

The psychological aspects of dental students with temporomandibular disorders at Hue University of Medicine and Pharmacy

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Abstract

Background: Psychological factors such as anxiety and depression have been recognized as the etiology of temporomandibular disorders. **Objectives:** The study aimed to evaluate the prevalence of temporomandibular disorders in dental students and describe the state of depression and anxiety and related factors in the students with the disorders. **Materials and methods:** 323 students at the Faculty of Odonto-Stomatology, Hue University of Medicine and Pharmacy, were examined to detect temporomandibular disorders, using the DC/TMD axis I. Then GAD-7 and PHQ-9 questionnaires were used to screen for anxiety and depression in the group with the disorders. **Results:** The proportion of students with temporomandibular disorders was 38.1%, intra-articular disorders accounted for the highest rate (80.5%). The percentages of depression and anxiety among students with the disorder were 28.4% and 55.3%, respectively. 41.5% of TMD students had mild anxiety and the same proportion of students had risk of depression. Risk factors associated with depression and anxiety were economic status and exercise, respectively ($p < 0.05$). **Conclusions:** The percentage of students with temporomandibular disorders is relatively high. The majority of students with the disorders are at risk for depression and low level of anxiety. There is a link between the economic status and depression, between exercise and anxiety.

Keywords: anxiety, depression, temporomandibular disorders.

1. INTRODUCTION

Temporomandibular disorders (TMD) is a broad term that involves masticatory muscles, temporomandibular joints, surrounding bones, soft tissues, or a combination of these structures [1]. TMD is increasingly common in the world and Vietnam. A study by Karaman A. (2023) on dental students at Istanbul Aydin University, Turkey showed that the prevalence of TMD was 53.3%, most of which were mild, while moderate and severe cases accounted for 4.6% and 2.7%, respectively [2]. Research by Hoang A. (2016) found that 72.6% of students at Faculty of Odonto-Stomatology, Hue University of Medicine and Pharmacy had at least one sign of TMD [3]. There is a difference in the prevalence of TMD between studies, mainly because of differences in study subjects as well as diagnostic criteria utilized for assessing the disorders. There are several different classification systems for TMD. Currently, Schiffman's diagnostic criteria (2014) for TMD so called DC/TMD (Diagnostic Criteria for Temporomandibular Disorder) is a commonly used diagnostic and classification system [4].

The causes of TMD are complex and multifactorial, including biological, genetic,

sex, trauma, occlusal abnormalities, habitual/parafunctional activities, and psychological factors [5]. In which, psychological factors such as stress, anxiety, depression are increasingly accepted as pathogenesis factors of TMD [6]. Kmeid E. (2020) concluded that TMD appear to be significantly associated with depression, anxiety and stress and remain largely undiagnosed in the population [7].

In modern society, life quality is increasingly improved. At the same time, we have to face many difficulties of an ever-changing life, with lots of pressure in study or at work. Therefore, mental health and psychological problems are increasing day by day. Among which, depressive disorders and anxiety disorders are two common problems. Especially, for medical students in general and students studying Odonto-Stomatology in particular, the study life is relatively stressful. High demand on theoretical classes, spending plenty of time on clinical practice... may have a big impact on their mental health. The results of a study performed by Phan T. (2016) showed that stress, anxiety, and depression accounted for a relatively high rate, at 48.08%, 68.79%, and 52.63%, respectively, among students of the Faculty of Pharmacy, Ho Chi Minh University

of Medicine and Pharmacy, mainly at moderate and mild level [8]. Therefore, we conducted this research for two following purposes: 1. Evaluating of TMD's prevalence and its classification in students at Faculty of Odonto-Stomatology, Hue University of Medicine and Pharmacy; 2. Describing the state of depression and anxiety among dental students with TMD and related factors.

2. MATERIALS AND METHODS

2.1. Subjects: the study was conducted on full-time students of the Faculty of Odonto-Stomatology, University of Medicine and Pharmacy, Hue University from year 1 to year 6 in the academic year 2021-2022. The exclusion criteria are students who are undergoing orthodontic treatment, have swelling and pain due to infection or trauma in the oral and maxillofacial region, have neurological diseases, or have been using psychological medications.

