

# Prevalence of TMJ disorders among students and its relation to malocclusion

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## ABSTRACT

**Introduction:** The main object of this study was to find out the correlation between types of malocclusion and temporomandibular joint (TMJ) disorders among students.

**Materials and methods:** This study was descriptive and cross-sectional in which 425 persons were examined. From this number, 308 persons were male, and 117 were female. All samples were students of Mashhad University of Medical and Dental Sciences. The range in age was 19 to 32 years with a mean of 26.1 years. Samples were selected randomly. SPSS software was used and statistical evaluation was done.

**Results:** The correlation between malocclusion and TMJ discomfort at a level of  $P=0.05$  was not significant. The highest level of correlation existed between TMDs and CI II malocclusion. The rate of TMJ discomfort in various types of malocclusion was respectively as follows: CI II > CI I > CI III. The correlation between TMJ discomfort and head, neck and back pain was meaningful ( $P=0.0298$ ). The rate of women with TMJ discomfort to men was 1.6: 1. Most patients with TMJ discomfort complained of joint noises and a small number of them remarked symptoms such as pain, jaw opening limitation, and other symptoms of the disorder. Joint noises were mainly in the form of clicking. TMJ discomfort accompanied by gastric disorder (generally speaking) was meaningful ( $P=0.0214$ ).

**Conclusion:** From this study it was concluded that there was no significant correlation between malocclusion and TMJ discomfort at a level of  $\alpha=0.05$  among students. The highest level of correlation, which still was not statistically significant, existed between TMDs and CI II malocclusion. The correlation between TMJ discomfort and head, neck and back pain was significant. It is suggested that specific studies be done to clear out the exact relation between gastric disorder and TMJ discomfort.

**Key words:** TMDs, TMJ disorder, malocclusion

**T**emporomandibular Joint (TMJ) is a unique. It is consisted of temporal bone and mandible. It has two distinct motions that must work together in perfect union. The joint cavity is part of temporal bone that forms the upper joint. The condylar joint is mobile, and is connected to the joint cavity by a joint disc and meniscus<sup>1</sup>. Because of its special complex position, TMJ problems are often not only difficult to diagnose in the beginning, but their proper treatment is also controversial. There is no such distinction concerning other joints in the body. Thorough knowledge is necessary for the established diagnosis to result in correct treatment. Etiological factors of TMJ discomfort are numerous<sup>2</sup>.

It can be said that malocclusion is the most common cause of TMJ discomfort<sup>3</sup>.

Robert and his colleagues studied a large group of patients who were arthroscopically examined for evaluation of their TMJ problems, but no relation was found between various occlusal patterns and inner joint pathology<sup>4</sup>. Clark could not find any occlusal factors that could have a role in creating TMDs<sup>5</sup>. Suligman and his colleagues claimed that there is no relation between the rates of various occlusal patterns in patients with dental abrasion created by bruxism and remarked that there is no inner pathological increase of the joint with special joint patterns in the presence of crepitus<sup>6</sup>. He reported that tenderness increases upon joint palpation in Class II, div.2. Other studies reported existence of positive correlation between Class II, div.2 malocclusion, pain and dysfunction in the joint area<sup>7</sup>.

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Diagram.1. Prevalence of malocclusions

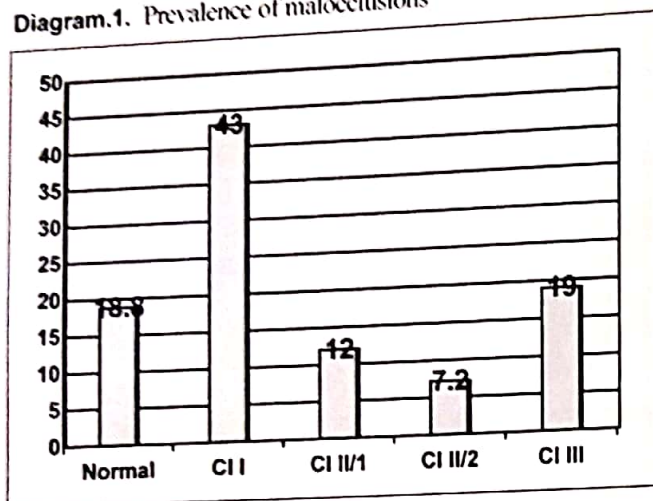
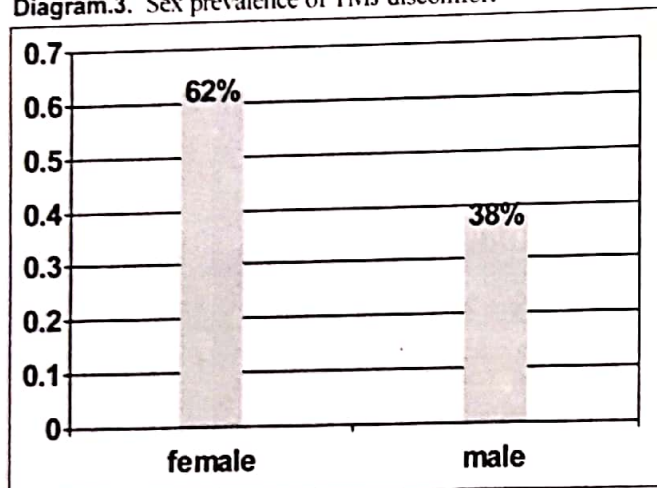


