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Research Article

PREVALENCE AND PATTERN OF IMPACTED MANDIBULAR THIRD MOLARS IN CHENNAI POPULATION – A RETROSPECTIVE STUDY

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A B S T R A C T

Background: The aim of this study was to assess the prevalence and pattern of mandibular third molar impaction in a tertiary care centre in Chennai and to assess whether there are any differences with regards to prevalence and pattern of mandibular third molar impaction when compared with other regional studies in different parts of the world.

Materials and Methods: This retrospective study was carried out from the clinical and radiographic records of the patients who were referred to the Department of Oral and Maxillofacial Surgery from October 2016 to October 2017 for a period of one year. Patients' records within the age group of 20-60 years were included in the study.

Results: The sample size obtained using the inclusion and exclusion criteria were 1515 patients of which 966 were male patients (63.8%) and 549 were female patients (36.2%). Of these 672 patients had impacted teeth which is about 44.4%. Among this 405 were males and 267 were females. The mandibular third molar impaction was most commonly seen in the age group of 20-30 years (60.1%) ($p<0.001$). The most common angulation was Mesioangular 36.6% ($p<0.001$), most common position was Position A 39.7% ($p<0.001$) and the most common class according to Pell and Gregory classification was Class II 48.2% ($p<0.001$).46% of cases had caries in the adjacent second molar and 13.8% of patients with impacted mandibular third molars had fracture of the angle of the mandible and 2.7% were associated with cyst or tumour.

Conclusion: The reports of the present study reveal that there are variations between different racial and ethnic groups in the prevalence and pattern of third molar impactions. This can be due to social, economic and genetic differences.

INTRODUCTION

The term impaction is derived from the Latin word "Impactus" meaning wedged. According to WHO an impacted tooth is one that fails to erupt in its normal occlusion or location by its expected age of eruption because of blockade of its path of eruption by overlying bone, soft tissue or another tooth. The third molar is the most commonly impacted tooth with a prevalence range of 16.67-68.6% (Quek *et al*., 2003). Various theories have been attributed for the impaction of a tooth such as Durbeck orthodontic theory, Phylogenic theory, Mendelian theory. Literature suggests agenesis of third molars account for about 19.7% to 25.9%. There is no sex predilection for impaction according to majority of the studies but there are some studies reporting higher frequency in females than males based on Hellman's theory.(Hellman M, 1936)

The aetiology of impaction could be multifactorial such as local and systemic causes or a combination. The local causes are overlying cysts or tumours, supernumerary teeth, loss of arch space, retained deciduous, ankylosis, root dilacerations, trauma, thickened overlying bone or soft tissue. The systemic disorders associated with an impacted tooth are endocrine disorders, febrile illness, Gardner syndrome, cleidocranial dysostosis, Yunis-Varon syndrome. The pathologies usually associated with an impacted tooth are caries of the impacted or adjacent teeth, pericoronitis, periodontitis, cysts, tumours, root resorption of the adjacent teeth.There are many recent studies which suggest that the presence of an impacted third molar weakens the angle of the mandible and makes it more susceptible for fracture (Meisami *et al*, 2002) and impacted third molars have also been attributed to lower arch crowding, TMJ disorders, orofacial pain and neuralgias. Radiographs either IOPA or OPG still remain the golden standard of investigation for impacted third molars. Transalveolar extraction under local anaesthesia is the treatment modality for impacted third molars. The aim of the current study was to assess the prevalence of mandibular third molar impaction among patients in a tertiary care centre in Tamil Nadu.

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MATERIALS AND METHODS

This retrospective study was carried out from the clinical and radiographic records of the patients who were referred to the Department of Oral and Maxillofacial Surgery from October 2016 to October 2017 for a period of one year. Patients' records within the age group of 20-60 years were included in the study. The exclusion criteria were incomplete root development, absence of adjacent second molar, patients below 20 years of age and patients with clefts or syndromes of the maxillofacial region, patients undergoing orthodontic treatment.

The clinical records were taken to rule out any syndromes or clefts. The parameters assessed clinically were age, sex of the patient, and the presence or absence of mandibular third molar impaction and the presence of caries in the adjacent second molar. Radiographically using an OPG the parameters evaluated were the angulation of the impacted teeth, position and depth of impaction and the space available distal to the second molar and the anterior border of the ramus for the eruption of the third molar, pathology in relation to the impacted teeth, presence of fracture. The angulation of the impacted teeth was assessed using Quek *et al* (2003) measurement of the angulation of impaction where the angle formed by the intersection of the long axis of the second and third molars are measured. According to this classification an angulation between 11-79^0 were classified as Mesioangular, Horizontal 80-100^0,Vertical 0-10^0 and Distoangular -11^0 to -79^0(Figure 1).

