Frequency of Temporomandibular Joint Disorders and Its Association with Malocclusion in an Iranian Population

Original Article

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Abstract

Introduction:Temporomandibular disorders (TMDs) are referred to signs and symptoms involving masticatory muscles, temporomandibular joint and relevant structures. Having been prevalent noticeably, we decided to evaluate the frequency of TMD, among patients referred to the dental clinic of Guilan university of medical sciences.

Materials and Methods: In this cross-sectional study, a sample of 265 subjects with the age range of 15-62 was randomly selected. Signs and symptoms of TMD and different types of malocclusion including anterior open bite, deep bite, edge to edge, overjet more than 4mm, midline deviation, posterior unilateral and bilateral cross bite, crowding, posterior teeth loss, premature contact in retruded contact position, lateral excursion and protrusion, tooth wear and bruxism were examined. Data were analyzed statistically using Chi-square and Fisher's Exact Test.

Results: The prevalence of TMD was 53.2%.The frequency of symptoms was 20.3% joint sound, 12.8% facial or joint pain, 3.4% headache, 5.3% limited mouth opening, 0.7% closed lock, 1.9% open lock.The frequency of signs was 10.1% limitation in mouth opening, 7.1% limitation in protrusion, 7.9%, limitation in lateral excursion and 37.5% deviation in jaw opening, 11.3% pain during jaw movements, 3.3% tenderness of joint, 35.8% joint sound, 16.2% muscle tenderness. A significant relationship was observed between bruxism, being female, tooth wear, premature contact in lateral movement at balancing side and TMD.

Conclusion: TMDs are prevalent in Guilan province and more frequent among ages 20-25 years.There is a higher risk in people with bruxism, tooth wear, and premature contact at balancing side in lateral excursion as well as females to develop TMD.

Key words: •Malocclusion •Signs and Symptoms •Temporomandibular joint disorders

Introduction

Disorder in the performance of the masticatory muscles can be classified into the following groups based on the relevant apparatus: the masticatory muscles, temporomandibular joint, teeth. Temporomandibular disorder (TMD) is one of the most common problems in face.[1] The prevalence of TMD is various according to different definitions, examinations, communities, and time. It is reported that 6 to 93 percent showed the symptoms of TMD according to the questionnaires filled out by the patients and 0 to 93 percent based on the clinical findings.[2] TMD is characterized by four features of facial pain, limited jaw movements, deviation during the jaw movements and joint sound.[3]

The etiology of this disorder is complicated and multifactorial. The review of the related literature, confirms five prominent risk factors leading to TMD. These factors are trauma, stress, severe pain, and parafunctional habits. The degree of their effect differs among individuals. The relation between statuses of patient occlusion with TMD has been of great concern for many years in the field of dentistry. Previously, the patient occlusion was considered as the main factor leading to TMD. It has been found that occlusal factors rarely or do not result in TMD, however. Currently, there exists no reliable data confirming the either theory.[4]

Khaneh Masjedi et al reported the prevalence of TMD, 76.59 percent in females and 3.40 in males. In this research, 9.50 percent of 20-30 year old subjects were suffering from TMD. Results indicated that there is a significant relationship between the posterior open bite and TMD. The decreased overbite and TMD correlated significantly, as well.[5]

Madani & Ajami also reported the prevalence of TMD, 5.23 percent in 11-14 year old teenagers. Among different kinds of malocclusion, there was a significant statistical relationship between TMD and deep bite.[3]

John MT et al in a cross sectional investigation revealed the relationship between overbite and overjet, and symptoms of TMD.[6]

Gesch et al reported there was no significant relationship between any of the occlusal factors and the subjective symptoms of temporomandibular joint disorder. The parafunctional habit of clenching was significantly related to the symptoms of TMD in both sex groups.[7]

Hirsch et al investigated the relationship between overjet and overbite with joint sounds. Considering the age and the sex as control variables, they found no significant relationship between the above mentioned variables.[8]

Therefore, considering the increasing prevalence of this disorder and the effect of different factors on the occurrence of it, the aim of this study is to investigate the prevalence of the temporomandibular joint disorder in an Iranian population referring to Guilan faculty of dentistry and the evaluation of the relationship of the aforementioned disorder with different kinds of malocclusion.

