

Original Article

Prevalence and Severity of Temporomandibular Disorders Among Egyptian Postgraduate Students: A Cross-Sectional Study

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Abstract

Aim: The purpose of this study was to determine the prevalence and severity of temporomandibular joint disorders among postgraduate students at Egyptian universities.

Materials and methods: 840 postgraduate students from different Egyptian universities were recruited and answered Fonseca's questionnaire. Out of the 840 respondents, 593 were included and evaluated using Fonseca's anamnestic index to classify them according to the severity of the disorder.

Results: The prevalence of temporomandibular disorders among the included population was 73.4%. The most common degree of severity reported was the mild category being 57% followed by moderate (31.7%) then severe (11.3%). Temporomandibular disorders were prevalent among females with a frequency of 73.3% while 26.7% for males. There was significant association between the temporomandibular disorders and sex ($P < .001$).

Conclusion: There's high prevalence of temporomandibular disorders among Egyptian postgraduate students. There's an association between sex and prevalence of temporomandibular disorders, with females being more susceptible to the development of temporomandibular disorders.

Keywords: Temporomandibular disorder, Temporomandibular joint, prevalence, TMD, Fonseca's questionnaire

Introduction

"Temporomandibular disorders" (TMD) is a collective term referring to a group of musculoskeletal conditions characterized by discomfort and/or dysfunction in the masticatory muscles, temporomandibular joints (TMJ), and associated structures. Temporomandibular disorders have a multifactorial etiology with emotional stress, dysfunctional behaviors, malocclusion, hormonal changes, masticatory muscle dysfunction, and structural abnormalities in the

TMJ being the most commonly cited factors, either individually or in combination.

Temporomandibular disorders are characterized by pain in the preauricular region, the temporomandibular joint, or the muscles of mastication, a restriction in the range of mandibular movement and the presence of joint sounds during jaw function. Additionally, discomfort with movement and deviation upon opening have been recognized. The identification of pain as a significant symptom

has resulted in an upsurge in research into the epidemiology and etiopathogenesis of TMD.

TMD epidemiology is essential because of their complicated etiology, broad age range of patients and the understanding that their management includes a variety of diagnostic methods and therapeutic procedures to totally treat their signs and symptoms. The frequency of TMD symptoms varies and TMD are usually diagnosed by correlating signs and symptoms.

Numerous epidemiological studies on the prevalence of TMD in patient and nonpatient populations have been carried out, and it was revealed that TMD affect approximately 5% to 12% of the general population. Higher percentages up to 40% have been reported in several studies of the general population (*Progiante et al., 2015*).

TMD is even more serious among university students—since they face numerous stressors, and it's well documented in the literature that TMD and oral parafunctions are much more common among emotionally burdened individuals. The prevalence of TMD among university students is observed to be relatively higher than older subjects and populations of rural areas. Studies reported that TMD symptoms were 77.8% (*Abuaffan, 2016*) and 68.8% (*Ryalat, 2009*) among the Sudanese and Jordanian university students respectively. There is insufficient data on the prevalence of TMD symptoms among Egyptian students in general, and postgraduate university students in particular.

Therefore, this study was conducted to determine the prevalence and severity of TMD among postgraduate students at Egyptian universities.

Subjects and Methods

Ethical approval

The current cross-sectional study was approved by the Ethical Committee of the Faculty of

Dentistry, Cairo University (approval number 11120). Participation in the study was voluntary. The completion of the survey by study participants was considered as implicit consent for the study. All participants were assured of the confidentiality of their survey responses.

The study protocol was registered on clinicaltrials.gov with registration number NCT04582851.

Settings

In this study, 840 postgraduate students were recruited from 13 Egyptian universities. Those universities included governmental ones [Cairo, Ain Shams, Alexandria, Aswan, Minia, Suez Canal, Mansoura, Zagazig, Al-Azhar and Beni-Suef University] while private universities included Misr International University (MIU), Future University in Egypt (FUE), and Misr University for Science & Technology (MUST). Students enrolled in postgraduate programs at these universities received invitations via email. In the period from January 2021 to February 2022, a questionnaire that was issued via Google Forms was used to collect study-related data. Out of the 840 respondents, 593 were included after duplicates and respondents who didn't meet the inclusion criteria were excluded.

Participants

Participants in this study were selected based on the following eligibility criteria. Male and female postgraduate students at Egyptian universities aged 25 to 45 were considered eligible. The Google forms were revised, and any duplicated responses or those from non-postgraduate students were excluded.

