

A Prospective Study on Response to Treatment of Patients with Temporomandibular Dysfunction: A Clinical Study

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Abstract

Temporomandibular joint disorders (TMD) affect a big proportion of the population. It is multifactorial in origin. The clarification of its associated factors is crucial. Early determination of TMD accompanied with suitable treatment may give good response. The aim of this study is to identify the relationship between demographic parameters, signs and symptoms, diagnosis, detection and treatment with review outcomes.

Study sample consists of 71 patients attended Oral Medicine and Oral Pathology clinic. Demographic parameters (age, gender, and profession) were recorded. TMD staging was done based on Wilkes system. Treatment including self-education, occlusal splint, and medication were proposed to patients based on their signs and symptoms. Prosthetic rehabilitation was indicated for free-end extension ridge. Treatment outcomes measure recommended by the International Association of Oral and Maxillofacial Surgeons (IAOMS) was used.

Age shows significant relationship with the signs and symptoms of TMD ($p < 0.05$). Association between signs and symptoms, diagnosis and stage of detection with the given treatment ($p < 0.05$) was acquired. Significant correlation existed between signs and symptoms before and after treatment ($r = - 0.452$). The stage of detection exhibited significant relationship with review outcome. It was worth noted that the outcome during review visit depended on the treatment given according to the signs and symptoms, which were influenced by demographic parameters ($p < 0.05$).

This study had successfully manifested the relationship between demographic parameters, the signs and symptoms complained by TMD patients, the diagnosis, the detection, treatment proposed with findings during review.

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Introduction

Temporomandibular disorders (TMDs) is a collective term that defines a subgroup of painful orofacial disorders, involving pain in the temporomandibular joint (TMJ) region, fatigue of masticatory muscles, limitation of mandible

movement, and the present of articular clicking.¹

Population-based studies show that TMD affects 10% to 15% of adults, but only 5% seek treatments. The disorders consist of multifactorial in origin and vary in etiologies, thus associated factors need to be evaluated and clarified.² Patients complaining of symptoms associated with TMD should be assessed properly including the staging of the disorder.³ The goals of treatment for TMD are to decrease pain, reduce adverse loading, restore normal function, and resumption of normal daily activities.⁴ Because the signs and symptoms of TMD can be transient and self-limiting, simple and reversible

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treatments have to be preferred over complicated and irreversible procedures.⁵

Recently, an increasing number of studies regarded TMD as a chronic disease, difficult to diagnose or predict a prognosis.⁶ Late detection of TMD may cause poor prognosis of the condition as it progress into more severe joint problems.⁷ The evaluations of affected patients including the stage of TMD are crucial in determining the clinical management of signs and symptoms and it is directly related to the effectiveness of the rehabilitation process.⁸

Thus, considering the context, this study focused on the relationship of demographic factor, signs and symptoms, diagnosis, detection of TMD, treatments done to TMD patients who came to IIUM Dental Polyclinic and the after effect of the treatment modalities.

Materials and methods

IREC approval gained on 2nd March 2016 with ID number IREC 557. Data collection was then carried out after the approval, starting from March 2016 to September 2016. Based on the record obtained from IIUM dental polyclinic, the total number of patients registered during this time interval was 3578. Out of this number, 71 TMD patients from Oral Medicine and Oral Pathology (OMOP) clinic were selected as sample study. Primary quantitative data was collected through purposive sampling. Patients need to be medically fit and healthy in order to be selected. This study excluded patients with systemic diseases, patients with bone pathology, patients with hormonal disturbances, and patient with partially erupted tooth/teeth with history of pericoronitis. Patients received a full disclosure of the nature of the study with an extended opportunity to ask questions. They were ensured to participate in this study voluntarily and informed consents were obtained from them. The confidentiality and anonymity of research participants were respected. Any possible harm was best avoided.

To address our research purposes, a prospective study was implemented by monitoring the conditions of patients, starting from their first visit, for examination and diagnosis, where the demographic parameters: age, gender, and profession; were recorded, up to follow up visit where the outcomes of treatment modalities were assessed. Patients

with TMD came to the IIUM Dental Polyclinic with several signs and symptoms, stated in Figure 2.

