Original Article

Relationship between Stress Level and Risk of Eating Disorder in Undergraduate Students during the COVID-19 Pandemic

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Abstract

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Background : The prevalence of undergraduate students' stress before COVID-19 pandemic in Indonesia was 36.7-71.6%, where undergraduate students' age was classified as the age group for the onset of eating disorders. During the COVID-19 pandemic, students must continue their studies. However, modifications of daily routines in pandemic have a negative effect on mental health, increase negative stress (distress), and it could increase the incidence of eating disorders symptoms. The purpose of this study was to find out the relationship between stress level in undergraduate student and the risk of eating disorder they might have during the COVID-19 Pandemic.

Methods : This study used cross sectional study design and conducted on June 2021. The subjects were 110 active students who studied in Faculty of Medicine Diponegoro University who was chosen using consecutive sampling technique. The Perceived Stress Scale-10 questionnaire was used to measure the students' stress level for the past month and the Eating Attitude Test-26 questionnaire was used to determine the students' risk of having an eating disoder. Both questionnaires were selected because it has been proven as reliable questionnaires with high sensitivity and specificity (Cronbach's alpha >0.7).

Results : The result showed that out of 110 students who have been subjects of this study, 25.5% of respondents experienced low stress, 68.2% of respondents experienced moderate stress, and 6.4% of respondents experienced high stress. It also showed that 4.5% of respondents have the risk of having an eating disorder.

Conclusion : There is a significant correlation (p=0.005) between the stress level and risk of eating disorder with very weak positive relationship direction (r=0.097).

Keywords : COVID-19, Eating Disorder, Stress level

INTRODUCTION

Stress is defined as a particular relationship between individual and their environment,[1] where there is an imbalance between demands from the environment and individual's ability to adjust, thus it becomes a source of stress and emotional tension.[2] According to the American Psychological Association (APA), there is a connection between age and perceived stress levels. It is reported that Generation Z (age 10 to 25 in 2021),[3] has the highest stress level of 5.3 out of 10 compared to other generations.[4] This generation involves primary school students up to undergraduate students. In another study, it is specifically stated that the prevalence of stress in undergraduate students in Indonesia was 36.7–71.6%.[5]

In dealing with stress, everyone has their own unique ways to cope. Generally, coping process can be divided into two, problem-focused coping if a person directly looks into solutions of the problem and emotional-focused coping if someone prioritizes to regulate their emotional response to stress.[6] It was written that most of the people who changed their eating behavior as a form of emotional-focused coping felt the effects of stress on their bodies were reduced.[7] Whereas changes in eating behavior, dieting, and weight control behavior are predicted to cause eating disorders in the next 5 years.[8]

Eating disorders are a syndrome associated with pathological eating attitudes and behavior.[9] It is reported that cases of eating disorders continue to increase from year to year, found more in women than men, and cases are more often found in western countries than in eastern countries.[10] However, Indonesia which is an eastern country, ranks fourth in the world after the United States, India, and China for the incidence of eating disorders, although statistical data is not known for sure.[9] It is should be emphasized that the onset of eating disorders are very common in adolescence and young adults with age range of 15–19 years, although it can occur at any age.[11]

Since 2019, the COVID-19 pandemic has brought huge amount of changes in various aspects in our daily life. Previous research has shown that the COVID-19 pandemic affects negatively on mental health by increasing distress and depressive symptoms in adults. The COVID-19 pandemic has also increased the incidence of symptoms and the risk of eating disorders due to modifications in daily routines, including mealtimes, sleep and exercise schedule, and the loss of social support.[12]

As far as the researcher knows, the topic of eating disorders during pandemic in undergraduate students has not been widely studied in Indonesia. In addition, national statistical data about the incidence of eating disorders in Indonesia has also not been regularly reported, let alone published. The purpose of this study was to find out the relationship between stress level in undergraduate student and the risk of eating disorder they might have during the COVID-19 Pandemic.