2.2. Study methods: this is a cross-sectional descriptive study. We established two sample frames including a list of male and female students of the Faculty of Odonto-Stomatology. We calculated the sample size using formula

$$n = Z^2_{1-\alpha/2} \frac{p(1-p)}{d^2}$$

Based on the result of a previous study, the prevalence of TMD in dental students was 30% ($p = 0.3$) [9]. We chose $\alpha = 0.05$, $d = 0.05$. The needed sample size was 323. At the time doing research, the number of dental female students at Faculty of Odonto-Stomatology was approximately double those of male. Therefore we recruited 323 students, including 108 male students and 215 female students, who met the selection criteria and agreed to participate in the study. Selected students answered a symptom questionnaire, followed by a clinical examination performed by a DC/TMD calibrated doctor, then were diagnosed with TMD based on Schiffman's DC/TMD 2014 [4]. Then, students having TMD were surveyed for depression, anxiety, and risk factors with questionnaires Patient Health Questionnaire PHQ-9 [4], Generalized Anxiety Disorders GAD-7 [4], and a questionnaires including related factors, respectively. Investigated variables consist of:

(1) Academic year: 1st year, 2nd year, 3rd year, 4th

year, 5th year, 6th year;

(2) Gender: Male, Female;

(3) TMD subtypes (diagnosed by DC/TMD criteria): pain-related to TMD and headache (myalgia, arthralgia and headache attributed to TMD), intra-articular joint disorders (disc displacement with or without reduction), and degenerative joint disorders;

(4) Depression level (evaluating by PHQ-9 questionnaire based on the total points): depression-free (0 - 4), at risk of depression (5 - 9), mild (10 - 14), moderate (15 - 19) and severe (20 - 27);

(5) Anxiety level (evaluating by GAD-7 questionnaire based on the total points): anxiety-free (0 - 4), mild (5 - 9), moderate (10 - 14), and severe (15-21);

(6) Study pressure: the pressure level the students felt and self-evaluated during previous school year, rating as low, moderate, and high;

(7) Participate in Clubs: the frequency the students took part in the extra-curriculum activities and Clubs in the school year, rating as very frequent, frequent, sometimes, seldom, or never;

(8) Doing exercise or sports: the frequency of playing or training sports or doing exercise, including < 1 time/week, 1 - 3 times/week, and > 3 times/week

(9) Economic status: the feeling of the students about the satisfaction of fulfillment for their self-demanding (regarding tuition fee, food consumption and other living expenses) from the family financial support or part-time jobs' salary, rating as: not enough, enough and excessive.

Data were processed using SPSS 20.0 software, with p-value of 0.05 for statistical significance. The relationship between risk factors and psychological aspects was investigated using Fisher's test.

3. RESULTS

3.1 Temporomandibular disorders in dental students

The percentage of students with temporomandibular disorders is 38.1% (Table 1). The 4th and 5th year students had the highest percentage of TMD. Figure 1 showed that women and men students had almost the same frequency of TMD (38.6% and 37%, respectively).

Table 1. TMD prevalence based on schoolyear

Grade	TMD		No		Yes		Total	
	n	%	n	%	n	%	n	%
1 st year	52	16.1	21	6.5	73	22.6		
2 nd year	30	9.3	19	5.9	49	15.2		
3 rd year	32	9.9	20	6.2	52	16.1		
4 th year	26	8	23	7.1	49	15.2		
5 th year	31	9.6	24	7.4	55	17.0		
6 th year	29	9	16	5	45	13.9		
Total	200	61.9	123	38.1	323	100		

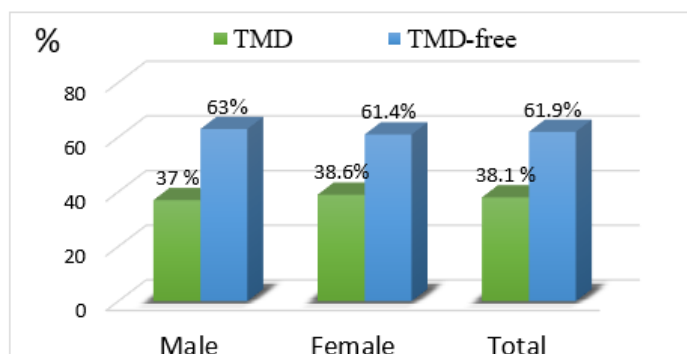
**Figure 1.** TMD prevalence based on sex.

