propensity to recur. So correct diagnosis of these lesions is very essential [9]. Hence surgically excised tissue should be duly studied histopathologically and properly diagnosed to ensure appropriate treatment. Orofacial cysts and tumors are known to exhibit geographic variations in prevalence and pattern. The knowledge of the epidemiology of odontogenic cysts and tumors is limited in a developing nation like India which may be attributed to inadequate documentation in our hospitals and health care centres [10]. Studies on prevalence of odontogenic cysts have been carried out in a number of countries [6-8,11]. But it is quite sparse in India. The present study was designed to know the relative frequency and information regarding the demographic profile of these lesions in Indian population and compare the findings with information reported in other parts of the world.

Materials and Methods

This prospective study is carried out from March 2010 to march 2017 at department of Oral medicine and radiology, King George Medical University, Lucknow. During these 8 years, 1000 study subjects with cystic jaw lesions were recruited for this study. The diagnosis of jaw cysts in all study subjects were done by clinical examination and radio-histopathological examination.All patients underwent clinical examination and plain film radiography (panoramic, periapical, and occlusal views). Depending on the case, some of them were referred for CBCT or computed tomography (CT) with a multiplanar reconstruction program. Age, sex, type of cyst and location were recorded in designed performa and statistical analysis was done using SPSS 21 version.

Results

The study group consists of 1000 study subjects having mean age of 33.9+10.09 years. However, the minimum age of occurrence was 15 years of age with maximum age being 59 years (Table 1). The study population is divided in 4 age groups. Most of study subjects were between age group of 18-35 years (55.8%) followed by 36-50 years (33.1%), 51-60 years (7.8%) and <18years (3.3%). (Table 2). The study population (N=1000) consists of 76.7% male and 23.3% female (Table 3). The gender is compared with site of occurrence in study population by χ^2 test. Males have more predilection for mandibular anterior region (24.4%) than females (19.3%) and

Tables 1: Showing mean age, minimum and maximum age of occurrence of cyst

	N	Range	Minimum	Maximum	Mean	Std. Deviation
AGE	1000	44	15	59	33.99	10.009
Valid N	1000					

Table 2: Showing age wise distribution of study population

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 18 years	33	3.3	3.3	3.3
	18 to 35 years	558	55.8	55.8	59.1
	36 to 50 years	331	33.1	33.1	92.2
	51 to 60 years	78	7.8	7.8	100.0
	Total	1000	100.0	100.0	

Table 3: Showing gender wise distribution of study population

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	767	76.7	76.7	76.7
	Female	233	23.3	23.3	100.0
	Total	1000	100.0	100.0	

Table 4: Showing the mandibular anterior region predilection with Sex

		Gender		
		Male	Female	Total
Mandibular anterior region	Yes	187	45	232
		24.4%	19.3%	23.2%
	No	580	188	768
		75.6%	80.7%	76.8%
Total		767	233	1000
		100.0%	100.0%	100.0%

this association was statistically not significant (p value= 0.109) (Table 4). However, females (56.7%) have more predilection for mandibular posterior region than males (36.6%) and this association was statistically highly significant (p value= <0.001) (Table 5). The odontogenic cysts occurs more commonly in male (21.6%) than female (5.2%) in maxillary posterior region and this association was significantly high (p value <0.001) (Table 6). In maxillary anterior region female (18.9%) have more predilection than male (17.3%). However in maxillary anterior region, the association with gender is statistically not significant (p value= 0.589) (Table 7). The Calcifying odontogenic cyst is more common in male (5.7%) than female (0%). However, the association of Calcifying odontogenic cyst is highly significant (p value= <0.001) with female (Table 8). The adult gingival cyst is more common in females (1.3%) than male (1.0%). However its relation with gender is not significant (p value=

Table 5: Showing the mandibular posterior region predilection with Sex

		Gender		
		Male	**Female**	**Total**
Mandibular Posterior region	Yes	281	132	413
		36.6%	56.7%	41.3%
	No	486	101	587
		63.4%	43.3%	58.7%
Total		767	233	1000
		100.0%	100.0%	100.0%

Table 6: Showing the Maxillary posterior region predilection with Sex

		Gender		
		Male	**Female**	**Total**
Maxillary posterior region	Yes	166	12	178
		21.6%	5.2%	17.8%
	No	601	221	822
		78.4%	94.8%	82.2%
Total		767	233	1000
		100.0%	100.0%	100.0%

