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Association of Stress with Prevalence of TMJ Dysfunction in Undergraduate Dental Students

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ABSTRACT

Temporomandibular joint disorder (TMD) refers to persistent medical conditions that affect the temporomandibular joint (TMJ) and related structures. Studies showed that stress was closely linked to the development of TMD. Furthermore, healthcare students are particularly susceptible to stress compared to the general population. This can have a negative impact on their quality of life and mental health during their training. The increased prevalence of TMD has also been reported among the same cohort of the population. However, there is a lack of literature published highlighting the prevalence of TMD and their association with increased levels of stress in dental students. This study aims to explore whether increased stress levels are associated with the prevalence of TMD in undergraduate dental students. A total of 218 dental students participated. Two online self-reported questionnaires consisted of structured case history on past medical and dental history with a Fonseca Amnestic Index (FAI) questionnaire used to identify the prevalence of TMD and DESS questionnaire for stress prediction were used. Data were analyzed using SPSS version 22 with a *p-value* less than 0.05. It was reported that about 48% of students had various TMD with no significant association found between the year of study and gender. However, a significant association was reported between stress gender. A positive correlation was also found between stress and TMD among participants. This study revealed a significant association between stress and the prevalence of TMD in undergraduate dental students. Educational institutions must adopt coping strategies to help trainees manage their psychological stress, which could reduce the incidence of TMD.

***Keywords*:** Temporomandibular Disorders, Temporomandibular Joint, Dental Students, Stress

ABSTRAK

Gangguan sendi temporomandibular (TMD) adalah kondisi kronis yang mempengaruhi sendi temporomandibular dan struktur terkaitnya. Stres telah lama dikaitkan dengan terjadinya gangguan TMJ. Telah dibuktikan dalam literatur bahwa mahasiswa kesehatan lebih rentan terhadap stres dibandingkan dengan populasi umum yang dapat mempengaruhi kualitas hidup dan kesehatan mental mereka secara keseluruhan selama pelatihan. Peningkatan prevalensi gangguan TMJ juga telah dilaporkan di antara kohort populasi yang sama. Namun, literatur terbatas telah diterbitkan menyoroti prevalensi TMD dan hubungannya dengan peningkatan tingkat stres pada mahasiswa kedokteran gigi. Tujuan dari penelitian ini adalah untuk mengeksplorasi apakah peningkatan tingkat stres berhubungan dengan prevalensi TMD pada

mahasiswa sarjana kedokteran gigi. Sebanyak 218 mahasiswa kedokteran gigi berpartisipasi dalam penelitian ini. Dua kuesioner yang dilaporkan sendiri secara online terdiri dari riwayat kasus terstruktur pada riwayat medis dan sejarah gigi masa lalu dengan menggunakan kuesioner Fonseca Amnestic Index (FAI) untuk mengidentifikasi prevalensi TMD dan kuesioner DESS untuk memprediksi stres. Data dianalisis menggunakan SPSS versi 22 dengan nilai p kurang dari 0,05. Dilaporkan bahwa sekitar 48% siswa memiliki berbagai macam TMD tanpa hubungan yang signifikan dengan tahun studi dan jenis kelamin. Namun, hubungan yang signifikan antara stres dengan jenis kelamin telah dilaporkan. Korelasi positif juga ditemukan antara stres dan TMD di antara para peserta. Studi ini mengungkapkan bahwa stres dapat menjadi penyebab utama prevalensi masalah TMJ pada mahasiswa kedokteran gigi. Strategi koping perlu diadaptasi oleh lembaga pendidikan untuk mengatasi stres psikologis yang terjadi pada mahasiswa sehingga mengurangi kejadian terjadinya TMD.

