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## Original Research Article

### The prevalence of Temporomandibular disorders among a group of Libyan dental students.

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#### ABSTRACT:

**Background:** It has been reported that Temporo-Mandibular-disorders (TMD) is the most common orofacial pain source of non-dental origin. The aim of this cross-sectional observational study is to explore the prevalence of signs and symptoms of TMD among a group of dental students in Benghazi-Libya.

**Methods:** The examined group comprised 100 students [17 males and 83 females; mean age:  $24.8 \pm 2.23$  years. The assessment was undertaken following Helkimo's measures. The prevalence and severity of TMD was determined using a self-reported anamnestic questionnaire and clinical examination. Descriptive statistics was employed to explore the frequencies of the examined variables. Linear correlation coefficient was conducted between the reported symptoms and recorded signs and between the reported symptoms and the clinical dysfunction scores (CDS). The level of significance was set at  $P < 0.05$ .

**Results:** A total of 37% of the students reported some level of TMD symptoms [32% mild (Ai1); 5% severe (Ai11)]. On the other hand, majority of the students (93%) demonstrated a range of TMD signs [76% mild (Di1); 17% moderate (Di11)]. Although linear correlation coefficient between the reported symptoms (Ai) and the recorded signs (Di) ( $r=0.32$ ) and between the reported symptoms (Ai) and the CDS ( $r=0.37$ ) were low, they were statistically significant ( $P < 0.05$ ).

**Conclusion:** Mild to moderate prevalence of TMD appears to exist among Libyan dental students.

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**Keywords:** Libya, Benghazi, Dental Students, Tempromandibular joint, Tempromandibular-disorder.

## INTRODUCTION

Tempromandibular disorder (TMD) is a term used to describe a heterogeneous group of correlated anomalies involving the Tempromandibular Joint (TMJ), cranio cervico facial muscles and occlusion, all of which have shared symptoms of orofacial pain, articular clicking as well as impaired jaw movement [1-3].

It is generally accepted that the aetiology of TMDs is multifactorial, including craniofacial causes (such as: changes in the TMJ, dysfunction of the masticatory muscles, occlusal interferences, bruxism and tooth loss) [2,4-6], generalized factors (such as immune-mediated systematic diseases and neoplastic tumors) [7], Psychological stress [8] or a combination of the reported features [2,4-6]. Oral prosthesis, orthodontic management, orthognathic surgery as well as mandibular fracture have been linked to TMJ alterations and worsening of present TMD [9]

It has been reported that TMD is the most common orofacial pain source of non-dental origin [10], and the second most prevalent musculoskeletal condition, subsequent to chronic lower back pain, that might lead to pain and disability [10]. The estimated prevalence of TMD at a population level varies between 12% and 50% [4,11-14]. This wide prevalence discrepancy might be attributed to variations in the examined races, different study designs and lack of homogeneity in the diagnostic criteria [5], as well as to the environment in which subjects are examined [8]. Furthermore, TMD appears to be relatively common, occurring in young and middle-aged adults (20-40 years of age), rather than in children and the elderly [15].

The diagnostic assessment of the TMD presents a challenge to the researchers and clinicians because of the broad range of musculo-skeletal, inflammatory, and dental disorders that can be manifested in the TMJ [8,16]. Furthermore, a

simple appraisal remains difficult because of the absence of uniform assessment criteria.

A number of TMD evaluation tools have been proposed in the literature. One of the most widely used is Helkimo's index [17] which combines anamnestic and clinical dysfunction indices. However, a universal assessment measures have yet to be recognized [5,8].

Whilst the prevalence of TMD has been extensively reported in western countries, similar studies in the Arab world are less frequent [3,18-21]. The literature search on key words such as TMJ, TMD, Libyans, students revealed that there were no published studies on TMD for Libyan subjects [September 2016]. Therefore, the aim of the present study was to examine the prevalence of signs and symptoms of TMDs among a group of Libyan dental students in Benghazi, using questionnaires and clinical examination.

## METHODS AND MATERIALS

This was a cross-sectional observational study. The examined cohort comprised 100 students attending the Faculty of Dentistry in Benghazi-Libya; 17 males and 83 females with an age range from 21 to 30 years.