Table 7: Showing the Maxillary anterior region predilection with Sex

		Gender		
		Male	**Female**	**Total**
Maxillary anterior region	Yes	133	44	177
		17.3%	18.9%	17.7%
	No	634	189	823
		82.7%	81.1%	82.3%
Total		767	233	1000
		100.0%	100.0%	100.0%

Table 8: Showing the distribution of Calicifying Odontogenic Cysts in sex

		Gender		
		Male	Female	Total
Calcifying odontogenic cyst	Yes	44	0	44
		5.7%	.0%	4.4%
	No	723	233	956
		94.3%	100.0%	95.6%
Total		767	233	1000
		100.0%	100.0%	100.0%

Table 9: Showing the distribution of Adult gingival cyst in sex

		Gender		
		Male	**Female**	**Total**
Adult gingival cyst	Yes	8	3	11
		1.0%	1.3%	1.1%
	No	759	230	989
		99.0%	98.7%	98.9%
Total		767	233	1000
		100.0%	100.0%	100.0%

Applied χ^2 test for significance. χ^2 value=0.098; p value= 0.754; consider not significant.

0.754) (Table 9). The residual cyst is more common in male(5.9%) than female(0%). It was statistically highly significant (<0.001) (Table 10). Lateral Periodontal Cystis more common in male (11.6%) than female (0%). (Table 11). It was statistically highly significant (<0.001). Odontogenic keratocyst is more common in male (15.6%) than female(6.0%) and this correlation was highly significant (p value= <0.001) (Table 12). However, the dentigerous cyst was more common in female (40.8%) than male (17.9%). this correlation was highly significant (p value= <0.001) (Table 13). Radicular cyst is more common in female (53.2%) than male (42.8%) and this association was (p=<.005) more significant

Table 10: Showing the distribution of Residual cyst in sex

		Gender		
		Male	**Female**	**Total**
Residual cyst	Yes	45	0	45
		5.9%	.0%	4.5%
	No	722	233	955
		94.1%	100.0%	95.5%
Total		767	233	1000
		100.0%	100.0%	100.0%

Table 11: Showing the distribution of Lateral Periodontal Cyst in sex

		Gender		
		Male	**Female**	**Total**
Lateral Periodontal Cyst	Yes	89	0	89
		11.6%	.0%	8.9%
	No	678	233	911
		88.4%	100.0%	91.1%
Total		767	233	1000
		100.0%	100.0%	100.0%

Table 12: Showing the distribution of Odontogenickeratocyst in sex

		Gender		
		Male	**Female**	**Total**
Odontogenickeratocyst	Yes	120	14	134
		15.6%	6.0%	13.4%
	No	647	219	866
		84.4%	94.0%	86.6%
Total		767	233	1000
		100.0%	100.0%	100.0%

Applied χ^2test for significance. χ^2value=14.302; p value= <0.001; consider highly significant

Table 13: Showing the distribution of Dentigerous cyst in sex

		Gender		
		Male	**Female**	**Total**
Dentigerous cyst	Yes	137	95	232
		17.9%	40.8%	23.2%
	No	630	138	768
		82.1%	59.2%	76.8%
Total		767	233	1000
		100.0%	100.0%	100.0%

Table 14: Showing the distribution of Radicular cyst in sex

		Gender		
		Male	**Female**	**Total**
Radicular cyst	Yes	328	124	452
		42.8%	53.2%	45.2%
	No	439	109	548
		57.2%	46.8%	54.8%
Total		767	233	1000
		100.0%	100.0%	100.0%

(Table 14). The site of occurrence is compared in age group by χ^2test and it was found that mandibular posterior regions(49.1%) is most predilected site in 18-35 years age group (Table 15). The mandibular anterior region is most predilected site of occurrence of odontogenic cysts is 51-60 years of age group (Table 16). However the maxillary posterior region(27.5%) is most predilected site in 36 to 50 years (Table 17). The maxillary anterior region is most common in 18 to 35 years (Table 18). The association between type of cyst and age groups has been evaluated. It was found that Calcifying

Table 15: Showing the distribution of site of occurence in age groups (Mandibular posterior region)

		Age intervals				
		Below 18 years	**18 to 35 years**	**36 to 50 years**	**51 to 60 years**	**Total**
Mandibular posterior region	Yes	7	274	99	33	413
		21.2%	49.1%	29.9%	42.3%	41.3%
	No	26	284	232	45	587
		78.8%	50.9%	70.1%	57.7%	58.7%
Total		33	558	331	78	1000
		100.0%	100.0%	100.0%	100.0%	100.0%

Applied χ^2 test for significance. χ^2 value=37.258; p value= <0.001; consider highly significant.

