

# Awareness among Dental Students about the Increased Risk of Developing TMJ Disorders after Surgical Removal of Impacted All Four Third Molars

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**Abstract:** Third molars, the most commonly impacted tooth are managed by surgical removal which may have various post-operative complications like pain, swelling, edema etc. Sometimes, temporomandibular joint disorder (TMD) may also occur. **Aim:** To evaluate awareness among dental students about the risk of developing TMD post-surgical removal of all four impacted third molars by having them fill out a set of 25 questions. **Materials and Methods:** The questionnaire was distributed as Google forms through WhatsApp and email for BDS interns at various dental colleges in and around Chennai. Their responses were collected, analyzed and the results were tabulated. **Result:** The overall knowledge of dental students on TMD and their risk factors was found to be 70.22%. More than 80% of dental students were aware of the term "impacted tooth" and definition of TMJ disorders. Only 55.02% positively supported TMJ disorders practice questions.

**Keywords:** Third molar impaction, Temporomandibular joint (TMJ), Temporomandibular joint disorder (TMD), surgical removal of impacted third molars.

## 1. Introduction

Third molars are the most commonly impacted tooth [1]-[3] and [3]. The term impaction as defined by Archer [4] is a tooth that is partially or completely unerupted and is positioned against another tooth or bone or soft tissue so that its further eruption is unlikely, described according to its anatomic position.

The mandibular third molar impaction is due to inadequate space in the retromolar area, measured on cephalometric profile x-ray films as the distance between the distal surface of the second molar and the anterior edge of the ramus, on a level with the occlusal line of the mandibular dental arch [5], [6].

Surgical removal of impacted third molars, one of the most common procedures performed today is also associated with postoperative complications like pain, swelling, ecchymosis, trismus, infection, hematoma, damage to the inferior alveolar or lingual nerves, and fracture of the mandible. Temporomandibular joint disorder can also occur after the

surgical removal of impacted third molars [2].

Contemporary surgery aims to reduce complications through a variety of modalities which include analgesics and corticosteroids, antibiotics, flap designs, sutures, drains, and additional therapies such as ozone, cryotherapy, platelet-rich plasma (PRP), platelet-rich fibrin (PRF), piezoelectric surgery, and lasers [2].

The term TMD refers to a group of conditions involving the orofacial region divided into those affecting the masticatory muscles and those affecting the temporomandibular joint (TMJ) [7]. Due to the complexity of the etiology, the diagnosis and management of TMD remain a challenge where consensus is still lacking in many aspects [8].

The main symptoms include temporomandibular sounds, tenderness or pain in the masticatory muscles, temporomandibular joint pain, impaired mobility of the mandible, and an irregular path of movement of the mandible. Headache and facial pain also are often described as being connected with functional disturbances of the masticatory system. Many of these symptoms are mentioned as indicators for the removal of impacted mandibular third molars. Apart from clinical examination which is considered the most important process in the diagnosis of TMD, imaging may serve as a valuable adjunct in selected cases.

Depending on the type of TMD, many treatment modalities have been proposed, ranging from conservative options to open surgical procedures. The three major points of view are that it is largely of muscular origin, it is a complex psychophysiological phenomenon, and it is due to disturbed occlusal mechanics [8].

The relationship between third molar removal and TMD is not discussed often. It also has the least supporting works of literature. This relationship is said to arise as the patient is expected to keep their mouth open wide for a long time along with experiencing the variable amount of forces on the mandible, ultimately causing the patient to increase their risk of

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developing overload or even damage to one or both TMJ [9].

The role of occlusion in the development of TMD is not clear, but it has been pointed out on many occasions that occlusal Interferences, emotional disturbances, general musculoskeletal disorders, and impaired state of health, play an important role in the etiology of TMD symptoms. It has been suggested empirically that non-erupted mandibular third molars can provoke signs and symptoms of TMD [10].

