

EVALUATION OF ASSOCIATION BETWEEN IMPACTED TEETH AND TEMPOROMANDIBULAR JOINT DISORDERS

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ABSTRACT

Impaction of the third molars has been established as a factor with the potential to damage temporomandibular joints. Furthermore, the trauma resulting from the surgery of third molars has been reported to be a predisposing factor in the progression of temporomandibular joint disorders (TMD) symptoms. The high frequency of third molar surgery can result in an increased number of patients who suffer from chronic oral and facial pains. Thus, it is important to identify those patients who have pre-existing pain or any signs of dysfunction in their temporomandibular joints and masticatory structures, prior to third molar surgery. The aim of this study was to evaluate the association between impacted teeth and temporomandibular joint disorders. A retrospective study was conducted by reviewing the case records of patients who underwent treatment in Saveetha Dental College and Hospital from June 2019 - March 2020. The study population included 96 patients diagnosed with temporomandibular joint disorders and 98 patients without TMD. Thus the sample size included a total of 194 patients who were evaluated for the presence of impacted teeth. Data was collected and statistical analysis was performed. Microsoft Excel 2016 (Microsoft office 10) data spreadsheet was used to collect data and later exported to SPSS IBM (version 23.0). Descriptive statistics and chi square test were employed with a level of significance set at $p < 0.05$. The most prevalent age group among the patients was 21 - 30 years (34.39%), followed by 31 - 40 years (29.29%). 60.8% were male patients and 39.2% were females. TMD was predominantly present (29.38%) in patients with impacted teeth than in patients without impacted teeth (20.1%) and the results were statistically significant ($p = 0.003$). Within the limits of this study, there is a significant association between the presence of impacted teeth and temporomandibular joint disorders. Therefore, it is important to include an assessment of the temporomandibular apparatus in the pre-operative evaluation of patients with impacted third molars.

Keywords: Extraction; Impacted teeth; Oral surgery; Temporomandibular joint disorders; Third molar

INTRODUCTION

The temporomandibular joint (TMJ) plays an important role in the orientation of mandibular movements as well as balancing stresses due to daily activities like speech, mastication, and swallowing (Franco et al., 2016). Temporomandibular joint disorders (TMD) comprise disorders of the TMJ, the related muscles of mastication and the surrounding skeletal structures (Murphy et al., 2013). These disorders may be congenital, developmental, traumatic, inflammatory, neoplastic and infectious. Generally, temporomandibular disorders can be divided into intra-capsular and extracapsular (De Rossi et al., 2014).

TMD Symptoms include pain in masticatory muscles, trismus, pain in TMJ, and joint sounds. Some people experience the symptoms transiently that they even resolve without any treatment whereas others experience long-term symptoms. TMD affects the life of individuals due to the development of functional disorders (Clark, 1991), (Huang et al., 2002), (Christabel et al., 2016). Furthermore, its multifactorial etiology complicates TMD treatment and often necessitates multidisciplinary cooperation for resolving its symptoms adequately (Patil et al., 2017).

Various etiological factors such as parafunctional habits and undesirable psychological status such as stress and trauma have been suggested for the incidence of TMD (Packiri, Gurunathan and Selvarasu, 2017), (Mp, 2017), (Marimuthu et al., 2018), (Barbosa et al., 2016). Trauma incurred to the jaw plays a significant role in the incidence and acceleration of TMD process and those suffering from TMD usually mention a positive history of trauma to the head and neck associated with their TMD (Kamisaka et al., 2000), (Kumar and Sneha, 2016).