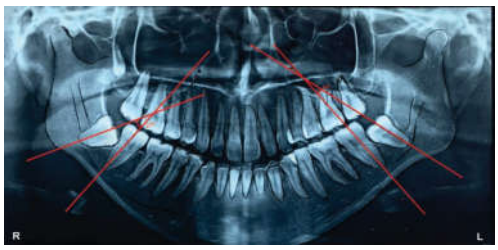

Figure 1 Angulation of third molar based on Quek et al (2003) classification

The position of the impacted teeth was evaluated by the relationship of the occlusal surface of the third molar to the occlusal surface of the second molar. Based on the position the impacted teeth are classified as Position A – the highest position of the impacted tooth is on a level with or above the occlusal plane of the adjacent second molar, Position B- the highest position of the impacted tooth is below the occlusal plane but above the cervical levelof the adjacent second molar and Position C- the highest position of the impacted tooth is below the cervical level of the adjacent second molar(Figure 2).

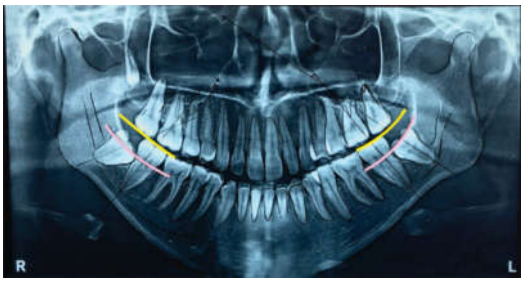

Figure 2 Position of third molar
Yellow Line – denotes occlusal plane
Pink Line – denotes cervical level

Based on Pell and Gregory Classification the impacted teeth were classified as Class I, II and III (Figure 3).

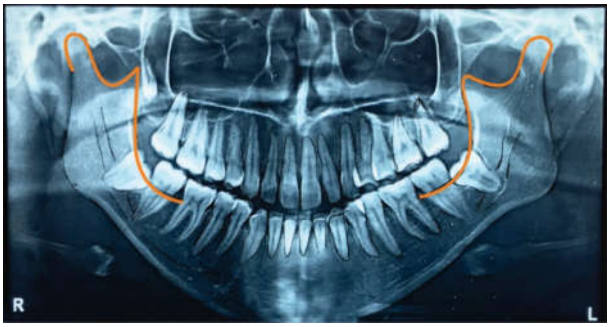

Figure 3 Relationship of the third molar to the ramus (Pell and Gregory classification)

In Class I- sufficient space is available between the distal surface of the second molar and anterior border of ramus to accommodate the mesiodistal width of the third molar. In class II- The space available between the distal surface of the second molar and anterior border of ramus is less than the mesiodistal width of the third molar and this suggests that the distal portion of the tooth is covered by bone. In Class III- the tooth is completely embedded within the ramus.The angulation, position and the space available were assessed by tracing of OPG. The statistical analysis was done using SPSS software version 22. To compare proportions between groups, Chi-Square test was applied. As a trend was noticed, Chi-Square for trend was applied. To compare proportions within a group (variables) non-parametric Chi-Square test was applied. The significance level was fixed as 5%. (α= 0.05)

RESULTS

The sample size obtained using the inclusion and exclusion criteria were 1515 patients of which 966 were male patients (63.8%) and 549 were female patients (36.2%). Of these 672 patients had impacted teeth which is about 44.4%. Out of the total 966 male patients, 41.9% had impacted teeth (n=405) and among 549 female patients 48.6% had impacted teeth (n=267) (Table 1). The male to female ratio of impacted teeth was 1:0.7. Pearson Chi-Square test result shows that these two proportions are statistically significant (p=0.012).

Table 1 Gender Distribution of Impacted Mandibular Third Molars

	Total no. of cases – 1515		**Impacted - 672**		**p-value**
Sex	Male	Female	Male	Female	
Total no.	966	549	405	267	0.012*
Percentage	63.8	36.2	41.9	48.6	

* Pearson Chi-Square test -These two proportions are statistically significant (p<0.05).

Considering the age of the patients 60.1%(n=498) were in the age group of 20-30 years,31.9%(n=114)in the age group of 31-40years,18.5%(n=498) in the age group of 41-50years and 17.8%(n=24) in the age group of 51-60 years. The Chi-Square test for trend shows that there exists a declining trend in impacted tooth as the age increases. This trend is statistically significant (p<0.001) (Table 2).

