

# The Relationship Between Stress and Temporomandibular Disorder in Students of the Faculty of Dentistry, Baiturrahmah University Class of 2020

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## ABSTRACT

**Background:** Stress characterized by mental tension and worry, is a common physiological response to difficult situations, especially prevalent among dental student facing high study demands. Unmanaged stress can lead to adverse effects on physical health and bodily function. Potentially increasing the risk of temporomandibular disorder (TMD) due to muscle hyperactivity and temporomandibular joint fatigue.

**Methods:** This research is an analytic observational study with a cross-sectional design. Respondents of this study were 95 students of the Faculty of Dentistry, Baiturrahmah University Class of 2020. Stress levels were assessed using the Student-Life Stress Inventory (SSI) questionnaire, while temporomandibular disorder was evaluated using the Helkimo Index (Anamnestic Index and Dysfunction Index).

**Results:** Findings showed that 72.6% (69 samples) experiencing mild stress, while 27.4% (26 samples) reported moderate stress. Anamnestic index showed 49.5% (47 samples) experiencing mild symptoms, 24.2% (23 samples) experiencing severe symptoms and 26.3% (25 samples) without symptoms. Dysfunction index showed 50.5% (48 samples) experiencing mild dysfunction, 42.1% (40 samples) experiencing moderate dysfunction and 2.1% (2 samples) experiencing severe dysfunction. Chi-square analysis test demonstrated a significant relationship  $p=0.000$  ( $p<0.05$ ) between stress variables and temporomandibular disorder variables.

**Conclusion:** Stress correlates with temporomandibular disorder among students of Baiturrahmah University Faculty of Dentistry, class of 2020.

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## INTRODUCTION

*Temporomandibular Joint* (TMJ) is a hinge joint that connects the lower jaw (mandible) with the upper jaw bone of the skull between the temporal bone and the condyle located on the front side of the left and right ears. Temporomandibular Joint is a system consisting of muscles, blood vessels, bones and nerves<sup>1</sup>, while temporomandibular disorder is a syndrome condition where sufferers feel pain in the temporomandibular jaw joint which can be caused by various factors and conditions. Common signs and symptoms of patients with temporomandibular disorder can include pain felt in the neck, ears, nape, face and some patients complain of not being able to open their mouth wide, locked joints, ringing in the ears and headaches. This can cause impaired jaw opening movements and difficulty chewing. In addition, it can make a clicking or popping sound when the patient moves the jaw joint.<sup>2</sup> The etiology of temporomandibular disorder (TMD) has many factors or is multifactorial. One of the factors that influence the emergence of temporomandibular disorder is psychosocial factors such as stress or depression. Riset Kesehatan Dasar (Riskesdas) 2018, stated that 9 out of 10 samples of the Indonesian population aged over 15 years were suffering from emotional mental disorders related to stress. As many as 12 million people aged over 15 years experience depression and 19 million Indonesians aged over 15 years experience mental emotional disorders.<sup>3</sup> This causes stress to become one of the predisposing factors for various existing diseases, including temporomandibular disorder.<sup>7</sup>

Dental students are one group of students who often face pressure or demands from the environment, both physical and emotional. Among dental students, their stress levels were found to be quite high. Stress can affect a person's physical and psychological condition, including poor work posture, muscle tension, and decreased sleep quality, all of which can contribute to the risk of developing temporomandibular disorder. Dense lecture demands, lots of assignments and exams, lab skills that must be mastered as well as social and economic pressures can potentially be a significant source of stress for dental students. Stress can affect the musculoskeletal system, including the muscles around the jaw, so that it can play a role in the occurrence of temporomandibular disorder.<sup>4</sup> Students of the 2020 class of the Faculty of Dentistry, Baiturrahmah University in 2023 have gone through 7 semesters where all major blocks such as orthodontics, prosthodontics, oral surgery and blocks others who take up quite a lot of study time have already passed so their stress level will certainly be different from students who have not gone through the entire block. Currently, they are busy completing their final assignment in the form of a thesis as one of the requirements for obtaining a bachelor's degree in dentistry. This of course takes up thought, energy and brings new burdens to bear. Their stress level can be considered to be one of the causes of temporomandibular disorder with all the experiences they have experienced.