Impaction of the third molars has been established as a factor with the potential to damage TMJ (Kumar, 2017a). Impaction refers to the failure of the tooth to reach normal occlusal and functional position following completion of chronological age and two-thirds root formation (Oginni et al., 2002), (Bui, Seldin and Dodson, 2003). Impactions may occur due to various reasons. For example, the jaw may be too small and there may be insufficient space for the teeth to erupt (Jesudasan, Abdul Wahab and Muthu Sekhar, 2015). Teeth may also become twisted, tilted, or displaced as they try to emerge, resulting in impacted teeth. Impacted teeth may result in swelling, pain and infection of surrounding gum tissue (Patturaja and Pradeep, 2016). Also, impacted teeth may cause permanent damage to nearby teeth or lead to the formation of cysts or tumors that can destroy portions of the jaw. Therefore, it is often recommended that impacted teeth be promptly removed. (Jain et al., 2019), (Kumar and Rahman, 2017) There are several post-operative complications following third molar extractions, including alveolar osteitis, bleeding, infection, etc (Abhinav, Sweta and Ramesh, 2019), (Pedersen, 1985).

Furthermore, the trauma resulting from the surgery of third molars has been reported to be a predisposing factor in the progression of TMD symptoms (Rao and Santhosh Kumar, 2018). The reason is that the process of removing the third molars involves extensive mouth opening for a long time and exertion of considerable forces to the mandible (Abhinav et al., 2019). Each of these factors contributes to the development of muscular and articular pains due to the stretching muscles and ligaments, subluxation of the condyle, and disc dislocation (Kumar, 2017b). The high frequency of third molar surgery can result in an increased number of patients who suffer from chronic oral and facial pains (Pullinger and Seligman, 1987). Previous literature suggests that TMD symptoms are common in patients who were referred for wisdom tooth extraction (Threlfall et al., 2005). Thus, it is important to identify those patients who have pre-existing pain or any signs of dysfunction in their temporomandibular joints and masticatory structures, prior to third molar surgery (Huang and Rue, 2006).

The aim of this study was to evaluate the association between the presence of impacted teeth and occurrence of temporomandibular joint disorders.

MATERIALS AND METHODS

Study design and study setting

This retrospective study was conducted in Saveetha dental college and hospital, Saveetha university, Chennai, to evaluate the association between impacted teeth and temporomandibular joint disorders among dental patients reporting to the outpatient department of oral and maxillofacial surgery from June 2019 to March 2020. The study was initiated after approval from the institutional review board of the University (SDC/SIHEC/2020/DIASDATA/0619-0320).

Study population and sampling

Among 86000 dental patients reported to our institution from June 2019 to March 2020, about 194 cases were included in the study by a simple random sampling method to minimise sampling bias. These included 96 patients with temporomandibular disorder, and 98 patients without temporomandibular disorder. All missing or incomplete data, pediatric patients, physically challenged and medically compromised patients, completely edentulous patients and denture wearers were excluded from the study. Each patient's dental records, treatment reports and photographs were reviewed thoroughly. Cross verification of data for errors was done with the help of an external examiner.

Data collection and tabulation

A single calibrated examiner evaluated the digital case records of the patients collected from June 2019 to March 2020 who reported with and without TMJ disorders and reviewed for presence of impacted teeth. Information on the patients' name, age, gender, presence of impacted third molars and presence of TMD were collected from the patients' case records. Age of the patients were categorized for statistical convenience as 11-20, 21-30, 31-40, 41-50 and 51-60.

Statistical analysis

The collected data was validated, tabulated and analysed with Statistical Package for Social Sciences for Windows, version 23.0 (SPSS Inc., Chicago, IL, USA) and results were obtained. Descriptive analysis was done to assess the prevalence of TMD in different age groups and gender. Categorical variables were expressed in frequency and percentage; and continuous variables in mean and standard deviation. Chi-square test was used to test association between impacted teeth and TMD. P value < 0.05 was considered statistically significant.

RESULTS AND DISCUSSION

Our study consisted of a total of 194 patients, 96 patients diagnosed with temporomandibular joint disorders and 98 patients without temporomandibular joint disorders and were evaluated for the presence of impacted third molar teeth. The patients included in this study ranged from 18 to 65 years of age with a mean age of 30.25 and SD 10.477 years. The most prevalent age group among the patients was 21 - 30 years (34.39%), followed by 31 - 40 years (29.29%), 11 - 20 years (19.29%), 41 - 50 years (10.71%), 51 - 60 years (5.71%) and 61 - 70 years (0.71%) [Figure 1]. Thus the majority of patients in our study belonged to the age group of 21-30 years (34.39%), and 31-40 years (29.29%).