Diagnosis, mainly disk derangement, bruxism, and myalgia, made based on the complaints of patients who came to IIUM Dental Polyclinic, while, detection of the TMD referred on Wilkes system

- I. Early
- II. Early/intermediate
- III. Intermediate
- IV. IntemediateLate
- V. Late

Treatment plans included in this study were subdivided into several categories to aid the data analysis.

1. Treatment 1, Self-care instructions, medication, mouth guard, and review.
2. Treatment 2, Self-care instructions, review.
3. Treatment 3, Self-care instructions, mouth guard, and review
4. Treatment 4, Self-care instructions, medication, and review.
5. Treatment 5, Self-care instructions and Prosthetic rehabilitation.

Follow up appointment was set 3-4 weeks after treatment had commenced. Assessment of the treatment outcomes was guided by the treatment outcome measures by International Association of Oral and Maxillofacial Surgeons (IAOMS)

1. Pain absent or so mild that it does not concern the patient; pain is significantly reduced in intensity and frequency
2. Mandibular range of motion of at least 35 mm inter-incisal and 6 mm lateral and protrusive
3. Absence or reduction of TMJ sound
4. Regular diet that, at worst avoids hard foods- patient minimally inconvenienced by diet
5. Return of normal imaging appearance of the TMJ, or stabilization of the degenerative changes noted in the imaging studies
6. Absence of significant complications
7. Absence of symptoms for at least 2 years

Case sheet consisting of information regarding the demographic parameters, signs and symptoms, diagnosis, treatments, prognosis and follow up part was used for data collection

(Appendix A). Data were also recorded in patients' own folders and in electronic PearlSuitev2 0.1.1.0 software, which was provided in the clinic desktop for clinical purpose. Panoramic radiograph (OPG) via Planmeca Romexis 2.8.0 was used as a part of investigation in order to achieve the diagnosis.

When the clinical presentation suggests a progressive pathologic condition of the TMJ, imaging should be part of the assessment. Example of patient's records as in folders (Appendix B) and patients records using PearlSuitev2 version 0.1.1.0 software (Appendix C) were attached in the appendices.

The data were analyzed using IBM Statistical Package for Social Science (IBM SPSSv23; SPSS Inc.) version 23. Statistical methods used were multiple regression method, mediational approach and moderator approach. Pearson correlation coefficient value was used to analyze the correlation among variables, while Anova test based on 'F' distribution was used to analyze mediational approach and moderator approach. Tables and pie charts were constructed based on the results.

The aim of this research is to study demographic parameters, signs and symptoms and treatment modalities of TMD.

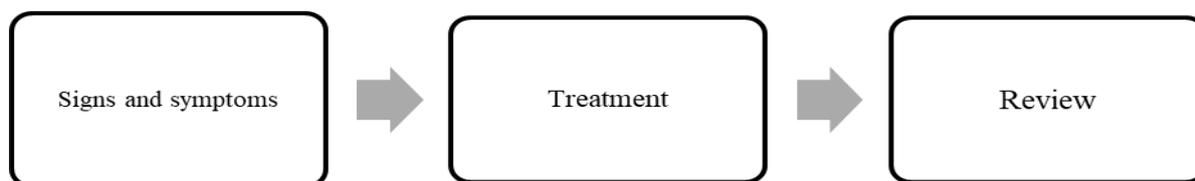


Figure 1. Theoretical framework for this study.

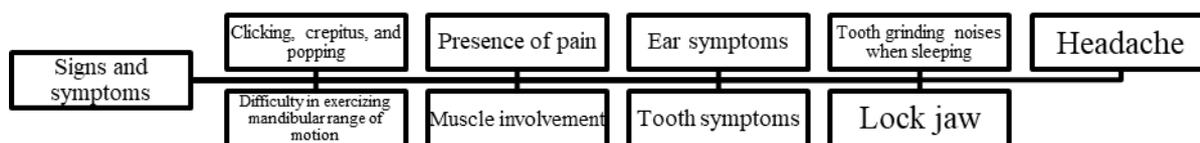


Figure 2. Signs and symptoms of patients with TMD.