The present study mainly aims in evaluating the awareness among dental students about the increased risk of developing TMD in patient's post-surgical extraction of all four impacted third molars

## 2. Materials and Methods

The study proposal was approved by the institutional ethical committee, Tagore Dental College and Hospital with the ethical code number 01022302. Voluntary informed consent was obtained from each participant. The study was done by circulating a set of 25 questions formulated in KAP (Knowledge, Attitude, and Practice) format to analyze the awareness among dental students about the increased risk of developing TMD after surgical removal of impacted all four third molars and randomly distributed to BDS interns studying at dental colleges in and around Chennai through Google forms. Their responses were collected, tabulated, and analyzed statistically using SPSS software version 27.0. A descriptive statistical analysis was carried out.

Study design: Cross-Sectional Study

Study Area: Dental colleges in and around Chennai.

Sample Size: 384

Study period: 6 months

**Inclusion Criteria:** Includes BDS Interns in various dental colleges in and around Chennai.

**Exclusion Criteria:** Includes First year, second year, third year and final year students pursuing BDS in various dental colleges in and around Chennai.

## 3. Results and Discussion

Third molars, also called as Wisdom teeth, present in the majority of individuals, are known to erupt between the ages of 18 to 24 years, at any point of the said time period, in Asian population. Impacted wisdom teeth are those third molars that do not normally erupt into their functional position in the oral cavity.

Lack of space for eruption, blockage in their eruption pathway, improper location of toothbud are often said to cause wisdom teeth to be partially or totally buried. Such impacted teeth are mostly asymptomatic and accidentally discovered in radiographs taken for routine dental examinations or cause mild to severe pain, discomfort or sometimes swelling and are diagnosed through physical examination with probing or direct visualization [11].

Table 1 and Fig. 2 represent the Knowledge of Dental students on TMD and its risk factors.

According to Table 1 and Fig. 2, the interns were found to have clear knowledge of the term impacted tooth than their knowledge on term TMD. The students seemed to have least knowledge on third molar impaction types and risk factors for TMJ disorders.

From Table 1 and Fig. 2, the overall knowledge of dental students on TMJ disorders and its risk factors was found to be 70.22%. The results show that dental students were more aware of the term "impacted tooth" with 85.6% correct responses. Similarly, a significant number of students (80.6%) demonstrated improved knowledge on the definition of TMJ disorders.

However, they require additional training and education in certain areas as indicated by the lowest percentages of correct responses. Specifically, only 58.1% of dental students answered correctly about third molar impaction types, and 59.1% had accurate knowledge about TMD risk factors.

Table 2 and Fig. 3 analyses the attitude of Dental students on temporomandibular joint disorders and its risk factors.

From Table 2 and Fig. 3, it was found that only 57.72% of Dental students showed positive attitude towards the actual facts of TMD. This implies that more comprehensive training and education is required on the topic- TMJ disorders, risk factors and its effect on oral and overall well-being of the individual.

According to the Table 2 and Fig. 3, the students showed positive attitude towards the points like possibility of TMD affecting the normal occlusion, causing significant damage to overall and oral health of the individual; the concept that factors other than impaction of third molars also have a role in increasing the risk of developing TMD. They had negative attitude towards the possibility for TMD to develop after third molar removal and degree of root developed during removal of

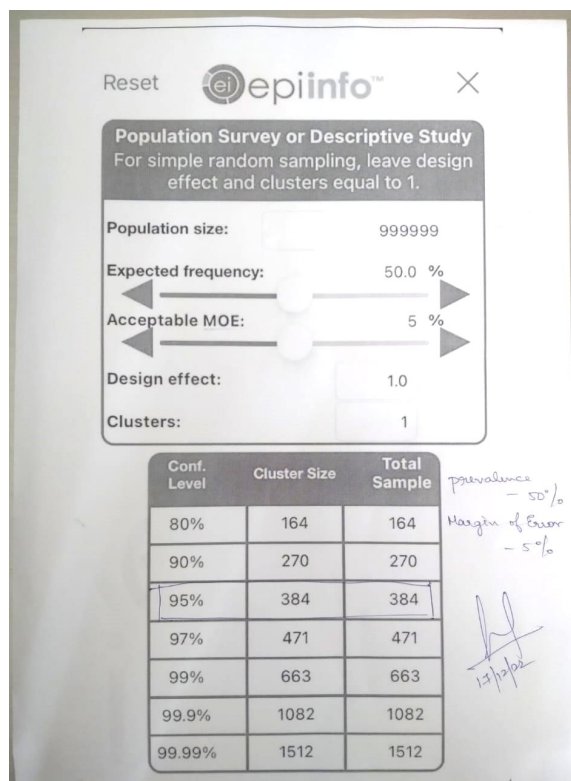


Fig. 1.

