

# TEMPOROMANDIBULAR DYSFUNCTION AND MALOCCLUSION IN SOUTH JORDANIAN CHILDREN AND ADOLESCENTS

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## ABSTRACT

*The present study reports the prevalence of symptoms and signs of Temporomandibular Dysfunction (TMD), as well as the associations between (TMD) and malocclusion traits in children and adolescents in South of Jordan in the period (2002–2007).*

*The sample comprised 1450 children (698 females and 752 males) aged 5–17 years, were grouped by chronological age and dental development stage (deciduous, early mixed, late mixed and permanent dentition). The registrations included functional occlusion (anterior and lateral sliding, interferences), dental wear, mandibular mobility (maximal opening, deflection) and temporomandibular joint and muscular pain recorded on palpation.*

*Significant associations were found between different signs of TMD and the different types of malocclusion. 24.6% of the children were found to have some form of TMD problem. Girls were more affected than boys. Symptoms and signs of TMD were significantly associated with posterior crossbite, anterior open bite, extreme maxillary overjet, mesial molar occlusion and midline displacement.*

*The most prevalent symptom of (TMD) was headache reported by (11.4%), the most prevalent signs of TMD were tenderness in the temporalis and masseter muscles (12.9%) and clicking of Temporo Mandibular Joint (TMJ) (11.7%). The most prevalent malocclusion traits associated with TMD were posterior crossbite (62.9%) and Angle Class II malocclusion (56.5%). The prevalence of clinical signs increased during the developmental stages.*

**Key words:** Temporomandibular dysfunction, Malocclusion traits, Functional occlusion

## INTRODUCTION

Temporomandibular dysfunction (TMD) is a multifactorial disturbance (inflammatory, degenerative, dysfunctional, idiopathic) of masticatory system<sup>1</sup>, diagnosed by signs and symptoms that are present:<sup>2</sup>

- Limited mandibular opening < 40mm in males and < 35mm in females
- Reduced lateral mandibular excursions of < 1 incisor width
- Joint noise and pain

- Tender muscles of mastication
- Fullness, popping or tinnitus of the ears
- Headache is often present

Categories of patients<sup>3</sup>

- Those with internal joint pathology
- Muscle spasm
- Psychogenic cases

A number of studies have shown that functional disturbances of the masticatory system in children and adolescents are common and seem to increase with

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age. Most of these studies report a high frequency of clinical signs of dysfunction (e.g, clicking and tenderness of masticatory muscles on palpation) as well as subjective symptoms. The reported prevalence, however, vary greatly, probably due to variations in number and age of the subjects examined, methods used and diagnostic criteria. Furthermore, the terms parafunction and dysfunction are often confused and consequently no distinction between mandibular dysfunction and orofacial parafunction is made in some studies. More confusing is the fact that parafunctions are sometimes included as subjective symptoms and sometimes as clinical signs. Since the cause of TMD in children as well as in adults is obviously multifactorial, prevention of such disorders alone seldom warrants a decision to start orthodontic treatment. A difficulty in this context is that we not only have to deal with the malocclusions present in the young dentition but also have to predict the long-term development of the occlusion. Though the role of morphological and functional occlusion as contributing factors in the development of TMD has been discussed during the last decades, there are still different opinions about the relative importance of occlusion to other contributing factors.<sup>4-6</sup> Even if much controversy has been reported regarding the role of occlusion on TMD, there is, however, no doubt that occlusal variables influence natural masticatory muscle function. During puberty, with intensive skeletal growth and increasing muscular strength, discrepancies in the mutual timing of these two elements as well as of tooth eruption may influence the intermaxillary relationship, which may have an effect on the occlusal stability. Comprehensive fixed-appliance orthodontic therapy performed during adolescence does generally not increase or decrease the risk of developing TMJ disorders in later life.

**METHODOLOGY**

A sample of 1450 children (698 girls and 752 boys) (5–17 years old) randomly selected from a population that attended the Orthodontic Clinics at Princess Haya Al-Hussein Hospital and Prince Zeid bin Al-Hussein Hospital in the period (2008–2011).

The subjects were grouped by chronological age, and the stage of dental development (deciduous, early mixed, late mixed and permanent dentition). All sub-

jects were examined clinically. The registrations included functional occlusion (anterior and lateral sliding, interferences), dental wear, mandibular mobility (maximal opening, deflection) and temporomandibular joint and muscular tenderness recorded by palpation. All subjects were already having dental and or skeletal malocclusion. Subjects were classified according to their type of malocclusion and whether they had any posterior crossbites. A comparison was made between different types of malocclusions and the associated signs and symptoms of TMD.

**RESULTS**

Data were collected, analysed, statistically calculated and represented in tables 1–4.

TABLE 1: GENDER DISTRIBUTION OF 1450 SUBJECTS (N) RELATED TO CHRONOLOGICAL AGE

Age (years)	Girls		Boys	
	n	%	n	%
5	50	3.4	48	3.3
6	30	2.0	33	2.2
7	50	3.4	56	3.8
8	40	2.7	54	3.7
9	52	3.5	48	3.3
10	55	3.7	66	4.5
11	58	4.0	70	4.8
12	43	2.9	46	3.1
13	56	3.8	60	4.1
14	30	2.0	38	2.6
15	87	6.0	85	5.8
16	82	5.6	87	6.0
17	65	4.4	61	4.2
Total	698	48.1	752	51.9