Table 2 demonstrated that there were all the different forms of TMD in the study sample. Each student could have one or more than one subtype of TMD according to DC/TMD axis I. Intra-articular disorders accounted for the highest rate (80.5%). In the group of intra-articular disorders, disc displacement with reduction was more common than disc displacement without reduction (78.9% and 1.6%). In the TMD group with pain, muscle pain accounted for the biggest proportion with 17.9% of students, followed by joint pain with 13% of students, and headache accounted for 7.3%. Osteoarthritis was the least common subtype of TMD, accounting for only 4.9%.

Table 2. Subgroups of TMD according to DC/TMD - Schiffman's criteria 2014

Sub-groups		Location		Right (n = 123)		Left (n = 123)		Total (n = 123)	
		n	%	n	%	n	%	n	%
Pain-related TMD and Headache	Myalgia	14	11.4	16	13.0	22	17.9		
	Arthralgia	10	8.1	11	8.9	16	13.0		
	Headache	8	6.5	6	4.9	9	7.3		
	All	24	19.5	26	21.1	36	29.3		
Intra-articular joint disorder	Disc displacement with reduction	65	52.8	60	48.8	97	78.9		
	Disc displacement without reduction	2	1.6	2	1.6	2	1.6		
	All	67	54.5	62	50.4	99	80.5		
Degenerative joint disorder		3	2.4	4	3.3	6	4.9		

3.2. Psychological status on dental students with temporomandibular disorders

Among students having TMD, the percentage of students with depressive disorder was 28.4%. In the group with depressive disorder, the most common degree was mild (21.1%), and there were no cases at severe depression level (**Table 3**). For anxiety state in TMD students, the proportion of students with anxiety disorders accounted for 55.3%, mainly at mild and moderate levels with 41.5% and 13%, respectively. One student (0.8%) had severe anxiety disorders (**Table 4**).

Table 3. Prevalence of depression in students with TMD

Depression (n = 123)		n	%
Depression - free (0 - 4)		37	30.1%
At risk of depression (5 - 9)		51	41.5%
Depression	Mild (10 - 14)	26	21.1%
	Moderate (15 - 19)	9	7.3%
	Severe (20 - 27)	0	0%
Total		123	100%

Table 4. Prevalence of anxiety in students with TMD

Anxiety (n = 123)		n	%
Anxiety - free (0 - 4)		55	44.7%
Mild anxiety (5 - 9)		51	41.5%
Anxiety	Moderate anxiety (10 - 14)	16	13%
	Severe anxiety (15 - 21)	1	0.8%
Total		123	100%

There is a statistically significant difference between the percentage of depressed and non-depressed students with family economic conditions ($p < 0.05$). There is a statistically significant difference between the percentage of anxious and non-anxious students with the frequency of exercise and sports ($p < 0.05$) (**Table 5**).

