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Radiographic assessment of the prevalence and pattern of impacted teeth in Kanyakumari population using orthopantomogram- A retrospective study

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Abstract

Background: The present study was aimed to record the incidence of each distinctive impacted tooth by reviewing panoramic radiographs.

Materials and methods: In present study 10-year records (2012 to 2021) of 4000 panoramic radiographs were obtained from the Department of Oral Medicine and Radiology, Sree Mookambika Institute of Dental Sciences (SMIDS), Kanyakumari. From the data collected, 442 patients' panoramic radiographs fulfilled the inclusion criteria and 627 impactions were detected and classified accordingly. The obtained results were tabulated and statistically analyzed.

Results: A total of 627 impactions were found with 15.7% prevalence. Males had the higher number of impacted teeth than females with a small margin. Mandibular third molar (69.26%) was found to be the most commonly impacted teeth followed by canine (14.8%), maxillary third molar (9.39%), premolar (3.0%), supernumerary (2.1%) and incisors (1%). Horizontal pattern (69.9%) was the most commonly reported impaction of mandibular third molar. In maxilla, vertical impaction (63%) was the most common pattern. The results also revealed that higher portion of impacted teeth lies in mandible (78.3%) than in maxilla (21.6%).

Conclusion: Impacted teeth and congenitally missing teeth are a common phenomenon nowadays. Many patients at their later age present to a dental surgeon due to pain and infection from impacted teeth. This study was designed to evaluate the prevalence of impacted teeth in patients in and around Kanyakumari district. With more than 15% prevalence of impactions in adults, it is wise to do panoramic imaging in suspected patients with missing teeth to prevent further complications like pain, infection and cystic transformation.

Keywords: prevalence, impaction, retrospective, panoramic radiograph

Introduction

Generally, an adult individual has 32 fully erupted permanent teeth in their oral cavity. But anthropological records showed alterations in size of skull and reduction in volume of masticatory muscle due to evolution which leads to minimal lower face projection with the tooth size remaining the same [1]. Eventually third molars can be seen missing as a result of modern agenesis [2]. Similarly overcrowded or impacted teeth are evident due to arch length deficiency and several other factors [3]. Incidence of impaction is getting higher year by year. It is essential to measure the prevalence of impacted teeth in a stated population, and it is done usually by panoramic radiograph imaging.

Classification of impaction was described in different studies by different method. The most followed classification for mandibular third molar impaction was given by Winter's based on inclination of the impacted third molar. Maxillary third molar impaction was classified based on position of long axis of third molar in relation to second molar. Classification of other impactions is not possible in panoramic view.

To assess the incidence and pattern of impacted teeth numerous studies were performed and the prevalence varied in different studies. The prevalence of impaction in and around Kanyakumari district has not yet been set up to date.

The aim of our study was to analyze the prevalence of various impactions based on classification, age, sex in patients reported to Department of Oral Medicine and Radiology in SMIDS, Kanyakumari.

Materials and Methods

This study was conducted in the Department of Oral Medicine and Radiology in Sree Mookambika Institute of Dental Sciences, Kanyakumari district, Tamilnadu. All panoramic radiographs obtained from 2012 to 2021 were evaluated from patients seeking overall treatment in the department with an electronic record. Panoramic radiographs were obtained using Planmeca Proline XC Digital OPG unit and images were stored in a digital database. 4000 OPGs were screened in the final study which accounted to patients with 627 impactions. Study included records of patients from 13 -78 years of age. But estimated eruption of canine ranges between 11-13years so only teeth which will not be able to attain functional occlusion were included in canine impaction.

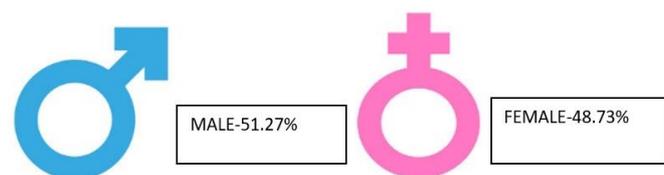
The parameters followed are

Inclusion	Exclusion
Good quality OPG (Ideal radiographs)	Incomplete OPG (Faulty radiograph)
Completely impacted tooth with complete root formation	Partial impactions and incomplete root formation
Age 13-78 years	Age<13 years
	Partially erupted

In present study, Impactions of maxillary and mandibular teeth were assessed according to classification. Supernumerary impactions were numbered based on quadrant. Other impactions were evaluated on basis of standardized OPG. Impactions were analyzed according to the type of tooth (3rd molar, canine, incisor, and premolar), location (maxilla or mandible, right/left), patients' age and gender. Presence of supernumerary impactions was also assessed. Data were entered into excel sheet and statistically analyzed.