In our study there were 118 males (60.82%) and 76 females (39.18%). Thus the majority of patients in our study were males rather than females.[Figure 2]. In patients with impacted teeth 29.38% had TMD. In patients without impacted teeth 20.1% had TMD. Thus, TMD was predominantly present (29.38%) in patients with impacted teeth than in patients without impacted teeth (20.1%) and the results were statistically significant. [Pearson's chi square value - 9.076; df -1; p=0.003 (<0.05)]. Thus a statistically significant association was present between impacted teeth and temporomandibular disorders. [Figure 3, Table 1].

This retrospective study was based on residents of Chennai seeking treatment at Saveetha dental college, Chennai. Currently there are no existing studies investigating the association between impacted teeth and TMD in the South Indian population. The results of our study showed that 29.38% of patients with impacted teeth had TMD. This study aims to create an awareness about the presence of TMD especially in patients who are undergoing extraction of impacted third molars, so as to prevent serious postoperative complications.

According to our study, there was a significant association between impacted teeth and temporomandibular joint disorders. This has been well established in previous literature. The American Association of Oral and Maxillofacial Surgeons has stated that third molar removal may cause or exacerbate TMJ symptoms (White and American Association of Oral and Maxillofacial Surgeons House of Deletates, 2007). A study by Lindquist J.T et al, it was concluded that any dental intervention that alters the occlusion has the potential to alter the position of the mandibular condyle in the glenoid fossa and predispose to TMD symptoms (Lindquist, 1988).

Fushima K et al states that the incidence of TMD has been known to rise after 19 years of age (Fushima et al., 1989). It has been suggested by Winstanley RB et al, that this could be attributed to occlusal changes as a consequence of teeth exfoliation and eruption of permanent successors, or the eruption of third molars leading to overcrowded dental arches(Winstanley, 1986). Moses J.J et al, concluded that third molar removal surgery may require wide mouth opening and the application of relatively large forces to the posterior mandible which could lead to TMD. It was also reported that traumatic arthritis may occur after third molar removal although the occurrence is rare(Moses, Lange and Arredondo, 1998).

In a study by DeAngelis et al, of the total number of patients examined, 13.3% showed signs and symptoms of temporomandibular joint pain and dysfunction while a further 23.3% also had symptomatic third molar teeth. Thus it was concluded that the signs of temporomandibular joint disorders are common in patients referred for third molar extractions (DeAngelis, Chambers and Hall, 2009). This is similar to a study by Karamshahi et al, which proved that the surgical trauma resulting from the removal of the third molars is a predisposing factor for developing TMD (Karamshahi et al., 2019). Momin et al. stated that several risk factors are related directly with the precipitation of adverse effects after surgical removal of third molars. These factors include depth, site of impaction, use of surgical tools, and experience level of the operator, which is correlated directly with the development of negative outcomes following third molar extractions (Momin et al., 2018).

It was observed that patients who suffer from temporomandibular joint disorders develop more severe complications after third molar surgery. Elgazzar et al, indicated that extracting the third molars results in increased risk of TMJ disk dislocation (Elgazzar and Ward, 2018). A study by Akhter R et al, investigated the relationship between TMD and surgery of third molars and indicated that the experience of third molar removal is associated with the joint click and limited opening of the mouth (Akhter et al., 2008).

Furthermore, in a cross-sectional study by Grossi B et al, a relationship was observed between TMD symptoms and a history of third molar extraction (Grossi et al., 2007). However, in a prospective study by Huang GJ et al, no difference was found between the clicking sound in patients with TMD before and after third molar surgery (Huang et al., 2014). When compared with untreated controls, subjects undergoing third molar surgery have a statistically insignificant increased incidence of TMD 6 months post-operatively in a study by Juhl et al (Juhl et al., 2009). Our study results were in accordance with the previous literature. Hence the overall consensus was in agreement with the results of our study.

