Measuring Stress Level Among Medical Students

Ronaldo Timotius Girsang[1], Ali Napiah Nasution[2*], Putranto Manalu[3], Sri Wahyuni Nasution[4]

[1,2,3,4] Masters Program in Clinical Medicine, Faculty of Medicine, Dentistry and Health Sciences, University Prima Indonesia Medan, North Sumatera, Indonesia
*Corresponding Author:
Email : aallinafiah@gmail.com

Abstract
Measurement of stress levels is important considering the long and stressful study period that medical students have to go through. This study aims to measure the difference in stress levels of the first year and third-year medical education students. The approach used in this study is a one-time unpaired numerical comparative analysis of two groups with a cross-sectional design. The study was conducted at the Faculty of Medicine, Dentistry and Health Sciences, Universitas Prima Indonesia for 2 (months) starting from February 2022–March 2022. A total of 76 subjects were involved, and each group consisted of 38 subjects. Determination of research subjects was carried out by purposive sampling technique with inclusion criteria in the form of the first-year and third-year preclinical students. In collecting data, the researcher used The Kessler Psychological Distress-10 (K-10) questionnaire. The collected data was then analyzed using an unpaired t-test. Furthermore, the results of the analysis are presented in tabular form along with interpretations. From the results of the study, it can be seen that many first-year and third-year students experience stress, and there is no significant difference between the two groups. Furthermore, the results of the study showed that there was no significant difference in the K-10 scores for first-year and third-year students based on place of residence, ethnicity, and area of origin. The phenomenon of stress in medical students needs attention from the university. Preventing an academic environment by designing a curriculum that promotes collaboration rather than competition as well as providing counseling services is recommended as a preventive measure.

Keywords: *K-10 scale, stress and medical students.*

I. INTRODUCTION

One of the public health problems of concern is mental health, a major cause of disability and loss of health globally (Wittchen et al., 2011). Psychological distress, including symptoms of depression and anxiety, is prevalent among patients with physical illnesses, with rates ranging from 4% to 47% in medical emergency departments. These psychological symptoms can accompany various physical conditions, including chronic illnesses and unexplained medical complaints. The relationship between psychological distress and physical health is complex, with evidence suggesting bidirectional influences. Comorbid depression and distress are associated with poor outcomes in several chronic illnesses, potentially due to lifestyle factors, poor treatment adherence, and biological processes. Self-help interventions have shown promise in improving depression symptoms in patients with physical conditions, particularly those without neurological conditions and when based on therapeutic models like cognitive behavioral therapy. However, psychological distress often goes undiagnosed in routine clinical care, highlighting the importance of appropriate assessment and screening (Faessler et al., 2015).

Psychological distress experienced by medical students due to a long and stressful study period needs serious attention. These conditions can harm the academic life and personal life of students (Al Saadi et al., 2017; Maser et al., 2019). A previous meta-analysis study reported that nearly half of medical students exhibit some form of psychological distress during medical school (Quek et al., 2019). Psychological distress in students is related to the transition period, and academic and non-academic burdens experienced (Alfiyan et al., 2021). The defining characteristics of psychological distress are exposure to stressful events that threaten physical or mental health, inability to cope effectively with these stressors and the emotional turmoil that results from this ineffectiveness (Deasy et al., 2014; Drapeau et al., 2012).

Several previous studies reported high levels of psychological distress in medical students. In Ethiopia, a study reported that the prevalence of stress was 52.4% and academic-related stressor domains were the main source of stress (88.6%)(Melaku et al., 2015). Egypt reported the prevalence of stress, anxiety, and depression of varying degrees was 62.4%, 64.3%, and 60.8% among the sample studied (Yousif et al., 2017). The prevalence of depression of 63% was found in a study in Saudi Arabia, stress decreased

significantly with increasing study years, except for the last year (Abdulghani et al., 2011). Indonesia also reported that many medical students experienced stressful conditions (Adryana et al., 2020; Maulana et al., 2020; Maulina, 2018; Rahmayani et al., 2019).

