

Original Research Article

Perception of the relationship between temporomandibular dysfunction and orthodontic treatment among Saudi population

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ABSTRACT

Background: The consensus about the relationship between temporomandibular dysfunction (TMD) and orthodontic treatment has gone from a cause and effect association between TMD and orthodontic treatment to the idea that there is no reliable evidence supporting this statement. The objective of the study was to assess the perception of the relationship between TMD and orthodontic treatment among Saudi population.

Methods: This is a cross-sectional survey about the relationship between TMD and orthodontic treatment which was prepared and sent to Saudi population through social medias. Answers were treated by means of descriptive statistics and strong associations between variables were assessed by Fischer's test.

Results: A total of 826 participant were involved in the study and were divided according to age into two groups. Questions about history of receiving orthodontic treatment, knowledge about the tempo-mandibular joint, relationship of orthodontic treatment and TMD and the thought that orthodontic treatment may increase symptoms of TMD were all significant with $p < 0.005$.

Conclusion: This study suggests that orthodontists' beliefs about the relationship between orthodontic treatment and TMD are in accordance with scientific evidence only when referring to treatment and prevention of TMD. The majority of orthodontists believe that, despite scientific evidence, orthodontic treatment can cause TMD.

Keywords: Temporomandibular joint disorders, Orthodontic appliances, Orthodontics, Relationship, Perception

INTRODUCTION

Temporomandibular dysfunction (TMD) tend to include a vast range of signs and symptoms related to the temporomandibular joint (TMJ) and the concerned masticatory musculature. Clinical signs of dysfunction include pain from the TMJs or jaw muscles, pain on mandibular movement, joint sounds (clicking and popping), and locking/luxation of joints, as well as limited

mandibular movements.¹ TMD's etiology and pathogenesis remains unclear as some multifactorial pathological conditions such as TMD could have a significant impact on life quality of individuals.² The TMD seems to have psychological, genetic, neurological and anatomic factors. For example, depression, stress and anxiety are usually involved in the development and progression of TMD.² Furthermore, occlusal disharmony, which is an anatomical factor, combined with

psychological findings and through the stomatognathic system may release tensions leading to pain and joint disorders.² From several research over the years, investigations regarding the relationship between orthodontic treatment and TMD, concludes opposite results. Numerous studies have pointed out that orthodontic treatment has some influence over the signs and symptoms of TMD. Furthermore, a recent systematic review concluded that there are insufficient research data on the relationship between orthodontic treatment and TMD on which to base our clinical practice.^{2,3} In fact, several research indicates non-association between orthodontic treatment, occlusion and temporomandibular disorders.^{2,4} Large number of studies approves that malocclusive patients have clinical signs such as clicking and tenderness while some experience symptoms like pain in the TMJ.⁵⁻⁷

Even with existing evidence and studies about the relationship, there is a reasonable disagreement due to the different etiological factors that TMD is a multifactorial which can include traumatic injury, immunological disorders, neoplasm, and stress. Furthermore, orthodontic treatment may influence some of the TMD signs and symptoms during the treatment and may treat an existing TMD by preventing a future TMD based on reported studies.³ It is important to know the level of perception of the relationship between TMD and orthodontic treatment among Saudi Arabia population especially with the lack of studies about it. Therefore, the aim of this study is to assess the beliefs about the relationship between TMD and orthodontic treatment among lay people, general practitioner and orthodontist in Saudi Arabia.

METHODS

This is a cross-sectional study which was performed from June 2018 until June 2019 to investigate the relationship between TMD and orthodontic treatment among lay people, general practitioners and orthodontists in the kingdom of Saudi Arabia. Data collecting methods was done through an online survey questionnaire (SurveyMonkey program) and was distributed through social media. Exclusion criteria for the study group included patients having history of neurological or musculoskeletal disorders, history of TMJ trauma or treatment and immunocompromised patients. Sample size was calculated using Raosoft (sample size calculator) considering 95% Confidence interval (CI), expected population 20,000 and expected response distribution 50%. Margin of error was kept 5% with a calculated sample size of 377, however, we had a very high response and the total participants were a total of 826 individual. Comparison between groups for qualitative variables was performed using Fischer’s exact tests while for quantitative variables an independent sample t-test (if normally distributed) or Mann Whitney test (if not normally distributed) will be utilized. p values less than or equal to 0.05 is considered statistically significant.

