TEMPOROMANDIBULAR DISORDER (TMD) IN RELATION TO ORTHODONTIC TREATMENT IN QASSIM REGION OF SAUDI ARABIA.

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Abstract

Introduction:- TMD is the main cause of pain of non-dental origin in the oro-facial region and is multifactorial in nature. Orthodontic treatment has been linked to TMD since 1980s, which started a series of studies to find out any co-relation between orthodontic treatment and TMD.

Objective:- To determine the prevalence of TMJD in patients during or after fixed orthodontic treatment in Qassim Area.

Materials and Methods:- It was a cross sectional study done on 232 orthodontic patients. Data collection was done by self-administrated questionnaire.

Result:- Data analysis was done by SPSS version 22. Results showed there was no significant co-relation between TMD and orthodontic treatment.

Conclusion:- Orthodontic treatment is not a cause of TMD.
7. No method of TM disorder prevention has been demonstrated.
8. When more severe TMD signs and symptoms are present, simple treatments can alleviate them in most patients.

(4) More recent studies concluded that there is no scientific evidence proving that orthodontic treatment will prevent the development of future TMD, or cure an existing disorder. (5)

There are not many studies done to co-relate orthodontic treatment and TMD in this part of the world. This study is aimed to determine the prevalence of TMJD in patients during or after fixed orthodontics treatment and identify the inter-relationship between different aspects of orthodontic treatment and TMD in Qassim region of Saudi Arabia.

Materials and Methods:
The study proposal and questionnaire were presented to research and ethical committees of Qassim university by November 2015, it got accepted by both committees by December 2015 (code for ethical acceptance #:EA/18/2015)

The study was a cross sectional study which was done over the period of 5 months from December 2015 - April 2016. The data collection was done over the period of 3 months from December 2015 - March 2016.

The data was collected from different sources: Qassim university dental clinics (both male and female), different intermediate/secondary schools in different cities in Qassimarea, the 1st high school of Onaizah and 2nd intermediate school in Onaizah.

Inclusion criteria of the study sample consisted of adult and adolescent orthodontic patients with the age range of 13-48 years having all permanent teeth erupted (except 3rd molar). All the subjects were either undergoing or had completed fixed orthodontic treatment for a minimum of 1 year. Subjects who were treated with both extraction and non-extraction treatment modality were included in the study. Subjects who were in mixed dentition were excluded from the study. Also Patients having degenerative lesions of joints including TMJ were excluded from the study.

Study participants:
232 participants consisting of 198 females and 34 males participated in the study. All participants had/were having fixed orthodontic treatment ranging from 1 year duration to more than 3 year duration. (Figure 1)

Data collection was done by self-administered questionnaire in which subjects were asked about the age, gender, duration of orthodontic treatment and the extractions done before the orthodontic treatment. 13 questions were asked about TMD which were divided into 2 main categories:

1. 8 questions were about the TMD symptoms that were experienced by the patients e.g. (clicking, pain, difficulty in mouth opening).
2. 5 questions about other probable causes of TMD e.g. (trauma, other dental treatment, stress, etc).

The subjects were asked to answer each question twice, once for their experienced symptoms before the orthodontic treatment and the again for during/after the orthodontic treatment.

The sample was divided into 4 groups based on the duration of orthodontic treatment.

![Figure 1: Duration of orthodontic treatment.](image-url)
The data was processed and analyzed through SPSS program (version 22). The descriptive statistics were calculated (mean, SD) by using descriptive analysis. chi-square test was done to determine the significance at level of 0.05%

**Result:**
The results are shown in table 1 with variables in the rows to the left and corresponding frequencies and p values in the columns to right.

The answers for each variable were divided into 4 categories:
A. Patients who answered with no twice (in both before and after), which indicates no relation to the variable.
B. Subjects who answered with yes twice, which indicates, a pre-existing relation with variable, which didn’t change by the orthodontic treatment.
C. Patients who answered with yes before and no after, which indicates pre-existing relation with variable before the orthodontic treatment which was eliminated after the orthodontic treatment.
D. Patients who answered with no before and yes after, which indicated that variable were introduced after the orthodontic treatment.