Measuring stress levels is important considering that stress can cause anxiety, depression, social dysfunction, and even the intention to end one's life (Crosswell & Lockwood, 2020). Recent advancements in stress measurement techniques include analyzing cortisol and dehydroepiandrosterone (DHEA) levels, which offer a quantifiable approach to psychological evaluation. Social media engagement patterns can also be used to assess stress levels, utilizing natural language processing and machine learning techniques. Traditional clinical psychological tests remain valuable tools for quantifying stress, anxiety, and depression levels. Emerging technologies now allow for stress assessment through speech analysis using smartphones and smart speakers, offering real-time monitoring in natural environments. However, these new methods raise important validation, ethical, and privacy concerns that must be addressed. While these innovative approaches show promise for advancing digital health initiatives, further research is needed to validate their effectiveness against established stress biomarkers and address potential privacy issues (Slavich et al., 2019).

Students who experience extreme stress or are indicated to be depressed need serious attention and treatment because it can harm the learning process and student achievement (Grotan et al., 2019). One scale that can be used to measure stress levels is The Kessler Psychological Distress-10 (K-10 scale) which was first developed and used in the annual US National Health Interview Survey to measure non-specific aspects of psychological distress (Stolk et al., 2014). K-10 scale is known to have good internal consistency and discriminant ability to detect depression or anxiety disorders (Sampasa-Kanyinga et al., 2018).

The Faculty of Medicine, Dentistry, and Health Sciences Universitas Prima Indonesia is one of the universities located in Medan City. Currently, as many as 358 students are pursuing a medical degree. Previously, there had never been a study on the level of stress experienced by students pursuing medical undergraduate education. This study aims to measure the difference in stress levels of the first-year and third-year medical students at the Faculty of Medicine, Dentistry, and Health Sciences Universitas Prima Indonesia.

II. LITERATURE REVIEW

2.1. Distress

Psychological distress is defined as an emotional problem state characterized by distinct psychological symptoms, such as symptoms ranging from depression (e.g. loss of interest, sadness, hopelessness) and anxiety (e.g. restlessness; feelings of tension) to personality traits, functional disability, and behavioral problems. . Symptoms may vary in composition and duration, and may be associated with somatic symptoms (eg insomnia and lack of energy). Some argue that psychological distress is a transient phenomenon consistent with normal emotional reactions to stressors, while others claim it is an underlying component of anxiety and depression and is a relatively stable condition. Several studies have been conducted on this subject with ambiguous results, ranging from high fluctuations in a month to relatively stable conditions for decades (Thelin et al., 2017).

2.2. Factors Affecting Psychological Distress

Four basic social patterns influence distress. The first social pattern is gender, where women are more likely to experience distress than men. Then, marital status, explains that married individuals tend to be more resilient to distress when compared to unmarried individuals. Next are unwanted life events, namely that the more unwanted changes occur in a person's life, the higher the level of distress experienced. And finally, the socioeconomic class, where it is stated that the higher a person's socioeconomic status (both in terms of education, employment, and income) the lower the level of distress experienced (Golden et al., 2018).

2.3. Aspects of Psychological Distress

According to WHO, psychological distress is mental health for each individual to realize his or her potential, can cope with normal psychological stress, and be able to contribute to his or her community. Mental health, therefore, refers to more than simply 'absence of disease', but includes 'a state of complete physical, mental and social well-being. However, it is important to point out that while some people may indeed need medical care and treatment for mental health problems, the majority of people who may experience distress from time to time in their lives will not require medical intervention (Tedstone et al., 2008). The main forms of psychological distress are:

1) Depression: one of the mood disorders characterized by the main symptoms of depressive affect, loss of interest and anhedonia, and loss of energy characterized by rapid fatigue. As well as having other additional symptoms such as reduced concentration or attention, reduced self-esteem or self-confidence, guilt or a sense of worthlessness, has a bleak and pessimistic view of the future, ideas or acts of self-harm or suicide, disturbed sleep, and decreased appetite (Sadock et al., 2017).
2) Anxiety: Anxiety is a feeling of fear and worry. This fear is usually about uncertain future events and situations that have the potential to cause stress or suffering. The relationship between "anxiety" and "anger" further implies an underlying feeling of hostility. Clinically, anxiety and anger often coexist, suggesting that the feared danger response can be non-specific and unpredictable, or specific and predictable (Sadock et al., 2017).