METHODS

This research is an analytic observational study with cross sectional approach that was conducted in June 2021. The sample was chosen using the consecutive sampling technique, which was the students of Faculty of Medicine Diponegoro University who met the inclusion criteria. The inclusion criteria of this study were students who actively being registered as students of Medical Study Program in Faculty of Medicine Diponegoro University during the COVID-19 pandemic and agreed to be this research's subjects by filling out the informed consent and questionnaire completely. Meanwhile, the exclusion criteria for this study were students who have already been diagnosed with eating disorders, currently undergoing therapy for their eating disorders, whether it was a psychotherapy or pharmacotherapy. After using consecutive sampling technique, the total number of respondents were 110 students. The Perceived Stress Scale-10 (PSS-10) questionnaire was used to measure the students' stress level for the past month and the Eating Attitude Test-26 (EAT-26) questionnaire was used to determine the students' risk of having an eating disoder. Both of these instruments have been validated and translated in Indonesia by Department of Psychology, University of Diponegoro at 2015.

Data processing and analysis was carried out using Lambda and Spearman test.

RESULTS

Table 1 shows characteristics of research subjects. Table 2 shows correlation between stress level and demographic factors. Table 3 shows correlation between the risk of eating disorders and demographic factors. Table 4 shows correlation between stress level and the risk of eating disorders.

DISCUSSION

The purpose of this study was to find out the relationship between stress level in undergraduate student and the risk of eating disorder they might have during the COVID-19 Pandemic. This study found that out of 110 students who have been subjects of this study, 25.5% of respondents experienced low stress, 68.2% of respondents experienced moderate stress, and 6.4% of respondents experienced high stress. From this data, it can be seen that more than half of the respondents experienced moderate stress. This finding is in line with previous research where the majority of undergraduate students at other medical faculties in Indonesia also

TABLE 1
Characteristics of research subjects

Variable		Frequency (%)
Age	Late Teen (17–25 years)	110 (100%)
Gender	Male	31 (28.2%)
	Female	79 (71.8%)
Religion	Islam	69 (62.7%)
	Catholicism	23 (20.9%)
	Protestantism	14 (12.7%)
	Buddhism	2 (1.8%)
	Hinduism	2 (1.8%)
BMI	Underweight (<18.5)	12 (10.9%)
	Normal or Healthy weight (18.5–22.9)	51 (46.4%)
	Overweight at risk (23–24.9)	20 (18.2%)
	Obesity class I (25–29.9)	18 (16.4%)
	Obesity class II (≥30)	9 (8.2%)
GPA	Excellent (IPK 4.00–3.51)	70 (63.6%)
	Good (IPK 3.50–3.01)	39 (35.5%)
	Moderate (IPK 3.00–2.50)	1 (0.9%)
Economic Status	< Rp. 500.000,00	23 (20.9%)
	Rp. 500.000,00 – Rp. 1.000.000,00	24 (21.8%)
	Rp. 1.000.001,00 – Rp. 2.000.000,00	33 (30%)
	> Rp. 2.000.000,00	30 (27.3%)
Isolation Status	Living alone	15 (13.6%)
	Living with family	95 (86.4%)

experienced moderate stress during the COVID-19 pandemic.[13,14] When compared with previous study before the pandemic,[15] it can be said that there was an increase of undergraduate students' stress levels during the COVID-19 pandemic. It was written that majority of respondents considered online learning was not effective and became one of the causes of stress.

This study also showed that 4.5% of respondents have the risk of having an eating disorder. If compared with studies conducted before the COVID-19 pandemic began, they also showed the same findings with this study, where the percentage of respondents who are at risk is lower than the normal respondents.[16,17] From the existing percentages, it can be said that generally, there has been a decrease of respondents who are at risk of developing eating disorders from before the pandemic, beginning of the pandemic, to a year after the pandemic took place. It happens because patients have been able to find adaptive coping strategies for their eating disorders, they are willing to accept the situation and seek therapy for eating disorder symptoms, and have been receiving social support from family during the pandemic period which has lasted for one year.[18]

This study also found that there were no significant relation of undergraduate students' stress level and the risk of eating disorder with subjects' demographic factors such as age, gender, religion, BMI, GPA, economic status, and isolation status.