The frequency for each variable is mentioned for the 4 main groups of the study(figure 1). Finally the p value for the chi square test is mentioned at 0.05% level of significance. (Significant if p<0.05).

| Table 1: Results, showing P value at 0.05% level of significance. (Significant if  p<0.05) | Duration of treatment | \( P \) Value |
|-----------------------------------------------|-----------------------|---------------|
|                                              | No                    | Yes (Before & After) | Yes Before & No After | No Before & Yes After | No | Yes (Before & After) | Yes Before & No After | No Before & Yes After | Frequency | Frequency | Frequency | Frequency | Frequency | Frequency | Frequency | Frequency | Frequency | Frequency | Frequency |
| TMJ sounds                                   | 27                    | 12 (Before & After)   | 3 (Before & No After) | 9 (No Before & Yes After) | 27 | 6 (Before & After)    | 3 (Before & No After) | 10 (No Before & Yes After) | 46 | 11 | 14 | 12 | 11       |
|                                              | 27                    | 12 (Before & After)   | 3 (Before & No After) | 9 (No Before & Yes After) | 27 | 6 (Before & After)    | 3 (Before & No After) | 10 (No Before & Yes After) | 46 | 11 | 14 | 12 | 11       |
| TMJ stiffness                                | 32                    | 6 (Before & After)    | 3 (Before & No After) | 10 (No Before & Yes After) | 32 | 6 (Before & After)    | 3 (Before & No After) | 10 (No Before & Yes After) | 64 | 12 | 2 | 7 | 9       |
|                                              | 32                    | 6 (Before & After)    | 3 (Before & No After) | 10 (No Before & Yes After) | 32 | 6 (Before & After)    | 3 (Before & No After) | 10 (No Before & Yes After) | 64 | 12 | 2 | 7 | 9       |
| Difficulty in mouth opening                 | 27                    | 6 (Before & After)    | 5 (Before & No After) | 13 (No Before & Yes After) | 27 | 6 (Before & After)    | 5 (Before & No After) | 13 (No Before & Yes After) | 55 | 10 | 2 | 18 | 12 |
|                                              | 27                    | 6 (Before & After)    | 5 (Before & No After) | 13 (No Before & Yes After) | 27 | 6 (Before & After)    | 5 (Before & No After) | 13 (No Before & Yes After) | 55 | 10 | 2 | 18 | 12 |
| Pain when moving jaw                         | 24                    | 9 (Before & After)    | 8 (Before & No After) | 10 (No Before & Yes After) | 24 | 9 (Before & After)    | 8 (Before & No After) | 10 (No Before & Yes After) | 52 | 15 | 4 | 14 | 11 |
|                                              | 24                    | 9 (Before & After)    | 8 (Before & No After) | 10 (No Before & Yes After) | 24 | 9 (Before & After)    | 8 (Before & No After) | 10 (No Before & Yes After) | 52 | 15 | 4 | 14 | 11 |
| Pain while eating/chewing food               | 26                    | 8 (Before & After)    | 8 (Before & No After) | 2 (No Before & Yes After)  | 26 | 8 (Before & After)    | 8 (Before & No After) | 2 (No Before & Yes After)  | 36 | 6 | 6 | 2 |
|                                              | 26                    | 8 (Before & After)    | 8 (Before & No After) | 2 (No Before & Yes After)  | 26 | 8 (Before & After)    | 8 (Before & No After) | 2 (No Before & Yes After)  | 36 | 6 | 6 | 2 |

*Significant if p<0.05*
## Discussion:
In the late 1980s the attention of the orthodontic community regarding TMD was awakened following litigation involving orthodontic treatment as the cause of TMD in an orthodontic patient in the US court. The orthodontist at cause lost the case only because at that time there was a lack of evidence based literature in medicine and dentistry. (3) 

In 1987 the Board of Trustees of the American Association of Orthodontists (AAO) passed a motion "that the AAO immediately initiate a program to conduct documented studies for the purpose of determining the relationship, or lack thereof, between orthodontic treatment and temporomandibular joint disorders." They also moved to form a new task-oriented committee, the Scientific Studies Committee, to conduct the program. Early in 1988, the committee was formed, consisting of persons with recognized knowledge in this area but with differing backgrounds: a prosthodontist, an oral pathologist, a general practitioner, and two orthodontists. Their conclusion was that orthodontic treatment generally is not a primary factor in TMD. (6)
This study was undertaken in order to determine the prevalence of TMJD in patients during or after fixed orthodontics treatment and identify the inter-relationship between different aspects of orthodontic treatment and TMD in Qassim region.