Kata Kunci: Gangguan Temporomandibular, Sendi Temporomandibular, Mahasiswa Kedokteran Gigi, Stres

1. Introduction

Temporomandibular joint disorder (TMD) refers to a group of conditions affecting the masticatory system, including the temporomandibular joint (TMJ) muscles used in mastication, associated tissue and nerve structure.[1] Furthermore, TMD is also a chronic condition that affects TMJ and its associated structure. In Saudi, the prevalence of TMD among dental students is reported to be 36.99%, but there is limited literature on TMD among dental students in Malaysia. TMJ range of function varies from the opening of the jaw such as yawning, and improving speech, and repeated opening and closure of the jaw such as chewing. TMJ also play a vital role in the use of mastication daily, and TMD can cause pain in the jaw, radiating pain around auricular areas, pain upon mastication, facial pain, and limitation of mouth opening which could lead to irritation, agitation, insomnia, and even loss of appetite.[3] The impact of TMD on a person's quality of life and daily activities can be significant.

Having a healthy TMJ and no TMD can significantly improve a patients' quality of life.[4] However, students with TMD may experience negative impacts on their quality of life, studies, and relationships with others. The etiopathogenesis of TMD is complex and not fully understood, with various risk factors and possibilities such as anatomical factors, psychosocial profile, and trauma to TMJ area.[3] Stress, orthodontic treatment and gender are often related to the cause of TMD. Recent investigation suggests that the younger generation, also known as the "burnout generation", experiences more stress and less sleep, contributing to the increasing number of young people seeking treatment for TMD.[5] Dental students are also among the stressed-out niche of the population as stated by a previous study.[2] This study aimed to evaluate the prevalence of TMD among dental students and their association with stress.

2. Materials and Methods

Before conducting this study, ethics approval was obtained from the ethics committee (SEGiEC/SR/FOD/31/20/20-2021). This cross-sectional study was carried out at the Faculty of Dentistry, SEGi University, using an online questionnaire (Google Form, Google) with a structured case history questionnaire and the Fonseca Anamnestic index (FAI), which had been validated in a previous study involving the Malaysian population.[4] All 218 dental students from the first to fifth year in 2021 were recruited using the convenience sampling method. Before distributing the online questionnaire, a briefing was conducted for each year's participants regarding the content of the questionnaire such as systemic illness and arthritis. As a result of this briefing, all students met the criteria for participation.

In this study, the questionnaire consisted of 3 parts. Part 1: Instructions and consent form, Part 2: Structured case history questionnaire containing demographic information, past medical and dental history with Dental Environment Stress Scale (DESS), which was adapted from a previous study on Malaysian dental

students[6] to identify and quantify the specific stress factors for dental students, and Part 3: FAI questionnaire containing 10 questions and respondents were asked to answer each question using a 3-point Likert scale: 0 = no, 5 = sometimes, 10 = yes. The total score of each participant on the FAI questionnaire was used to classify the severity of TMD. Subsequently, scores ranging from 0 to 15 were considered as no TMD, scores between 20 to 45 were classified as mild TMD, scores between 50 to 65 were categorized as moderate TMD, and scores between 70 to 100 were deemed as severe TMD. All data were analyzed using IBM SPSS Statistic Version 22.0 for windows (IBM Corporation, Armonk, New York) with a significant $p < 0.05$. Chi-square test, Mann-Whitney test, Kruskal-Wallis test, and Spearman's correlation test were used for the data analysis.

3. Results

According to these findings, year 2 (25.53%) and 5 (30.43%) students experienced moderate and severe stress more often compared to other students (Table 1). Female students were found to be more stressed compared to male (Table 2).

Table 1: The association year of study with DESS score

Year	Not Applicable	No Stress	Mild Stress	Moderate Stress	Severe Stress	Total	*p*-value
1	3	9	20	4	2	38	0.788
	7.89%	23.68%	52.63%	10.53%	5.26%	100%	
2	2	11	22	9	3	47	
	4.26%	23.4%	46.81%	19.15%	6.38%	100%	
3	1	13	13	8	1	36	
	2.78%	36.11%	36.11%	22.22%	2.78%	100%	
4	1	12	26	7	5	51	
	1.96%	23.53%	50.98%	13.73%	9.8%	100%	
5	2	14	16	11	3	46	
	4.35%	30.43%	34.78%	23.91%	6.52%	100%	
Total	9	59	97	39	14	218	
	4.13%	27.06%	44.5%	17.89%	6.42%	100%	