The examined students were of Libyan descent for at least two generations with no history of chronic illness, craniofacial abnormality, systematic disease or hypodontia. None had a history of either tooth extraction or orthodontic treatment and none was on medication.

A functional assessment was undertaken using the Helkimo clinical dysfunction (Di) and anamnestic (Ai) indices [17]. The anamnestic questionnaire composed of ten questions. The questions explore the possibility of the presence of pain in the TMJ, pain in the head and neck while chewing, parafunctional habits, movement limitations, joint clicking, Subsequently the findings were categorized according to the anamnestic dysfunction index to (Ai) as 0, I, or II. While Ai0 comprised individuals with subjectively symptom-

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free, Aii and Aiii characterize those presented with mild and severe symptoms of TMD correspondingly.

The clinical examination included the assessment of the following; 1- Maximum opening of the mandible taking into consideration the measurement of the overbite (or openbite) while examining any deviation of the mandible during opening movement 2- Protrusive movement of the mandible in view of the measurement of over jet. 3- Right and left lateral mandibular excursions. All measurements were computed in millimeters (mm) and were obtained by a digital caliper with a sensitivity of 0.01mm. Each movement was repeated three times in order to compare the values and record the average score. The TMJs were assessed for sound and pain. The masticatory muscles (temporalis, masseter, medial pterygoid) were palpated for tenderness and the lateral pterygoid muscle was assessed against forced contraction. Subsequently, the results were categorized following the clinical dysfunction index; Di of point zero (Di0) for subjects with clinically sign-free; DiI (1-4 points) and DiII [5-9] respectively for subjects with moderate and severe signs of TMD correspondingly. The occlusal components were beyond the scope of this study.

The clinical examination was undertaken by one consultant (M.M) who has significant experience in TMD clinical assessment. The use of one examiner ensured the consistency of the procedure and uniformity of the interpretation of the responses provided by the subjects.

#### STATISTICAL ANALYSIS

The collected data were coded and entered into an Excel 2010 spread sheet. Statistical analysis was undertaken using SPSS, Chicago, Illinois version 17. Descriptive statistics, Frequency and percentage of each variable were computed. The positive answers in each score were added and the percentage means were computed. Correlation coefficients between both scores were calculated. Statistical significance was set at the level  $P < 0.05$ .

An intra-examiner reliability study was carried out to confirm the consistency of the results. Twenty students were randomly selected for repeated clinical assessment on the same day of the first examination to minimize the possibility of symptoms variability. The average intraclass Correlation Coefficient (ICC) of all variables was found to be greater than 0.90, indicating an excellent level of agreement between the two examinations.

#### RESULTS

The examined subjects were 100 students (83 males and 17 females; (mean age= 24.8, SD=2.23). Unpaired Student *t*-test showed that there was a significant statistical male/female discrepancy ( $P > 0.05$ ). Thus further statistical analysis to evaluate sex differences in the prevalence of TMD could not be undertaken and the data were pooled together for further analysis.

Figure 1 shows that whilst 63% of the participants had no TMD symptoms (Ai0), 32% reported mild symptoms (Aii). On the other hand, just 5% described the existence of severe TMD symptoms (Aiii).

