**Pathologies associated with impacted mandibular third molar – A radiographic study**

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**Abstract**

**Introduction:** For many years, removing or retaining impacted third molar has been a subject of discussion in the dental literature. Although, the decision to remove third molars associated with pathologic changes is often straight forward and one can go for extraction but prophylactically removing an asymptomatic third molar is not an easy decision.

**Aim:** To evaluate the frequency and type of a group of pathologic conditions in and around impacted mandibular third molars through digital panoramic radiographs.

**Objectives:** To assess the frequency and type of pathologies associated with impacted mandibular third molars.

**Result:** In this study it was found that there was a statically significant association (p-value 0.001). It was found that prevalence of pathologies more in females 54.6% than in males 45.4%. Prevalence of periapical and pericoronal lesions and odontome seen more in the age group between18-28 years 20.5% ,41.0% and 0.4% respectively. Among pericoronal lesions NFS showest highest predominance with female gender predilection, similarly Apical periodontitis in Periapical lesions.

**Conclusion:** The un predictable course in in formative stages in tooth development, developmental discrepancies in the upper and lower jaws owing to idiopathic growth deficit or deficit secondary to external environment such as traumatic events etc. are well known.

**Keywords:** IMTM, Lower Jaws, Diagnosing

**Introduction**

An impacted tooth can be defined as on that is prevented from erupting into its final position because of mal position or lack of space. For many years, removing or retaining impacted third molar has been a subject of discussion in the dental literature. It was indicated that pathologies such as periapical pathology, disease of follicle including cysts land tumors are all well-defined criteria for extraction of third molar[1,2]. However, possibilities of development of pathologies around impacted third molar are not yet determined. The third molars are the last teeth to erupt in the oral with a relatively high chance of becoming impacted. Hence the surgical extraction of these impacted teeth has become the most common dentoalveolar surgeries[1,2].

Various retrospective studies have revealed that asymptomatic, non-functional, unerupted third molars were removed to prevent the associated pathologies in one third of total reported cases. Still there is no general indication for the need of surgical removal of all asymptomatic third molars that has been agreed upon till date[2,3]. Both the odontogenic as well as the non-odontogenic pathologies are clearly appreciated on Orthopantamographs in their actual dimension with slight magnification. The posterior mandibular body and angle region bearing the molar teeth are depicted in their true medio-lateral dimension, which provides the clear extent in delineating the superior-inferior and medio-lateral dimension of pathologies in the same region[4]

Owing to the reduced scanning time exposure factors and case of availability panoramic radiography is the key choice for diagnosing and assessing most of the mandibular pathologies[4,5]. The third molars are the teeth which erupts last in the chronology of eruption of the permanent teeth, and eruption of these are governed by the complex factors such as the maxillomandibular space deficiencies in the posterior region. The unpredictable course in informative stages in tooth development, developmental discrepancies in the upper and lower jaws owing to idiopathic growth deficit or deficit secondary to external environment such as traumatic events etc are well known.[6]

Moreover prevalence of mandibular pathologies are mostly associated in the posterior region of mandible and most commonly they involve the mandibular third molar region hence the study targeted at the patients with impacted third molars will help evaluating the need for health education in such patients and also guide the surgeons in decision making regarding the removal of asymptomatic pathology associated with the impacted mandibular third molars[7,8].

**Materials and Method**

The radiographic study will be carried out in the department of oral medicine and radiology at Teerthanker Mahaveer dental college and research centre, Moradabad. The present study conducted in the department of oral medicine and radiology on the patients who reported to radiology department of oral medicine at Teerthanker Mahaveer dental college and research center, Moradabad.

The study comprised of 1200 orthopantomogram of both sex and aged in between 18 to 68 years and retrieved from the data from the data base of the radiology department of oral medicine and radiology at Teerthanker Mahaveer dental college and research

center, these digital images will be interpret for the determination of frequency and type of a group of radiographically detectable pathologic conditions around impacted mandibular third molar in patients those are reported in the department on the basis of following parameters and later stored in to the program given. Permission from the ethical committee of TMDCRC was obtained for this study.

**Inclusion criteria**

1. All the Impacted mandibular third molars Teeth included in this region will be either fully covered with bone or partially erupted.