Relationship between Stress Level and Eating Disorder Risk
During the COVID-19 pandemic, students' stress tends to increase.[19] The causes of increased stress are multifactorial. Some of them are modification into online learning system and drastic changes in social environment during the COVID-19 pandemic which

TABLE 2
Correlation between stress level and demographic factors

Variable		Stress level			p
		Low Stress	Moderate Stress	High Stress	
Age	Late Teen (17–25 years)	28	75	7	constant
Gender	Male	8	20	3	0.798[$]
	Female	20	55	4	
Religion	Islam	15	51	3	0.134[$]
	Catholicism	7	14	2	
	Protestantism	3	9	2	
	Buddhism	1	1	0	
	Hinduism	2	0	0	
BMI	Underweight (<18.5)	2	10	0	0.721[¥]
	Normal or Healthy weight (18.5–22.9)	13	35	3	
	Overweight at risk (23–24.9)	7	12	1	
	Obesity class I (25–29.9)	5	13	0	
	Obesity class II (≥30)	1	5	3	
GPA	Excellent (IPK 4.00–3.51)	16	52	2	0.952[¥]
	Good (IPK 3.50–3.01)	11	23	5	
	Moderate (IPK 3.00–2.50)	1	0	0	
Economic Status	< Rp. 500.000,00	6	16	1	0.386[¥]
	Rp. 500.000,00 – Rp. 1.000.000,00	2	20	2	
	Rp. 1.000.001,00 – Rp. 2.000.000,00	11	20	2	
	> Rp. 2.000.000,00	9	19	2	
Isolation Status	Living alone	5	9	1	0.621[$]
	Living with family	23	66	6	

requires undergraduate students to self-isolate. When the environment changes and humans feel that they lose their sense of control, they tend to feel afraid and insecure. These feelings are amplified by the threat of being infected with the COVID-19 virus.[20] All of these causes have increased undergraduate students' stress level so that stress management is necessary. In terms of managing their stress, humans must go through a process called a coping mechanism, either it is a problem-focused coping or an emotional-focused coping. One form of emotional-focused coping is a change in eating behavior. A bad eating behavior which lasts long enough and is accompanied by persistent food preoccupation, an excessive fear or worry about body shape, or body image distortion can lead a person into having an eating disorder. From these explanation, it can be drawn the reason why someone with stress can be at risk for eating disorders.

This study found a significant relationship between stress levels and the risk of eating disorders (p=0.005) with a very weak relationship strength (r=0.097). The direction between two variables is positive, which means the higher level of stress someone has, their risk of developing an eating disorder is also greater. This finding is in line with previous research.[21] The very weak relationship strength between the two variables can be explained by the theory of coping mechanisms. According to Lazarus and Folkman, problem-focused coping consists of confrontational coping, seeking social support and planning ways to solve problems, while emotional-focused coping consists of ways to control oneself, humor, keeping a distance from the crowd,

TABLE 3
Correlation between the risk of eating disorders and demographic factors

Variable		Risk of Eating Disorders		p
		Normal	At Risk	
Age	Late Teen (17–25 years)	105	5	constant
Gender	Male	31	0	0.154$^\$$
	Female	74	5	
Religion	Islam	68	1	0.228$^\$$
	Catholicism	21	2	
	Protestantism	12	2	
	Buddhism	2	0	
	Hinduism	2	0	
BMI	Underweight (<18.5)	12	0	0.098$^\$$
	Normal or Healthy weight (18.5–22.9)	50	1	
	Overweight at risk (23–24.9)	19	1	
	Obesity class I (25–29.9)	17	1	
	Obesity class II (≥30)	7	2	
GPA	Excellent (IPK 4.00–3.51)	67	3	0,957$^\$$
	Good (IPK 3.50–3.01)	37	2	
	Moderate (IPK 3.00–2.50)	1	0	
Economic Status	< Rp. 500.000,00	23	0	0.053$^\$$
	Rp. 500.000,00 – Rp. 1.000.000,00	24	0	
	Rp. 1.000.001,00 – Rp. 2.000.000,00	32	1	
	> Rp. 2.000.000,00	26	4	
Isolation Status	Living alone	15	0	0.365$^\$$
	Living with family	90	5	