Results

A total of 4000 panoramic radiographs with 627 impactions of 442 patients were found out of which 322(51.27%) belongs to male and 306 (48.73%) belongs to female.



The frequency distribution of impactions in and around Kanyakumari population was tabulated. The statistical analysis revealed mandibular third molar (69.26%) to be the most commonly encountered impaction followed by canine (14.8%), maxillary third molar (9.39%), premolar (3.0%), supernumerary (2.1%) and incisors (1%). Table (1.0) shows analysis of different type of fully impacted teeth where frequency of third molar impaction is higher. (Figure-1) reveals that the lower jaw/mandible (78.3%) possesses impactions to a greater extend when compared to upper jaw/maxilla (21.6%). Table (1.2) shows the comparison between 3rd molar

impaction in maxillary (9.39%) and mandibular arch (69.26%) and also reveals the most common impaction in individual arches (maxillary right-47.75%, maxillary left-52.54%, mandibular right-43.34%, mandibular left-56%).

Table (1.3) shows the comparison between canine impaction in maxillary (9.5%) and mandibular arch (5.25%) and also reveals the most common impaction in individual arches (maxillary right-53.3%, maxillary left-46.6%, mandibular right-45.45%, mandibular left-54.5%).

The frequency of various impactions among male and female (figure-2) showed that only molar has female predilection and all other impactions showed slight male predilection.

(Figure-3) shows distribution of mandibular third molar based on angulation (Winter's classification). Horizontal impaction (68.32%) was the most commonly reported which is sequentially followed by mesioangular (26.23%) and vertical (2.75%). Distoangular (2.05%) and buccolingual (0.65%) were the least patterns of impaction recorded.

(Figure-4) shows distribution of Maxillary third molar based on position. Type 2 vertical (63%) impaction was the most common followed by Type 1 horizontal (37%) impaction.

The patients were divided into 4 age groups from 13 to 78. (Figure-5) shows age category from 13 – 17. Prevalence of canine impaction (55.4%) was higher in this age group followed by molar (30.2%), premolar (12.6%) and incisors (4.3%). Male predominance was slightly higher (Table1.4). Canine and molar had slightly higher frequency of male predilection.

The age category from 18-25 (figure-5), showed highest prevalence of molar impaction among all age groups. Third molar (85.5%) was the most commonly impacted followed by canine (9.4%), supernumerary (3.2%), incisors (1.5%) and premolar (1.7%). No gender predilection evaluated.

The age group 25-40 (figure-5) also revealed molar impaction (80.3%), canine impaction (13.5%), supernumerary (4.3%) premolar (3%) and incisors (1%). There was female predilection in canine impaction and male predilection in supernumerary, premolar and incisors.

The final age group > 40 years of age (figure-5) showed the least number of impactions among all 4 groups. The results were tabulated and incidence of molar impaction (71.8%) was higher followed by canine (19.3%) and premolar (7.8%). There was no incidence of supernumerary and incisor impactions. Therefore, age grouping showed statistically significant difference. Gender in turn was not statistically significant.

Consequently, various results were obtained by different authors among different populations few in favor and few in disagreement with our study.

Discussion

Impaction is a common pathological deformity of modern civilization. The prevalence and etiology of impactions have long been in research. The results indicate how common impactions are and the need to discover the possible etiological factors. Investigating the oral cavity beyond clinical examination is significant and allows to establish a more precise and correct diagnosis. Impacted teeth should be evaluated radiographically. The results of our current study may differ from other studies which may be due to racial differences. Our study targets the prevalence of Impaction among population in and around Kanyakumari by evaluating their panoramic radiographs.

The prevalence of impaction is 15.7% in our study. Several other studies showed variable findings depending on their

ethnic background. When comparing the distribution of impaction between the two jaws, mandible (78.3%) possess impactions to a greater extent when compared to maxilla (21.6%) which is due to inadequate retromolar space and the direction of eruption. Impaction more frequently occurs in teeth that erupt at later ages [4]. Likewise, the sequence observed in this study revealed that third molar (79%) has higher impaction rate followed by canine and other teeth. Mandibular third molar (69.26%) impaction is the most prevalent than other impaction. This is in agreement with study conducted by Fabio Luis Miranda Pedro in a Brazilian Subpopulation who noted the same results [1]. Third molar impaction alone showed higher prevalence in females (41.24%) than males which may be due to their smaller jaw size and different growth patterns where females usually stop growing when the third molars just begin to erupt whereas in males, the jaw development continues during the time of eruption of the third molars creating more space for eruption. Excluding third molar impaction, there was slight male predilection in our study which was in accordance with study conducted by Deepak Passi where males (60.8%) were more likely to present with impacted mandibular third molars than females (39.2%), but in disagreement with a study by Mohamed A. Shaddad in a Sample of Sudanese Population [5, 6]. Other studies by Ferhat Ayranci, Lina Alfadil showed no gender predilection [7, 8].

