ORIGINAL ARTICLE

ROLE OF MALOCCLUSION IN TENSION TYPE HEADACHE

[1]IBRAHIM AL-SHORMAN, BDS (Iraq), JDB (Jordan)
[2]NABEEL SHDEIFAT, BDS (Jordan), JDB (Jordan)

ABSTRACT

The purpose of this study was to clarify the role of occlusal traits in recurrent tension-type headache without signs or symptoms of temporomadibular disorders in adolescents to facilitate more evidence-based therapies in the treatment of tension-type headache. This cross sectional study was carried out on a total of 600 adolescents from Jan 2007 to Oct 2010 at Prince Rashid bin Al-Hasan Hospital, Irbid province of Jordan. A complete headache group of 25 adolescents were recruited in this study. A control group of 25 adolescents was obtained, equally matched to the headache group for gender and closely matched for age and dental classification. The data collection comprised of a structured questionnaire answered by the patients and a subjective evaluation about their emotional state. A specific questionnaire for temporomandibular disorders was applied, followed by a clinical examination. Plaster models were made during orthodontic initial records for each patient to obtain certain occlusal traits measurements. On the basis of the results obtained in this study, it was concluded that overbite problem (p = .031), overjet problem (p = .037) and posterior crossbite (p = .047) were displaying statistically significant associations (p <.05) with significantly increased risk (>2.7:1) of tension type-headache.

Key words: *Malocclusion, Primary tension-type headache, Temporomandibular disorders*

INTRODUCTION

Tension-type headache (TTH) is the most prevalent primary headache disorder and frequently reported symptom of temporomandibular disorders (TMD).[1-3] The prevalence of TTH ranges from (0.5 to 72.8%).[4,5] Unfortunately, TTH is the least studied of the primary headaches despite it is a medico-social and, ultimately, an economical problem, which has a profound impact on the quality of life for adolescents.[1,6]

The form, function and pathofunction of the dynamic masticatory system comprises one of the most fascinating, basic and important areas of study in dentistry. There is a functional homeostatic balance between the teeth, periodontium, masticatory and cervical musculature, temporomandibular joint (TMJ) structures and the psyche of each individual. This balance may be disrupted by a number of factors acting either alone or in combination resulting in the expression of signs and symptoms associated with TMD.[7] Currently, TMD is considered not a single entity, but a complex biomechanical, neuromuscular, neurobiological and biopsychosocial phenomenon of varying aetiology and pathology. The aetiology of TMD is multifactorial, and is usually cumulative consequence of a multifactorial process. TMJ internal derangement, joint effusion, bruxism, stress, malocclusion, trauma, abnormal breathing patterns and Borrelia burgdorferi spirochaetes have been suggested as possible aetiologic factors.[8-13] The present study was focused strictly on the possible relationship of TTH which could not be attributed to any other disorders rather than malocclusion. If a malocclusion pattern is found to be associated with TTH, then it might be postulated that correction of the malocclusion would provide headache relief.

METHODOLOGY

The study involved 600 adolescents, (350 female and 250 male), aged (14-18) years, who came for orthodontic treatment in Prince Rashid bin Al-Hasan Hospital in a three years period (2007–2010). The protocol for this study was approved by the Human Research Ethics Committee at the Royal Medical Services in Jordan. Specific headache area of target was recurrent

[1] **Correspondence:** Specialist Orthodontics, King Hussein Medical Center, Amman–Jordan, E-mail: dribraheemn@yahoo.com, Tel: 0777419529