Materials and Methods

In this cross-sectional study, the population consists of patients referring to the Guilan faculty of dentistry from 2010 to 2011.The sample size was figured out according to the previous studies and the existing facilities. Accordingly, 256 subjects were randomly chosen and assigned to the control and the experimental groups. The patients of the following features were eliminated from the study:

- Had orthodontic or TMD treatment
- The previous history of trauma and surgery in the temporomandibular joint
- The report of joint disorder after the dental procedures by the patient
- The previous history of radiotherapy treatment in the maxillofacial area
- The presence of congenital and syndromal temporomandibular abnormalities.
- Suffered from systematic disease such as arthritis, rheumatism, osteoarthritis, osteoporosis, and so on.
- Suffered from neurological and craniofacial disorders.
- Used the eliminating or alleviating medication for the symptoms of TMD, such as NSAID (Non Steroidal Anti Inflammatory Drugs) and cortisone.

The gathered data was recorded in a form. This form was comprised of four parts: 1) demo-

graphic data of the patient, 2) TDM clinical signs, 3) TDM symptoms,4) the probable related factors.

All the examinations were carried out on dental unit by using gloves, mirrors, tongue blades, articulator paper, ruler and dental floss.

First, it was ascertained that they were satisfied to take part in the research by written consent. Second, they were given a questionnaire to fill it out to conduct a careful patient history. In so doing, their demographic information was provided first, in the other parts, they answered some questions pertaining to the symptoms of temporomandibular joint disorder including the joint sounds, the joint pain, headache more than once a week, limitation of jaw opening, locked jaw. Afterwards, the degree of mouth opening, of lateral movements, and the degree of overjet were measured using a ruler. Opening the mouth less than 40 mm, the lateral movements, and protrusion less than 8mm were considered as impairment. Deviation during mouth opening was checked and identified clinically. The patients were asked some questions concerning the pain in different positions of jaw movements. By palpating the outer surface of the condyle, joint tenderness as well as clicking sounds were checked. The patient was also questioned for the possible oral habits.

Extra and intraoral examinations were carried out inTable 1.

Table 1. It reveals details of extra and intraoral examinations

Extraoral examination

- ***Temporalis muscle:*** the doctor gently palpated the anterior portion of temporalis muscle above the zygomatic arch in the foreside of TMJ gently and moved slowly to the posterior part of the zygomatic arch , and TMJ area to palpate posterior portion of temporalis muscle.
- ***Masseter muscle:*** the fingers were positioned on zygomatic arch and then the fingers moved downward to the inferior border of mandible and palpated the muscle.

Intraoral examination

***Functional manipulation:**

- ***The internal pterygoid muscles***: in case of being the source of the pain, the overlap of the upper and lower anterior teeth would result in pain. Opening the mouth widely would lead to pain in the TMJ as well.
- ***The lower external pterygoid muscles***: the patient was asked to protrude his jaw against the external pressure put on it. Had it been the cause of the pain in the patient, this action would result in pain in the patient too. Clenching of the upper and lower teeth increases the pain, but biting a barrier such as tongue blade would not increase the pain. It might alleviate the pain, however. As far as clenching, opening the mouth, and protruding the jaw against the external pressure might cause pain. In order to discriminate it from pain in lower external pterygoid muscles, a barrier was placed between posterior teeth in painful side. The patient was asked to close his mouth, and then protrude his jaw against the pressure. If the source of the pain or tenderness is intra articular, the pain or tenderness would not increase, or it might even decrease. At the other hand, if the reason of the pain is the spasm of the lower external pterygoid muscles, the pain would increase.
- ***The upper external pterygoid muscles***: If it be the source, clenching would be painful. In order to scatter the pain, the patient was asked to keep his mouth open wide. This action would stretch the uplifting muscles. In other words, if opening the mouth is not painful, the source of the pain while clenching the teeth would be the upper external (lateral) pterygoid muscles. Painfulness and tenderness of opening the mouth, indicates that the upper external (lateral) pterygoid muscles as well as the uplifting muscles are associated with TMD. In order to scatter the pain, it is necessary for the patient to distinguish the spot of the pain.

***The evaluations of the anterior skeletal open bite, deep bite, edge to edge, over 4mm overjet, lateral and side by side retrusive cross bite, the midline of dental status in the maximum intercuspation, crowding, extracted or the missing teeth**

***The premature contact in retruded contact position and non-working side in the lateral movement**

Results

In this study, 256 patients of the average age of 29.63 were examined. They constituted 128 female & 137 male subjects of the age range of 15-62. The finding of the following research, indicated the prevalence of the disorder was 2.53%, which from this population, 3.5%

were suffering from muscular disorder, 2.37% from intra-articular disorders, and 7.10% from articular and muscular disorders simultaneously.

From among the whole population suffering from TMD, males constituted 5.44%, and females 5.62% .The difference was statistically significant and there was apositive correlation between being female and the TMD disorder. At the other hand, a significant correlation between age and TMD was not tracked. Accordingly, the most observed age range was 21-25 (Figure 1).