RESULTS

A total of 826 individual participated with an approximately equal proportion of participants divided regarding age where participants <25 years (50.8%, n=420) while those ≥25 years were (49.2%, n=406). The majority were females (78.7%, n=650) with bachelor degree and higher level of education (72.2%, n=598) while most of the respondent reported that they are not specialized in the field of dentistry (69.7%, n=577) (Figure 1).

Approximately half the participants received orthodontic treatment before (49.3%, n=408) while half the participants (45.2%, n=372) knew the definition of a TMJ.

Table 1: Demographic characteristics of the participants (n=826).

Demographic characteristics		Frequency	Percentage
Age (in years)	<25	420	50.8
	≥25	406	49.2
Gender	Male	176	21.3
	Female	650	78.7
Level of education	Illiterate	3	0.4
	Less than secondary	27	3.3
	Secondary	200	24.2
	Bachelor and above	598	72.2

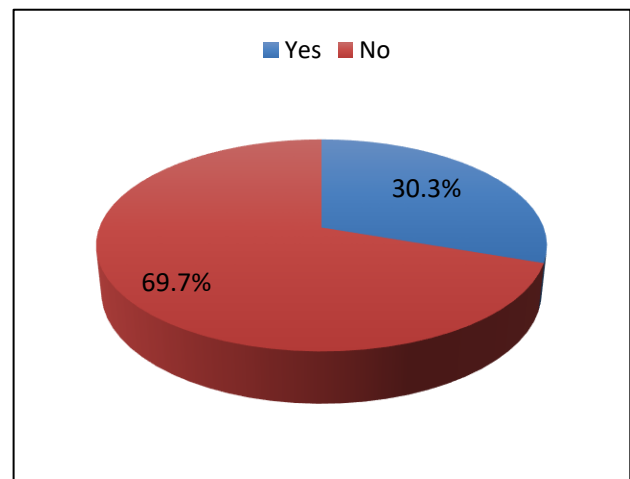


Figure 1: Specialization in the field of dentistry.

Over half the participants (56.2%, n=465) experienced one or more of following symptoms; clicking, popping of the jaw and mouth locking or/and pain of TMJ while opening or closing the mouth. Moreover, around half of the participants (55.7%, n=459) agreed that there is a relationship between orthodontic treatment and TMD.