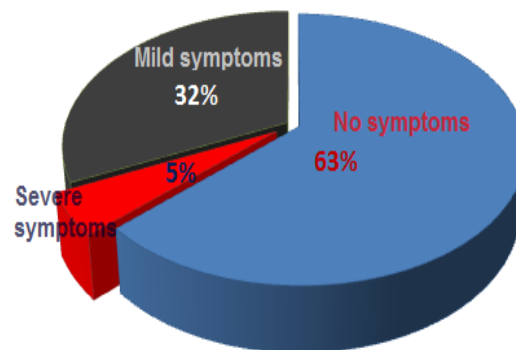
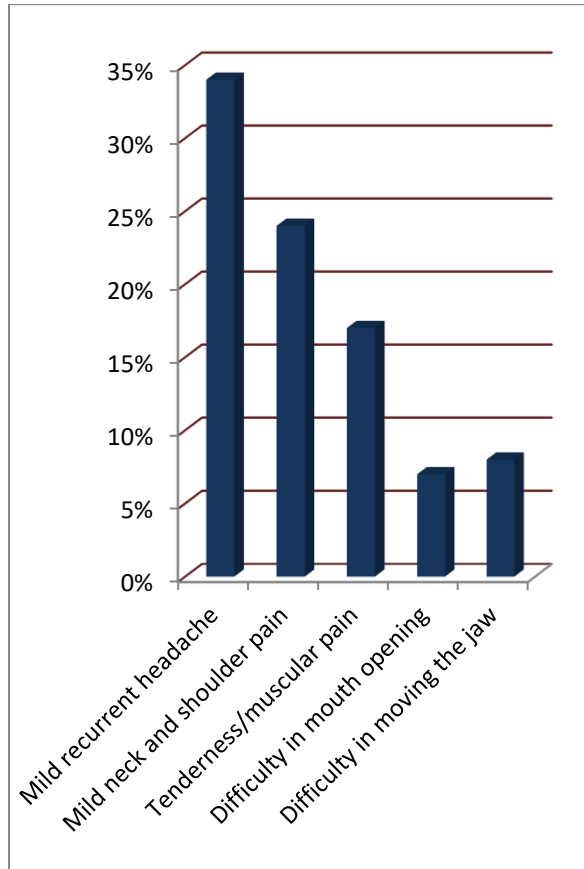


Figure 1: Pie chart displaying the percentage (%) of recorded symptoms of the tempromandibular disorders

Figure 2 illustrates that out of the ten explored symptoms pain was the most featured at 55%; minor neck aches and shoulder pain (24%),

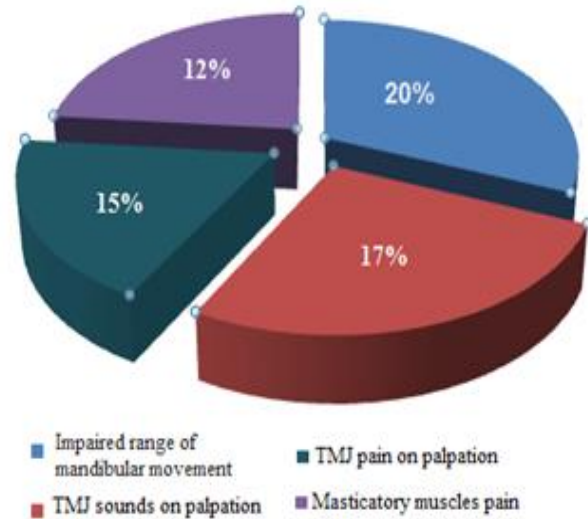


tenderness and or muscular pain (17%) and slight pain in or around the ear (14%). Mild recurrent headache was the second most reported symptom in 34%. The least described symptom was slight difficulty in opening the mouth (7%) and minor difficulty in moving or using the jaw (8%).



**Figure 2: Bar graph displaying the percentage (%) of the most recorded symptoms of the Temporomandibular disorders**

Assessment of the signs of the TMD among the examined participants revealed that impaired range of movement was the most frequently recorded (20%) followed by TMJ sounds during movement (17% out of which 9% were bilateral). Furthermore, only 15% of the participants had joint pain during movement (out of which only 3% suffered from bilateral TMJ pain). Masticatory muscle pain during palpation was the least observed sign (12%) (Figure 3).



**Figure 3: Pie chart showing the percentage (%) of subjects with recorded signs of Temporomandibular disorders**

The clinical dysfunction scores revealed that 7% of the examined cohort had no signs of TMD (Di 0), 76% demonstrated mild dysfunction symptoms (DiI), while only 17% showed signs of moderate clinical TMD (DiII). None of the participants revealed severe TMD clinical signs.

The linear correlation coefficient ( $r$ ) between the reported symptoms ( $A_i$ ) and the recorded signs ( $D_i$ ) was 0.32, and between the reported symptoms ( $A_i$ ) and the clinical dysfunction score (CDS) was 0.37. Although these values were low, they were statistically significant ( $P < 0.05$ ).

The outcome of the assessed three dimensional mandibular movements (Table 1) showed that just over half of the examined subjects (51%) demonstrated maximum mouth opening capacity of 40 mms or more while only 2 patients (2%) had restricted vertical movement. Furthermore, over 40% of the participants had the potential of eccentric mandibular movement of 7mm or more (right side 48%; left side 44%). Moreover, 13% had restricted eccentric lateral movement towards the right side and 10% towards the left side. Almost one third of the participants (30%) demonstrated the potential of protrusive mandibular movement

of 7mm or more, while only 16% of the sample had limited protrusive movement of zero to 3mm.