Table 16: Showing the distribution of site of occurence in age groups (Mandibular Anterior region)

		Age intervals				
		Below 18 years	**18 to 35 years**	**36 to 50 years**	**51 to 60 years**	**Total**
Mandibular Anterior region	Yes	5	75	107	45	232
		15.2%	13.4%	32.3%	57.7%	23.2%
	No	28	483	224	33	768
		84.8%	86.6%	67.7%	42.3%	76.8%
Total		33	558	331	78	1000
		100.0%	100.0%	100.0%	100.0%	100.0%

Applied χ^2 test for significance. χ^2 value=98.582; p value= <0.001; consider highly significant.

Table 17: Showing the distribution of site of occurrence in age groups (Maxillary Posterior Region)

		Age intervals				
		Below 18 years	**18 to 35 years**	**36 to 50 years**	**51 to 60 years**	**Total**
Maxillary Posterior Region	Yes	0	87	91	0	178
		.0%	15.6%	27.5%	.0%	17.8%
	No	33	471	240	78	822
		100.0%	84.4%	72.5%	100.0%	82.2%
Total		33	558	331	78	1000
		100.0%	100.0%	100.0%	100.0%	100.0%

Applied χ^2 test for significance. χ^2 value=47.149; p value= <0.001; consider highly significant.

Table 18: Showing the distribution of site of occurrence in age groups (Maxillary anterior region)

		Age intervals				
		Below 18 years	**18 to 35 years**	**36 to 50 years**	**51 to 60 years**	**Total**
Maxillary anterior region	Yes	21	122	34	0	177
		63.6%	21.9%	10.3%	.0%	17.7%
	No	12	436	297	78	823
		36.4%	78.1%	89.7%	100.0%	82.3%
Total		33	558	331	78	1000
	100.0%	100.0%	100.0%	100.0%	100.0%	

Applied χ^2 test for significance. χ^2 value=83.757; p value= <0.001; consider highly significant.

Table 19: Showing the distribution of calcifying epithelial odontogenic cyst in age groups

		Age intervals				
		Below 18 years	**18 to 35 years**	**36 to 50 years**	**51 to 60 years**	**Total**
Calcifying epithelial odontogenic cyst	Yes	0	44	0	0	44
		.0%	7.9%	.0%	.0%	4.4%
	No	33	514	331	78	956
		100.0%	92.1%	100.0%	100.0%	95.6%
Total		33	558	331	78	1000
		100.0%	100.0%	100.0%	100.0%	100.0%

Applied χ^2 test for significance. χ^2 value=36.457; p value= <0.001; consider highly significant.

epithelial odontogenic cyst (7.9%) is most common in 18 to 35 years of age group. This association with age group is highly significant (p value= <0.001) (Table 19). Adult Gingival Cyst is most common in 36 to 50 years of age group. This association with age group is not significant (p value= <0.05) (Table 20). Residual cyst (51.3%) is most common in 51 to 60 years of age group (Table 21). Lateral Periodontal Cyst (48.7%) most common in 51 to 60 years of age group(Table 22). The OKC (26.9%) is most common

Table 20: Showing the distribution of Adult Gingival Cyst in age groups

		Age intervals				
		Below 18 years	**18 to 35 years**	**36 to 50 years**	**51 to 60 years**	**Total**
Adult Gingival Cyst	Yes	0	4	7	0	11
		.0%	.7%	2.1%	.0%	1.1%
	No	33	554	324	78	989
		100.0%	99.3%	97.9%	100.0%	98.9%
Total		33	558	331	78	1000
		100.0%	100.0%	100.0%	100.0%	100.0%

Applied χ^2 test for significance. χ^2 value=5.121; p value= 0.163; consider not significant.

Table 21: Showing the distribution of Residual cystin age groups

		Age intervals				
		Below 18 years	**18 to 35 years**	**36 to 50 years**	**51 to 60 years**	**Total**
Residual cyst	Yes	0	0	5	40	45
		.0%	.0%	1.5%	51.3%	4.5%
	No	33	558	326	38	955
		100.0%	100.0%	98.5%	48.7%	95.5%
Total		33	558	331	78	1000
		100.0%	100.0%	100.0%	100.0%	100.0%

Applied χ^2 test for significance. χ^2 value=432.0; p value= <0.001; consider very high significant.

Table 22: Showing the distribution of Lateral Periodontal Cyst in age groups

		Age intervals				
		Below 18 years	**18 to 35 years**	**36 to 50 years**	**51 to 60 years**	**Total**
Lateral Periodontal Cyst	Yes	0	2	49	38	89
		.0%	.4%	14.8%	48.7%	8.9%
	No	33	556	282	40	911
		100.0%	99.6%	85.2%	51.3%	91.1%
Total		33	558	331	78	1000
		100.0%	100.0%	100.0%	100.0%	100.0%

Applied χ^2 test for significance. χ^2 value=220.2; p value= <0.001; consider very high significant.