Table 1  
Knowledge of dental students on temporomandibular joint disorders and its risk factors

Knowledge questions	Correct response		Incorrect response	
	N	%	N	%
1. Knowledge on the term impacted tooth	345	85.6	58	14.4
2. Knowledge on abbreviation of the term 'TMD'	273	67.7	130	32.3
3. Knowledge on definition of TMJ disorder	325	80.6	78	19.4
4. Knowledge on third molar impaction types	234	58.1	169	41.9
5. Knowledge on risk factors for TMJ Disorders	238	59.1	165	40.9

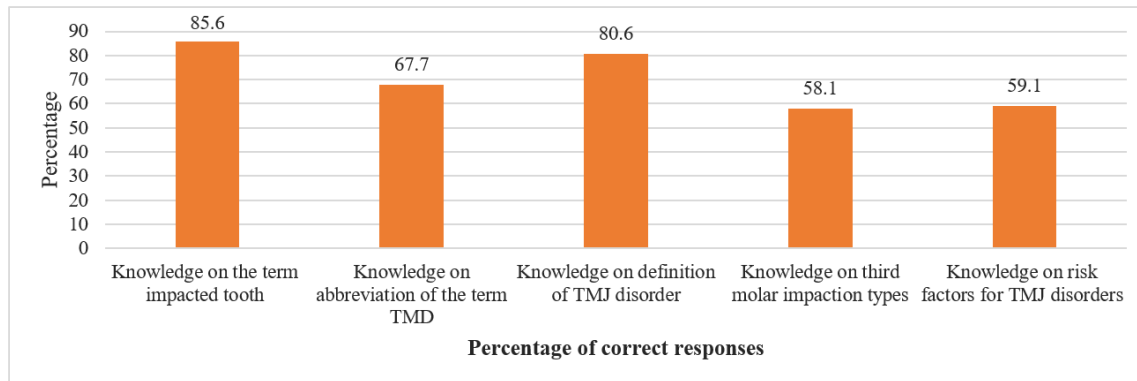


Fig. 2. Knowledge of dental students on temporomandibular joint disorder and its risk factor

Table 2  
Attitude of dental students on temporomandibular joint disorders and its risk factors

Attitude questions	Yes N (%)	No N (%)	May be N (%)
TMJ disorder affects normal occlusion	257 (63.8)	42 (10.4)	104 (25.8)
There are other factors apart from impaction that increase the risk of developing TMJ disorders	260 (64.5)	68 (16.9)	75 (18.6)
TMJ health significantly affects the oral and overall health of the individual.	253 (62.8)	56 (13.9)	94 (23.3)
There is a possibility for TMJ disorders to develop, after the removal of third molars.	189 (46.9)	95 (23.6)	119 (29.5)
The degree of root developed during the removal of third molar affects the patient's risk of developing TMD.	204 (50.6)	80 (19.9)	119 (29.5)