TABLE 4
Correlation between stress level and the risk of eating disorders

Stress Level	Risk of Eating Disorders		
	Normal	At Risk	Total
Low Stress	28	0	28
Moderate Stress	72	3	75
High Stress	5	2	7

Variable	p	r	Description
Stress Level and Risk of Eating Disorders	0.005$^{*\$}$	0.097	Significant very weak correlation

seeking emotional support, giving positive words affirmation, praying and doing religious activities. Carver and Weintraub added another type of coping, namely dysfunctional coping which consists of various activities that are not good for someone's wellbeing.[22]

But if we focus on emotional-focused coping, a study has listed several activities that undergraduate students usually chose to reduce stress. From the most desirable, namely listening to the music, socializing with family or friends, sitting alone in a quiet place, exercising, praying or reading the bible, and so on.[23] From the description above, it can be seen that there are several types of coping methods which contain many activities. The subjects in this study were not asked further about their usual coping methods, but it is possible that the majority of respondents did not choose emotional-focused coping mechanism in the form of eating behaviour changes so they are not at risk of developing eating disorders. This lead us to the result which shows very weak relationship between stress levels and eating disorders, even though the majority of respondents experienced moderate stress.

Stress Level and Demographic Factors

The first demographic factor was age where in this study shows homogeneous result, so that there is no comparison category for relationship analysis. However, the existing finding was in accordance with previous study which stated that generation Z (age 10 to 25 in 2021) has the highest stress level compared to other generations.[3] Because all respondents were categorized as Generation Z, this theory explained why more respondents experience moderate stress compared to low stress.

This study also found that there were no significant relationship between gender and stress levels (p = 0.798). It can be caused by uneven distribution of male and female respondents, where 71.8% of respondents were women. Although there was no significant relationship, the result of this study were in line with previous research where women tend to have higher stress levels than men. In general, it was women who experienced more chronic stress with stressors from small things in their lives. Kaplan and Sadock also stated that women have twice the risk of experiencing stress compared to men.[24]

While Indonesia has officially recognized six religions, research on the relationship between religion and stress had never been done. This study did not find a significant relationship between those two variables (p=0.134). However, research conducted by Ira Darmawanti stated that there was a positive relationship between a person's religiosity and the level of stress they experienced. Religiosity itself was known as a personal aspect of a person's religious life that emphasized personal depth and respect for God.[25] It could be related

to the result of this study that whatever religion someone had, it could be used as a coping mechanism. The stress level experienced was not from what type of religion that they had but from how religious they were in practicing their religion. Nevertheless, the level of religiosity was not measured in this study and should be a consideration for future researchers.

BMI was also had no significant relationship with stress levels (p=0.721). This finding had same results from previous studies which had also been done on undergraduate students in Faculty of Medicine in Indonesia.[26,27] No significant relationship might be due to the number of factors that could affect the level of stress and a person's BMI, but were not measured in this study. Some factors that needed to be considered were individual's psychosocial aspect, eating habits, and physical activity, which resulted with significant outcomes when those were included from earlier study. It was written that stress could increase someone's appetite and daily food intake which could lead to overweight and obesity.[28] That statement could be associated with this study where seven respondents who experienced severe stress, one of them was overweight and three of them were in stage II obesity.