None of the occlusal factors in the static occlusion including the anterior open bite, deep bite, edge to edge, more than 4 mm overjet, unilateral and bilateral posterior cross bite, midline status, crowding, missed four or more posterior teeth showed any significant correlation with TMD (P>0.05).

The frequency distribution of the occlusal disorder was shown in table 3.

The premature contact in lateral movements, bruxism and tooth wearing were correlated meaningfully with TMD from among the occlusal factors.

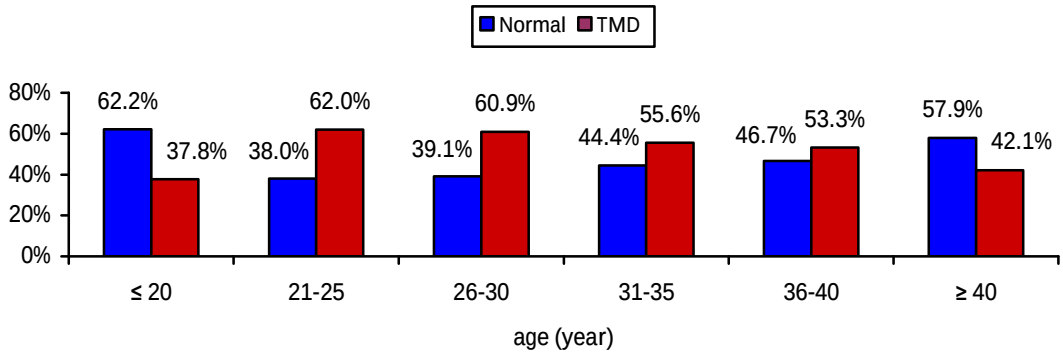

Figure 1. The frequency of TMD based on the age range

Table 2. The frequency distribution of TMD signs

Signs	Female No (%)	Male No (%)	Total No (%)
Joint sound	29(22.6)	25(18.2)	54 (20.3)
Facial or joint pain	22(17.1)	12(8.7)	34(12.8)
Headache without reason	6(4.6)	3(2.2)	9(3.4)
Limited mouth opening	8(6.2)	6(4.4)	14(5.3)
Open lock	3(2.3)	2(1.4)	5(1.9)
Closed lock	0(0)	2(1.4)	2(0.7)

Table 3. The frequency distribution of TMD symptoms

Signs	Female No (%)	Male No (%)	Total No (%)
Limitation in mouth opening	17(13. 3)	11(8. 0)	27(10.1)
Limitation in Protrusive movement	10(8. 6)	9(5. 6)	19(7. 1)
limitation in Lateral movement	9(7. 0)	12(8. 7)	21(7. 9)
Deviation in opening the mouth	51(39. 8)	50(36. 5)	101(37. 5)
Pain in opening the mouth	18(14. 0)	10(7. 3)	28(10. 5)
Pain in protrusive movement	8(6. 2)	3(2. 1)	11(4. 1)
Pain in lateral movements	9(7. 0)	3(2. 1)	12(4. 5)
Pain during palpation	5(3. 9)	4(2. 9)	9(3. 3)

Continue Table 3.

Signs	Female No (%)	Male No (%)	Total No (%)
Reciprocal click	22(17.2)	17(12. 4)	39(14. 7)
Single click	23(17. 9)	29(2. 1)	52(19. 6)
Crepitus	0	0	0
Popping	3(2. 3)	1(0. 7)	4(1. 5)
Temporalis sensitivity	7(5. 4)	5(3. 6)	12(4. 5)
Masseter sensitivity	9(7. 0)	5(3. 6)	14(5. 3)
Lateral pterygoid sensitivity	10(7. 8)	5(3. 6)	15(5. 6)
Medial pterygoid sensitivity	5(3. 9)	4(2. 9)	9(3. 3)

Table 4. The frequency distribution of the different kinds of malocclusions and the parafunctional habits

Malocclusion and parafunctional habits	Status (Yes/ No)	Number	percentage	Analysis (P- value)
Protrusive Open bite	Yes	8	3	0.854
	No	257	97	
Deep bite	Yes	59	22. 3	0.66
	No	206	77. 7	
Edge to edge	Yes	24	9.1	0.201
	No	241	90.9	
Over jet More than 4 mm	Yes	30	11. 3	0.561
	No	235	88. 7	
Retrusive Cross bite	Yes	20	7. 5	0.818
	No	245	92. 5	
Side by side retrusive Cross bite	Yes	18	6. 8	0.329
	No	247	93. 2	
Middle line	Yes	92	34. 7	0.199
	No	173	65. 3	
4 or more absent teeth	Yes	50	18.9	0.115
	No	215	81.1	
premature contact in the posterior position of the mandible	Yes	119	44. 9	0. 064
	No	146	55. 1	
premature contact in the protrusive movements	Yes	80	30.2	0.421
	No	185	69.8	
Premature contact in the lateral movements	Yes	100	37.7	* 0.031
	No	165	62.3	
Incisal attrition	Yes	106	40	* 0. 017
	No	159	60	
Bruxism	Yes	77	29.1	* 0.001
	No	188	70.9	
Crowding of mandibular teeth	Yes	66	24.9	0.887
	No	199	75.1	
Crowding of maxillary teeth	Yes	69	26	0. 576
	No	196	74	