**Table 1: Displaying the percentage (%) of participants maximum mandibular opening, (mm) maximum eccentric mandibular movements (right and left) and maximum protrusive capacity of the sample.**

VARIABLES	PERCENTAGE %
<i>MAXIMUM VERTICAL OPENING</i>	
≥40MM	51
30-40MM	47
<30MM	2
<i>MAXIMUM RIGHT LATERAL MOVEMENT</i>	
≥7MM	48
4-6MM	39
0-3MM	13
<i>MAXIMUM LEFT LATERAL MOVEMENT</i>	
>7MM	44
4-6MM	46
0-3MM	10
<i>MAXIMUM PROTRUSION</i>	
>7MM	30
4-6MM	45
0-3MM	16

## DISCUSSION

This cross-sectional study firstly examined a sample of Libyan dental students to derive a preliminary data on the prevalence of signs and symptoms of TMD using anamnestic questionnaires and clinical examination. Most of the approached students declined to participate due to the fragile security status when the study was conducted. Thus, the present group was considered a convenient sample and the number was accepted as a pilot study with a recommendation for further study with greater sample size.

The present findings might offer an insight to the health care practitioner to detect the presence of TMD in their patients. Furthermore, the current findings would provide a reference for comparison with other similar studies and for future national research with larger sample size and representable male/female numbers.

This questionnaire was designed to evaluate the anamnestic and clinical dysfunction indices according to Helkimo's epidemiological index [17]. Helkimo's index [17] includes five frequently observed physical signs and symptoms to score. This index remains the most widely used scoring system in TMD research, but it is not without serious flaws related to its validity. This limits its wide-ranging applicability. Van Der Weele and Dibbets [22] explained that it seems that a random set of cut-off standards for the varied groups within the subcategories have been selected, yet not weighed accordingly. Furthermore, it's analysis is limited only to one dimension [22]. They concluded that although Helkimo's index [17] might be a seminal tool in the evaluation of TMD, more work is required to enhance its efficiency.

It had been noticed that the peak of prevalence of TMD symptoms is between 20-40 years of age, with a lower prevalence in younger and older cohorts [5,23]. Therefore, this study was planned to examine subjects within this age group. Furthermore, students are voluntarily available and easier to recruit. However, their dental background could influence the results of the study [24].

The recruited females in the present study (83) were significantly more than males [17]. This discrepancy limited the possibility of undertaking statistical analysis for each sex separately. Manfredini et al. [5] confirmed in their systemic review and a number of other studies [25,26] reported as well that treatment-seeking individuals with TMD were mainly females.

Whilst 63% of the present subjects had no symptoms of TMD (Ai0), 32% presented with mild symptoms (Ail) and only 5% suffered from severe symptoms (Aill). A similar trend was observed in

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subjects with comparable age groups from Jordan [18] at 63%, 21.5% and 15.5% respectively and from Niger [24] at 70%, 26.3% and 2.9% correspondingly. All the reported groups were assessed by the same method (the anamnestic questionnaire). Other studies noticed lower prevalence of TMD in their countries; 12% in Finish subjects [27], 57% in Egyptians [28] and 53% in Brazilians [26].

Interestingly, great discrepancies in the frequency of TMD clinical signs were noticed in the literature. While Finish [27], Jordanians [18] and Nigerians [24] showed prevalence of 61%, 62.8% and 68.8% respectively, lower values were observed in Tanzanian (40%) [29] and Iranian (37%) [20] samples. The higher values of TMD clinical signs in Libyan subjects revealed in the present study (95%) might be attributed to the observed high percentage of impaired range of mandibular movements (61% limited protrusion, 56% restricted lateral movement and 49% impaired vertical movement). Although, there is no clear reason for such high prevalence of clinical signs of TMD in Libyan students, the level of stress they are exposed to and their psychological wellbeing for living in an unstable city (Benghazi) might be the main reason for the high TMD. Bonjardim et al. [2] reported a significant association between their examined group of university students and psychological status. Conducting another study with greater sample size, and when the country is more stable might be more informative.