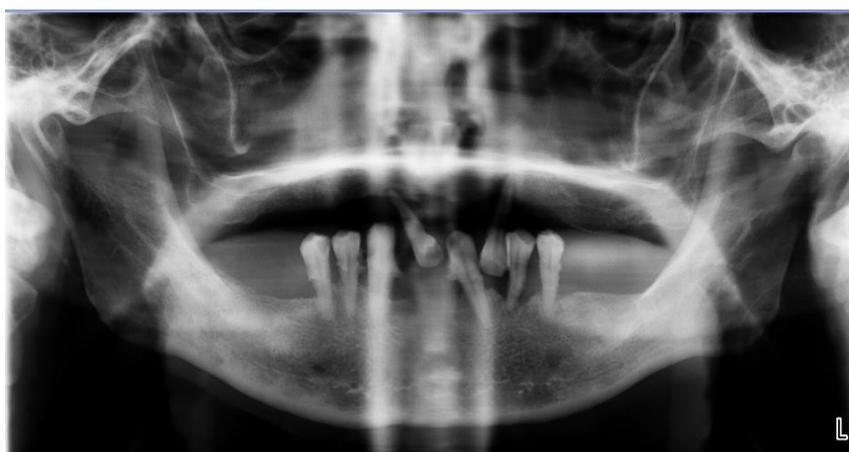


Figure 3. Oral pantomogram of patient with history of close lock.

Results

Of 71 TMD patients attending KOD polyclinic, 20 of them are male (28.2%) and 51 are female (71.8%). The age range was between 14 years old to 70 years old. Patients were grouped into

'student' and 'non-student' with 42 (59.2%) and 29 (40.8%) respectively.

The correlation between each demographic parameter and the appearance of signs and symptoms of TMD was assessed. Among received complained of signs and symptoms

were composed into bar chart illustrated in Figure 5. It can be seen that clicking, crepitus and popping dominated the signs and symptoms (23 patients). Ear symptoms (1 patient) and tooth grinding (1 patient) make up the smallest proportion of the complaint.

Result obtained shows that only age shows significant relationship with the appearance of signs and symptoms of TMD ($p < 0.05$), while gender and profession do not contribute to the condition ($p > 0.05$). Hence, the hypothesis of 'there is relationship between demographic factor and the appearance of signs and symptoms of TMD is accepted.

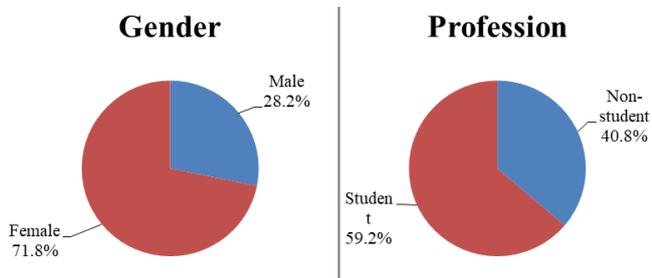


Figure 4. Pie charts on gender and profession percentages.

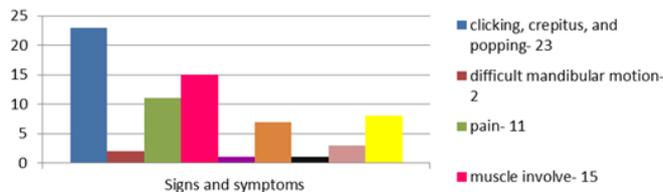


Figure 5. Bar graph showing the distribution of signs and symptoms of TMD patients.

The relationship between signs and symptoms, diagnosis and the stage of TMD detection with the treatment modalities was also evaluated. Table 1 and table 2 summarize the diagnosis and the stage of detection together with their frequency. ADD contributed to majority of diagnosis while PDD was the least diagnosed condition.

The bulk of patients were diagnosed in early stage of detection. However, there was none of patients diagnosed with late stage of detection.

Diagnosis	Treatment	Patient
Anterior disk displacement (ADD) - anterior misalignment or displacement of the articular disk above the condyle	1	3
	2	30
	3	5
	4	5
	5	1
Posterior disk displacement (PDD) - posterior misalignment or displacement of the articular disk above the condyle	2	3
	4	1
	5	1
Myalgia -pain in the masticatory muscles	1	1
	2	4
	3	2
	4	4
Bruxism excessive teeth grinding or clenching jaw	3	11

Table 1. The overall treatment gave based on the diagnosis

Treatment	No of patients receiving treatment
1	4
2	36
3	18
4	11
5	2

Table 2. The summary of treatment modalities received by the patients.