Table 23: Showing the distribution of Odontogenickeratocyst in age groups

		Age intervals				
		Below 18 years	**18 to 35 years**	**36 to 50 years**	**51 to 60 years**	**Total**
Odontogenickeratocyst	Yes	0	45	89	0	134
		.0%	8.1%	26.9%	.0%	13.4%
	No	33	513	242	78	866
		100.0%	91.9%	73.1%	100.0%	86.6%
Total		33	558	331	78	1000
		100.0%	100.0%	100.0%	100.0%	100.0%

Applied χ^2 test for significance. χ^2 value=82.758; p value= <0.001; consider highly significant.

Table 24: Showing the distribution of Dentigerous cyst in age groups

		Age intervals				
		Below 18 years	**18 to 35 years**	**36 to 50 years**	**51 to 60 years**	**Total**
Dentigerous cyst	Yes	32	171	29	0	232
		97.0%	30.6%	8.8%	.0%	23.2%
	No	1	387	302	78	768
		3.0%	69.4%	91.2%	100.0%	76.8%
Total		33	558	331	78	1000
		100.0%	100.0%	100.0%	100.0%	100.0%

Applied χ^2 test for significance. χ^2 value=180.4; p value= <0.001; consider very highly significant.

Table 25: Showing the distribution of Radicular Cyst in age groups

		Age intervals				
		Below 18 years	**18 to 35 years**	**36 to 50 years**	**51 to 60 years**	**Total**
Radicular Cyst	Yes	1	293	158	0	452
		3.0%	52.5%	47.7%	.0%	45.2%
	No	32	265	173	78	548
		97.0%	47.5%	52.3%	100.0%	54.8%
Total		33	558	331	78	1000
		100.0%	100.0%	100.0%	100.0%	100.0%

Applied χ^2 test for significance. χ^2 value=100.9; p value= <0.001; consider highly significant.

in 36 to 50 years (Table 23) while Dentigerous cyst (97.0%) is more common in Below 18 years of age group (Table 24). Radicular cyst (52.5%) is more common with18 to 35 years (Table 25).

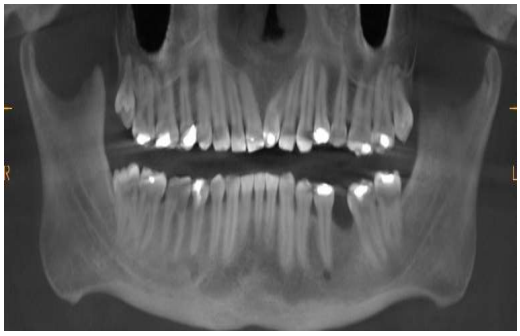

Fig. 1: Panoramic radiograph showing the periapicalradiolucency in maxillary Ist premolar region

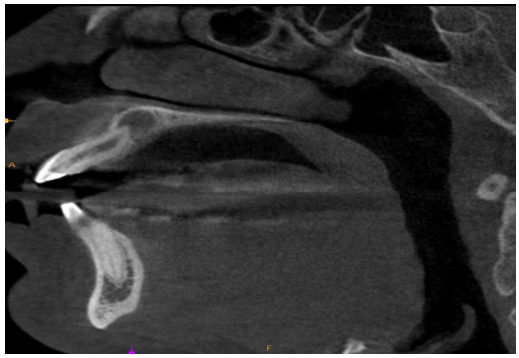

Fig. 2: Saggittal section of CBCT showing periapical radiolucency in maxillary 1st Premolar region suggestive of radicular cyst

Fig. 3: Panoramic radiograph showing multilocular radiolucency in left mandibular Ist molar region suggestive of Dentigerous cyst

Fig. 4: Saggittal section of CBCT showingmultilocular radiolucency with impacted Ist and 2nd mandibular molar in left side suggestive of Dentigerous cyst

Fig. 5: Panoramic radiograph showing odontogenic keratocyst.