The results of this study have to be interpreted with the geographic limitation of the study population and the sample size selected. Hence it cannot be generalized to other adult populations of geographic and cultural variation.

This study aids in establishing a significant association between the presence of impacted teeth in patients with temporomandibular joint disorders. Future scope includes conducting further prospective studies over a large scale population as a multi centered study.

CONCLUSION

Within the limits of this study, there is a significant association between the presence of impacted teeth and temporomandibular joint disorders. Therefore, it is important to include an assessment of the temporomandibular apparatus in the pre-operative evaluation of patients with impacted third molars.

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AUTHORS CONTRIBUTION

S.K. contributed to the study conception and design, data collection, analysis and interpretation and drafted the work. T.A. contributed to data interpretation, study design and data collection. A.B. contributed to study conception, design and data collection. All authors critically reviewed the manuscript and approved the final version.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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GRAPHS

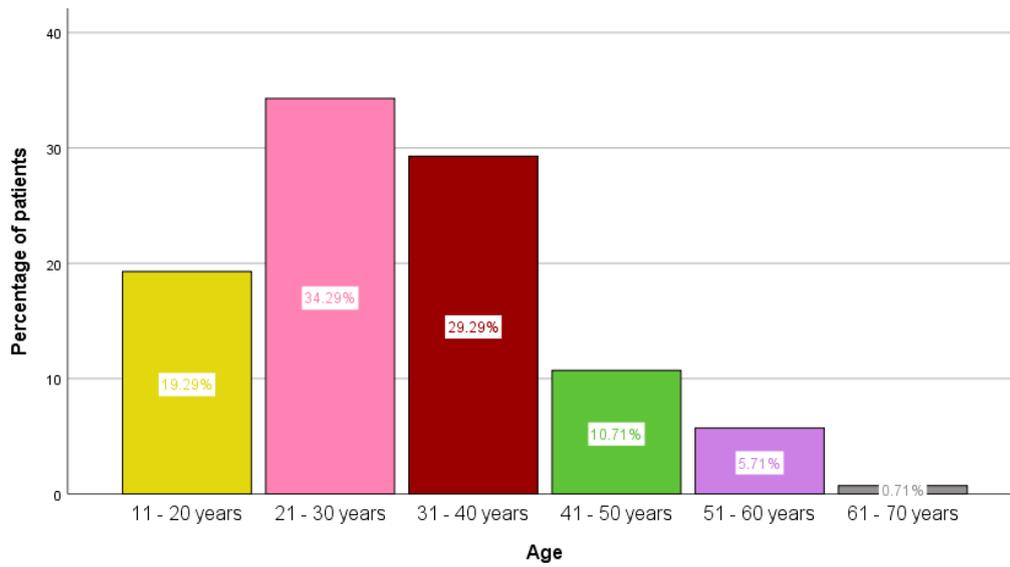


Figure 1. Bar graph depicting the age wise distribution of the study population. X axis represents the age category and Y axis represents the percentage of patients included in this study. Majority of patients in our study belong to the age group of 21-30 years (34.39%), and 31-40 years (29.29%).