[2] Specialist Orthodontics, King Hussein Medical Center, Amman–Jordan

TTH which could not be attributed to any other disorder rather than malocclusion in adolescents with no recorded signs and symptoms of TMD. In this study, information on headache was assessed identically by standardized face-to-face interviews. The 600 adolescents were given a standardized headache questionnaire which was based on the "The International Classification of Headache Disorders, 2nd edition criteria" (ICHD-II). Headache fulfilling all required criteria was classified as complete TTH. If one criterion was missing, headache was defined as probable TTH. The standardized headache question module enabled the ascertainment of the 6-month headache prevalence in general and the 6-month prevalence of complete TTH and probable TTH.[1] The complete (ICHD-II) group of 25 adolescents (15 female, 10 male) was identified based upon required responses that would classify them for TTH with no recorded signs and symptoms of TMD. The diagnosis of TTH was based on a detailed history, and meticulous clinical examination. Clinical and articular examination for each patient was performed to rule out TMD. Articular variables (clinical signs of dysfunction), including tenderness on palpation of the TMJ and the masticatory muscles, the existence of a mandibular deviation on maximal opening, the presence of TMJ sound (clicking and popping, heard with a stethoscope) and articular mobility (maximal opening, maximal right and left movements, maximal protrusion), were examined. Palpations were carried out on the anterior, middle and posterior fibers of the temporalis, the coronoid process, the TMJ lateral and posterior aspects, the deep and superficial masseter (anterior part, body, gonial part), the styloid process, the anterior belly of the digastric muscle and the medial and lateral pterygoid muscles. Individual variables consisting of functional variables (including functional malocclusion, various parameters in relation to masticatory function, orofacial dysfunctions and parafunc-tions) and morphological variables (morphological malocclusion) were also evaluated.[14,15]

Exclusion criteria included: history and/or treatment for any signs or symptoms of any form of TMD, previous orthodontic treatment, currently or previously taking medication for headaches, diagnosed or treated for migraine headaches, history of neurological disorder, history of craniofacial disorder, head or neck trauma and head or neck surgery. A control group of 25 adolescents was selected based upon a response of no headache, equally matched to the headache group for gender and closely matched for age and dental classification. The results of the grouping are presented in Table 1. Plaster models made during orthodontic initial records for each patient were used to calculate the following occlusal trait measurements: Angle's classification, maxillary overjet, mandibular overjet (reverse overjet), anterior crossbite, posterior crossbite, scissors bite, overbite, openbite, crowding, spacing and dental midline discrepancy. The criteria for when a patient was considered to have an occlusal trait problem were identified by past research and reviews.[3,16] For statistical purposes, patients with maxillary overjet $\geq$ 0 mm were initially classified into one group as having an overjet problem. Similarly, patients with overbite $\geq$ 5 mm or open bite $\geq$ 0 mm were classified into one group as having an overbite problem. Crowding $\geq$ 2 mm, spacing $\geq$ 2 mm and dental midline discrepancy $\geq$ 2 m. The absolute measurements of each tooth and each arch length segment were summed and reported to the nearest 0.5 mm by using a digital caliper which was accurate to 0.01 mm.

RESULTS

The assessment of an association between subjects with a problem and the occurrence of headache was determined by contingency table analysis and a summary of the results is presented in Table 2. All assessments showed higher prevalence for headache in the sample group than in the control group. The data were analyzed using SPSS software version 17 for statistical analysis (Statistical Package for Social Sciences, SPSS Inc., Chicago, Illinois, USA), the level of significance tested was ($p < 0.05$). Statistical analysis consisted of (P-value) contingency table determination of associations between occlusal trait measurements and subject group. Statistically significant indications of increased risk of headaches for the sample group are seen for overbite ($p = .031$), overjet ($p = .037$) and posterior crossbite ($p = .047$). No association was found between

TABLE 1: DESCRIPTIVE STATISTICS OF STUDY GROUPS

	Headache group	Control group
Age		
Average	15 y 6m	15 y 4m
Range	13 y 10m – 18 y 2m	13 y 10m– 18 y
Gender	15 F 10 M	13 F 12 M
Angle's classification of malocclusion		
Class I	11	15
Class II	10	8
Class III	4	2

TABLE 2: RESULTS OF THE (P-VALUE) CONTINGENCY TABLE ANALYSES

Problem	Prevalence		p-value
	Headache group %	Control group %	
Overjet	48	20	.037
Anterior crossbite	28	20	.051
Posterior crossbite	36	12	.047
Scissors-bite	4	4	1.00
Overbite	44	16	.031
Crowding			
Mandibular	44	36	.564
Maxillary	40	32	.556
Spacing			
Mandibular	16	12	.684
Maxillary	12	8	.637
Midline	28	20	.508

Angle's classification of malocclusion with the headache group: (p = .399).