The number of impactions in the maxillary and mandibular arch on right and left side respectively was equal in our study. Similarly there was no difference in the frequency of impaction between the right and left sides of both jaws in a retrospective study of radiographs in Oman by Samira M and study by Deepak Passi [5, 9]. Higher incidence rate on the left side than right was given by Ferhat Ayranci [7].

For evaluating the pattern of mandibular third molar winter's classification was used like most other studies. Horizontal pattern of impaction (68.32%) was the most common among mandibular third molar impaction. The results of our current study may differ from those in the literature. Various studies showed different results. In studies conducted by Deepak Passi, Mohamed A. Shaddad, Lina Alfadil, Samira M. Al-Anqudi, mesioangular impaction was the most common [5, 6, 8, 9]. Vertical pattern was noticed in Middle Black Sea region by Ferhat Ayranci, The distal angulations was the most common pattern noted by IlknurVeli(7,10). Vertical pattern was the most common in maxillary third molar which confirms the reports of most authors. Vertical pattern was the most common in the maxilla (32.2%) in a Sample of Sudanese Population Mohamed A. Shaddad, a Study evaluating radiographs of Adolescents by Ferhat Ayranci, and a study in Saudi Arabia by Lina Alfadil [6, 7, 8]. Mesioangular pattern was the common variant of maxillary third molar observed in a study by Dr. Madhumati Singh [11].

Canine impaction is often the last tooth to erupt and also travels the longest distance to erupt into the arch, which makes the maxillary canine the second most common impacted tooth in the oral cavity [12]. The age category from 18-25 (figure-5), showed highest prevalence of impaction among all age groups except canine impaction. The prevalence of impaction is reduced as the age increases due to increased extraction of impacted teeth in older patients. Prevalence of canine impaction (55.4%) was higher in the age group 13-17 (figure-5) than other age groups due to early diagnosis and intervention [13]. This is in agreement with the study conducted among Chennai Population by Pooja Umaiyal M [12]. For instance, the management of impacted

canines is essential in terms of esthetics and function. Very few studies have been done to assess the prevalence of impacted premolar teeth. The overall rate of incidence of impaction in premolars is estimated to be about 0.5% (14). However, our study reported 3.0% of impacted premolar. Impaction of premolars can be either due to systemic or local factors, lack of space in, mesial drift and inflammatory lesions. Impaction of incisors was also reported. Impaction of the maxillary incisor (1%) is reported less frequently than that of third molars or canines. Early diagnosis is very important as the maxillary incisors are the most prominent teeth in an individual's smile. Finally, the decision to extract or not to extract impactions should always be based on the location of teeth to vital structure, dimension of follicle and the expected surgical complications.

Conclusion

This study to evaluate the prevalence of impaction in Kanyakumari revealed 15.7% population had at least one impaction. Mandibular third molar impaction showed highest means of prevalence with more or less equal distribution on both sides of the jaw. Horizontal and vertical orientation was highly prevalent among the mandible and maxilla respectively. Relating our study with other studies published globally revealed there is no parallelism and each study showed different incidence or pattern of impaction.

Acknowledgment

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Table 10: (Percentage of individual impacted tooth)

Type of Tooth	Percentage
Third Molar	79%
Canine	14.8%
Premolar	3%
Supernumerary	2.1%
Incisors	1%

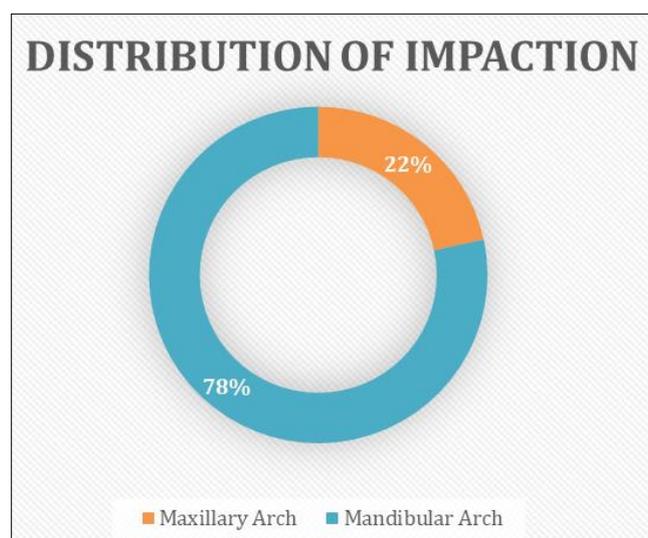


Fig 1: Distribution of impaction among arches

Table 1. 2: (Impactions in maxillary and mandibular 3rd molar on right and left side)