**Exclusion criteria**

1. Traumatic conditions involving the mandibular third molar area will be excluded.

2. Any craniofacial anomaly or associated with any other syndromes e. g Down Syndrome, Cleidocranial Dysostosis.

3. Absence of mandibular second molar is excluded from this study.

A total no of 1200 panoramic radiographs in the age group range between 18 to 68 years selected and retrieved from the archival database of the department selected data was in accordance with the inclusion and exclusion criteria.

These radiographs interpreted by the observer to assess the frequency and type of a group of pathologic conditions in and around IMTM through digital panoramic radiographs. According to the criteria suggested by Al Khateeb TH & Bataineb in 2006.They classified pathologies around IMTM are pericoronal radiolucent area, periapical and odontome.

**Criteria of AL Khateeb TH et al in 2006**

1. In pericoronal radiolucency can be of two types one is pericoronal radiolucency with opacities and without apacities and the selection criteria was completely

radiolucent area which is encircle the crown of completely embedded IMTM.

2. In pericoronal radiolucency the criteria was a totally radiolucent area which is attached to the one third of the apical part of the root apex of the IMTM, it could be extended up to CEJ but not above that.

3. In case of Odontome the selection criteria was a radio-opaque lesions of having same density to dental tissue. It is in the form of uniform opaque masses or multiple stacked denticular structures, which is surrounded by radiolucent margin located to coronal, mesial, distal & mesial side of IMTM.

After interpretation done, then the data was analysed, collected and tabulated and send for statistical analysis. The data were statistically evaluated. The chi square test was used for the comparison of categorically variables by using the SPSS statistically software 2.1.23 version.

**Results and Observation**

The age distribution of study subjects in the study lies in between 18 to 68 years. In the study subjects showed the highest frequency of 732(60.9%) between the age group of 18-28 years age group followed by 277(23.1%) in the age group 29-38 years, 116(9.7%) in the 39-48 years, 57(4.7%) between the age group of 49-58 years and least frequency was 18(1.5%) in the age group of 59-68 years (Table 1).

The gender distribution of the study group shows higher in frequency of about 655(54.6%) in females followed by 545 (45.4%) in males (Table 2).

Prevalence of occurrence of pathologies with respect to age was most predominantly seen in case of periapical lesion 150 (20.5%) between the age of 18-28 years followed by 48(17.3%) in 29-38 years,21(18.1%) in 39-48 years,13(22.8%) in 49-50 years. The least no of cases seen in 59-68 years of about 4 (22.2%) with significant p value 0.001. Similarly, the highest no of cases of

pericoronal radiolucency seen in between the age group of 18-28 is 300(41.0%), followed by 132(47.7%) in 29-39 years,57(49.1%) in 31-48 years,20(35.1%) in 49-58 years and least no of occurrence of pericoronal pathologies seen in between the 59-68 years 8(44.4%), which is significant p value 0.001. However, occurrence of odontome shows higher in number between age group 18-28 years is 3(0.4%) followed by 2(0.7%) in the age group of 29-38 years. there is no occurrence of pathologies between the 39-68 years. The p value is 0.001 significant statistically (Table 3).

The prevalence of various pathologies with respect to gender showed more predominance in females of about 133 (20.3%) compare to male of about 103 (18.7%) in periapical lesions, p value is 0.981 which is non-significant. Similarly periapical radiolucency with respect to impacted third molar region showed more in females about 306(46.7%) and 211(38.7%) in males with a significant p value 0. 001.However the occurrence of odontome in third molar region showed more in males then females group of about 4(0.7%) and 1(0.2%) respectively and p value is 0.001 that is statistically significant (Table 4).

The prevalence of different pathologic radiolucency involving mandibular molar with respect to gender showed higher predominant of number in females of about 445 (55.62%) than in males 355(44.38%) in pericoronal radiolucent lesions. Similarly, pericoronal radiolucency showed higher in females of about 207(56.10%) and 162(43.90%) in males. In odontomes it showed more in males than in females of 04(80%) and 1(20%), which is significant with a p value of 0.001 (Table 5).

The various pathologies involving the pericoronal region radiographically includes Normal follicular space, Periostitis underlying pericoronitis, Dentigerous cyst,

Inflammatory paradental cyst, it showed predominantly higher in no with NFS 475 (59.38%) followed by PUP 297 (37.13%), DC 05(0.62%) and IPC of about 23(2.87%) with a p value of 0.001 significant statistically (Table 6).