Table 2 Age Distribution of Impacted Mandibular Third Molars

Age	21-30	31-40	41-50	51-60	p-value
Total no.	828	357	195	135	
Total no. Impacted	498	114	36	24	<0.001*
Percentage impacted	60.1	31.9	18.5	17.8	

*Trend Chi-square test - there exists a declining trend in impacted tooth as the age increases. This trend is statistically significant (p<0.001).

Taking into consideration the angulation, 36.6% of impacted mandibular third molars were Mesioangular, 35.7% Horizontal, 15.6% Distoangular and 12.1% Vertical (Table 3). Comparing the position of the impacted teeth 39.7% were in position A, 37.1% in position B and 23.2% in position C (Table 3).

Table 3 Distribution of Impacted Mandibular Third Molars By Angulation, Position And Class

	Angulation				Depth			Relationship of The Impacted Lower Third Molar To The Ramus of The Mandible And The Second Molar		
	Mesioangular	Distoangular	Horizontal	Vertical	Position A	Position B	Position C	Class I	Class II	Class III
Total no.	246	105	240	81	267	249	156	201	324	147
Percentage	36.6	15.6	35.7	12.1	39.7	37.1	23.2	29.9	48.2	21.9
p-value		<0.001*				<0.001*			<0.001*	

* Pearson Chi-Square test -These proportions are statistically significant (p<0.001).

Analysis of the space available between the distal surface of the second molar and anterior border of ascending ramus based on Pell and Gregory classification showed that 29.9% (n=201)were in Class I, 48.2%(n=324) Class II, and 21.9% (n=147) Class III(Table 3). These proportions were statistically significant (p<0.001). 46% of cases had caries in the adjacent second molar and 13.8% of patients with impacted mandibular third molars had fracture of the angle of the mandible and 2.7% of patients were associated with cyst or tumour.

DISCUSSION

According to Farman (2004) impacted teeth are those that are prevented from eruption because of a physical barrier in their path of eruption. The most common tooth to be impacted is the mandibular third molar. The aetiology of impaction is multifactorial. The management of impacted third molars have always been controversial. The National Institute of Health (NIH) recommends that both impacted and erupted third molars with evidence of follicular space enlargement should be removed electively and the associated soft tissue should be subjected to histopathological examination, in addition to this third molars with non-restorable carious lesions and those causing resorption of the adjacent teeth should also be extracted. (National Institute of Dental Research, 1979) Among the total 549 female patients, 48.6% of patients presented with impacted teeth and 41.9% of 966 male patients had impacted teeth.

Eventhough the number of female patients (n=549) are less compared to the male patients (n=966), the proportion of female patients with impacted teeth (n=267/549) seems to be mildly higher compared to male patients (n=405/966). This is in accordance to Hellman's theory (Hellman M, 1936), which suggests that impaction is more common in females which could be due to the cessation of growth in females when the third molars just begin to erupt leading to lack of space for eruption, on the contrary in males the growth of the jaws continue beyond the time of eruption leaving a chance of space for the third molars to erupt. There are many other studies which also support female predilection such as Hashemipour *et al* (2013), Quek *et al*(2003), Hugoson and Kugelberg(1988), Ma'aita and Alwrikat(2000) and Kim *et al*(2006). Similarly, the results of the present study are also in contrast to studies by Hattab *et al*(1995), Brown *et al*(1982), Haidar and Shalhoub(1986), Montelius GA(1932), Aitasalo *et al*(1972), and Kramer and Williams(1970) which suggests that there is no sex predilection. However, the male to female ratio of impacted teeth in the present study was 1:0.7. Even though the proportion of female patients with impaction seems to be higher, the overall male to female ratio is in favour of male patients.

This result is due to the large number of male patients reported in this study. Poor oral health awareness, fear and anxiety of dental treatment among the female population could be the reasons for the larger number of male patients encountered in the current study.This is in mildly in accordance with the study by Farizana *et al* (2013) on pattern of occurrence and treatment of impacted teeth among Tanzanian population which reported a male to female ratio of 1.2:1.

Considering the age group of the patients, 60.1% of the patients in the age group of 20 to 30 years presented with impacted teeth.In this study more than half of the patients were in the third decades of life which coincides with studies by Hashemipour *et al*(2013), Ma'aita and Alwrikat(2000) and Meisami *et al*(2002). This may be due to the early onset of any symptoms related to third molar impaction during the specified age group or increased oral health awareness in the recent times accounting for this finding of most of the patients being in the third decades of life.