After data analysis the major result of this study was that there was no significant difference between orthodontic treatment and TMD. It was also observed that there was no significant difference between duration of orthodontic treatment and TMD.

This result was proved by many other studies in the literature such as: Long-term follow-up study which followed patients until 30 years of age. They identified no link between orthodontic treatment acting as either a preventative measure or a significant cause of TMD. (7)

Egermark followed a cohort of patients who had orthodontic care between 1981 and 1983 he laudably followed up the patients 20 years later. One of the conclusions was that there was no statistically significant difference in the prevalence of TMD in patients who had received orthodontic treatment when compared with those who hadn’t received active orthodontic intervention. (8,9,10)

Another major finding was that TMD signs and symptoms (TMJ sounds, TMJ stiffness, pain with mouth opening, pain with chewing) didn’t show any statistically significant difference before and after the orthodontic treatment. Also there was no relation between extraction (for the purpose of orthodontic treatment) and TMD.

This finding has been proved constantly by many other researchers such as: A Dibbets & Van der Weele in 1992 who concluded that after 20 years of observation, it appears that neither orthodontic treatment nor extraction has a causal relationship with the signs and symptoms of TMD. (11)

Another longitudinal study done over 20 year investigating the relationship between orthodontic treatment and TMD concluded that orthodontic treatment neither causes nor prevents TMD and that participants with a history of orthodontic treatment did not have higher risk of new or persistent TMD. (14)

The only significant result of this study in which the p value was 0.035 was for a single symptom of TMD (pain when moving the jaw to the side), which can’t be used alone to identify an etiological factor since it’s only one symptom of TMD

A result similar to this (in which a single symptom of TMD increased with orthodontic treatment) was observed by prospective longitudinal study examining adolescent girls undergoing treatment showed that in the treated group there was a significantly reduced prevalence of muscular signs after treatment but that clicking, a symptom often identified, increased in both the treated, untreated, and normal groups over the 2 years of observation. (12, 13)

In this study no correlation between stress, parafunctional habits or history of trauma and TMD was observed.

On the other hand, a study by Robinand Chiomentowas done in 2010 in which they identified the three most prevalent risk factors for TMD to be, oral parafunctions, traumatic factors, and psychological factors. (15)

Another finding was that there was no correlation between TMD and neck/cervical pain. The relation between cervical/neck pain and TMD has been observed by many authors in the literature such as Visscher et al. showed that chronic cranio mandibular pain patients more often suffer from cervical spinal pain than controls. (16) Stiesch-Scholz et al. also reported that patients with raised muscle tenderness of the temporomandibular system exhibited significantly more often pain on pressure of the neck muscles than patients without muscle tenderness of the temporomandibular system. (17) However, Armijo Olivo et al. in a critical review of the literature on this topic, underlined that the association between the cervical spine, the stomatognathic system and craniofacial pain is supported by studies which must be interpreted with caution because of their lack of scientific rigor. This does not exclude a tendency toward a link between cervicalgia and the stomatognathic system. (18)

**Conclusion:**

To date, to our knowledge, there has never been a satisfactory evaluation of orthodontics with respect to TMD. There is no evidence that orthodontic treatment treats or prevents temporomandibular disorders (TMDs). There are
also no trials or studies that reach the threshold required to support the concepts of orthodontic treatment relating to TMD.

It is important to distinguish between absence of evidence and evidence of absence. There may not be evidence of an effect because there are no data regarding the effectiveness of orthodontic treatment for TMD.

**Limitation:**
- A relatively small sample size was used.
- Unequal female to male ratio that was unavoidable since the orthodontic treatment is more popular in female patients in Qassim area and the female patients were more willing to participate in the study.
- Age, most of the study subjects were between 16-25 years old which was expected since most orthodontic patients fall in this age range.

**Recommendations:**
- Further research is needed in which a larger sample size is obtained.
- A clinical longitudinal prospective study is advised in which the subjects are monitored before, during and after the orthodontic treatment.
- The use of standardized diagnostic criteria for TMD.

**Acknowledgment:**
- First and for most we would like to thank our supervisor Dr. Rabi Bilal for her help and support.
- We also would like to thank Dr. Ramy Elmoazen for his help with the data analysis.

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