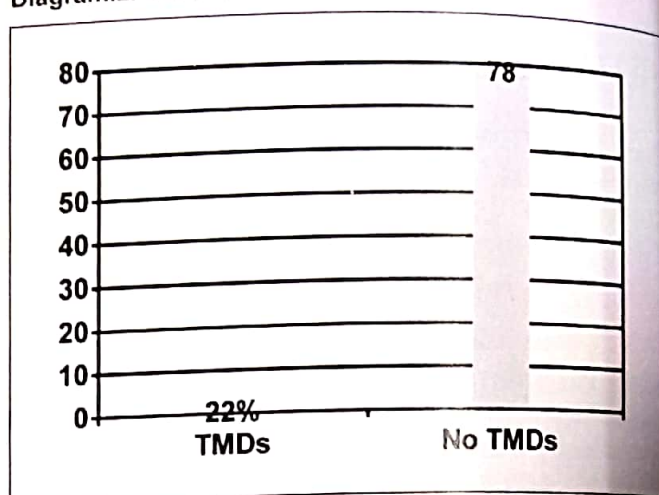
Diagram.3. Sex prevalence of TMJ discomfort



Mohlin and his colleagues reported increase of TMJ discomfort in Class III patients with reverse over jet and open bite<sup>8</sup>. In their study the correlation coefficient was meaningful from a statistical viewpoint, but it was never more than 0.3 to 0.4.

Cadarer remarked upon the existence of positive relation between malocclusion and unnatural morphology of the joint<sup>7</sup>. Hemanche and Overg proved that in patients with malocclusion capsular pathology increases inside the joint<sup>1</sup>. On the basis of Drokase and Karelson's studies there is a notable relation between malocclusion and TMJ discomfort<sup>9</sup>. On the

Diagram.2. Prevalence of TMJ discomfort



basis of this study, Class III patients with mandibular prognathism have more tendencies for TMJ discomfort. It is remarked in another study that joint sounds are heard in patients with functional cross bites<sup>(10)</sup>. Upon premature contact, headaches and other muscular pains are increased, too. In another study that was done on children aged 7 to 11 years, it was reported that patients with Class II and Class III malocclusion are more susceptible to TMJ discomforts than other groups. Solberg and his colleagues discovered that in mature youngsters with increased over jet, variation in condylar morphology is more prevalent than others<sup>11</sup>.

Oryan and Epker remarked that morphological variation in the structure of condyle may be related to the existence of the variation in biomechanical forces<sup>12</sup>. However, nothing special is observed about the rate of joint dysfunction and muscular pain in patients with dentofacial abnormalities in scientific sources. Laskin and his colleagues examined patients who referred for orthognathic surgery and studied the rate of TMJ discomfort in them<sup>13</sup>. About 10% of them suffered from TMJ complaints. In a retrospective evaluation, Upton and his colleagues in Michigan University, noticed that about 53% of patients in need of orthognathic surgery suffered from TMJ discomfort, too<sup>14</sup>.

Proffit and his colleagues noticed in their study that there is female preponderance in TMJ discomfort<sup>15</sup>. They also found out that the TMJ discomfort occurs more in persons

Table.1. Relationship between TMJ discomfort and type of malocclusion

TMJ Problem \ Malocclusion	CI I	CI II div 1	CI II div2	CI III
No	126	38	22	65
Yes	57	13	8	16



**Table 2.** The relationship between TMJ discomfort with gender and neck pain

	Gender	
	F	M
No TMJ	81	250
TMJ	36	58
No NP	103	27
NP	14	34

with a history of jaw trauma.