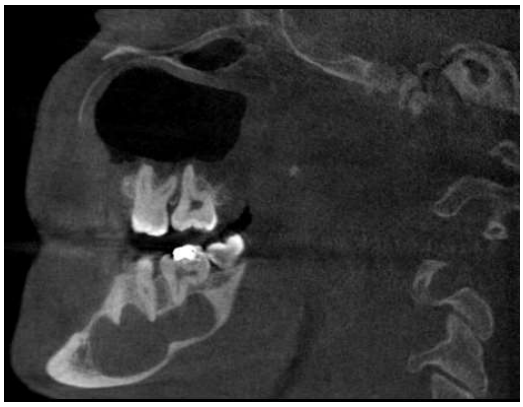

Fig. 6: Saggittal section of CBCT showingmultilocular radiolucency

Discussion

Studies of cysts and tumors of the oral cavity from several parts of the world indicate that knowledge of the location, frequency, and basic clinical features of these lesions is essential to assess the expression of these lesions in diverse populations as well as to identify the groups at risk. The incidence and epidemiological behavior of odontogenic lesions exhibits geographical variations in different regions of the world [12]. The present study solely focuses on the relative frequency and clinical and demographical characteristics of OC's in a north Indian population.1000 patients with cystic lesions of the jaws were screened of OC's and reviewed. It was observed that 76% of study population were males which suggested that the odontogenic cysts were found more in the male population. Johnson et al. [13] also reported that males were more suffering from OC's along with the other studies which gave similar results [14-20]. On the contrary, female predominance was found in Brazilian population [21]. In present study group maximum patients i.e, males and females were in between 18-35 years (55.8%) followed by 36-50 years (33.1%). So it was observed that peak incidence of OC's was between 18-35 years which was slightly consistent with the findings of other studies by Niranjan et al. [22], Ochsenius et al [23], Avelar et al [24] and Borges et al. [25] who observed that the peak incidence of odontogenic cysts was between 20 and 29 years. Radicular cysts represented 45.2% of all reported cysts and it was found in 452 cases out of which 328 (42.8%) are males and 124 (53.2%) are females with an incidence peak at the 18-35 years (64.8%) of age group followed by 36-50 years (34.9%) of age group. Their incidence is highest in third and fourth decade of lifespan with male dominance. Anatomically the periapical cysts commonly found in the maxillary than the mandibular region [26]. The dentigerous cysts which represented 23.2 % of all reported cysts and was found in 232 cases out of which 137 (17.9%) were males and 95 (40.8%) were females with an incidence peak at 18-35 years (73.7%) of age group followed by below 18 years (13.7%) of age group. Dentigerous cysts are the second most common odontogenic cysts after radicular cysts, comprising 20% of all mandibular cysts. The age range varies widely with peak incidence occurring in the second and third decades of life with a male predominance [27].

Odontogenic keratocysts represented 13.4% of all reported cysts and it was found in 134 cases out of which 120 (15.6%) are males and 14 (6%) are females with an incidence peak at the 36-50 years (66.4%) of age group followed by 18-35 years (33.5%) of age group. On the other hand Ramachandra et al [28] observed that Odontogenic keratocysts represented 22.65% of all reported cysts. OKCs occurred more frequently in men (58.6%) than in women (41.4%), and they occurred in patients within a wide age range, most commonly in patients in the third decade of life (28.9%), the mean age of patients with OKC was 30.8 years. 76.5% occurred in the mandible [29].

A presumptive explanation to condone this high prevalence of radicular cyst that it could be related to caries. Radicular cyst in most cases was an aftermath of deep carious lesions and dental pulp necrosis. Pulp necrosis, colonization and proliferation of microorganisms within the root canal system, release of bacteria toxins and inflammatory mediators into the periapical region and a combination of factors involving epithelial-stromal interaction lead to the formation of radicular cyst. On the other hand high prevalence of dentigerous cyst was cardinally related to high prevalence of impacted teeth due to the fact that impacted teeth was indespensable condition to develop a dentigerous cyst. An average of worldwide rate of third molar impactation of 24.4% [30] had been reported.On association of site of lesion with gender, it was observed that maximum cases were found in mandibular posterior region (413) out of which 281 (68%) were males and 132 (32%) were females followed by mandibular anterior region in which it was observed that total 232 cystic lesions were found out of which 187 (80%) were males and 45 (19%) were females.So, we inferred that cysts occurred more frequently in men than in women in accord with findings reported in other studies that were conducted by Ledesma et al. [31] and Prockt et al. [32]. Adult gingival cyst-there is no predilection regarding sex and race. However it is found more in mandible then maxilla. With age of patent ranged 18–78 years but most cases were in adults 4th and 5th decade of life 33. Lateral periodontal cyst (LPC) is more prevalent in adults in the 5th-7th decades, with mean age of 52 years, without preference for race or sex. The most frequently reportedlocation of LPC is the mandibular premolar area, followed by the anterior region of maxilla [34].

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