Variables

The objective of this study was to determine the prevalence and severity of TMD among postgraduate students. TMD was diagnosed by Fonseca's questionnaire as shown in table (1). The Fonseca anamnestic index

(FAI) was developed in Brazilian Portuguese to assess the severity of TMD based on the patient's signs and symptoms. It was shown to be simple and of good specificity, reliability, and accuracy (*Rodrigues-Bigaton et al., 2017; Topuz et al., 2020*). The questionnaire consists of 10 ordinal questions, which are answered by "yes", "no" or "sometimes". Participants were to select one answer: yes, no, or sometimes. Each 'yes' answer was assigned a value of 10, 'sometimes' was assigned a 5, and 'no' was assigned a 0. The sum of the values for all 10 answers was used to classify subjects as follows: no TMD (0-15 points), mild TMD (20-45 points), moderate TMD (50-65 points), and severe TMD (70-100points).

A translated version to the native language of Egypt (Arabic language) was used for reasons of applicability, and the validation of the translation was performed by language experts. Other demographic data such as the sex, the age, the postgraduate degree, the faculty of specialty and the university were also collected.

Data sources/measurement

Invitations by E-mail were sent out to the postgraduate students registered in the aforementioned Egyptian universities. The e-mail contained a summary about the aim of the study and an assurance of the confidentiality of the respondents. A link to the survey website at Google Forms was provided within the e-mail. The link was further posted on multiple Facebook groups of postgraduate studies at Egyptian universities. The responses were received in the form of a spreadsheet, where all data relevant to the outcome were seen. Revising the data for duplicate emails, eligibility and any irrelevant data or responses was carried out. The frequency distribution of the participants and the severity of the condition were then calculated and sent for statistical analysis.

Potential sources of bias:

Selection bias: Despite of being susceptible to response rate bias, the authors of the study preferred sending emails or using the social media for data collection because of health restrictions related to the COVID-19 pandemic and the implementation of social distancing and online learning.

Study size:

Epi info population survey was used to calculate the sample size. With confidence interval 95% and a margin of error 3%; a total of 428 participants were needed to investigate the prevalence of TMD.

Statistical methods

Qualitative data were presented as frequencies and percentages. For univariate analysis; Chi-square test was used for comparisons regarding qualitative variables. Model fit was tested using Chi-square test (-2 Log Likelihood test) and Pseudo R² tests and the model was fit to describe the relations between the dependent and independent variables. The significance level was set at P<0.05. Statistical analysis was performed with IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.

Results

In the present study, 840 participants were recruited from 13 Egyptian Universities; 10 governmental and 3 private universities. Seventy-nine questionnaires were recognized as duplicates and were, therefore, removed leaving 761 responses to be assessed for eligibility. 168 responses did not fulfill the selection criteria. Hence, 593 postgraduate students were finally included in the study and were statistically analyzed.

1. Demographic data

This cross-sectional study included 593 postgraduate students; 188 males (31.7%) and 405 females (68.3%). 55.8% % of the participants had an age ranging from 25-30 years; 31.4% from 31-35 and 12.8% ≥ 36 years.

The most prevalent current postgraduate degree was Master's degree comprising almost $\frac{3}{4}$ of the participants followed by the PhD, the Fellowship and finally the Diploma. Almost 89% of the participants were from health-related sciences (Medicine, Dentistry, Pharmacy, Physiotherapy and Veterinary Medicine). Almost 89.5% of participants were from governmental universities and 1.5% from private universities, while 9% did not respond to this data item.

2. Prevalence of TMD

TMD was prevalent in 73.4% of the studied group (Fig 1) with a distribution for the severity of the condition as follows; 57% of participants had mild TMD, 31.7% moderate TMD and 11.3% severe TMD (Fig 2).

3. Association between TMD and demographic data

All the demographic data except sex revealed an insignificant association with TMD since their frequency distribution among TMD affected and non-affected individuals was not significantly different. The frequency distribution of TMD among females was 2.302 times that of males at $P < .001$ (table 2).

Discussion

Temporomandibular joint disorder (TMD) is an umbrella term used to describe a group of musculoskeletal and neuromuscular conditions that involve the temporomandibular joint (TMJ), the masticatory muscles, and all associated structures. TMD often present with pain in the jaw, face, and neck with or without a decreased range of motion. It is often accompanied by headache or ear pain. The condition could be really debilitating and could affect the quality of life. Hence, it seemed necessary to determine the prevalence of this condition in a highly susceptible category of the

Egyptian population, namely the postgraduate students.