It is generally accepted that pain is a significant symptom of TMD and the main cause for seeking treatment [30]. In this study pain was the most reported symptom (27%), followed by headache (20%) and then TMJ sounds (17%). The percentage of pain symptoms is considered the highest in the literature. North Americans and European studies showed that clinically detectable pain was found in 3% and 18% respectively of their examined subjects of similar age group to our students [17,31-33]. Furthermore, 13.1% of the examined Jordanian subjects had TMJ pain [18], as well as 5.5% of Nigerian students [24]. This high incidence

of pain in the Libyan subjects might be a result of their increased stress due to the unstable security status and their worries of how this might negatively affect their study and future. Furthermore, Isong et al. [34] reported that pain threshold of TMD varies considerably by race, sex, age and socioeconomic status.

Up to date, the normal range of the three dimensional mandibular movement in Libyan subjects have not been investigated. Thus, the outcome of this analysis has to be interpreted with caution and the significant but weak correlation coefficient between the noted signs and the described symptoms, in addition to the clinical dysfunction score do not principally designate that a significant percentage of the cohort suffer from TMD. This makes our results open to various interpretations.

Although our study provides some information about the prevalence of TMD among Libyan dental students, long term clinical studies with greater sample size should be considered in this domain. Early diagnosis and prevention of future complications associated with TMDs is the key for successful TMD treatment.

## CONCLUSION

In this study, mild to moderate prevalence of TMD appears to exist among this examined cohort of Libyan university dental students in Benghazi. Pain was the most common reported symptom, while impaired range of movement was the most frequently recorded sign. Special attention and follow up should be paid to those subjects who had received diagnoses of TMD.

## CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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temporomandibular disorders. Journal of dental research. 1995;74(11):1738-44.

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## ملخص باللغة العربية

انتشار الاضطرابات الصدغية الفكية بين مجموعة من طلاب طب الأسنان الليبيين.

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### خلفية:

تعتبر اضطرابات الصدغية الفكية مصدراً للألم الأكثر شيوعاً من أصل اضطرابات الأسنان. الهدف من هذه الدراسة استكشاف انتشار علامات وأعراض اضطرابات الصدغية الفكية بين مجموعة من طلاب طب الأسنان في بنغازي ليبيا.

### الطرق:

تضمنت المجموعة التي تم فحصها 100 طالب [17 ذكور و 83 إناث]. كان متوسط العمر:  $24.8 \pm 2.23$  سنة. وقد أجري التقييم باستخدام مقاييس هلكيمو Helkimo's. تم تحديد انتشار وشدة اضطرابات الصدغية الفكية باستخدام استبيان أنامنيستيك المبلغ عنها ذاتياً من قبل المريض وكذلك عبر الفحص السريري. وقد استخدمت إحصائيات وصفية لاستكشاف ترددات المتغيرات التي تم فحصها. كما تم حساب معامل الارتباط ما بين الأعراض والعلامات المسجلة، وكذلك ما بين الأعراض التي تم الإبلاغ عنها وعجز الوظائف السريرية. تم تحديد مستوى الدلالة عند  $P < 0.05$ .

### النتائج:

أبلغ ما مجموعه 37% من الطلاب عن مستوى معين من أعراض اضطرابات الصدغية الفكية (32% خفيفة و5% شديدة). من ناحية أخرى، أظهرت الفحوص الإكلينيكية أن غالبية الطلاب (93%) يعانون من علامات اضطرابات الصدغية الفكية (76% خفيفة و17% معتدلة). على الرغم من أن معامل الارتباط الخطي بين الأعراض المسجلة والعلامات المسجلة ( $r = 0.32$ ) وما بين الأعراض المبلغ عنها وعجز الوظائف السريرية ( $r = 0.37$ ) كانت منخفضة، غير أنها كانت ذات دلالة إحصائية مقبولة ( $P < 0.05$ ).

### الاستنتاج:

هناك انتشار من بسيط إلى معتدل لأعراض اضطرابات الصدغية الفكية بين طلاب الأسنان في ليبيا.

### الكلمات المفتاحية:

ليبيا، بنغازي، طلاب طب الأسنان، مفصل الفك السفلي، اضطرابات الصدغية الفكية.