Research conducted by Augusto et al 2016 showed that the prevalence of temporomandibular disorder in students was distributed according to mild temporomandibular disorder (50.0%), moderate (16.4%), and severe (5.5%). With mental disorders common in 29.9% of students and the average perceived stress is 30.9%. This shows a significant and statistically significant relationship between temporomandibular disorder and stress.<sup>5</sup> Temporomandibular disorder or temporomandibular joint disorders is a common health problem among dental students. A study conducted in 2018 of 300 dental students in Indonesia showed that high levels of stress were associated with an increased risk of experiencing symptoms of temporomandibular disorder.<sup>6</sup>

Another study in the same year on dental students in Brazil showed that students who experienced high academic stress had a higher risk of experiencing temporomandibular disorder.<sup>7</sup> A cross-sectional study conducted on 247 undergraduate dental students giving high levels of stress, depression, and anxiety were identified respectively in 54.7%, 55.9%, 66.8%, and of study participants who referred to the presence of symptoms of temporomandibular disorder.<sup>4</sup> Several previous studies have shown an association between high levels of stress and the occurrence of temporomandibular disorders in dental students. Perceived stress increases the activity and performance of the muscles that play a role in the chewing process and causes teeth to clench. The relationship between the two will result in altered circulation in the masticatory muscles and result in various kinds of problems, one of which is temporomandibular disorder.<sup>8</sup> Research on the relationship between stress and temporomandibular disorder in dental students can also provide guidance in developing knowledge that can reduce stress and improve temporomandibular joint health in dental students.

## RESEARCH METHODS

This type of research is analytical observational with a cross-sectional research design to determine the relationship between stress and temporomandibular disorders. Research data was obtained from direct examination of the temporomandibular joint based on the components of the Helkimo Index (Anamnestic index and Dysfunction index).<sup>25,26</sup> And identify stress with the Student Stress Inventory (SSI) questionnaire which has 4 subscales (Physical, Interpersonal relation, Academic and Environment). This instrument was developed from the stress model proposed by Charles Gadzella Morris (1994).<sup>23,24</sup> The population in this study was 95 students from the Faculty of Dentistry at Baiturrahmah University class of 2020. The sampling technique used in this research was total sampling. Total sampling is a sampling technique where the entire population is sampled. The sample size in this study was 95 people based on inclusion and exclusion criteria. The variables used in this research are stress as the independent variable and temporomandibular disorder (TMD) as the dependent variable. The data collection method in this research was using a questionnaire. This research was carried out at the Faculty of Dentistry, Baiturrahmah University in April – December 2023. The data analysis used in this research was Univariate Analysis and Bivariate Analysis.

## RESULTS

### *Univariate Analysis*

**Table 1.** Research Frequency Distribution Results

Information	Gender	
	<i>f</i>	%
Man	14	14.7
Woman	81	85.3
<b>Total</b>	<b>95</b>	<b>100</b>

  

Information	Stress Level	
	<i>f</i>	%
Mild	69	72.6
Moderate	26	27.4
Severe	0	0.0
<b>Total</b>	<b>95</b>	<b>100.0</b>

<b>Subscale 1 (Physical)</b>		
<b>Information</b>	<b>f</b>	<b>%</b>
Mild Stress	59	62.1
Moderate Stress	36	37.9
Severe Stress	0	0
<b>Total</b>	<b>95</b>	<b>100</b>

<b>Subscale 2 (Interpersonal Relations)</b>		
<b>Information</b>	<b>f</b>	<b>%</b>
Mild Stress	91	95.8
Moderate Stress	4	4.2
Severe Stress	0	0
<b>Total</b>	<b>95</b>	<b>100</b>

<b>Subscale 3 (Academic)</b>		
<b>Information</b>	<b>f</b>	<b>%</b>
Mild Stress	79	83.2
Moderate Stress	16	16.8
Severe Stress	0	0
<b>Total</b>	<b>95</b>	<b>100</b>

<b>Subscale 4 (Environment)</b>		
<b>Information</b>	<b>f</b>	<b>%</b>
Mild Stress	51	53.7
Moderate Stress	42	44.2
Severe Stress	2	2.1
<b>Total</b>	<b>95</b>	<b>100</b>