However, as it is understood from the studies, some malocclusions such as Class II, div. 2, increase the susceptibility for TMJ discomfort<sup>16</sup>. In patients with Class III malocclusion who have anterior jaw displacement, there is a problem in closing their jaws. Deviation in closing the jaw causes increase of muscular tension, and this decreases the size and threshold of hyperactivity. It is not clear whether malocclusion creates any interior changes in the joint or not. There is high probability that malocclusion facilitates damage to the joint at the time of clenching and bruxism. The aim of this study was to find out the relation between TMJ disorders and malocclusion.

## MATERIALS & METHODS

In this research 425 persons were examined. From this number 308 persons were male, and 117 were female. All patients were students of Mashhad University of Medical and Dental Sciences. The range in age was between 19 and 32 years with a mean of 26.1 years. Samples were selected randomly; and the method of research was cross-sectional. The place for primary examination of these samples was the Dental Faculty and dormitories of Mashhad University of Medical Sciences. We used specially prepared forms in order to register examination results. Regarding that occupational stress plays an important role in aggravating TMJ discomfort, and in order to prevent creating false answers, examination was scheduled at a time when students had no class examinations and were just involved with routine activities and regular study.

Tools used in this study were as follow: Tongue blade, mirror, excavator, dental pence, arthroscope, ruler, pencil, gloves, and SPSS were used to examine cases. Chi-square and correlation coefficient test were done and diagrams and tables were extracted.

Examinations were performed in two phases. During the first phase samples were studied from the viewpoint of systemic diseases, gastric disorder (as a general term), presence or absence of TMJ discomfort, head, neck, and back pain. The type of malocclusion was defined by the relation of

molars and incisors on the basis of Angle's classification. Increase or decrease in facial vertical height, open bite, cross bite and prognathism of the jaws were registered.

In the second phase of examination, those persons with TMJ discomfort were studied more carefully. TMJ discomforts were divided into three groups: (1) those complaining from pain, (2) those with limitation of jaw movement, and (3) those with joint popping or clicking.

We studied natural signs for pain (constant, pulse, pressure), vastness (severity from 0 to 10 respectively), way of appearance (constant, alternatively, irregular, sometimes, seldom), place (cheek, around neck and head, around TMJ by use of palpation (touching method using two hands), time of appearance (when talking, early in the morning, afternoon, after awaking from sleep, during the night, during the day), creating factors (chewing, swallowing, speaking, opening the mouth, certain mandibular movements and states, during resting), the duration of time from the onset to down set of pain (less than one week, less than one month, less than six months, less than one year) and history of pain (symptoms, time period, treatment history, unaware).

Concerning limitation of jaw movement, the patient's ability to open his (her) mouth, jaw deviation, chewing disorder and incoordination of jaw movement were studied. The extent of condylar movement was evaluated by examining the ears both from inside and outside. The degree of mouth opening was measured by ruler, and the result was registered. Noises, crepitus, clicking, and their relation with pain and mouth opening were studied. This was done by use of an arthroscope. Palpating the chewing muscles and areas of soft facial tissue as well as joint surroundings was carried out by the two-hand touch method. In addition to enquiry from the patient about head, neck and back pain, doubtful cases were examined by the palpation method on those areas. Tenderness upon palpation of the muscles was taken as dysfunction and registered.

## RESULTS

From the total number of samples studied, 80 persons (18.8%) had normal occlusion, 183 persons (43%) had C1 I



malocclusion, 51 persons (12.2%) had CI II, div.1 malocclusion, 30 persons (7%) had CI II, div.2 malocclusion, and 81 persons (19.2%) had Class III malocclusion (diagram-1).

Out of 425 persons examined, 94 persons (22.1 %) suffered from TMJ discomfort (diagram-2). From these persons, 56 (13.1%) remarked that their main problem were joint noises. Only 2 of these had crepitus, and the rest had clicking.

In patients with CI II, div.2 malocclusion, joint noises were mentioned more than other discomforts. Only one patient had muscle fatigue, muscle pain, and bruxism all together. Regarding the rate of P-value level of  $\alpha=0.05$ , the statistical difference was not significant. Thus, the variables are independent, and the relationship between two variables of malocclusion and TMJ was very slight. TMJ discomfort accompanied by gastric disorders (generally speaking) is meaningful at a level of  $\alpha=0.05$ . Among 425 persons studied, 19 (4.5%) had both TMJ discomfort and gastric disorders. In this research the P-value was 0.0214, and regarding this, considerable correlation is understandable.

Out of 425 persons, 31 patients (7.3%) had chronic pain in their heads, necks, and

backs. 17 (4%) of patients remarked that they had TMJ discomfort as well as head, neck and back pain. Those who had TMJ discomfort and head, neck, and back pain as well, were only 2 (0.4%) (Table-2).

