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Original Article

Assessment of the relationship between stress and temporomandibular joint disorder in female students before university entrance exam (Konkour exam)

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ABSTRACT

Background: Temporomandibular joint is one of the most complicated joints of the body and plays an important role in the head and neck system. One of the factors affecting the temporomandibular joint and lead to temporomandibular disorder is anxiety with all the events causing it. The aim of this study was to determine a relationship between anxiety and temporomandibular disorders.

Materials and Methods: In this prospective study, subjects were randomly selected. One hundred and thirty pre-university students in Isfahan were evaluated with Ketel's test of anxiety, exam stress test and temporomandibular disorder questionnaires. The evaluation was done in two stages 10 months and 1 month prior to the university entrance exam (Konkour), clinical assessments consisted of masticatory muscles and sternocleidomastoid muscle palpation, temporomandibular joint palpation for pain and noise and its movement, and mouth opening limitations. The Wilcoxon rank test and paired *t*-test were used to analyze the data and the *P* value under 0.05 was considered significant.

Results: The level of anxiety and occurrence of temporomandibular disorders were increased between two stages and had the highest level in the second stage. There was a significant increase between two stages ($P<0.001$).

Conclusion: The parallel increase of temporomandibular disorders and anxiety between the two stages can suggest a possible relationship between anxiety and temporomandibular disorders. Therefore, the effect of anxiety in triggering temporomandibular disorder symptoms is probable.

Key Words: Relationship, stress, temporomandibular joint disorder

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INTRODUCTION

Diagnosis, control and treatment of patients with temporomandibular disorder is one of the most challenging issues, considering the fact that Temporomandibular joint (TMJ) disorders present a variety of sings and symptoms.[1,2] Researchers have indicated different risk factors for TMJ disorders including physiological factors and stress.[3-6] Manfredino *et al*., performed a study using stress measurement questionnaires and indicated that in comparison to other various oral conditions, stress was significantly higher in patients with TMJ disorder ($P=0.001$).[3] Manfredino *et al*., performed a study using stress measurement questionnaires and indicated that in comparison to other various oral conditions, stress was significantly higher in patients with TMD.[3] Madani *et al*., indicated that stress had an important role in prevalence of TMD and concluded that risk factors such as premature contact, clenching, bruxism and trauma to the joint are of less importance.[4] Uha *et al*., investigated the effect of stress after war on TMD and concluded that, amongst 100 people that experienced war suffered from

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TMD more than the control group because of war stress. Since one of the major factor causing stress in young Iranian society is the university entrance exam called "Konkour"; this study was conducted to assess this factor. The assessment of relationship between stress and TMJ disorders in female pre-university students was performed in two stages, the first stage was 10 months prior to the exam and the second stage was 1 month prior to the exam. The aim of this study was to determine a relationship between the temporomandibular joint disorders and level of anxiety in a group of female pre-university students.

MATERIALS AND METHODS

One hundred and thirty female students were selected from 2 high schools of Isfahan with cluster sampling method. The molar relationship in all students was examined in the primary examination and the ones with class II and III molar relations were excluded from the sample groups. Occlusal contacts of teeth were examined using an articulation paper and samples with premature contacts were excluded from the study. Over-jet and Over-bite were measured and samples with abnormal measures were excluded from the study. In all qualified samples question papers was undertaken; a temporomandibular joint disorder test, the anxiety test of ketel, and the exam anxiety test. This procedure was performed in two stages, 10 months and 1 month prior to Konkour exam. Clinical examinations of temporomandibular joint disorder sings and symptoms were performed for all students and the following were done:

1. Para-functional habits including bruxism and clenching were assessed by the questionnaire and divided to the following stages: Having bruxism, having clenching, having both, and having no para-functional habits; that were number-specified with 1, 2, 3, and 4 respectively.
2. Orofacial pain results were attained by the questionnaire and clinical examination and divided to following stages: Pain in the ramus of mandible, band-like pain around head, peri-auricular pain, peri-orbital pain, and having no pain, that were number-specified with 1, 2, 3, 4, and 5 respectively.
3. Lateral and posterior palpation for examination of pain and noise in TMJ was performed in open and closed mouth status. The following stages of results were attained: Pain anterior to right ear, pain anterior to left ear, pain anterior to both ears, pain inside right ear, pain inside left ear, pain inside both ears, without pain, and without sound; that were number-specified with 1, 2, 3, 4, 5, 6,7, 8 and 9 respectively. Joint noises were assessed from patient's statement and the type of noises were diagnosed from questioners and divided to clicking and crepitus. Also, noises of the joint were assessed by asking from the samples and divide to click and crepitus.
4. Pain in mastication muscles were evaluated by examination and questioning [Table 1].
5. The maximum opening of the mouth was measured [Figure 1]. The following stages of results were attained: Opening between 2.5 and 4.5, opening more than 4.5 and opening less than 2.5 mm; that were number specified with 1, 2, and 3 respectively.
6. Deviation of jaw through opening was examined through clinical observations and the following stages of results were attained: deviation to right side, deviation to left side and having no deviation; that were number-specified with 1, 2, and 3 respectively.
7. Limitations of jaws for protrusive and lateral movements were measured with a ruler [Figure 2] and the results were divided to "presence" and "absence" that were number-specified with 1 and 2 respectively.
8. Level of anxiety was measured using two questionnaires for each student.