The various pericoronal radiolucent lesions with respect to gender found in NFS predominantly more in females group of about 255(53.68%) then males of about 220(46.31%) followed by PUP lesions also more in females group 177(59.59%) than males 120(40.40%) however in DC group showed more in male group than females3(60%) and 2(40%), similarly the IPC lesions also showed higher in male subjects of 12(52.17%) and females 11 (48.83%) significant statistically with a p value of 0.001 (Table 7).

The various periapical pathology involving periapical region also showed predominantly more in AP condition of about 264(71.54%) followed by PA 48 (13.02%), CO of about 27 (7.31%) and PG is of 30(8.13%) respectively with a statistically significant p value of 0.001 (Table 8).

The various radiolucent lesions involving the periapical regions with respect to gender found predominantly more in female group of about 163 (61.75%) than males 101 (38.25%) in AP but in contrast PA more in male 30(62.5%) then females 18 (37.5%) similarly CO in female group of about 12(46.45%), PG in male 16 (57.14%) then females 14 (42.86%). significant statistically with a value of p 0.001 (Table 9).

The occurrence of odontome in a third molar region of about 05 (0.41%) (Table 10).

S The prevalence of odontome showed more in males 04(80%) than females 01(20%) which is a significant p value of 0. 001.The occurrence of odontome in third molar region shows higher in number between the age group 18-28 years is 3 (60%) followed by 2 (40%) there

is no occurrence between the age group 36-68 years. The p value is 0.001 sig statistically (Table11).

## Discussion

of sample size for assessing third molar impaction radiographically is usually controversial and every patient cannot be subjected to radiographic evaluation as all the patients with unerupted or partially erupted are not symptomatic hence exposing the patient to ionizing radiation is not advisable so retrospective study proves more efficacious and truthful to determine the commonest associated pathologies with the MITM.

In the present study a total no of 1200 digital radiographs reviewed from the computer data base, the most common associated age group showing prevalence of pathologies associated with IMTM was in the age range of 18-28 years with females 54.6% of all of the pathologies (655 out of 1200 patients) and males having 45.4% (545 out of 1200) table 2.

In the present study it was found that the most common associated age group showing the prevalence of pathologies associated with IMTM was in the age range of 18-28 years (table 3) and prevalence decreases as the age group progress further which was in accordance with Mukherji A et al, Nazir A et al in 214,Mesgarzadeh AH in 2008 et al and AL Khateeb TH et al in 2006 [12,6,3], female gender showed higher prevalence of pathologic condition than male gender, which was similar to the study done by Ravikumar K.K in2019 , Braimah R.O in 2018 but not in contrast a study done by AL Khateeb et al in 2006 which Male gender shows higher prevalence than female [16,15,2].The most common attributed factor for this is the jaw size of females is shorter than males.

In our study the prevalence of periapical lesion, pericoronal lesions & odontome was most commonly found in the age group of 18-28 years and lowest in the 59-68 years (table 3) which was in accordance with the

study done by Al Khateeb TH et al in 2006 [2]. Females gender showed higher no of periapical radiolucency 133(20.3%), pericoronal radiolucency 306(46.7%), which was not in contrast with the study done by Al Khateeb TH [2]. Odontome was found more in male gender 4(0.7%) which was similar to a study done by Shin SM et al in 2016 in which there is no significant relation with the relation of existence of pathologies and gender 11. The incidence of pathologic radiolucency around IMTM with respect to gender showed more number of lesions in females 445(55.62%) than males 355(44.38%) similarly periapical lesions were found more in females 207(56.10%) than males 162(43.90%) and odontome were found more in males 04(80%) than females 01(20%) with p value significance, this was in accordance to the study done by Shin SM et al in2016 in which they found occurrence of odontome higher in male gender group[11].

In the present study among all pericoronal radiolucency NFS was found 475 out of 800 lesions showed principally higher in number, which was similar to the study done by Mesgarzadeh et al in 2008 where they found the similar observation and with respect to gender NFS found more predominantly in female group of about 255 (53.68%) which showed not in contrast with the Mesgarzadeh et al in 20083.They documented that male gender exhibits more NFS pathology then female gender group. PUP showed second highest number, which is accordance with the study done by Mukherji A et al in 201712. Another study done by Ye- ZX et al, Kim JY et al in 2017 & Sina M in 2017 et al found the same observation [23,14, 13.]PUP showed higher prevalence in females 177(59.59%) which was in opposite to the study done by Yilmaz S et al in 2015 showed higher male no than females[10].