2.4. Clinical Features of Psychological Distress

Coping patterns prior to medical school as well as personality traits, support systems, and many other factors, influence stress and their ability to deal with it. Symptoms of psychological distress (eg stress, anxiety, and depression) were significantly higher at the end of the first year of medical training than at baseline. Therefore medical schools should observe their students at the end of the first year especially before the exam period, to determine if they need psychological support. Due to the psychological stresses inherent in this process, all medical schools should have accessible medical student mental health services. Some medical schools provide this service through the department of psychiatry or other related training programs (Selamu & Singhe, 2018).According to Ridner 2004, that psychological distress disappears when the stressor disappears or when a person comes to deal with this stressor effectively. The level of distress can be influenced by a person's response to distress. Responses to stress are grouped into 4 parts, namely physiological responses, cognitive responses, emotional responses, and behavioral responses.

2.5. Psychological Distress Assessment

The Kessler Psychological Distress-10 (K-10) is one of several recent instruments of relatively short psychological distress based on questions about depression and anxiety disorders experienced by a person in the last 4 weeks developed by Kessler et al. for psychological distress screening in the US National Health Survey. The purpose of this scale is to have a brief screening tool to determine whether or not participants need a more in-depth structured interview (Brooks et al., 2006; Thelin et al., 2017).

III. METHODS

The approach used in this study is a one-time unpaired numerical comparative analysis of two groups with a cross-sectional design. The two groups being compared consisted of first-year and third-year preclinical students. The study was conducted at the Faculty of Medicine, Dentistry and Health Sciences, Universitas Prima Indonesia (FKKGIK UNPRI) for 2 (months) starting from February 2022–March 2022.

In determining the sample size for each group, the researcher used the sample size formula for unpaired numerical comparative analytical research in two groups with one measurement. The calculation results show that the minimum sample size for each group is 38 subjects, so the total sample required is 76 subjects. Determination of research subjects was carried out by purposive sampling technique with inclusion criteria of first and third year preclinical students, no history of mental illness, head trauma, and history of

drug use. Subjects were given a consent form to participate as a subject before being given a research questionnaire.

In collecting data, the researcher used The Kessler Psychological Distress-10 (K-10) questionnaire. K-10 consists of 10 items related to emotional state and each has 5 rating scales. Total score ranged from 0–40. Thus, a high overall score indicates a high level of psychological distress. The collected data was then analyzed using unpaired t-test. Furthermore, the results of the analysis are presented in tabular form along with interpretations.

IV. ANALYZE AND RESULT

This research was conducted at the Faculty of Medicine, Dentistry, and Health Sciences, Universitas Prima Indonesia from January 2022 to March 2022 involving 38 subjects in the first-year medical student group and 38 subjects in the third-year medical student group.

Demographic characteristics of each group. The median value (min-max) of age in the first year and third-year student subject groups are 18 (17-20) years and 20 (19-22) years. For gender, the majority were women in the first and third-year student subject groups as many as 25 (65.8%) and 22 (57.9%). Most residents are with families in the subject group of first-year students 20 (52.6%) and third-year students as many as 25 (65.8%). Students who experience the most psychological distress are third-year students as many as 26 people (68.4%). K-10 scores for first-year and third-year students with K-10 scores of 25(10-36) and 22(10-36) (see Table 1).

Next, the researchers conducted an unpaired t-test to analyze the difference in K-10 scores for first-year and third-year students based on place of residence, ethnicity, and area of origin (Table 2). The results of the analysis showed that there was no significant difference between students living with their families (p=0.242) and students living in boarding houses (p=0.371) concerning the K-10 scores for first-year and third-year students. Furthermore, there was no significant difference between Batak ethnic students (p=0.532) and non-Batak ethnic students (p=0.476) concerning the K-10 score for first-year and third-year students.

Likewise, for the area of origin variable, the K-10 score for first-year and third-year students based on their area of origin showed that there was no significant difference between students from Medan City (p=0.160) and students from outside Medan City (p=0.371).

Tabel 1 Demographic Characteristics of Subjects

Characteristics	**First-year n (%)**	**Third-year n (%)**
Age	Med (min - max)	Med (min - max)
(in year)	18 (17-20) years	20 (19-22) years
Gender		
Male	13 (34,2%)	16 (42,1%)
Female	25 (65,8%)	22 (57,9%)
Residence		
Family	20 (52,6%)	25 (65,8%)
Boarding house	18 (47,4%)	13 (34,2%)
Ethnic		
Batak	13 (34,2%)	18 (47,4%)
Beside Batak	25 (65,8%)	20 (52,6%)
Hometown		