DISCUSSION

"The International Classification of Headache Disorders, 2nd Edition", classifies headaches in a hierarchical manner which allows physicians and researchers to assign diagnoses in a progressive manner from broad to very specific. TTH is included as one of four primary headache types including: migraine, tension-type, cluster headache and other trigeminal autonomic cephalagias. TTH is the second of this group, and thus all subdivisions begin with the number two. The subdivisions of tension headache are the following: 2.1 infrequent episodic tension-type headache, 2.2 frequent episodic tension-type headache, 2.3 chronic tension-type headache, 2.4 probable tension-type headache.[1] The underlying pain mechanisms in TTH are highly dynamic and the outcomes of these mechanisms seem to be varied in frequency and intensity among different individuals and even the same individual over time. The initiating stimulus can be mental stress, anxiety, motor stress, a local myofascial release of noxious stimuli or the accumulation of endogenous substances. The underlying pain mechanism may therefore be an effect of temporal or spatial summation of peripheral stimuli that leads to an altered central nervous system (CNS) response and possibly leads to central sensitization which is probably the most important key for understanding the etiology of TTH. The relationship between primary headaches and TMD signs and symptoms could arise from the fact that both conditions share the same pathophysiological pain pathway (trigeminal system) to the CNS.[11,17-21]

The correlation between recurrent TTH and TMD has been well established. As a matter of fact, studies show that TTH is frequently the most common reported TMD complaint[1-3] and TMD patients have been shown to experience more frequent and more severe headache.[8,16,19,21] One of the topics of greatest debate relates to the association between occlusal factors as a causal role and TMD. Upon review of the available literature it is clear that there is a relatively weak association between malocclusion as a causal factor and the development of TMD, the degree to which it may play a role has not been definitively delineated. A recent published study in Angle Orthodontist entitled "TMD in Relation to Malocclusion and Orthodontic Treatment", the purpose of this study was to answer the question "are signs and symptoms of TMD related to malocclusion or orthodontic treatment?" After an extensive review of 58 articles, the authors found that associations between specific malocclusions and the development of significant signs and symptoms of TMD could not be verified.[22]

A multiple logistic regression analysis to compute the odds ratio for 11 common occlusal features for asymptomatic controls as related to 5 TMD subgroups found several occlusal factors to demonstrate odds risk ratio of at least 2, the authors suggested that occlusal factors were related to TMD in only 15% of cases. These occlusal features that were identified to be potentially related include anterior open bite, overjet greater than 6 mm, centric relation/intercuspal position (CR/IP) slide greater than 4 mm, unilateral lingual crossbite and 5 or more missing posterior teeth. Other occlusal schemes were not found to be statistically significant.[23]

Another recent publication reported on the association between morphologic occlusion and functional occlusal factors and TMD symptoms. In this study, 4310 subjects were evaluated, no specific occlusal factor was found to be significantly associated with TMD symptoms. However, parafunction demonstrated a positive relationship to TMD symptoms (odds ratio 3.4).[24] Farelle et al[25] suggested that unilateral posterior crossbite is not a risk factor for TMJ disk displacement. Mohlin et al[26] found that crowding of teeth was the only separate malocclusion trait showing significant correlation to TMD. Proffit[27] stated, "the prevalence of TMD in the population is between 5% and 30%, which is less than

the number of people with moderate degrees of malocclusion (50% to 75%). It was estimated that the overall contribution of occlusal factors in defining TMD patients is (10-20%).[23] Thus, (80-90%) of TMD parameters are left unexplained by the occlusion. However, if malocclusion is (10-20%) responsible for TMD and TTH is the most common symptom reported TMD complaint, perhaps there are specific malocclusions that can be directly correlated to TTH, and thus the correction of such conditions may alleviate the headaches.

It is concluded that the scientific literature has not convincingly demonstrated a definitive relationship between static occlusal factors and TMD. Therefore, TMD could not be correlated to any specific type of malocclusion.

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