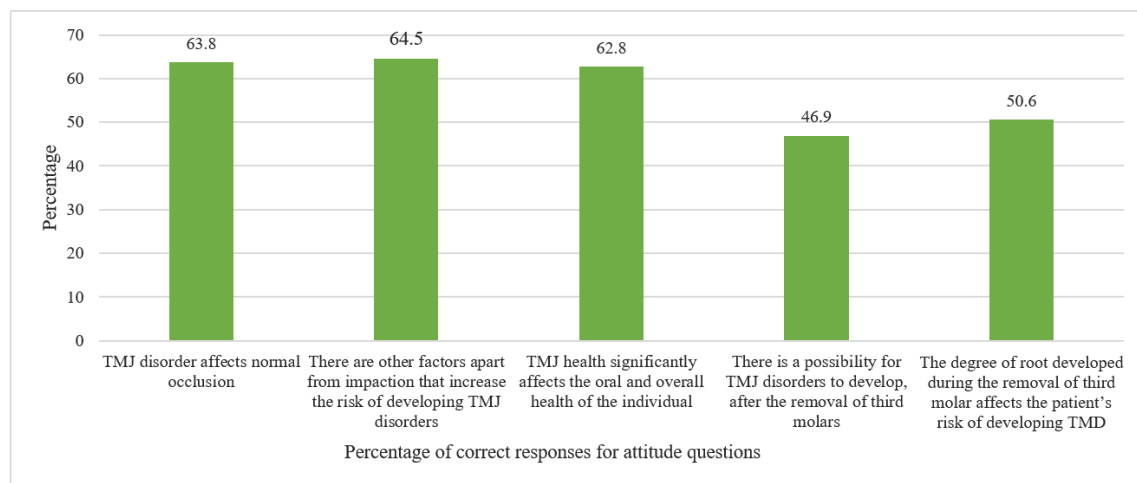


Fig. 3. Attitude of dental students on temporomandibular joint disorders and its risk factors

impacted third molar to be an influencing factor on possibility of developing TMD after third molar impaction removal.

Table 3 and Fig. 4 analyses the awareness on practical aspect of dental interns dealing with TMJ Disorders and its risk factors.

From the Table 3 and Fig. 4, it was found that only 55.02% showed positive responses to TMJ disorders practice questions. This suggests that a significant portion of Dental students did not demonstrate a good understanding of TMJ disorders.

However, 55.02% Dental students showed better understanding on the risk factors of TMJ disorders such as patients with psychological disorder (82.9%), lack of

mandibular support during third molar extraction (80.4%) and angle of 3rd molar impaction (79.4).

The interns were well aware of factors like the angle of impaction of third molar affecting the risk of developing TMD after their surgical removal; prolonged mouth opening during third molar removal increases the risk of developing TMD, lack of support to mandible during removal of third molar increasing the risk of TMD.

They were also aware of the facts like TMD patients of muscle origin can benefit from massage therapy, younger patients have lower risk of developing TMD after third molar impaction than older patients, patients with psychological

Table 3  
Practice of dental students on temporomandibular joint disorders and its risk factors

Practice Question	Options	Frequency (N)	Percentage (%)
Which classification is best used in treatment planning for treating impacted tooth?	Based on the nature of overlying tissue	89	22.1
	Pell – Gregory’s classification	85	21.1
	Winter’s classification	57	14.1
	All the above	172	42.7
The angle of impaction of a third molar, affects the patient’s risk of developing TMD after their removal	Yes	320	79.4
	No	83	20.6
Which type of impacted third molar is most likely to cause TMJ disorders after its removal than the others?	Vertical impaction	82	20.3
	Horizontal impaction	136	33.7
	Mesioangular impaction	79	19.6
	Distoangular impaction	106	26.3
Bell’s classification of TMD includes:	Masticatory muscle disorders	67	16.6
	Temporomandibular joint disorders	85	21.1
	Chronic mandibular hypomobility	46	11.4
	Growth disorders	27	6.7
Name the index used to assess the degree of TMD.	All of the above	178	44.2
	Helkimo index	138	34.2
	Fedorova’s and volodkin’s index	147	36.5
	Green’s – vermillon’s index	118	29.3
What surgical procedures are done to remove an impacted third molar?	Odontectomy	81	20.1
	Lateral trephination technique	92	22.8
	Lingual split technique	63	15.6
	All the above	167	41.4
Which among the following are used for radiologic interpretation of third molar impaction during treatment planning?	George winter’s war lines	107	26.6
	Wharfe’s assessment	77	19.1
	Pederson scale	59	14.6
	All of the above	160	39.7
Younger patients have lower risk of developing post-operative TMJ Disorder	Yes	289	71.7
	No	114	28.3
Use of mouth prop during the removal of impacted third molar, decreases the risk of post-operative TMD.	Yes	195	48.4
	No	97	24.1
	Maybe	111	27.5
Prolonged mouth opening during third molar removal increases the risk of developing TMD.	Yes	216	53.6
	No	75	18.6
	Maybe	112	27.8
Lack of support to the mandible while removing mandibular third molar increases the risk of TMJ disorders.	Yes	324	80.4
	No	79	19.6
Name some medical complications that can possibly increase the risk of the patient developing TMJ disorders after removal of third molars.	Arthritis	102	25.3
	TMJ disorders	41	10.2
	Malocclusion	35	8.7
	Trauma	34	8.4
	Trismus	32	7.9
	Infection	27	6.7
	MPDS	22	5.5
	Dry socket	22	5.5
	Fracture	14	3.5
	Impaction	13	3.2
	TMJ dislocation	12	3.0
TMJ disorders patients, whose pain is of muscle origin, are more likely to benefit from massage therapy	True	317	78.7
	False	86	21.3
The most effective pharmacologic agents for the management of TMJ disorders include:	Analgesics	77	19.1
	Nonsteroidal anti-inflammatory drugs (NSAID)	99	24.6
	Corticosteroids	39	9.7
	All the above	188	46.7
Patients with psychological problems are more prone to develop TMJ disorders than patients with other medical complications.	True	334	82.9
	False	69	17.1