The prevalence and severity of TMD was determined in this study by using the Fonseca's anamnestic index (FAI) (*Fonseca et al., 1994*). Although its diagnostic accuracy is lower than other tools that involve clinical examination like the RDC/TMD, the FAI has many advantages such as simplicity, speed of application, and low cost, making it useful in epidemiological studies, patient screening, and the initial diagnosis of TMD. Besides, the tool is self-reported by the participants, eliminating the need for evaluator training. It has been widely utilized in clinical screening, and numerous TMD prevalence studies, which impact public health practice and policy making (*De Oliveira et al., 2006; Lemos et al., 2015; Zhang et al., 2020*). It is a valid and reliable tool for assessing stress, parafunctional habits, pain frequency and jaw function limitations (*Paulino et al., 2018; Topuz et al., 2020*). It was proved to be of high accuracy, with specificity and sensitivity of 91.90% and 86.30% respectively (*Rodrigues-Bigaton et al., 2017*). The FAI was shown to be consistent with other screening and diagnostic tools for TMDs, such as the American Association of Orofacial Pain Questionnaire and the Jaw Symptom and Oral Habit Questionnaire (*Pastore et al., 2018*).

Throughout the literature, the frequency of TMD among postgraduate students was barely addressed, particularly in Egypt. It has been reported that university students frequently belong to the age range where TMD symptoms occur most commonly. The most common age range for TMD occurrence, according to the literature, is 20 to 45 years old (*Köhler et al., 2012; Ryan et al., 2019; Yadav et al., 2020*). This inspired the study's researchers to investigate the condition's prevalence in this particular group.

Table (1) Questions of the Fonseca's questionnaire

| No. | Question |
|-----|---|
| 1 | Do you have difficulty opening your mouth wide? |
| 2 | Do you have difficulty moving your jaw from side to side? |
| 3 | Do you feel fatigue or muscle pain when chewing? |
| 4 | Do you have frequent headaches? |
| 5 | Do you have neck pain or a stiff neck? |
| 6 | Do you have earaches or pain in that area (TMJ)? |
| 7 | Have you noticed any clicking in your TMJs while chewing or opening your mouth? |
| 8 | Have you noticed if you have a habit of clenching or grinding your teeth? |
| 9 | Do you feel that your teeth do not come together well? |
| 10 | Do you consider yourself a tense or nervous person? |

Table (2): Descriptive statistics and results of Chi-square test for comparison between demographic data of participants with TMD and normal subjects

| Demographic data | | Normal (n = 158) | | TMD (n = 435) | | P-value | Effect size |
|-----------------------------|--------------------|---------------------|------|------------------|------|---------|---------------|
| | | N | % | n | % | | |
| Sex | Male | 72 | 45.9 | 116 | 26.7 | <0.001* | OR = 2.302 |
| | Female | 86 | 54.4 | 319 | 73.3 | | |
| Age | 25-30 y | 92 | 58.2 | 239 | 54.9 | 0.707 | $\nu = 0.048$ |
| | 31-35 y | 45 | 28.5 | 141 | 32.4 | | |
| | 36-40 y | 17 | 10.8 | 40 | 9.2 | | |
| | >40 y | 4 | 2.5 | 15 | 3.4 | | |
| Current Postgraduate degree | Diploma | 1 | 0.6 | 11 | 2.5 | 0.497 | $\nu = 0.063$ |
| | Master | 121 | 76.6 | 323 | 74.3 | | |
| | PHD | 31 | 19.6 | 90 | 20.7 | | |
| | Fellowship | 5 | 3.2 | 11 | 2.5 | | |
| Faculty | Health-related | 143 | 98.6 | 383 | 97.2 | 0.343 | OR = 0.861 |
| | Non-health related | 2 | 1.4 | 11 | 2.8 | | |
| University | Governmental | 145 | 98 | 385 | 98.5 | 0.690 | OR = 0.821 |
| | Private | 3 | 2 | 6 | 1.5 | | |