<b>Anamnestic Index</b>		
<b>Information</b>	<b>f</b>	<b>%</b>
Ai 0 (No Symptoms)	25	26.3
Ai 1 (Mild Symptoms)	47	49.5
Ai 2 (Severe Symptoms)	23	24.2
<b>Total</b>	<b>95</b>	<b>100.0</b>

<b>Dysfunction Index</b>		
<b>Information</b>	<b>f</b>	<b>%</b>
At 0 (No clinical symptoms)	5	5.3
At 1 (Mild Dysfunction)	48	50.5
At 2 (Moderate Dysfunction)	40	42.1
At 3 (Acute/Serious Dysfunction)	2	2.1
<b>Total</b>	<b>95</b>	<b>100.0</b>

**Bivariate Analysis**

**Table 2.** Relationship between Stress and *Anamnestic Index*

<b>Stress Level</b>	<b>AI</b>								<b>P Value</b>
	<b>Ai 0</b>		<b>Ai 1</b>		<b>Ai 2</b>		<b>Total</b>		
	<i>F</i>	%	<i>F</i>	%	<i>F</i>	%	<i>F</i>	%	
Mild	18	18,9	32	33,9	19	20	69	73	0,000
Moderate	7	7,3	15	15,7	4	4,2	26	27	
<b>Total</b>	<b>25</b>	<b>26,2</b>	<b>47</b>	<b>49,6</b>	<b>23</b>	<b>24,2</b>	<b>95</b>	<b>100,0</b>	

**Table 2.** Relationship between Stress and *Dysfunction Index*

<b>Stress Level</b>	<b>IN</b>					<b>P Value</b>
	<b>Di0</b>	<b>Di1</b>	<b>Di2</b>	<b>Di3</b>	<b>Total</b>	

	<i>F</i>	%	<i>F</i>	%	<i>F</i>	%	<i>F</i>	%	<i>F</i>	%
Mild	3	3,2	38	40	27	28.4	1	1	69	73
Moderate	2	2,3	10	10.5	13	13.6	1	1	26	27
<b>Total</b>	<b>5</b>	<b>5.5</b>	<b>48</b>	<b>50.5</b>	<b>40</b>	<b>42</b>	<b>2</b>	<b>2</b>	<b>95</b>	<b>100.0</b>

## DISCUSSION

Based on the results of research with a total of 95 respondents, that the stress level of students at the Faculty of Dentistry, Baiturrahmah University, Class of 2020, was mostly mild stress, namely 69 people (72.6%), moderate stress was 26 people (27.4%) and there were no students with severe stress levels. The results of the frequency distribution of stress levels support research conducted by Atika et al 2019 on students from the dental faculty at Andalas University, showing that the type of stress most often experienced by students was mild stress, as many as 37 people (55.2%) with no severe stress found among students. It showed different result with research by Husada et al 2019 regarding the relationship between stress and temporomandibular joint disorders in students of the dental profession program at Maranatha Christian University, the highest level of stress was obtained, namely moderate stress with a percentage of 96.8%. Another research conducted by Yikealo et al 2018 on College of Education (CoE) students, the level of stress most experienced by students was moderate stress at 63.4%. Differences in the results of the level of stress experienced can occur due to various things, such as the number of respondents, the field of science studied, factors that trigger stress and differences in the measuring instruments used.

Stress levels in dental students can be influenced by various things, both internal and external. Internal factors can include personal characteristics, such as levels of anxiety, optimism and self-control. It can also come from values and beliefs, such as views about past successes, failures and stressful experiences. External factors include curriculum and academic load, demands for learning and achievement, and interpersonal conflict.<sup>9</sup> Research conducted by Al Samadani et al 2014 on undergraduate students at the Faculty of Dentistry, King Abdul Aziz University, Saudi Arabia, suggests that apart from The learning environment, lack of time to complete the work and the large workload also contribute to causing stress for dental students. This is an example of a factor that causes increased stress that comes from external sources. In the same study by Al-Samadani et al 2014, it was also reported that the fear of failing to become a dentist was the main cause of stress in undergraduate dental students with a fairly high percentage, namely (51.3%).<sup>10</sup>