All collected data were statistically analyzed with SPSS software version 16.0. Wilcoxon singed rank test was used for the comparison of temporomandibular joint disorder between two study periods. The paired *t*-test was used for the comparison of Ketel anxiety test and exam anxiety test between October and May. *P* value of less than 0.05 was considered statistically significance in all analyses.

RESULTS

The paired *t*-test was used to compare the mean results of the Ketel anxiety test and the exam anxiety test undertaken in both study periods [Table 2].

Comparison of Ketel anxiety test results indicated that the amount of anxiety were increased significantly from May (41.8) to October (37.25). Comparison of stress test indicted a significant increase from May (17.06) to October (11.04).

The Wilcoxon Signed Rank Test was used to compare the mean results of temporomandibular examinations achieved, both in October and May. The findings indicated that presence of para-functional

Figure 1: Measurement of maximum opening without pain

Figure 2: Measurement of maximum protrusion

Table 1: Evaluation of pain in mastication muscles and the attained stages

Muscle	Examination	Result stage 1	Result stage 2	Result stage 3
Temporalis	Palpating the insertion of muscle superior to zygomatic arch and the temporal region	Pain in right side	Pain in left side	Pain in both sides
Masseter	Palpating the exterior side of ramus	Pain in right side	Pain in left side	Pain in both sides
Medial pterygoid	Palpating the interior side of ramus	Pain in right side	Pain in left side	Pain in both sides
Lateral pterygoid	Palpating the posterior region of maxillary tuberosity	Pain in right side	Pain in left side	Pain in both sides
Sternocleid-mastoid	Palpating on both sides of neck	Pain in right side	Pain in left side	Pain in both sides

Table 2: Comparison the mean results of the ketel test and the exam anxiety test in October and May (*P* value<0.05)

Test	October (mean)	May (mean)	Cases (*n*)	*P* value
Ketel test	37.25	41.8	132	0.000
Ketel degree	4.99	5.99	132	0.000
Anxiety exam test	11.04	17.06	132	0.000

habits, head and face pain, sound and pain of TMJ, mastication muscle pain and limitations of lateral and protrusive movements in October and May were significantly different (*P* value<0.05). It was also indicated that there was no significant difference in the measures of sternocleidomastoid muscle pain (*P* value=0.102), deviation of the jaw through opening (*P* value=1.000) and the maximum opening of the mouth (*P* value=0.157) between October and May. There was a noticeable increase in most of the TMD signs and symptoms for example; para-functional habits (from 2.03 to 20.07), head and face pain (from 3.00 to 11.37), TMJ pain (from 2.62 to 12.910), TMJ sounds (from 3.47 to 13.10), masseter muscle pain (from 3.40 to 20.70), temporalis muscle pain (from3.30 to 18.70), pterygoid muscle pain (from 4.00 to 11.60), sternocleidomastoid pain (from 0.00 to 0.67), limitation in protrusive movements (from 0.00 to 9.10) and limitation in lateral movements (from 0.00 to 3.00).

DISCUSSION

TMD is one of the most common disorders in orofacial region that is usually associated with pain, unusual sounds and discomfort in mastication. Psychological factors affecting the masticatory system and TMJ and are able to induce para-functional habits.[7-11]

The present study aimed at investigation of the relationship between stress and TMJ disorders. Some studies concluded that the final year students presented with higher stress scores.[12] The university entrance exam (Konkour) was selected as the stressor and its effect on female pre-university students was assessed in two determined study interval, (10 and 1 month prior to exam respectively).

The statistical studies indicated that the grades of anxiety test were significantly increased (*P*=0.000) during the time period of October to May [Table 2]. In May, the level of stress is higher due to being closer to the Konkour and the higher level of TMJ disorders is also justifiable for this matter.

With the assessments undertaken in this study and with respect to differences in prevalence of sings and symptoms between October and May, it can be concluded that there is a possible direct relationship between stress and TMJ disorders.

Many studies were conducted on this matter and the effect of psychological factors including stress, on TMJ disorders was investigated:

Deleeuw *et al*. concluded that individuals with chronic TMD were assessed with high levels of anxiety in psychiatric tests and it was indicated that pain in face and head was associated with stress.[11] It was concluded the same as this study that, stress can act as an important factor affecting on incidence of TMD.

Bonjardim *et al*. concluded that anxiety has a significant relationship with TMD in youths (young individuals) (P=0.01).[13] All background factors were omitted the same as this study and the results of both studies were the same.

Manfredino *et al*.[4] Indicated that the level of anxiety in individuals having orofacial pain were significantly higher (P=0.001) that matches the results of this study.

Mehdizade and Madani performed a comparison between different factors initiating TMD and concluded that psychological factors are the most important among all factors.[3]

Vedolin *et al*. investigated the impact of stress and anxiety on the pressure pain threshold of myofacial pain patients and concluded that, there is a significant relationship between stress and unusual sound of TMJ (P<0.05) that matches the results of this study.[14]

Uha *et al*. concluded that the majority of individuals that took part in war and experienced its stress had a significantly higher level of TMD in comparison to others.[15]

All the conducted studies indicated that stress is an effective factor for the incidence of TMJ disorders.

CONCLUSION

With respect to the significant increase of sings and symptoms from October to May, stress is possibly capable of arising TMJ disorders. It can be concluded that considering psychological factors including stress is necessary during the examination of patients with TMJ disorders and dentists have an excellent social relationship with the patients in performing complete evaluation of the TMJ during their visits. Signs and symptoms of TMD should be described to stressed students.

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