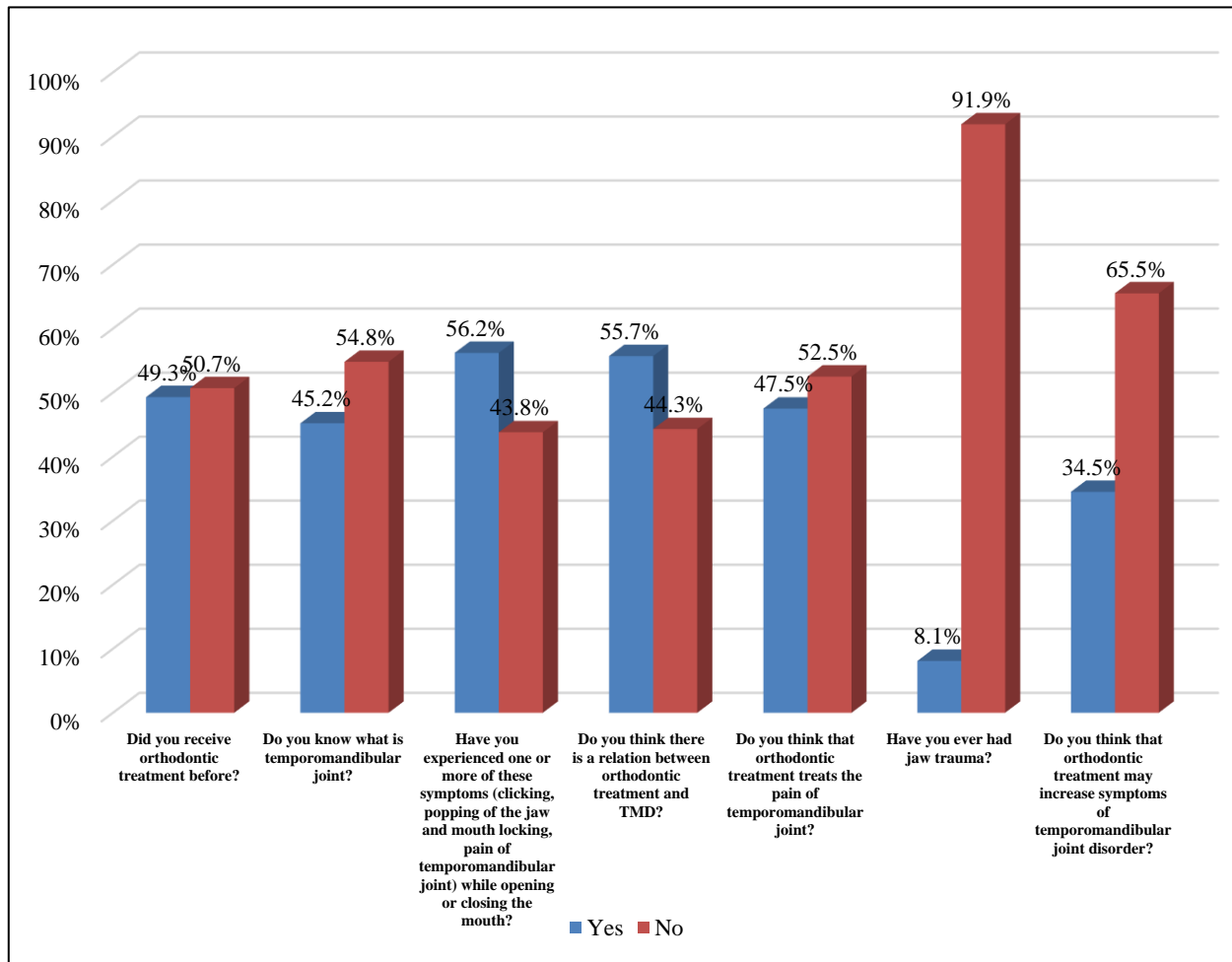


Figure 2: Variables.

Table 2: Relationship between the answers.

Questionnaire	Frequency (%)			P value
	Are you specialized in the field of dentistry?			
	Yes	No		
Did you receive orthodontic treatment before?	Yes	147 (36.0)	261 (64.0)	0.000*
	No	104 (24.8)	315 (75.2)	
Do you know what temporomandibular joint is?	Yes	232 (62.0)	142 (38.0)	0.000*
	No	19 (4.2)	434 (95.8)	
Have you experienced one or more of these symptoms (clicking, popping of the jaw and mouth locking, pain of temporomandibular joint) while opening or closing the mouth?	Yes	149 (32.0)	316 (68.0)	0.224
	No	102 (28.1)	261 (71.9)	
Do you think there is a relation between orthodontic treatment and TMD?	Yes	146 (31.8)	313 (68.2)	0.361
	No	105 (28.8)	260 (71.2)	
Do you think that orthodontic treatment treats the pain of temporomandibular joint?	Yes	141 (36.1)	250 (63.9)	0.001*
	No	109 (25.2)	323 (74.8)	
Have you ever had jaw trauma?	Yes	14 (20.9)	53 (79.1)	0.096
	No	236 (31.1)	522 (68.9)	
Do you think that orthodontic treatment may increase symptoms of temporomandibular joint disorder?	Yes	102 (35.9)	182 (64.1)	0.017*
	No	149 (27.7)	389 (72.3)	

Meanwhile, just under half the participants 47.5% (n=391) agreed that orthodontic treatment treats the pain of TMJ. Interestingly, a minority of (8.1%, n=67) reported that they had a history of jaw trauma. Lastly, approximately one third (34.5%, n=284) thought that orthodontic treatment may increase symptoms of TMD (Figure 2).

Two-way cross-tabulation showed participants who are specialized in the field of dentistry were higher in receiving orthodontic treatment before and knew in depth what is TMJ. Moreover, Fisher's exact test shows that the association was statistically significant ($p < 0.05$) as participants who are specialized in the field of dentistry were more likely to have experienced one or more of these symptoms: clicking, popping of the jaw and mouth locking and/or pain of TMJ while opening or closing the mouth.

Meanwhile, some think that there is a relation between orthodontic treatment and TMD, and that orthodontic treatment treats the pain of TMJ but showed no statistical significance ($p = 0.361$). Similarly, participants who are specialized in the field of dentistry were more likely to have experienced jaw trauma but also showed no statistical significance ($p = 0.096$) (Table 2).