In our study DC showed 0.62% occurrence rate which was according to the study done by Al Khateeb & Shin SM et al in 2016 which was not in contrast with the study done and they found that DC was the most common cyst among all cyst associated with IMTM [2,11]. IPC showed 23(2.87%) prevalence rate which was similarly a study done by AL Khateeb et al stated that IPC showed low incidence rate 0.08% in their study2. DC and IPC found more in male than females, Sina S M et al found no significance of lesion and gender of the patient11.

Among all periapical lesions , AP showed highest incidence 264(71.54%) and followed by other pathological radiolucency such as PA ,CO and PG ,which was in accordance to the study done by Subedi S et al in 2020 , Khawaja A.H et al in 2014 and Al khateeb TH et al. AP ,PA showed more incidence in females 163(61.75%),18(37.5%) and CO ,PG found more in males 19,8,2.In our study occurence of Odontomes related to IMTM predominantly found in the age years of 18-28,which was opposite finding of study done by Sina M et al and the prevalence was 05(0.41%) and which is similar to the study done Patil S et al in 2014[13,5].

## Conclusion

Impacted teeth /embedded teeth with higher frequency of various pathology in mandibular region, MTM are the most commonly encountered among all types of impactions. IMTM with pathologies showed a high incidence among both the sexes males as well as females. Panoramic radiographs is the useful diagnostic tool to assess the different pathologies associated with IT in mandibular region radiographically. we concluded that the pericoronal radiolucency (NFS) is highest pathology associated with IT and panoramic radiographs is the important tool to evaluate the various pathologies of mandibular region.

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Figure 1: pericoronal radiolucency



Figure 2: pericoronal radiolucency



Figure 3: periapical radiolucency



Figure 4: odontome

|  | Frequency | Percent |
|---|---|---|
| 18-28 Years | 732 | 60.9 |
| 29-38 years | 277 | 23.1 |
| 39-48 years | 116 | 9.7 |
| 49-58 years | 57 | 4.7 |
| 59-68 years | 18 | 1.5 |

Table.1 Age Distribution of Study Subjects (N=1200).
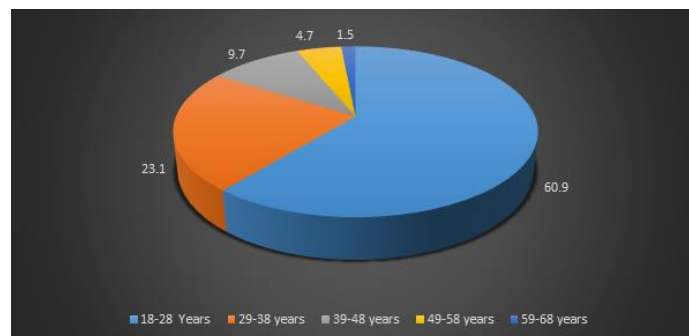


Chart 1

| | Frequency | Percent |
|---|---|---|
| Male | 545 | 45.4 |
| Female | 655 | 54.6 |

Table 2: Gender Distribution of Study Subjects
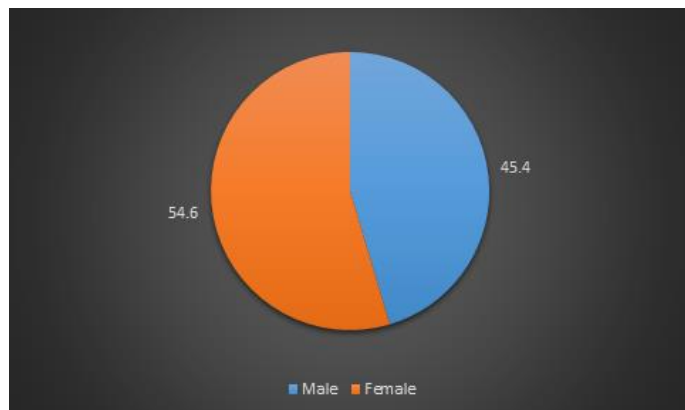