Table 2: The association of gender of dental students to DESS score

Gender	Not Applicable	No Stress	Mild Stress	Moderate Stress	Severe Stress	Total	*p*-value
Male	5	29	32	6	2	74	0.003
	6.76%	39.19%	43.24%	8.11%	2.7%	100%	
Female	4	30	65	33	12	144	
	2.78%	20.83%	45.14%	22.92%	8.33%	100%	
Total	9	59	97	39	14	218	
	4.13%	27.06%	44.5%	17.89%	6.42%	100%	

In this study, 112 out of 218 dental students (51.38%) had no TMDs, and the remaining 106 (48.62%) had TMD ranging from mild to severe. There are 84 out of 218 (38.53%) had mild TMD, while 17 were at the moderate level (7.8%) and 5 (2.29%) experienced severe TMD.

The mean score of FAI score was 1.61±0.73 (Table 3), and the mean and standard deviation of each questionnaire were calculated. Among all the questions asked, question 10 (*Do you consider yourself as a tense (nervous) person?*), question 7 (*Do you ever clench or grind your teeth?*) and question 5 (*Do you have pain on the neck or stiff neck?*). Based on the mean score between genders, female students scored higher than male on average (Table 4). Furthermore, when looking at the distribution of the gender across different scores of FAI, female tended to have higher scores of moderate stress (10.42%) and severe stress (3.37%) compared to male which only had FAI score of 3 (2.7%) (Table 3).

Table 3: Mean and standard deviation of each question among genders

Questions	Male Mean±SD	Female Mean±SD	Total Mean+SD
Is it hard for you to open your mouth?	0.54±1.56	0.77±1.99	0.69±1.86
Is it hard for you to move your mandible from side to side?	0.07±0.58	0.42±1.62	0.30±1.37
Do you get tired/ muscular pain while chewing?	1.08±2.23	1.84±2.88	1.58±2.7
Do you have frequent headaches?	1.49±2.71	2.99±3.75	2.48±3.5
Do you have pain on the neck or stiff neck	2.16±3.11	3.33±3.65	2.94±3.51
Do you have earaches or pain in TMJ	0.34±1.26	1.01±2.41	0.78±2.11
Do you ever clench or grind your teeth?	2.83±3.42	3.13±3.69	3.03±3.6
Have you notice any TMJ Clicking while chewing or when you open your mouth?	2.09±3.31	2.74±3.68	2.52±3.57
Do you feel if your teeth do not articulate (bite or occlude) well?	1.62±3.22	1.94±3.6	1.83±3.47
Do you consider yourself a tense (nervous) person?	2.23±3.33	4.65±3.68	3.83±3.74
	1.45±2.47	2.28±3.1	1.61±0.73

In this study, a total of n=218 dental students participated, including 74 male (33.94%) and 144 female (66.1%). Of the 218 dental students, 85 were pre-clinical students (38.99%) and 133 were clinical year students (61.01%). Further distribution of demographic details composed of students from five different years. Year 1 consists of 37, Year 2 consists of 47, Year 3 consists of 37, Year 4 consists of 51 and Year 5 consists of 46.

The results showed *a p-value* greater than 0.05 which was not significant for all the 2 findings. The Mann Whitney Test was used to determine the difference between gender on FAI scores. This result proved to be significant with a *p-value* less than 0.05 (Table 4).

Table 4: Mann-Whitney test of Gender and FAI score

Variables	Z statistic	*p*-value
Gender	-2.224	0.026

The Kruskal Wallis Test was carried out to determine the difference between Years of Study on FAI score. With a p-value greater than 0.05, the results did not appear to be significant. Spearman's correlation test was conducted to examine the correlation between Year of Study and FAI, and it is a weak and insignificant correlation (r= 0.082, p > 0.05). The correlation between the DESS and Fonseca Score was examined as result shows a weak and significant correlation (r=0.254, p<0.001).