## DISCUSSION

TMJ discomfort has been reported to be more prevalent in some types of malocclusion, like CI II cases, but no considerable difference between TMDs of CI II div.1 or CI II div.2 malocclusions has been mentioned<sup>2,3,6,7</sup>. In this study from 30 persons with CI II div. 2 malocclusion, 8 persons had TMJ discomfort, 4 patients proclaimed joint noises, and the remainder stated other symptoms of TMJ disorders.

Some researchers believe that it is possible that even slight occlusal deviations may be a cause of TMJ discomfort. If this were correct, then it would be necessary for all people to have completely perfect occlusion to avoid TMJ and myofascial pain. Since the number of individuals with TMDs is between 5 to 30%, depending on the type of study, and it is comparatively lower than the total number of persons who have a mean range of severe occlusal disorders (50 to 75% of the community), it looks as if occlusal disorder could not be the only factor of increase in muscles activity and TMJ discomfort<sup>6</sup>. Some people with malocclusion do not get muscular pain when influenced by stress, but get pain in other organs. This study confirms the former studies concerning the existence of correlation between malocclusion and TMDs. Although the results gained in this study explain a further relation between CI II malocclusion and TMDs, but generally speaking, the correlation between malocclusion and TMDs at the level of  $\alpha=0.05$  was not significant. In our

study TMDs in various types of malocclusions was respectively as follow: CI II > CI I > CI III. Upon the result of this study, it can be said that in CI III malocclusion, TMJ discomfort is less, and in some scientific references the same result has been mentioned<sup>3</sup>, while in another report the reverse result has been indicated<sup>1</sup>.

There are not many studies concerning correlation between gastric disorder (as a general term) and TMJ discomfort. Proffit believes that people react differently to stressful situations, and the tension affects different organs in different people<sup>6</sup>. Those who have gastric disorder rarely have TMD symptoms, too. Sensitive people show the signs of stress sooner than insensitive persons. For this reason, it is impossible to say that all occlusal discrepancies will result in the appearance of TMDs in all people.

In our study TMJ discomfort accompanied by gastric disorders is meaningful at a level of  $\alpha=0.05$ . Among 425 persons studied, 19 (4.5%) had both TMJ discomfort and gastric disorders. In this research the P-value was 0.0214, and regarding this, considerable correlation is understandable. A study to clear out the relation between gastric disorder and TMJ discomfort is suggested.

In regard to head, neck, and back pains and their synchronization with TMJ discomforts, not many studies have yet been done. Among the students studied here, 425 persons, 17 (4%) patients had TMJ head, neck, and back pains. This correlation from a statistical viewpoint at the level  $\alpha=0.05$  was significant. In this study P-value=0.0298 was gained, which is taken as meaningful.

The rate of females with TMJ discomfort is more than that in males. That may originate from several causes. Women are more sensitive to disease symptoms, and refer for clinical examination and treatment sooner than men. Furthermore, stress in women is more problematic than in men. These reasons could justify the matter, although the true reason for TMJ discomfort may be otherwise. In this study the rate of females with the TMJ discomfort in comparison to males was 1.6 to 1. Most of the women complained of TMJ noises, while other symptoms of the disease were relatively lower. The correlation coefficient between TMDs and gender from a statistical viewpoint was meaningful. P-value was at a level of  $\alpha=0.05$  in our statistical study, and the rate was  $X^2=0.0118$  that is highly significant from a statistical viewpoint. In previous studies done, the rates 3:1, 8:1, and 10:1, showed and confirmed that females had a higher number of incidences. The correlation between gender and gastric disorders, head, neck, and back pains was not meaningful from a statistical viewpoint ( $\alpha=0.05$ ).

## CONCLUSION

1. The correlation between malocclusion and TMJ discomfort at a level of  $\alpha=0.05$  was not significant. The highest

level of correlation existed between TMDs and CI II malocclusion. The rate of TMJ discomfort in various types of malocclusion was respectively as follow: CI II>CI I>CI III.

2. The correlation between TMJ discomfort and head, neck and back pain was meaningful ( $P=0.0298$ ).

3. The rate of women with TMJ discomfort to men was 1.6: 1.

4. Most patients with TMJ discomfort complained of joint noises and a small number of them remarked symptoms such as pain, jaw opening limitation, and other symptoms of the disorder.

5. Joint noises were mainly in the form of clicking.

6. TMJ discomfort accompanied by gastric disorder (generally speaking) was meaningful ( $P=0.0214$ ).

**Suggestion:** It is suggested that specific studies be done to clear out if there is any exact relation between gastric disorder and TMJ discomfort.

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