Based on table 2, patients with ADD receive various treatments according to their signs and symptoms, but majority of them were only advised for self – care instruction and called for review. The treatment for PDD and myalgia also vary accordingly. On the other hand, in this study all patients with bruxism receive similar treatment consisting of self – care instruction, occlusal appliance and review.

Result gained displayed a significant relationship between the signs and symptoms, the diagnosis and the stage of detection with the given treatment ($p < 0.05$). This denotes that for

any treatment to be conducted, it needs to depend on the presenting signs and symptoms, the diagnosis of the condition, as well as the stage of TMD detection.

Apart from the difference between complained signs and symptoms during first and review visit. The relationship was tested with mediational approach through direct and indirect effect of data analysis. Using direct effect, the initial signs and symptoms were directly compared with the outcome during review visit.

For the direct effect data analysis, negative Pearson correlation coefficient value ($r = -0.452$) and significant relationship subsisted between the signs and symptoms during first visit and review visit ($p < 0.05$). Negative correlation value in the direct effect indicates that there is an inverse relationship presents between the initial and review visit's signs and symptoms. The acceptance was negatively correlated as patients were presented with lesser signs and symptoms during review visit when compared to the initial one as shown in table 4.

Indirect effect also shows statistical significance ($p < 0.05$) when the comparison was made. It was proven as 21 patients claimed that they have total absence of signs and symptoms and another nine patients claimed that the signs and symptoms had reduced during review visit. However, 23 patients with clicking, crepitus or popping, two patients with pain, four patients with muscle involvement, one patient that had tooth symptoms, one patient with headache and three patients with locked jaw complained that their problems still remained during review visit. The remaining seven patients were not able to attend review visit in this study. Based on both direct and indirect test, the results suggested that there is significant difference between signs and symptoms during first visit and review visit as the mean value calculated during these two visits are unequal. Thus, there is positive significant difference between signs and symptoms during first visit and review visit.

		Symptoms	Diagnosis	Detection	Treatment
Symptoms	Pearson Correlation	1	.386**	.349**	.238*
	Sig. (2-tailed)		.001	.003	.046
	N	71	71	71	71
Diagnosis	Pearson Correlation	.386**	1	-.209	.270*
	Sig. (2-tailed)	.001		.080	.023
	N	71	71	71	71
Detection	Pearson Correlation	.349**	-.209	1	.257*
	Sig. (2-tailed)	.003	.080		.030
	N	71	71	71	71
Treatment	Pearson Correlation	.238*	.270*	.257*	1
	Sig. (2-tailed)	.046	.023	.030	
	N	71	71	71	71

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

Table 3. The association between the appearance of signs and symptoms, the diagnosis and the stage of TMD detection with treatment modalities.

		Symptoms	TMD Review
Symptoms	Pearson Correlation	1	-.452**
	Sig. (2-tailed)		.000
	N	71	71
TMD Review	Pearson Correlation	-.452**	1
	Sig. (2-tailed)	.000	
	N	71	71

Table 4. Correlation between the initial and review visit's signs and symptoms.

** Correlation is significant at the 0.01 level (2-tailed).

Discussion

Characterization of TMD has been difficult due to large number of signs and symptoms, and the variation in the number and types manifested in any particular patient. Notwithstanding this, several measures have been employed for the diagnosis and evaluation of TMD, such as the Research Diagnostic Criteria for Temporomandibular Disorders, radiography, magnetic nuclear resonance imaging, computed tomography, and electromyography.⁹

Demographic factors play a role in incidence of TMD in the current study. This is in agreement with Herb et al., 2006.¹⁰ Systematic review of clinical studies revealed that gender, age, and psychological factors were associated with TMD.¹¹ Based on the current results, only age shows a significant relationship with TMD in term of signs and symptoms. Robert et al., 2015 suggested that the incidence of TMD peaks from 20 to 40 years of age.¹² this is in agreement with the current study. Manfredini et al. 2010 identified at least two distinct age peaks within patient population one at about age 30 to 35 years, with disk displacement, and another at about age 50 to 55 years, which is in controversy with our study.¹³

The results of the current study didn't show a significant relationship between the gender and TMD. However, from this study, females shown more incidence of TMD when compared to male with a ratio (3:1), thus coincide with epidemiological studies provided by Ira Tanti et al., 2016. Although these differences have been

explained by behavioral, psychosocial, hormonal and constitutional factors, no conclusive results have been drawn.¹⁴