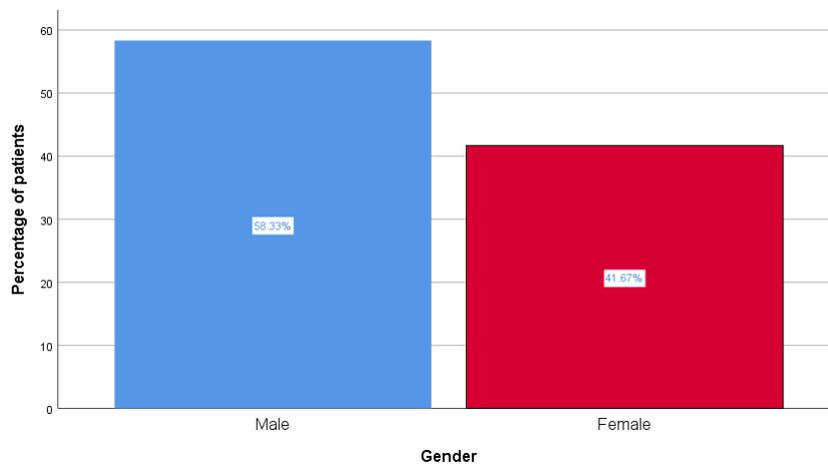


Figure 2. Bar graph depicting the gender wise distribution of the study population. X axis represents the gender and Y axis represents the percentage of patients included in this study. Majority of patients in our study were males 118 (60.82%) than females 76 (39.18%).

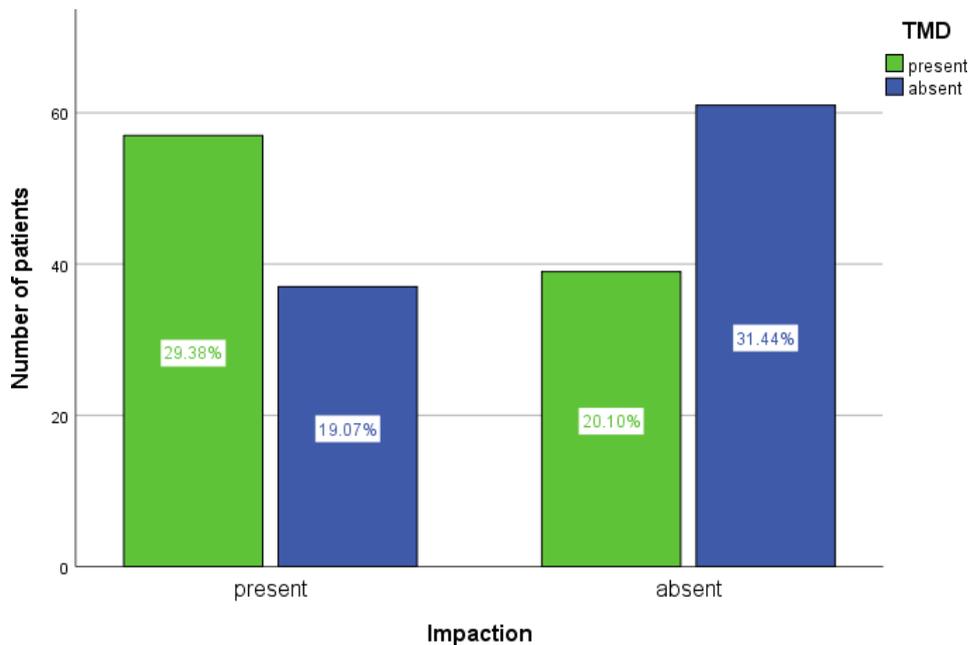


Figure 3. Bar graph depicting association between impacted teeth and temporomandibular joint disorders. X axis represents presence or absence of impacted teeth and Y axis represents the number of patients with and without TMD. TMD was predominantly present (29.38%) in patients with impacted teeth than in patients without impacted teeth (20.1%). Chi square test was done and it was found that the results were statistically significant. [Pearson's chi square value - 9.076; df -1; p=0.003 (<0.05)]. Thus a statistically significant association was present between impacted teeth and temporomandibular disorders.

Impaction	Temporomandibular disorder		Statistical analysis		
	Present	Absent	Pearson chi square value	dF	P - value
Present	57	37	9.076	1	0.003
Absent	39	61			

Table 1 : Table shows the association between impacted teeth and temporomandibular joint disorders. Majority of the patients with TMD had impacted teeth (57 patients) and the results are statistically significant. Pearson's chi square value - 9.076; df -1; p=0.003 (<0.05).