TABLE 2: GROUPING OF SUBJECTS ACCORDING TO SPECIFIED STAGES OF DENTAL DEVELOPMENT

Stage of Dentition	Girls		Boys	
	n	%	n	%
Deciduous	123	8.5	114	7.9
Early mixed	210	14.5	234	16.1
Late mixed	150	10.3	204	14.1
Permanent	215	14.8	200	13.8

TABLE 3: PREVALENCE OF TMD AND HEADACHE IN THE SAMPLE EXAMINED (698 GIRLS AND 752 BOYS) GIVEN IN PERCENT

	Girls	Boys	Total
<b>TMJ pain on palpation</b>			
Grade 1	4.6	3.3	4.0
Grade 2	0.1	0.1	0.1
<b>Clicking</b>			
Palpable	10.8	7.9	9.3
Audible	0.8	0.6	0.7
Locking	1.6	0.9	1.3
Luxation	0.6	0.2	0.4
<b>Muscle pain on palpation</b>			
Masseter grade 1	6.3	4.5	5.4
Masseter grade 2	0.5	0.0	0.3
Temporalis grade 1	7.6	5.7	6.7
Temporalis grade 2	0.7	0.3	0.5
Headache	14.2	8.7	11.4

TABLE 4: PREVALENCE OF TMD IN DIFFERENT MALOCCLUSIONS, GIVEN IN PERCENT; NUMBER OF CHILDREN (N) WITH DIAGNOSED MALOCCLUSION

Malocclusion Angle's	n	TMD		
		None	Mild	Moderate
Class I	980	74.9	22.4	2.7
Class II: 1	320	71.2	25.8	3.0
Class II: 2	98	72.3	24.8	2.9
Class III	52	68.1	27.6	4.3
Bimaxillary protrusion	352	67.4	29.9	2.7
<b>Overjet</b>				
<0 mm	204	75.3	22.3	2.4
4-6 mm	793	71.3	25.4	3.3
>6 mm	120	66.2	30.4	3.4
<b>Overbite</b>				
<0 mm	319	63.6	29.6	6.8
4-6 mm	702	74.2	24.7	1.1
>6 mm	64	70.9	26.3	2.8
Posterior crossbite	162	37.1	53.6	9.3

DISCUSSION

The differences of the prevalence of signs and symptoms of TMD, not only between various populations but also within samples of the same population and of the same chronological ages may depend on methodological registration criteria and variations in the registration reproducibility of the examiners. In the present epidemiological study of 1450 subjects, inter and intra-observer test was performed before the start of the study, ending up in a satisfactory conformity for those variables, which were registered in the final examination. It is important to note that the present results are unambiguous regarding differences between various developmental occlusal stages. When comparing the prevalence of signs of TMD in the early mixed, late mixed and permanent dentitions, the cross-sectional nature of the present study must be taken into account. The sample was sufficiently large to demonstrate average changes in the prevalence of signs from one dental stage to another, gender differences in prevalence of certain clinical signs were demonstrated also in the various dental stages, indicating higher frequencies for girls than boys. Gender differences in prevalence of clinical signs of TMD could probably be explained by psychological factors, girls may be more sensitive to tenderness and pain on palpation of the TMJ and muscles. Other factors may also be crucial and it is well known from TMD studies in adults that women are more affected than men. Significant associations were found between different signs of TMD. Displacement of the mandible seems to be an important factor in the present study. Sliding of the mandible laterally, from rest position (RP) to maximum intercuspation position (MIP), will explain the significant association between TMD and posterior crossbite and hence the association with clicking and muscle tenderness. Sliding of the mandible, anteriorly as well as laterally, is unfavourably influenced by nonworking-side interferences. Dental wear was common in the present study and also was associated with TMJ pain and muscle tenderness, which was most frequent in boys. Headache was also associated with muscle pain, but whether muscle pain gives rise to headache or vice versa is an open question.<sup>7-10</sup> Besides posterior crossbite, TMD was also associated with Angle Class III, anterior open bite and extreme maxillary overjet. The desirability of initiating orthodontic measures at an early age is becoming more generally

accepted. Thus, subjects with a morphological malocclusion (e.g, posterior crossbite, Angle Class III, anterior open bite, extreme maxillary overjet) should be treated orthodontically at an early age to take advantage of the craniofacial growth and thereby achieve the greatest possible adaptation in function and to eliminate the traits of the anomaly. The question of whether or not such measures will prevent development of TMD or even reduce TMD signs and symptoms in these patients is still open to discussion, since the cause of mandibular dysfunction is obviously multifactorial.<sup>15</sup> Functional disturbances of the masticatory system were recorded in 24.6% of the present children and adolescents, most of them being mild in character. Girls were in general more affected than boys.<sup>11</sup> The prevalence of clinical signs increased during the developmental stages.

## CONCLUSION

TMD was significantly associated with posterior crossbite, Angle Class II malocclusion, anterior open bite and extreme maxillary overjet. These morphological malocclusions should be treated orthodontically at an early age. The question of whether or not such measures also will prevent development of TMD or decrease the TMD signs in such patients is still open to discussion since the cause of mandibular dysfunction is obviously multifactorial. Significant associations were found between different signs of TMD.

Functional disturbances of the masticatory system were recorded in 24.6% of the present children and adolescents, most of them being mild in character. Girls were in general more affected than boys. The prevalence of clinical signs increased during the developmental stages. TMJ signs and symptoms occur in healthy individuals including children and adolescent. There is no evidence that orthodontic treatment can

care TMJ disorders. Also there is no evidence of an elevated risk of TMD associated with any particular type of orthodontic treatment. Thus far there is little evidence that orthodontic treatment can prevent TMD.

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