*(P-value<0.05) Statistical significant

Discussion

The present study revealed 2. 53 % of the population, showed the signs and symptoms of temporomandibular disorder which was in agreement with Khaneh Masjedi et al[5] finding.

At the other hand, the prevalence of 25% was reported in Thilander et al study [9], 2.44% in Baghaee et al[10] and 5.23% in Madani et al[3]. It seems that the difference between the results of the present and previous studies is due to different age groups. Other studies[11,12] which showed higher prevalence of TMD, the populations consisted of young mature age groups.

The varieties in the report of the prevalence of TMD are due to different evaluation methods, sample size, lack of a unified definition of TMD, lack of a clinical criterion, and a determined background in the studies. However, what is accepted is that the prevalence of TMD in teenagers and children is less than in adults, and the peak age at which TMD is highly prevalent is 25 which lessens by ageing.[13]

Despite the fact that there existed no meaningful statistical correlation between age and TMD; in the current study, it was observed that TMD is less in prevalent in teenagers, but more noticeable in people in their 20-25s. However, it has a decreasing tendency by aging which is in agreement with the studies run by Khaneh Masjedi et al.[5]

In this study, there existed a statistically significant difference between male and female population. TMD was more prevalent in females than in males. To justify this finding, different hypotheses can be presented. The most acceptable one is the female hormones. The beginning pattern of TMD after puberty and the lower probability of TMD after menopause, indicates the importance of these hormones in etiology of this disorder.[14] Other researchers also have found that the sex difference plays a less important role in childhood than in postpuberty.

As it was confirmed in other studies run by Bonjardim et al[16] de Kanter et al[17] and Miyak et al;[18] in the present research, the most common symptom was joint sound. Pain in joints and face were noticeable accordingly.

The other common symptoms were jaw deviations and joint sounds. According to de Kanter et al[17], the most common symptoms of TMD were jaw deviation and then joint sound. However, in most of the studies, the joint sound was the most noticeable symptom,[18-21] not the deviation in jaw opening.

The least common symptoms and signs were close lock and joint pain during palpation, which was similar to Thilander et al[9] and Otuyemi et al[12] reports.

In the current study, it was attempted to estimate the relationship between some of these above mentioned factors and temporomandibular disorder by assigning subjects of the study to two groups of healthy and the ones suffering from TMD. In addition, occlusal factors were studied. It was observed that there is no significant statistical relationship between different types of malocclusion including anterior open bite, deep bite, more than 4 mm over jet, edge to edge bite, unilateral or bilateral posterior cross bite, midline deviation, 4 or more absent teeth and crowding with TMD. This result is in agreement with the findings of previous studies.[5-8, 22]

Our findings indicate that among the premature contacts in different positions and movements, only premature contact in the nonworking side in lateral movements, was one of the symptoms related to TMD. This relationship was statistically significant. Williamson studied this dental contact pattern during the masticatory muscles movements.[23] In the case of no dental contact in the balancing side during lateral movements, only two masticatory muscles in working side will be active. Otherwise, four masticatory muscles would be active in balancing side as well as working side.[23] Madani & Ajami called this kind of premature contact as the most important etiologic factor leading to TMD.[3]

The other point investigated was the prevalence of bruxism in the population of this study. There was a significant statistical correlation between bruxism and TMD. Manfredini also reviewed forty six articles on the relationship between bruxism and TMD and

concluded that there was a positive relationship between them.[24] Bruxism is one of the parafunctional actions and is mostly unconscious and happens during sleeping. The forces on teeth are mostly horizontal. These forces are more likely to damage the preservative tissues of teeth. The kind of contraction in the parafunctional movements is often isometric. This non physiologic action blocks the blood flow to the muscle tissues; consequently, it leads to release of dioxide Carbon, and symptoms such as fatigue, pain, and muscle spasm reveal.[25]

Conclusion

According to the current study, almost half of the studied population suffered from TMD. They were not aware of their problem. Besides, females and the age group of 20-25 were more prone to having TMD. Deviation during opening was the most noticeable symptom and the joint sound was the main sign. Tooth wearing, bruxism, and premature contact in lateral movements can increase the risk of TMD.

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