problems are more prone to develop TMD than patients with other medical complications.

They were least aware on topics like best used classification in treatment planning for treating impacted tooth, which type of impacted molar is most likely to cause TMD after their removal, what is Bell’s classification of TMD, the indexes used to assess the degree of TMD, surgical procedures done to remove impacted third molar, use of mouth prop to reduce the risk of developing TMD after third molar impaction, the most effective

pharmacologic agents for the management of TMD etc.

A significant proportion of all oral surgical operations include the preventative excision of asymptomatic unerupted or impacted third molars. Patients are advised to have this prophylactic surgery since such teeth are prone to induce specific pathologic lesions if left in place [12].

Temporomandibular disorders (TMD) refers to a group of conditions involving the orofacial region divided into those affecting the masticatory muscles and those affecting the

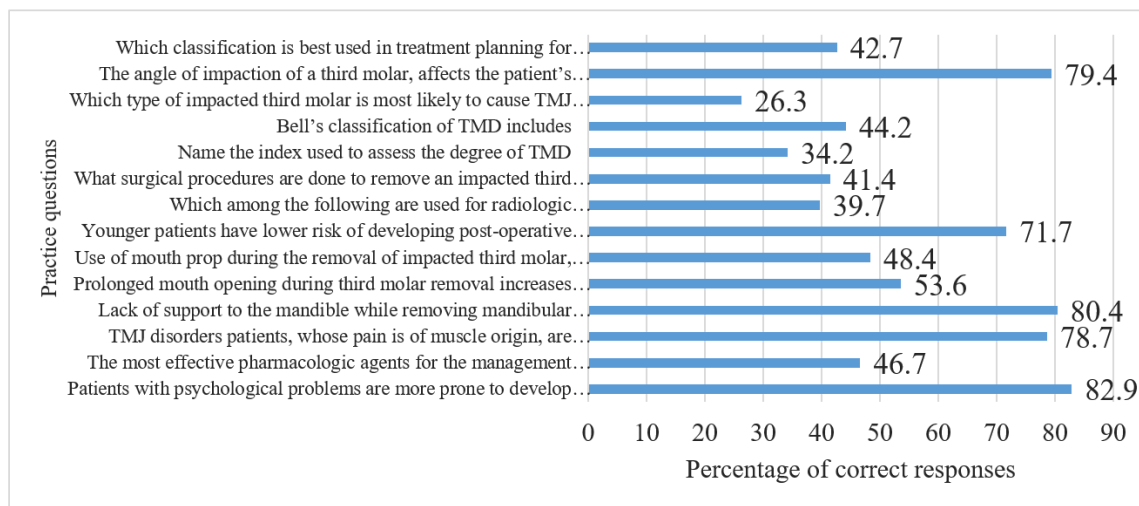


Fig. 4. Practice of dental students on temporomandibular joint disorders and its risk factors

temporomandibular joint (TMJ) [1]. Their multifactorial etiology makes the diagnosis and management of TMD, a challenge for many clinicians.