The results of the frequency distribution of the stress level subscales between the physical, interpersonal relations, academic and environmental subscales found that environmental factors dominate and are distributed across all levels of stress compared to other factors, including the level of severe stress which is only found in the environmental subscale with mild stress in 51 people (53, 7%), moderate stress 42 people (44.2%) and severe stress 2 people (2.1%). Things that are included in environmental factors that cause stress can include the living environment, weather, pollution, and the circumstances surrounding the learning environment. The quality of housing includes security, cleanliness, comfort of space, housemates, flooding, leaks, deficiencies and damage to residential facilities, and noise that can come from neighbors, traffic, or other activities that can cause disturbing sounds that will cause discomfort. can disrupt students' concentration, sleep, and ability to focus on

academic assignments which can cause stress.<sup>11</sup> Apart from that, pollution and weather can also make a person's stress worse. High pollution can contribute to an increased risk of physical problems. Research shows that students living in areas with high levels of pollution may experience increased levels of stress and mental health symptoms.<sup>12</sup> Changes in weather, especially unstable or extreme weather, can affect college students' mood and energy levels. A decrease in sunlight intensity during the winter can also contribute to mood condition. Longitudinal research shows that extreme weather changes can be related to fluctuations in mood and stress levels in students.<sup>13</sup> As is known, the weather in the city of Padang is famous for its scorching heat, students often have lecture schedules when the sun is rising so this will disturb student's mood and focus in carrying out lectures. Improved environmental design that reduces noise and improves air quality can provide significant benefits to student well-being.<sup>13</sup>

The highest moderate subscale stress was found in the environmental subscale with 42 people (44.2%) and the physical subscale with 36 people (37.9%). Physical conditions have a fairly high frequency in students' stress levels. Stress can affect the digestive system and cause problems such as stomach upset, and indigestion or irritable bowel syndrome (IBS). Chronic stress can weaken the immune system, making students more susceptible to infection and disease. Subjective complaints such as headaches, back pain, constant fatigue and easy aches are often experienced by students who experience stress. Dental students who experience high stress will be more susceptible to infectious diseases.<sup>14</sup>

Stress in dental students caused by interpersonal relationships can come from various causes, most of which are related to demands between students, lecturers, dental nurses and various human resources involved in them. Some of the factors that cause this stress can include interpersonal incompatibility, peer conflict, excessive competition, and lack of social support. High competition in the dental environment can be intense enough between students to achieve certain academic achievements or clinical opportunities that can create interpersonal tension and conflict.<sup>15</sup> In clinical practice, students also work in teams. Lack of skills in communicating and collaborating effectively with significant differences in personality or values with colleagues can give rise to interpersonal tension. Lack of conformity can cause conflict and create a learning environment that is not conducive. Weak social relationships or lack of support from colleagues, academic staff, family and the surrounding environment play an important role in self-pressure which can cause students to become stressed in overcoming academic and clinical challenges.<sup>16</sup>

In academic factor, there are many factors that can cause academic stress level in students. The large number of mild stress levels in this study (79 people) shows that the academic stress experienced by pre-clinical students can be handled well and the students' physiological responses run well even though there is still moderate stress in 16 people. Dentistry study programs require students to understand complex material and require the dedication of significant time to study. Dental students must not only be successful in theoretical learning but also in the clinical field by prioritizing skills in treatment and establishing a correct diagnosis. High levels of stress can be attributed to the pressure placed on students during dental education because clinical requirements, exams and grades, length of study period, level of emotional intelligence and the pressure of being a qualified dentist in the future often worsen a person's stress level.<sup>4</sup>

Stress levels can produce varying outcomes per individual. In this study, the highest level was found in the environmental subscale with moderate stress levels. Academics, interpersonal relationships, environment, and physical can be collaborative things that can run simultaneously in influencing a person's stress level between mild, moderate, and severe. The various factors above can be taken into consideration in implementing appropriate actions in dealing with stress.