Medan City	17 (36,8%)	25 (65,8%)
Outside Medan City	21 (63,2%)	13 (34,2%)
Condition		
Psychological Distress	24 (63,2%)	26 (68,4%)
Non Psychological Distress	14 (36,8%)	12 (31,6%)
K-10 Score	Med (min - max) 25 (10-36)	Med (min - max) 22 (10-36)

The results of this study indicate that female student are the group that experiences the most psychological distress. This finding is consistent with previous studies showing that women are more prone to stress, but further and in-depth studies are needed (Casey et al., 2015; Jafari et al., 2017; Quek et al., 2019). This study further identified feelings of psychological distress at admission to the first or initial clinical placement. Medical students experience these feelings increased throughout the first clinical year but have minimal impact on academic outcomes. Dendle *et al.* (2018) reported that medical students' psychological distress had an impact on academic performance in their freshman year.

The results of the study also showed that there was no significant difference between students living with their families and students living in boarding houses concerning the K-10 scores for first-year and third-year students. Previous research revealed that there was no significant effect on the stress level of medical students who lived with their family, friends, or alone (Saeed et al., 2016). However, another study found that medical students who lived with their families tended to have lower levels of stress and fatigue than those who lived alone (Humphris et al., 2002).

Table 2 Scores of K-10 in First and Third Year Students and Predictors

Variabel	First-year			Third-year		
	n	K-10 score (Mean±SD)	*p*	n	K-10 score (Mean±SD)	*p*
Residence						
Family	20	25,75±7,405	0,242	25	24,76±7,401	0,371
Boarding house	18	22,89±7,403		13	22,38±8,710	
Ethnic						
Batak	13	25,46±6,527	0,532	18	23,00±7,647	0,476
Beside Batak	25	23,84±7,951		20	24,80±7,743	
Hometown						
Medan City	17	26,29±6,917	0,160	25	24,76±7,401	0,371
Outside Medan City	21	22,86±7,663		13	22,38±8,170	

In this study, it was concluded that there was no significant difference between Batak ethnic students and non-Batak ethnic students on the K-10 scores for first-year and third-year students. This finding is in line with the results of a previous study that reported no difference in the prevalence of depressive symptoms by

race/ethnicity. Furthermore, the sense of personal achievement and quality of life is lower in minority medical students than in non-minority students (Dyrbye et al., 2006). An American study reports that African-American medical students are at higher risk for symptoms of depression and anxiety than their white counterparts in their early first year of medical school (Hardeman et al., 2015).

There is no significant difference in the K-10 scores for first-year and third-year students based on the area of origin in this study. However, in contrast to the findings of a study conducted by Dendle *et al.* (2018), terdapat perbedaan signifikan tingkat distress psikologis berdasarkan daerah asal dengan mahasiswa tahun pertama dan tahun ketiga. there is a significant difference in the level of psychological distress based on the area of origin with first-year and third-year students.

Finally, the phenomenon of high-stress levels among medical students deserves special attention. The preventive step that can be taken is for the university to develop preventive mental health counseling and services as an integral part of routine clinical services provided to medical students (Pedrelli et al., 2015; Quek et al., 2019).

Based on the research findings, it is strongly recommended that universities implement comprehensive mental health counseling and services specifically designed for medical students. These services should be integrated into the routine clinical care provided to students to ensure easy access and reduce stigma. Key components of these mental health services should include: 1) Preventive counseling: Regular workshops and sessions to educate students about stress management techniques, coping mechanisms, and the importance of self-care; 2) Confidential counseling: Individual counseling sessions for students experiencing high levels of stress, anxiety, or depression, 3) Peer support groups: Facilitated groups where students can connect with their peers, share experiences, and offer mutual support.; 4) Crisis intervention services: Immediate access to mental health professionals for students in crisis or experiencing severe distress.

By prioritizing mental health support for medical students, universities can help to mitigate the negative impacts of high stress levels, improve academic performance, and foster a healthier learning environment.

V. CONCLUSION

Measurement of stress levels is important considering the long and stressful study period that medical students have to go through. From the results of the study, it can be seen that many first-year and third-year students experience stress, and there is no significant difference between the two groups. Furthermore, the results of the study showed that there was no significant difference in the K-10 scores for first-year and third-year students based on place of residence, ethnicity, and area of origin. The phenomenon of stress in medical students needs attention from the university. Preventing an academic environment by designing a curriculum that promotes collaboration rather than competition as well as providing counseling services is recommended as a preventive measure.

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