Positive significant differences between symptoms before and after treatment was observed in this study. The best therapies for TMD are those that target the various contributing factors and correlates treatment strategies with patients' daily variations in symptoms. The least invasive procedures should be used first and if this adequately resolves the pain, no other treatment is needed.¹⁵ Hence, a non-surgical approach used for the initial management namely education, self-care practices, drug treatment and occlusal splint.^{5,16} Uncertainty in illness and negative emotions affect the disease progression, prognosis and yet affect their quality of life.¹⁷ The result of the study come to term with Yang et al, that reassurance and patient education is a consequential treatment plan. Based on Gauer et al., 2015 patients should be counseled on behavior modifications such as stress reduction, sleep hygiene, elimination of parafunctional habits, and avoidance of extreme mandibular movement which in agreement with the current study.¹²⁻¹⁸

Herb et al., 2006 proposed that splint therapy/occlusal appliance is considered an adjunct to pharmacologic therapy and most appropriate when nocturnal parafunctional activities can be identified as it reduce abnormal muscle activity and spasm.¹⁰ This is in agreement with the current study. The use of occlusal appliance is thought to alleviate or prevent degenerative forces placed on the TMJ, articular disk, and dentition. These devices may benefit patients with severe bruxism and nocturnal clenching. Systemic reviews have shown conflicting results on the preferred occlusal device for relieving TMD symptoms.¹² In contrast to the current study, Martins et al. proposed that musculoskeletal manual approach is better in reducing TMD symptoms. In some patients, it may promote clenching and grinding, therefore, increase the TMD symptoms.

Drugs are other modalities in managing TMD symptoms. In the current study, drugs used include anti-inflammatories and muscle relaxants which coincide with Graff-Radford, 2016. Muscle relaxants can be prescribed with non-steroidal anti-inflammatory drugs (NSAIDs) if there is evidence of a muscular component to TMD.¹² 5-years randomized controlled trial (RCT) of

patients with TMD demonstrated that medical management and non-surgical rehabilitation improved pain and dysfunction as effectively as surgical intervention with rehabilitation.¹⁹

The result of this study suggested that there is significant relationship between demographic factor and TMD moderated by symptoms and treatment. Early detection and identification of signs and symptoms of TMD can assist in prevention of future problems which were suggested by Ferreira-Bacci et al., 2012; Garde et al., 2014 and Habib et al., 2015, hence providing a better prognosis of TMD.^{1,20}

Conclusions

This study had successfully manifested the relationship between age parameters, the signs and symptoms complained by TMD patients, the diagnosis, the detection, treatment proposed with findings during review. Positive response of patients towards treatment was proven. Most patients who initially attended with pain and disturbance in function of TMJ had presented with reduce or total absence of signs and symptoms during review. Hence, early detection of the condition greatly influences the outcome of the treatment. According to the National Institutes of Health, because more studies are needed on the safety and effectiveness of most treatments for joint and muscle disorders, experts strongly recommend using the most conservative, reversible treatments possible

Thorough knowledge is needed to understand TMD in depth so that correct diagnosis and appropriate treatment shall be administered. The overall oral health may be compromised if the success of the treatment is not achieved, as this may lead to avoidance from seeking dental treatments due to the problems arising from TMJ. Persistent pain might affect the life style and lead to the application of general anesthesia even for simple dental treatment, thus complicate it. Public awareness regarding the early signs and symptoms of TMD should be increased in order to prevent more damaging effect of TMD in the later stage.

In the sense of this study, future study should include large number of sample size, including all races and variation of TMD cases. Demographic parameters should be extended. Socioeconomic status and psychological background might be added into demographic parameters. Although our

study provided some information regarding the relationship between detection and treatment outcome, long term clinical studies should be conducted in this region as for TMD patients, as weeks to months duration is needed to show the outcome of the treatment. Comparison on treatment outcome between healthy patients with medically compromised patients may be conducted. The Fonseca anamnestic index (FAI) is another simpler measure based on the Helkimo index that has been employed to identify the degree of TMD severity. It is recommended that the management of TMD be modulated with the symptom severity, anticipated compliance, abilities of dentist, effect on the patients' lifestyle (for both symptoms and treatments), and cost (in terms of price, time, adverse sequelae, etc.).

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