A study affirmed that the COVID-19 pandemic was a stressor that could be a bad risk for a person's mental health.[29] 71.26% of students who had increased stress and anxiety in this pandemic, only 43.25% of them could overcome it.[30] Those findings were similar to the result of this study, where majority of respondents experienced moderate to high stress. In contrast, the GPA, which was considered as a proof of students' ability in their study period, was found to be higher in students with moderate and high stress. From the GPA, it could be seen that most students could overcome their stress well in term of their studies. The result of this study found that there was no significant relationship between someone's GPA with their stress level (p=0.952). Different findings might be caused by the learning system or curriculum which was not exactly the same. Furthermore, pandemic in Indonesia has also lasted for almost a year so that students had quite a long time (two semesters) to adjust themselves with online learning system. This reason was proven by a study that found a significant effect between student's adaptation to learning environment with their GPA (p=0.04).[31]

Besides of changes in the learning system, COVID-19 pandemic also impact on the economy aspects that could be a stressor. Previous study said that in general, students from low socio-economic status had higher level of academic stress.[32] However, this study got a different result. Perhaps the amount of pocket money received by students everymonth was not able to represent the students family's economic status because this study did not ask whether there was a change in the amount of pocket money they received before and after

the pandemic period. The result may also be caused by the majority of respondents (57.3%) had considerable pocket money, namely bigger than Rp. 1,000,000.00, where 86.4% of total respondents still lived with their families. Therefore, the economic status in this study did not provide a significant relationship (p=0.386) and it was likely not to be a stressor for students, which has been proven by other study with same sample in previous year.[33]

A study wrote that isolation status during pandemic period could be a risk factor to someone's mental health.[34] In contrast, there was no significant relationship found in this study (p=0.621). This could be caused by the distribution of respondents where 86.4% of students lived with their families. The research data showed that out of 95 respondents who lived with their family, 66 of them experienced moderate stress and 6 of them experienced high stress. Although there was no significant relationship, the result of this study was in accordance with other study, where students who lived with their parents were more likely to feel stressed (70.2%).[35] There might be a problem inside the family that affected students physically and emotionally, thus gave an impact in learning skills which could become the source of academic stress. On the contrary, other study found out that students who lived alone also had their own stressors, namely homesickness.[36] Another study stated that the sources of stress can be different for everyone and their level of stress depends on their perception towards the stressor. So that students who perceive a stressor as a threatening situation, tend to feel more stressful.[33] Therefore, the results of this study is in accordance with previous study, which also stated that the relationship between isolation status and stress levels was not significant.

Risk of Eating Disorders and Demographic Factors
In this study, respondents' age was homogeneous so that the analysis showed constant results. However, respondents' age in this study was in the range of 17–25 years, which could be categorized as late teen according to the Indonesian Ministry of Health. The age category often be the onset of eating disorders, namely teenagers and young adults.[37] It was in accordance that five respondents had a risk of eating disorders in this study.

Furthermore for gender, there was also an insignificant relationship with p value of 0.154. This might be caused by uneven distribution of respondents' gender, where 71.8% of respondents are women. However, other study in Indonesia about eating disorders with almost equal distribution of gender (male 55.8% and women 44.2%) also had insignificant results (p=0.325).[38] It can be said that gender does not have an influence on someone's risk of having eating disorders eventhough the incidence showed more cases of eating disorders in women. Kaplan and Sadocks also stated that eating disorders were indeed more common in women, especially Anorexia Nervosa, Bullimia Nervosa, and Binge Eating Disorder.[39] In this study, five respondents who are at risk were all women.

Eating disorders were usually associated with body image, which was once mentioned that female students were more likely to feel dissatified with their appearance and their body.[40] Especially in women, eating disorders often appeared in their adolescence age because there was a transition in their body caused by puberty so it could change their self-perception. However, questions about body image was not taken in this study, but it could be the reason why five respondents were at risk. In addition, other study mentioned that women usually prefered emotional focused coping as a way to deal with their stress.[24] This theory explained why women have higher risk of eating disorders because one form of emotional focused coping is dietary changes.