Chart 2

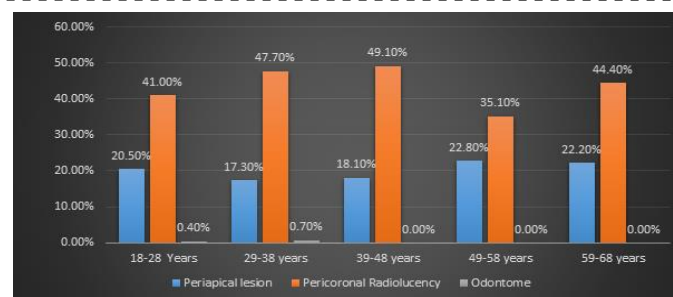| Age Groups | Periapical lesion | Pericoronal Radiolucency | Odontome |
|---|---|---|---|
| 18-28 Years | 150 | 300 | 3 |
| | 20.5% | 41.0% | 0.4% |
| 29-38 years | 48 | 132 | 2 |
| | 17.3% | 47.7% | 0.7% |
| 39-48 years | 21 | 57 | 0 |
| | 18.1% | 49.1% | 0.0% |
| 49-58 years | 13 | 20 | 0 |
| | 22.8% | 35.1% | 0.0% |
| 59-68 years | 4 | 8 | 0 |
| | 22.2% | 44.4% | 0.0% |
| Chi Square value | 7.046 | 5.223 | 7.943 |
| P value | 0.001 (Sig) | 0.001 (Sig) | 0.001 (Sig) |

Table 3: Prevalence based on age groups (N=1200)



Chart 3

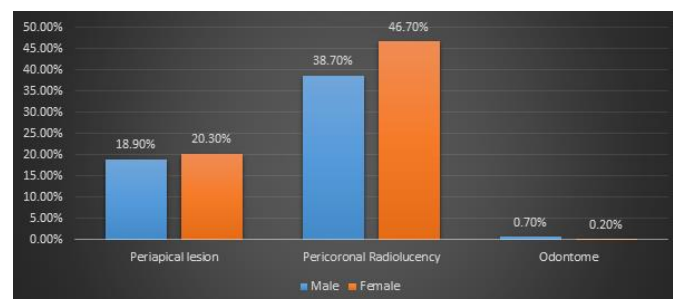| | Periapical lesion | Pericoronal Radiolucency | Odontome |
|---|---|---|---|
| Male (N=545) | 103 | 211 | 4 |
| | 18.9% | 38.7% | 0.7% |
| Female (N=655) | 133 | 306 | 1 |
| | 20.3% | 46.7% | 0.2% |
| Total | 236 | 517 | 05 |
| Chi Square value | 0.372 | 7.653 | 5.564 |
| P value | 0.981 (non-Sig) | 0.001 (Sig) | 0.001 (Sig) |

Table 4: Prevalence based on gender (N=1200)



Chart 4

| | Male | Females | P value |
|---|---|---|---|
| Pericoronal Radiolucency (N=800) | 355 (44.38%) | 445 (55.62%) | 0.001 (Significant) |
| Periapical Radiolucency (N=369) | 162 (43.90%) | 207 (56.10%) | |
| Odontome | 04 (80%) | 01 (20%) | |

Table 5:    Prevalence of Pathological Radiolucency Among Mandibular Molars based on gender
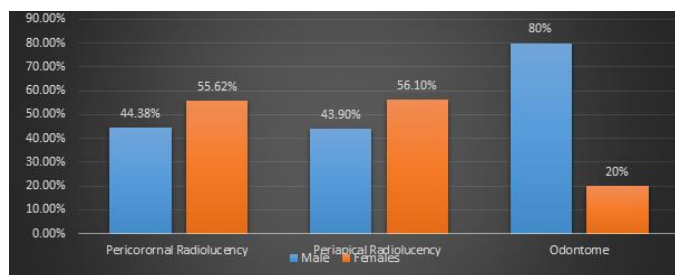


Chart 5

|  | N | Percentage | P value |
|---|---|---|---|
| Normal follicular space | 475 | 59.38% | |
| Periostitis underlying pericoronitis | 297 | 37.13% | 0.001 |
| Dentigerous cyst | 05 | 0.62% | |
| Inflammatory paradental cyst | 23 | 2.87% | |