Table 5. Depression and anxiety related factors

Related factors		Depression		p1	Anxiety		p2
		Yes n (%)	No n (%)		Yes n (%)	No n (%)	
Study pressure	Low	8 (6.5)	27 (22)	0.084	4 (3.3)	31 (25.2)	0.428
	Moderate	19 (15.4)	53 (43.1)		9 (7.3)	63 (51.2)	
	High	8 (6.5)	6 (4.9)		4 (3.3)	10 (8.1)	
Participation in Clubs	Very frequent	1 (0.8)	3 (2.4)	0.303	0 (0)	4 (3.3)	0.641
	Frequent	2 (1.6)	14 (11.4)		2 (1.6)	14 (11.4)	
	Sometimes	18 (14.6)	42 (34.1)		8 (6.5)	52 (42.3)	
	Seldom	11 (8.9)	16 (13)		6 (4.9)	21 (17.1)	
	Never	3 (2.4)	13 (10.6)		1 (0.8)	15 (12.2)	
Doing exercise or sports	< 1 time/week	22 (17.9)	47 (38.2)	0.595	14 (11.4)	55 (44.7)	0.036
	1 - 3 times/week	9 (7.3)	26 (21.1)		1 (0.8)	34 (27.6)	
	> 3 times/week	4 (3.3)	15 (12.2)		2 (1.6)	17 (13.8)	
Economic status	Not enough	7 (5.7)	6 (4.9)	0.041	2 (1.6)	11 (8.9)	1
	Enough	26 (21.1)	80 (65)		15 (12.2)	91 (74)	
	Excessive	2 (1.6)	2 (1.6)		0 (0)	4 (3.3)	

4. DISCUSSION

4.1. Temporomandibular disorders in dental students

The proportion of students with TMD is quite high, accounting for 38.1%. This result is similar to study of Srivastava K. (2021), in which TMD prevalence was at 36.99% [10]. It can be seen that female and male had the same frequency of the disease (38.6% and 37%, respectively). This result is consistent with the study by Priyanka M. (2012) which investigated the prevalence of TMD in medical and dental students, at PIMS University, Ahmednagar, India [11]. In the above cross-sectional research, and some similar studies, it was found that the rate of signs and symptoms of TMD was equal in both men and women. On the contrary, in the studies performed in hospitals, the number of women having TMD significantly surpassed those of men. Women were often concerned and worried about their health. In addition, the sensitivity to pain in women is higher. Therefore, it is more common for female patients to go to the doctor for seeking medical treatment than men. A study by Nguyen G. (2021) surveying the status of TMD in patients visiting Hue University of Medicine and Pharmacy Hospital, recorded that the proportion of women going to the doctor was higher than that of men (2.85:1) [12].

In our study, intra-articular disorders accounted for the highest rate (80.5%). In the group of intra-articular disorders, disc displacement with reduction occurs at a higher rate than disc displacement without reduction. This result is in agreement with the study of Nguyen G. (2021) and Srivastava K. (2021) [10], [12]. In the group of painful TMD, myalgia is the most common subgroup. Similar results were found in the study of Srivastava K. (2021) [10]. Each student can have one or more than one subtype of TMD, which means that it is possible to be in both the pain related TMD subgroup and the intra-articular disorder subgroup, or even with osteoarthritis. The rate of subjects with osteoarthritis is rare, accounting for only 4.9%. This result is consistent with the study of Jussila P. (2017) [13]; and slightly higher than the result in study of Nguyen G. (2021) (2%) [12]. The rate of joint degeneration was rare due to TMD is a self-limited condition, which means that the possibility of progression from pain-related to TMD or intra-articular derangement to osteoarthritis is not high [14]. The given reason is that fibrocartilage is the structure that covers the condyle and the articular

surface of the skull of the temporal bone, instead of hyaline cartilage, so the mandibular condyle has the ability to change to adapt to the loads on the joint during functional activity or under effects of macro-trauma or micro-trauma [15]. Moreover, this study sample is all young people, perhaps there were not many serious injuries in the joints.

4.2. Psychological status on dental students with temporomandibular disorders

In our study, when using the PHQ-9 questionnaire with a cutoff at 10 for depression, the percentage of students with disorders was 28.4%. A study by Simoen L. (2020) reported a lower rate of depression, at 19.4% [16]. Although using the same research tool (PHQ - 9 questionnaire) and the same cut-off point (at 10), there is difference in results between these studies. The probably reason is that our study was conducted on dental students who may have more difficulties in life, while Simoen L. performed his study in general patients diagnosed with pain due to TMD. Regarding the level of depression disorders, in our study, the majority of students have a risk of depression with the rate of 41.5%, followed by mild depression at 21.1%, moderate level at 7.3% and no severe depression. Our results are also similar to that of Simoen L. (2020) which recorded the distribution of depression levels in descending order at the rate of 26.4%, 12.8%; 3.7% and 2.9% [16].