Previous study done by AF DeAngelis *et al.* [13] suggests that the signs of temporomandibular joint disorders are common in patients referred for third molar extractions. This study also highlights the importance of including an assessment of the temporomandibular apparatus in the pre-operative evaluation of patients with impacted third molars.

Similar study done previously by Raustia *et al.* [14] concluded that risks of complications of surgical removal of impacted third molars increases with age and encourages examining the correlation between the difficulty of surgery and degree of impaction of the third molar with the changes of signs and symptoms of TMD on a larger material.

A study done by Huang *et al.* [15] found the risk for patient to develop TMD to be elevated during the first year after third molar removal. In this study, analysis of the data suggested a relationship between severity of impaction and TMD even when the extraction parameters and subsequent risk for TMD in univariate or multivariate analyses were not significantly related.

A systemic review conducted by Yohana Sandy Souza Damasceno & Daybelis González Espinosa & David Normando [16] concludes the third molar extraction to be related with the development of TMD signs and symptoms and that TMD can be aggravated depending on the third molar's location, the degree of impaction and surgical difficulty, age, and gender of the patient.

This systematic review also highlights the need to perform randomized clinical trials with diagnostic criteria and standardized surgical procedures.

A study conducted by Palinkas M. *et al.* [17] shows the traumatic removal of the mandibular third molar promotes post-surgical consequences such as orofacial pain and limited mandibular movements. It also suggests that TMD can be treated using anterior occlusal splints, splints with posterior occlusal support, occlusal adjustment, and removable therapeutic partial prostheses.

Therapeutic support regimens in the areas of psychology,

NSAID (local drug delivery system and oral route of drug administration), physical therapy (exercises) and physiotherapy can also be associated, depending on the needs of each patient.

A prospective cohort study performed by Mirmohamad sadeghi H. *et al.* [18] after comparing the frequency of joint click, severity of TMJ pain using VAS (Visual Analog Scale) and maximum mouth opening (MMO) on intervals of day before the third molar surgery and 1 week, 1 month and 6 months after surgery using clinical examinations and Research Diagnostic Criteria for TMD questionnaire in both patients with symptoms of TMD prior to third molar surgery and in patients without the symptoms of TMD prior the same, reported reduction in MMO and increase in VAS score in patients with TMD were evident compared to patients without TMD. The surgical trauma from the removal of the third molars was seen to be a predisposing factor for developing TMD.

A study by Akhter R. *et al.* [19] done on investigating the relationship between TMD and surgery of third molars also indicated that the experience of third molars removal is associated with the TMJ clicking and limited opening of the mouth.

In a cross-sectional study done by Barbosa C. *et al.* [20], a relationship was observed between TMD symptoms and a history of third molar extraction.

The present study analyses the awareness among dental students specifically interns on the concepts of third molar impaction, their treatment methodologies, TMD and the possibility of patients subjected to develop TMD as a post-operative complication of surgical removal of third molar.

The study provides an insight on the interns being aware about the terms impaction and TMD but lack a deeper understanding about the ways to treat them and the relationship between surgical removal of impacted third molar and TMD arising as its postoperative complication.

The interns also had necessary awareness on TMJ anatomy and its influence on oral and overall health of the individuals. This study states the need to educate the dental students on TMD and its relationship with removal of impacted third molar which leads to better understanding of the concepts of impaction and TMD.

The findings suggest that targeted educational interventions and additional training in TMJ disorders for dental students could be beneficial to improve their knowledge and ability to diagnose and manage TMD effectively.

Continuing education programs and workshops could also help bridge the gap and enhance understanding among all participants.

#### 4. Conclusion

Awareness among dental students about the increased risk of developing TMD after surgical removal of all four third molars was found to be less, though the students had a clear understanding of impaction and TMJ anatomy. This study shows the need to conduct more CDE programs to increase the awareness among students on the said topic and aid in better understanding of the issue.

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