The results of the frequency distribution of the anamnestic index show that the students of the Faculty of Dentistry, Baiturrahmah University, class of 2020, experienced the most symptoms of temporomandibular disorder, namely 47 people (49.5%), followed by 23 people (24.2%) with severe symptoms and 25 without experiencing symptoms. people (26.3%). Symptoms of temporomandibular disorder, especially pain, not only involve the temporomandibular joint and masticatory muscles, but can also spread to adjacent structures such as the teeth, ears, neck and head muscles. Apart from that, for other chronic pain conditions, temporomandibular disorder has serious consequences and consequences for the individual's daily life in various ways such as physical disability, impaired sleep quality, and reduced learning ability. Research indicates that around 60-70% of the population may experience at least one temporomandibular disorder sign during their lifetime, yet only a mere 5% necessitate treatment.<sup>16</sup>

The dental program requires students to understand complex material and requires significant time dedication to study. Dental students must not only succeed in theoretical learning but also in the clinical field by prioritizing skills in treatment and making correct diagnoses. The heightened stress levels experienced by dental students stem from various sources, including the demands of clinical education, rigorous examination protocols, academic grading systems, extended study durations, considerations of emotional intelligence, and the overarching aspiration to attain professional competency as future dentists.<sup>4</sup> This is in line with research by Maderazo 2017 at the College of Dentistry, Lyceum of the Philippines University, that the highest level of student stress is caused by academic achievement. The demand to provide quality care, along with the intense competitive environment among students can create high pressure and be a contributing factor to stress.<sup>22</sup>

Then, the results of the dysfunction index frequency distribution among students at the Faculty of Dentistry, Baiturrahmah University, class of 2020, showed that the majority experienced mild dysfunction, namely 48 people (50.5%). Followed by moderate dysfunction as many as 40 people (42.1%), severe dysfunction as many as 2 people (2.1%) and experiencing no dysfunction or no clinical symptoms as many as 5 people (5.3%). These results are in line with research by Vojdani et al 2012 in School of Dentistry, Shiraz University of Medical Sciences, that the highest results, namely 50% of the sample, included mild dysfunction, 13% moderate dysfunction, and 8% severe dysfunction. Stress can be positive or negative, depending on the situation and how the individual responds to it. Excessive stress can cause various problems including temporomandibular disorder. Stress can cause temporomandibular disorder through various mechanisms, including changes in the nervous system, changes in hormones, and changes in behavior. Stress can cause changes in the nervous system, including increased sympathetic nervous activity. This can cause contraction of the muscles around the temporomandibular joint, which can cause pain and tension. Stress is also related to hormone levels,

such as the hormone cortisol. This hormone will weaken the connective tissue around the temporomandibular joint, which can cause problems with the joint.<sup>17</sup>

Individuals under stress often resort to specific coping mechanisms as a natural response to alleviate mental tension. One such coping mechanism involves adopting detrimental habits that can adversely affect various organs or systems within the body. These include chewing gum excessively, biting pencils, biting nails, and grinding teeth. These habits/parafunctions can represent an individual's way of releasing emotional tension. The parafunction described leads to a diminished blood flow to muscle tissue, resulting in the accumulation of metabolic waste products within tissue cells, triggering symptoms of fatigue, pain and spasms. Parafunction generally causes morphological and functional disorders of the bones, teeth and soft tissues of the stomatognathic system including disorders of the temporomandibular joint.<sup>18</sup>

In the context of the temporomandibular joint, excessive muscle tension can cause pain. Prolonged stressful situations can increase adrenaline production, which in turn can trigger the habit of teeth grinding or bruxism. Bruxism can cause pain disorders in the temporomandibular joint.<sup>19</sup> In addition, increased adrenaline in stressful situations can also stimulate the release of substances that can cause inflammation.<sup>19</sup> Discomfort experienced in the temporomandibular region may serve as a somatic expression of psychological conditions such as stress. Broadly speaking, alterations resulting from temporomandibular disorder can disrupt an individual's daily routines and social interactions, consequently exerting detrimental effects on their emotional and physical well-being, as well as their academic and professional endeavors.<sup>20</sup> The weakness of this research is that it does not explain other causes that can worsen the condition. temporomandibular disorder and unspecified types of temporomandibular disorder. The results of data obtained from 95 respondents from the Faculty of Dentistry, Baiturrahmah University, Class of 2020, show a positive correlation between stress and temporomandibular disorder. Dental students have been proven to be vulnerable to stress which can be caused by many factors. This does not rule out the possibility that the mental tension they experience can cause symptoms and dysfunction of the temporomandibular joint.

## **CONCLUSION**

Based on the results of research on the relationship between stress and temporomandibular disorder in students at the Faculty of Dentistry, Baiturrahmah University, class of 2020, it can be concluded that there is a relationship between stress and temporomandibular disorder in students at the Faculty of Dentistry, Baiturrahmah University, class of 2020..

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