DISCUSSION

Multiple theories have been suggested to examine the TMD's etiology, however, no single nor specific factor was detected. A controversial role remains for the orthodontics in the process of developing, preventing as well as treating the TMD.⁸⁻¹⁰ In our current study we found that more than 50% of the participants believed there was a relationship between TMD and orthodontic treatment. In a systemic review carried by Fernández-González et al reported that there was no direct or obvious evidence correlating the orthodontic treatment with the TMD nor did it had any effect on improvement or prevention of TMDs.⁴ In a literature review, Leite et al reviewed a previously published studies within the last 15 years, evaluating the impact of orthodontic treatment on signs and symptoms of TMD, and whether orthodontic treatment would be recommended for treating or preventing signs and symptoms of TMD.¹ The authors concluded that the orthodontic treatment with or without extraction during treatment has no impact on the signs and symptoms of TMD and was associated with no risk for its development.¹

However, when we inquired whether orthodontic therapy was an adjunct to increased TMD, approximately 34.5% believed that orthodontic therapy may increase symptoms of the TMD. On the other hand, a study conducted in South Korea by Hwang and Park compared two groups, one of them went through the experience of orthodontic treatment where 95% felt that orthodontic treatment made it worse.¹¹ In addition, most studies proved that low incidence of TMD signs and symptoms were significantly affected before and after orthodontic treatment.^{2,12-14}

Egermark et al reported in a prospective long-term study that TMD after orthodontic treatment had no elevated risk when they received the treatment during their childhood. However, those were only a minority of 18% which means it wasn't greatly affecting it.⁵ In addition, a recent study was conducted by Ruf and Bock in 2018 reported the same findings to our results that orthodontic treatment neither decrease nor increase the risk of developing TMD.¹⁵

In contrast to the result of our study, which disagreed that orthodontic treatment treats the pain of TMJ, the statistical findings were significant demonstrating a suggestive result that was controversially discussed in similar studies.^{2,4,16} In the previously mentioned literature review by Leite et al, the authors concluded that the orthodontic treatment does not treat or prevent the onset of signs and symptoms of TMD. Furthermore, in a study that was conducted by Coelho et al. Most orthodontists participating in this study disagreed that orthodontic treatment have a relation with treatment or prevention of TMD.¹⁶

The TMJ has many essential functions and none of its components are exempt from injury. Some of the late complication of traumatic TMJ injury include ankylosis, either intracapsular or extracapsular, osteoarthritis, condyle fracture and facial asymmetry. However, most cases of extracapsular ankylosis do not involve TMJ structure while intracapsular TMJ ankylosis affects TMJ structure, and even surrounding tissue, including the fibrous adhesions or bony fusion.^{17,18} In 2006 a study carried by Uhac et al used a questionnaire and clinical examination to assess the prevalence of temporomandibular disorders in Croatian war veterans suffering from Post-traumatic stress disorder (PTSD).¹⁹ The study showed significant differences with regard to overbite, overjet and restricted movements and was the highest in relation to pain while there was no differences obtained in clinical significance. Furthermore, headache was experienced by 63.83% of the subjects with PTSD, facial pain by 12.77%, and pain in the region of the jaw by 10.64%. Headache was the most intense pain, with an average intensity of 4.92 on a scale of 0 to 10. Meanwhile, pain on loading, intra-meatal tenderness, and TMJ clicking were more prevalent in the PTSD group than in the healthy control group. The result of study supports the concept that PTSD patients are at increased risk for the development of TMD symptoms.¹⁹ The results of the present study showed no significance between the participants who are specialized in the field of dentistry and the experience of one or more of these symptoms: clicking, popping of the jaw and mouth locking, pain of temporomandibular joint while opening or closing the mouth nor the experience of jaw trauma. However, no attempt was made to investigate the link between third molar extraction which can be a limitation in exploring further pathological and clinical causes and its relationship such as psychological stress, parafunctional habits and the above-mentioned experiences. However, trauma to the jaw and third molar removal were identified as predisposing factors for symptoms of TMD as showed in the study conducted by

Akhter et al, as they reported that TMJ symptoms such as pain and difficulty in mouth opening, rather than clicking, are related to jaw injury.²⁰ Several studies on TMD have shown a correlation between TMD symptoms and removal of third molar.²¹⁻²³

Our study has several limitations. As it was a survey study among Saudi population with a limited dental knowledge, the participants may guess or misinterpret the answers and that might affect the results. Secondly, all data were collected from written questionnaires, clinical examinations were not conducted to eliminate any pathological causes affecting their knowledge. In addition, clinical examination might provide more precise data about the causes of the above reported symptoms by the participants as well as shift the prevalence making it less likely to occur when compared with the prevalence of TMD symptoms reported on the questionnaires.

CONCLUSION

This study suggests that Saudi population beliefs about the relationship between orthodontic treatment and TMD are limited among non-dental professions. However, further exploration is needed by excluding pathological and stress causes to determine the level of relationship.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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