*: Significant at $P \leq 0.05$, OR: Odds Ratio

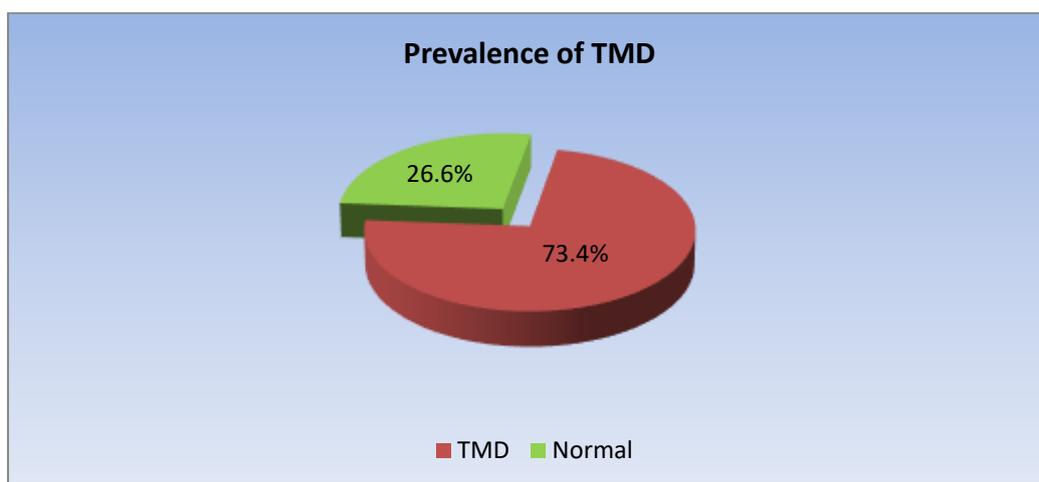


Figure (1). Pie chart representing prevalence of TMD among study participants

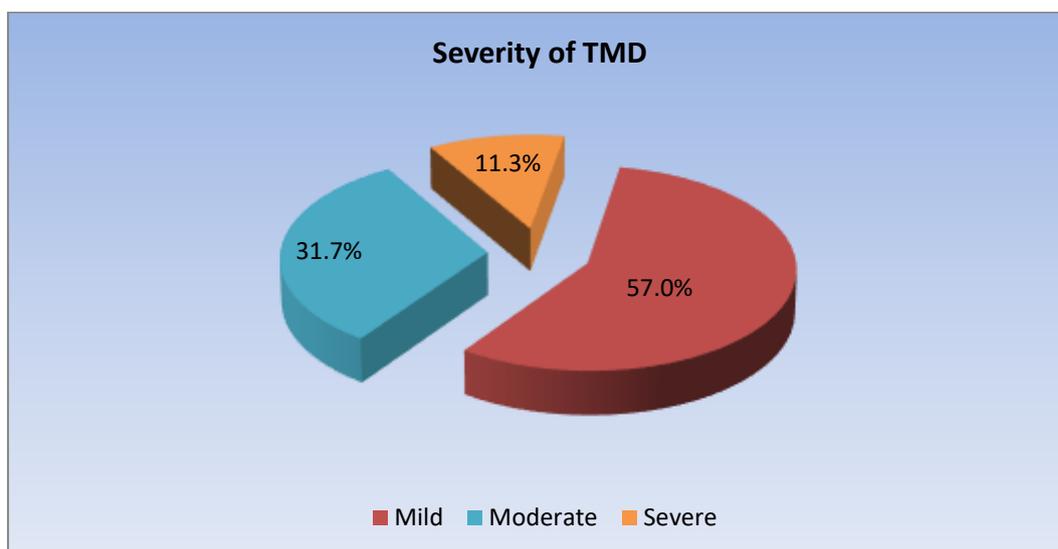


Figure (2). Pie chart representing severity of TMD

In the current study, the prevalence of TMD was 73.4% with the highest prevalence being in the mild category (57%) followed by moderate (31.7%) then severe TMD (11.3%). The prevalence is higher than that reported by the study of *Rashed & Elsharkawy, 2018* (41.4%), which investigated Egyptian undergraduate students. The reported prevalence may have varied due to the students' living circumstances, variation in their degree,

and their academic status at the time of the study. However, the prevalence is comparable

to that of *Abuaffan, 2016* in the Sudanese (77.8%), and *Ryalat, 2009* in the Jordanian (68.6%) university students. It is also noteworthy to know that the prevalence reported in this study ranges from 42% to 75%, which is consistent with findings from other FAI-based TMD prevalence studies (*Pedroni et al., 2003; De Oliveira et al., 2006; Nomura et al., 2007; Modi et al., 2012; Augusto et al., 2016; Zareef et al., 2018*). The variation in

TMD prevalence studies may be attributed to the difference in ethnic background, sex distribution and sample size.

There was a statistically significant correlation between sex and TMD, as was shown in the univariate analysis, where females were 2.302 folds more prone to TMD than males. Higher TMD prevalence in females has been similarly reported in several studies (*Winocur et al., 2006; Gonçalves et al., 2010; Minghelli et al., 2014; Paulino et al., 2018*), including systematic reviews (*Bueno et al., 2018; Ryan et al., 2019*). However, the rationale for this distribution is still debatable. Possible explanations include higher pain sensitivity, stress, hormonal changes, preoccupation, and treatment seeking in females (*Pedroni et al., 2003; Paulino et al., 2018*). Furthermore, TMD studies in children showed no apparent sex differences in TMD signs and symptoms, lending credence to the theory that hormones may increase the risk of TMD development (*Emodi-Perlman et al., 2012; Pizolato et al., 2013*).

Conclusion

Within the limitations of this study, it was concluded that TMD is a prevalent condition among Egyptian postgraduate students, where females are 2.302 times more prone to TMD than males.

Conflict of interest and source of funding

The authors report no conflict of interests and no financial support for this study.

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