In the current study Mesioangular impaction (36.6%) was the most prevalent closely followed by Horizontal impaction (35.7%) and Vertical was the least (12.1%). This is consistent with the reports by Hattab *et al*(1995) (50%), Obiechina *et al*(2001)(42.2%), Farizana *et al* (2013), Hassan AH(2010), Quek *et al* (2003), Kramer & Williams(1970), Morris and Jerman(1971), Eshghpour *et al*(2014). However, Haidarand Shalhoub (1986) in Saudi population noted higher frequency of Vertical impaction followed by Mesioangular, Distoangular and Horizontal. Similarly, Ajaykumar *et al*(2014) and Reddy and Prasad (2011) reported higher frequency of Vertical impaction. The possible reason for high frequency of Mesioangular impaction could be due to the differential growth between mesial and the distal roots. Depending on the proportion of root development, under development of the mesial root results in Mesioangular impaction. Another reason attributed to increased occurrence of Mesioangular impaction is normal rotation of third molars from the Horizontal to

Mesioangular and from Mesioangular to Vertical and a failure of rotation of Mesioangular to Vertical is very common leading to increased Mesioangular impactions.

Comparing the position of the impacted teeth in our study 39.7% were in position A, in agreement with the findings of Monaco *et al* (2004), Obeichina *et al*(2001), Hugoson and Kugelberg (1988), Hashemipour *et al*(2013), Ajay Kumar *et al*(2014). In contrast Eshghpour *et al*(2014), Blondeau and Daniel (2007), Almendros-Marques *et al*(2008), Quek *et al* (2003) and Hassan AH(2010) reported Position B as the most common Impaction level. This contrast between the reports of studies is due to the difference in the classification methods. In the present study the level of impaction was assessed based on the relationship of the occlusal surface of the third molar and the adjacent second molar. On the contrary studies which indicated Class B as the most common impaction level, the level was assessed according to the position of the CEJ of the third molar in relation to the alveolar bone height. Since the latter method excludes normally erupted third molar it is considered as a more objective method to classify the level of impaction.

In the study sample of current research, around 48.2% were classified as Class II where more than the half of the crown were in the anterior border of ramus. This was in compliance with the findings of Eshghpour *et al*(2014), Hashemipour *et al*(2013), Obeichina *et al*(2001), Monaco *et al*(2004), Blondeau and Daniel (2007), Almendros-Marques *et al*(2008). This lack of space between the anterior border of the ramus and the distal surface of the second molar to accommodate the mesiodistal width of the third molar could be multifactorial such as change in human lifestyle, food habits, delayed third molar mineralisation and early physical maturation of the jaws. The findings of the current research suggest that this lack of space plays a major role in determining the angulation and the position of impaction.

In this study 13.8% of patients with impacted mandibular third molars had fracture of the angle of the mandible. This is in accordance with the hypothesis that the presence of impacted third molars decreases bone mass in the angle region making it more susceptible for angle fractures. Thangavelu *et al* (2010) reported that the patients with impacted third molars were three times more likely to develop angle fractures and less likely to develop condylar fractures than those without impacted mandibular third molars. They concluded that the removal of unerupted third molars predisposes the mandible to condyle fractures. Vigneshwaran *et al* (2015) reported 1.79% incidence of pathology around impacted third molars of which 1.54% were associated with cyst or tumour. In the current study the incidence of pathology was much higher around 2.7%.

CONCLUSION

The results of the current study reveal that the Chennai subpopulation has a mild male predilection for impaction in contrast to other regional studies at the global level which showed female predilection for impaction.Mesioangular impaction was the common type and considering the depth of impaction, position A was the most common which again contradicts other studies done among other populations of the world. However, majority of the impactions were in Class II comparing the space available in the present research which was a universal finding seen in majority of the studies at the international level suggesting that the major cause of impaction is that the retromolar space available is less than the mesiodistal width.

The main purpose of this study was to analyse whether there was any universal consensus on the prevalence and pattern of impaction. The reports of the present study reveal that there are variations between different racial and ethnic groups. This can be due to social, economic and genetic differences. The major limitation of this study is lack of randomisation as it is based on hospital records and it was done in only one region of Tamil Nadu. Further large randomised studies need to be conducted in different parts of the state of Tamil Nadu to evaluate the pattern of impaction in other regions of Tamil Nadu.

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