Impaction	Maxillary (9.39%)		Mandible (69.26%)	
	Right	Left	Right	Left
Molar (79%)	47.75%	52.54%	43.34%	56%

Table 1. 3: (Impactions in maxillary and mandibular canine on right and left side)

Impaction	Maxillary (9.5%)		Mandible (5.25%)	
	Right	Left	Right	Left
Canine (14.8%)	53.3%	46.6%	45.45%	54.5%

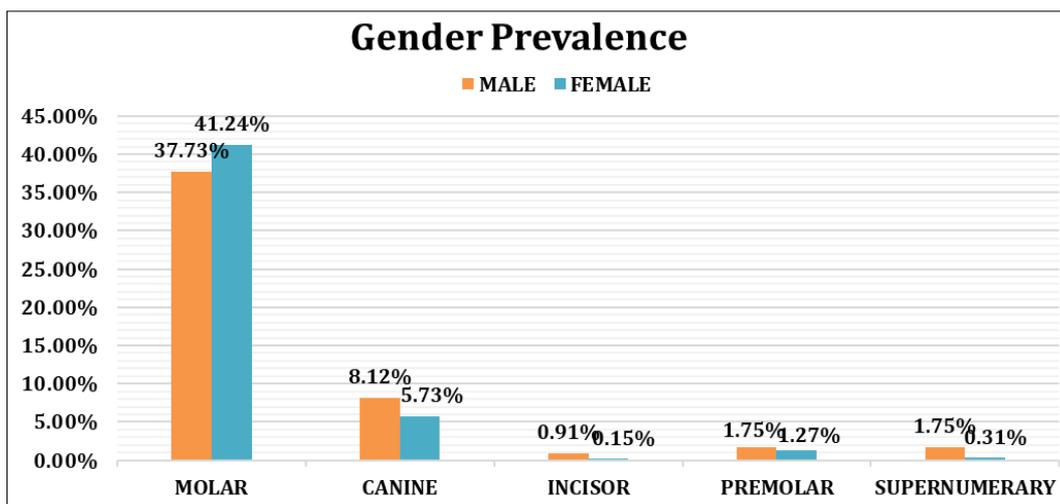


Fig 2: Male female predilection of impacted teeth

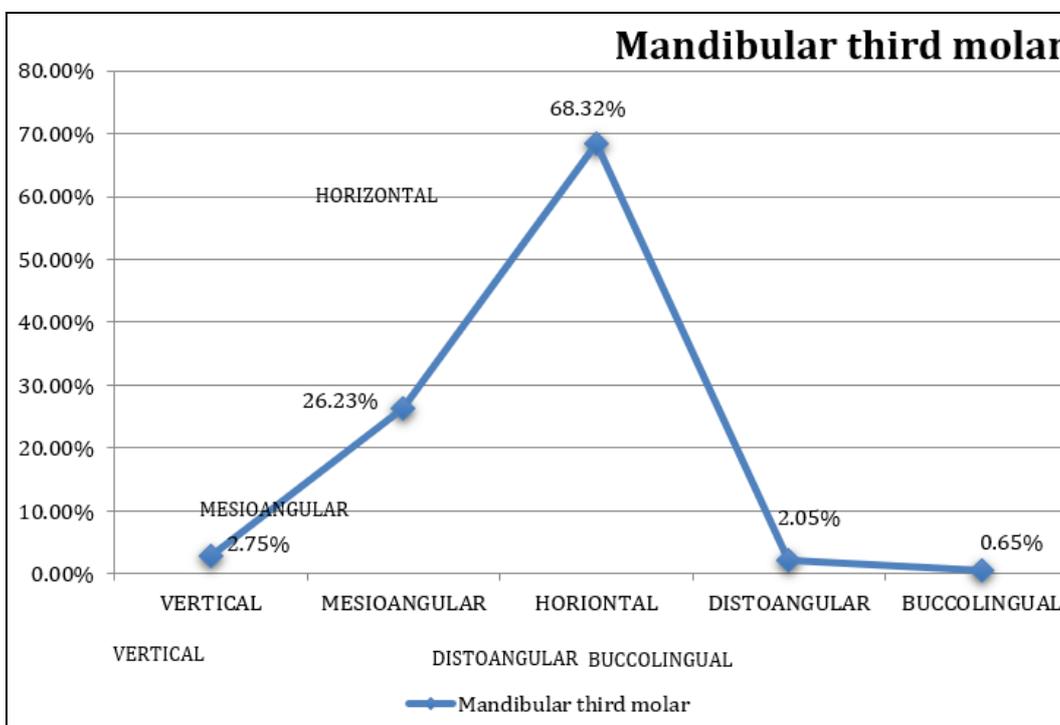


Fig 3: Types of Impactions – Mandibular third molar

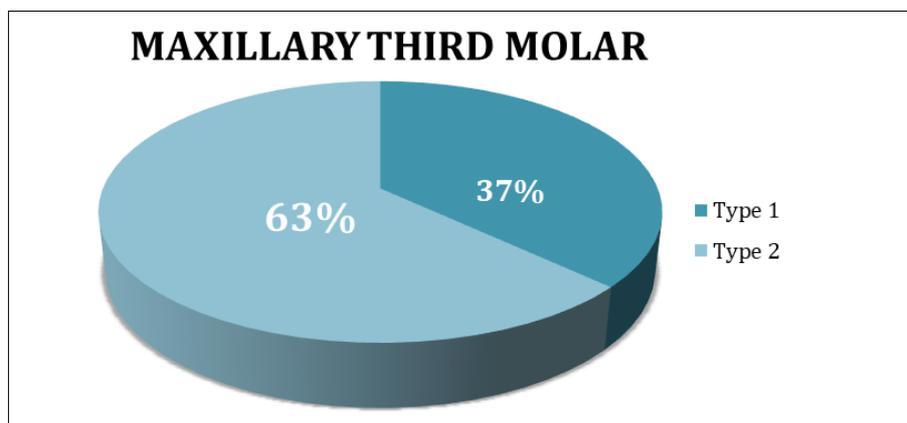


Fig 4: Maxillary third molar distribution