4. Discussions

FAI has proven to be an efficient, fast and reliable questionnaire used in clinical, research or epidemiological studies.[4],[7],[8],[9] Therefore, it is used in this study to determine the prevalence of TMD among dental students. Furthermore, it is suitable with the current pandemic situation where clinical examination of all the participants would be a difficult procedure and decision to be carried out. It also goes well with the ease of use and distribution of forms that dental students need to fill out.

For both male and female dental students, the most prevalent category was found to be those without TMD symptoms. This finding is consistent with studies conducted in Karachi and Malaysia, but contrasts with studies from Brazil and India, which reported that mild TMD symptoms were the most commonly prevalent. [4],[7],[10],[11]

Another study on Brazilian volunteers showed that female participants had a high score for moderate TMD symptoms.[8] Different demographics showed different findings on the same subject. Subsequently, 106 out of 218 dental students (48.6%) were having TMD symptoms ranging from mild (38.53%), moderate (7.8%) to severe (2.29%), while more than half of the students were having no TMD symptoms (Table 3). Compared to studies conducted by several investigators, the prevalence of TMD in this study is lower than other findings.[4],[7],[9]

Further breakdown of Fonseca's questionnaire, *'Do you consider yourself a tense(nervous) person?'* scored the highest at 57.8% while *'Do you ever clench or grind your teeth'* and *'Do you have pain on neck or stiff neck?'* closely followed behind with 46.79% and 46.33%, respectively. This finding was in accordance with the study by Habib et al on Riyadh students [12], in which a large number of students considered themselves as a tense or nervous person (45.5%).

This suggested that dentistry was a nerve wrecking course among students across the continent. The training to be a health professional such as a dentist can be stressful and cause anxiety to students.[13] Subsequently, students with moderate or severe stress are more prone to TMD as this study showed that year 5 students are having significant amount of stress in accordance with high prevalence of TMD among year 5 students as well.

In this study, clenching and grinding is also one of the common findings. Parafunctional habits such as clenching, or grinding have been shown to be one of the causes of TMD.[14] Students with severe TMD should initiate conservative treatment to reduce the progression and severity of the disorder.

In terms of gender comparison, male students without TMD symptoms (54.46%) are more than female students without TMD symptoms (47.22%). However, when comparing mild TMD between genders, both male and female students are almost equal to each other (37.84% and 38.89%). This study shows that female students have higher FAI scores than male students. Similar findings were found in studies carried out in several parts of the world.[5],[7],[8],[9],[11],[15],[16] Gender imbalance can also contribute to the result showing more female students with TMD. Stress can also be a factor that leads to TMD (5). Studies showed that female students tended to experience more stress compared to male students.[5],[6],[17]

The limitations of this study were that no clinical examination of the temporomandibular joint was performed and it relied solely on the participants' self-reported responses. A clinical examination was not carried out due to restrictions of the Covid-19 pandemic and infeasibility. In this study, there may be some reporting bias because it is a self-reporting questionnaire.[18] Subsequently, gender bias occurred due to the fact that there were fewer male students compared to female. This may have led to the interpretation that TMD is more prevalent among female students.

Based on these findings, it is recommend that future studies should aim to acquire sufficient and equal numbers of male and female students to obtain more conclusive results regarding the prevalence of TMD.[19],[20] Additionally, collecting information on oral habits and the duration of orthodontic treatment provided essential information on the occurrence of TMD, which could be incorporated into the case history

section of future studies.5 Since stress is one of the factors that contribute to TMD, it was suggested that future studies should explore the correlation between chronic stress among dental students and its relationship with TMD.[14],[21],[22] Clinical examination of TMJ could also be incorporated in future studies according to Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD).[23] A nationwide study can be conducted to determine the prevalence of TMD among dental students in Malaysia as it enables changes to be made academically or environmentally before more dental students with TMD are produced.

In conclusion, there is a correlation between TMD and stress in dental students. However, there is no significant association with the year of study or gender. The prevalence of TMD among dental students highlights the importance of preventing further progression of TMD. Therefore, clinical examination based on RDC/TMD, and qualitative questionnaires can be carried out further to understand the cause of TMD among dental students.

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