Currently, there are various studies in Viet Nam or all over the world using the GAD-7 questionnaire to screen and evaluate anxiety on several different subjects. Our study using the GAD-7 questionnaire with a cutoff at 10 for anxiety found that among students with TMD, the percentage of students with anxiety was 13.8%. Simoen L. (2020) depicted a higher anxiety rate of 29.1% while also utilized GAD-7 with the same cut-off point [16]. In terms of degree, the majority of students with TMD had mild anxiety with 41.5%, followed by moderate and severe level, with 13% and 0.8%, respectively. Our results are similar to that of Simoen L.(2020), using the same standard for the distribution of anxiety by levels with a decreasing rate of 27%, 15.8% and 13.3%, respectively [16]. Depression and anxiety are considered as risk factors and have a significant association with TMD [6], [7]. According to Nishiyama A. (2012), psychological disorders might only have slightly impact on TMD or it might probably provoke TMD [17]. In his research, he illustrated the way that psychological problem could result in TMD. In case psychological disorders increase the bruxism level (grinding, clenching or contacting) or other oral

habitual behaviours, which making the masticatory muscles overactivated, stretched for a long time, leading to muscle fatigue and pain, gradually leading to TMD. Research by Simoen L. (2020) indicated that the PHQ-9 and GAD-7 questionnaires for screening depression and anxiety should be performed in the diagnosis of patients with TMD to evaluate their psychosocial aspects [16].

The results in our study showed that the factor related to depression was economic status ($p < 0.05$). Students with a low economic background had a higher rate of depression than those with excessive financial condition (5.7% and 1.6%, respectively). Research by Phan T. (2020) and Shao R. (2020) also suggests that there is a link between depression and the economic status [18], [19]. The economic factor mentioned in the study was the students' self-perception about the level of meeting their own living demands. Many students need to cover their life expenses by their own, which might cause them difficulties in life. Even in students who receiving stable financial support from their families, they still feel overwhelming when living independently and learning how to manage their money to fulfil their need. These reasons could increase the rate of depression among students. The study also found that there was a relationship between anxiety and exercise ($p < 0.05$). Students who exercised less than 1 time a week had a higher rate of anxiety compared to those who exercised more than 3 times per week (11.4% and 1.6%). Exercise stimulates the release of endorphins along with other natural chemicals in the brain that help improve mood [20]. Regular and appropriate exercise can both improve health and reduce anxiety. However, research by Phan T. (2016) suggests that there is no association between exercise and anxiety, however, there is a relationship between exercise and depression [8]. The study of Phan T. (2016) and Shao R. (2020) showed that there is a relationship between study pressure and anxiety, between club participation and depression

[8], [19]. In our study, there was no association between anxiety disorders and these factors. This difference may result from using different anxiety rating scales or the different methods of selecting research subjects.

In the study, one calibrated dentist performed clinical examination for evaluating TMD, using the most common diagnostic criteria - DC/TMD. The results of the study showed valuable information about TMD status in dental students, especially in Viet Nam population. The limitation is that we only used the questionnaires for assessment of anxiety and depression. However, PHQ-9 and GAD-7 in Vietnamese were validated questionnaires. Therefore, we could probably rely on these tools to screen for psychological problems with acceptable findings.

5. CONCLUSION AND RECOMMENDATION

The percentage of students with TMD was quite high (38.1%). Intra-articular disorders were the TMD subgroup with the highest rate (80.5%). Disc displacement with reduction and myalgia are the two most common subtypes of TMD according to the DC/TMD - Schiffman classification (2014) with 78.9% and 17.9% students, respectively. The proportion of students with TMD having depression and anxiety disorders was 28.4% and 55.3%, respectively. The majority of students had the risk of depression and mild anxiety, with the same rate at 41.5%. There was an association between economics status and depression, between exercise and anxiety. We suggest that appropriate approach to screen students with depression and anxiety should be conducted regularly at the university, especially for TMD students. The TMD students with moderate and severe anxiety or depression should be referred to psychiatrics for further examination. Further research could be performed to figure out the relationship between TMD and psychological disorders.

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