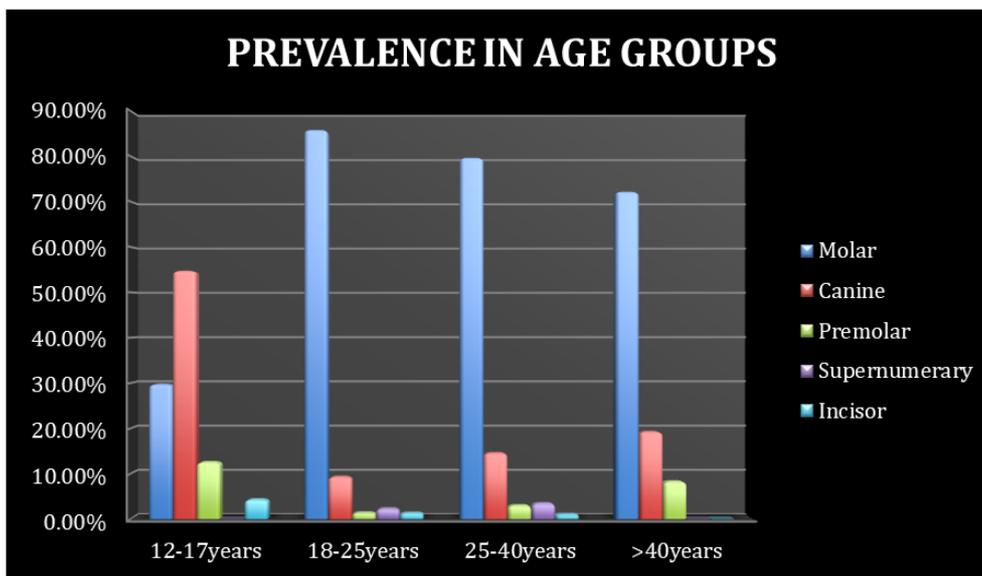


Fig 5: Prevalence of impaction among various age groups

Table 4: Distribution of impaction among gender in various age groups

TEETH	12-17 years		18-25 years		25-40 years		>40 years	
	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
MOLAR	30.4%	29.2%	85.1%	86.9%	80.5%	79.2%	76.9%	67.8%
CANINE	56.4%	53.3%	8.2%	10.5%	10.3%	18.9%	19.2%	19.4%
PREMOLAR	8.6%	16.6%	0.7%	2%	3%	-	3.8%	12.8%
INCISOR	4.3%	-	2.1%	0.5%	1.0%	-	-	-
SUPERNUMERARY	-	-	4.1%	0.5%	5.2%	1.7%	-	-

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