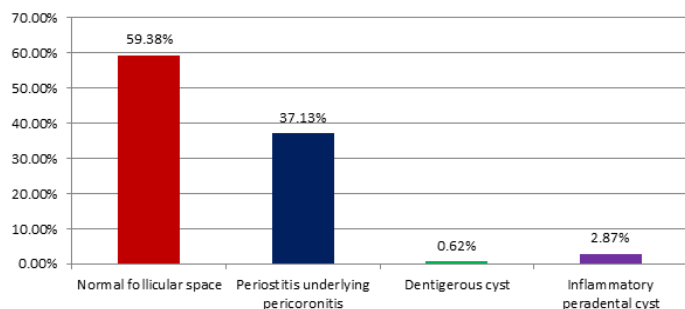Table 6: Radiological Diagnosis of Pericoronal Radiolucency (N=800)



Chart. 6

|  | Male | Female | P value |
|---|---|---|---|
| Normal follicular space (n=475) | 220 (46.31%) | 255 (53.68%) | |
| Periostitis underlying pericoronitis((n=297) | 120 (40.40%) | 177 (59.59%) | 0.001 (Significant) |
| Dentigerous cyst (n=05) | 3 (60%) | 2 (40%) | |
| Inflammatory | 12 | 11 | |

| peradental cyst (n-23) | (52.17%) | (48.83%) | |
|---|---|---|---|

Table 7: Radiological Diagnosis of Pericoronal Radiolucency based on gender (N=800)
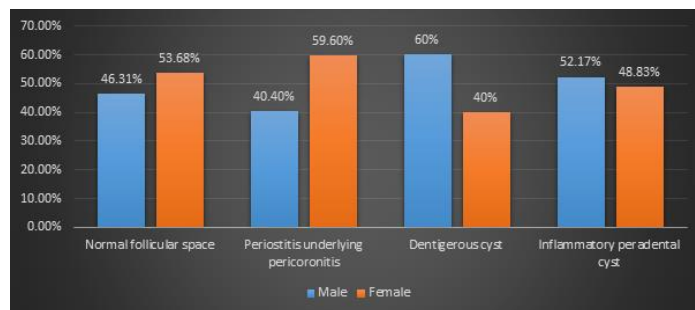


Chart 7

|  | N | Percentage | P value |
|---|---|---|---|
| Apical periodontitis | 264 | 71.54% | |
| Periapical abscess | 48 | 13.02% | 0.001 |
| Condensing ostitis | 27 | 7.31% | |
| Periapical granuloma | 30 | 8.13% | |

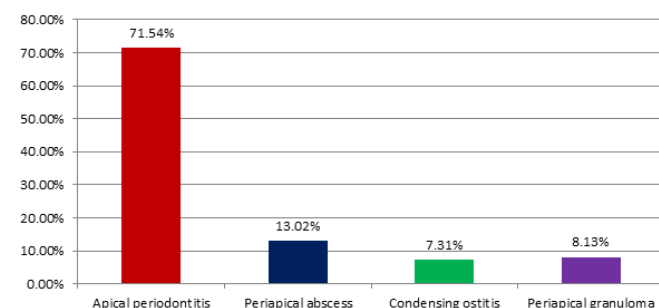Table 8: Radiological Diagnosis of Periapical Radiolucency (N=369)



Chart 8

|  | Male | Female | P value |
|---|---|---|---|
| Apical periodontitis (n=264) | 101 (38.25%) | 163 (61.75%) | 0.001 (Significant) |
| Periapical | 30 | 18 | |

| | | | |
|---|---|---|---|
| abscess (n=48) | (62.5%) | (37.5%) | |
| Condensing ostitis (n=27) | 15 (55.55%) | 12 (46.45%) | |
| Periapical Granuloma (n=30) | 16 (57.14%) | 14 (42.86%) | |

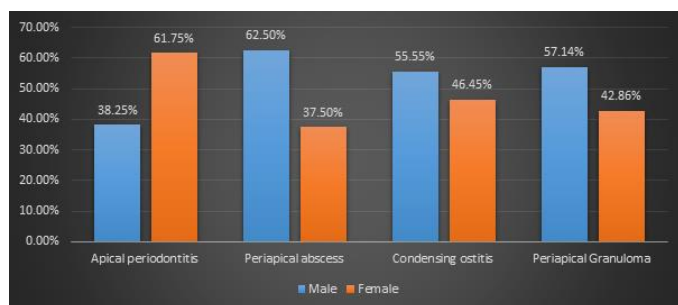Table 9: Radiological Diagnosis of Periapical Radiolucency based on gender (N=800)



Chart 9