About religion, in Indonesia there has never been any research linking it with eating disorders yet. Nevertheless, this study found a nonsignificant relationship between religion and eating disorders (p=0.228). Studies in other countries also found that there was no significant correlation between those two variables but rituals in each religion has been proven to increase the risk of eating disorders, for example the ritual of fasting in the month of Ramadan.[41,42]

In diagnosing eating disorders, BMI was used but this study found insignificant relationship between BMI and eating disorders (p=0.098). Similar results were also found in another study which stated that eating disorders were also influenced by other factors, namely food intake and infection status[43] although these two factors were not included in this study. According to PPDGJ-III pocket book, to diagnose a type of eating disorder, a patient was not only seen from his BMI but also from his behavior before and after eating, patient's body image, as well as changes in hormonal and physiological aspects. Respondents who were at risk in this study, four of them were in the overweight and obese categories. This could be explained with the theory which stated that women who were obese and overweight had higher risk of eating disorders. Possible causes behind the increased risk were immoderate worry about their weight and body shape, low self-esteem, and excessive dieting.[44]

Another demographic factor analyzed in this study was GPA, which was also found insignificant (p=0.957). A study stated that an increase in academic burden during pandemic became a trigger for eating disorders.[45] Despite being at risk for having eating disorders, two respondents still had good GPAs and three other respondents had excellent GPAs. Good academic performance was also found in a study, where students with eating disorders did not have academic obstacles, moreover had 1.35–1.49 times higher GPA than other

students who were not at risk.[46] In contrary, other study showed opposite results, where students who were not at risk had higher GPA.[47] Inconsistent analysis results explained why there was no relation between GPA and the risk of eating disorders. In addition, the psychological aspects of each individual at risk for eating disorders have an influence on attitudes, interests, motivation, and behavior related to academic success, so that it has a measurable impact on academic performance.[47]

Furthermore, respondents' economic status which was assessed based on the amount of monthly pocket money showed an insignificant relationship with eating disorders (p=0.053). This result was not in accordance with previous research which stated that socioeconomic status could trigger eating disorders.[48] It was possible that different findings were caused by difference in respondents' age because undergraduate students in this study did not work so they did not have their own monthly allowance.

The last demographic factor analyzed in this study was isolation status. Previous research found that environment had an impact on a person's mindset which could be related to eating disorders. An environment that focused on the perception of being skinny and exercising excessively, being in a bad family relationship, and being educated with less empathy parenting style could be risk factors for eating disorders.[39] However, this study found a non-significant relationship between isolation status and eating disorders (p=0.365). In this study, two options were given for isolation status, that is living alone and living with family. All respondents who were at risk lived with their families. This could be explained by the previous theory that someone who had poor family support could be more at risk of having eating disorders rather than someone who lived alone. Other study also mentioned that girls felt greater pressure from their parents regarding to food restriction.[49] Female students also reported to receive more negative comments about their body from their parents, which affected their psychological condition.[50] Both of these theories may be experienced by respondents who were at risk because they lived with their families during the COVID-19 pandemic.

Limitation of This Study

This study was concluded when a pandemic took place in Semarang, Indonesia so direct data collection (for example by interviewing) was limited by COVID-19 regulation. Wide inclusion criteria contributed to this study bias and this study have not been able to include other risk factors that may affect the relationship between variables. Further research could consider other sampling methods, include other social risk factors that may affect both variables, and specify inclusion criteria to reduce study bias.

CONCLUSION

Based on the results of the study, it was concluded that there was a significant correlation between the stress level and risk of eating disorder with very weak positive relationship direction. There was no significant relationship between demographic factors of the respondents with their level of stress, nor with the risk of eating disorders.

Ethical Approval

The study has received ethical clearance approval from the Health Research Ethics Comission of the Faculty of Medicine, Diponegoro University with ethical clearance number No. 170/EC/KEPK/FK-UNDIP/V/2021. All research subjects were asked for consent with informed consent questionnaire before the study was conducted. Identity of respondents and all research data will be kept confidentially.

Conflicts of Interest

The authors declare that there was no conflict of interest.

Author of Contributions

Conceptualization, Jessica Clara; methodology, Jessica Clara and Widodo Sarjana; writingoriginal draft preparation, Jessica Clara; writingreview and editing, Widodo Sarjana; supervision, Widodo Sarjana, Titis Hadiati, Innawati Jusup.

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