The Relationship between Stress Level and Nutritional Status of Students at SMP Negeri 56 Surabaya

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Abstract

Background: Stress prevalence increases by 5% in 15-year-olds and over in Surabaya. Stress causing negative effects is called distress. It may affect teenagers' nutritional status without considering their diet, leading to growth inhibition if it occurs continuously. It follows Riskesdas's (2013) data stating that 13-15-year-olds have a nutritional status of 3.3% very thin, 7.8% thin, 8.3% overnutrition, and 2.5% obese. Therefore, this study aimed to discover the relationship between stress level and nutritional status at SMP Negeri 56 Surabaya due to its dense academic and non-academic activities. Based on JPNN.com, several students hurt themselves using a blade due to psychological problems. **Methods**: This study used an observational analytical study design through a cross-sectional approach. Data collection was performed using the DASS-21 questionnaire and weight and height measurements, then analyzed using the Pearson Correlation or Rank Spearman test. **Conclusion:** the stress level was not related to the nutritional status of eighth-grade students of SMP Negeri 56 Surabaya, observed from the current nutritional status (BB/U), past nutritional status (TB/U), and body proportion (IMT/U).

Keywords: *DASS-21, Nutritional status, Stress level, Teenagers*

Introduction

Stress prevalence in 2011-2012 was 428,000 cases (40%) of a 1,073,000 total cases. Based on the Basic Health Research data,stress prevalence in teenagers annually increases by 6%, where Indonesian populations of 15-year-olds and over experience mental disorders of stress, anxiety, and depression.[1] In 15-year-olds and older in Surabaya, the mental disorder prevalence increases by 5%.[2] Stress occurs due to an imbalance between pressure and individual ability to respond to such pressures. Stress with negative effects is called distress. Initial symptoms of distress include anxiety and depression.

Most people experiencing stress are teenagers since adolescence is the transition from childhood to adulthood. Various stressors may affect the emotional increase in teenagers, i.e., personal, family, school, and social factors.[3]

If teenagers continuously experience stress, it leads them not to consider their diet and affects their nutritional status, resulting in growth inhibition. Riskesdas data in 2013 revealed that 13-15-year-olds were 3.3% very thin and 7.8% thin. Overnutrition prevalence in 13-15-year-olds was 8.3%, and 2.5% was obese.[1]

Based on research Bitty et al. (2018) obtained a relationship between stress and nutritional status with the strength of strong correlation relationships and

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positive direction.[4] Meanwhile, Kusuma et al. research (2010) had no relationship between stress levels and nutritional status.[5] Based on this background, the researchers were captivated to examine the relationship between stress level and nutritional status of eighth-grade students of SMP Negeri 56 Surabaya since this middle school has dense academic and non-academic activities and various achievements from the students, teachers, and school. Moreover, based on JPNN.com, 56 students of SMPN 56 Surabaya hurt themselves using a blade due to psychological problems.[6]

Materials and Methods

The study was performed using an observational analytical study design with a cross-sectional approach, having a total of 53 samples of eighth-grade students at SMP Negeri 56 Surabaya meeting the inclusion criteria: aged 12-16 years, having a complete family is a biological child, living with parents, and without congenital disorders. The exclusion criterion did not have a chronic illness. The independent variable was stress level, and the dependent variable was nutritional status. Data collection was carried out using a DASS-21 questionnaire distributed to students and weight and height measurements, which were then analyzed using the Pearson Correlation test if the data were distributed normally or the Rank Spearman test if the data were distributed abnormally.

Results and Discussion

The sample size that met the inclusion and exclusion criteria amounted to 53 students comprising 27 male students and 26 female students. The minimum age was 13 years, while the maximum age was 16 years, with a mean age of 14.3 years on a 0.61 standard deviation. The highest age distribution was 14 years, where male students dominated the females (tabel 1.)

Tabel 1. Frequency Distribution of Student Gender in Percentage Based on Age

Gender	Age								Total	
	13		14		15		16			
	n	%	n	%	n	%	n	%	n	%
Male	0	0.0	19	55.6	7	40.7	1	3.7	27	100
Female	2	3.8	19	46.2	4	46.2	1	3.8	26	100

Distribution of Student Stress Level on Gender

In the table 2., most students did not experience stress by 88.67% from 53 students, where males dominated females. Also, female students were more susceptible to stress than male students. The most commonly experienced Stress level was moderate.

Based on the study result, most students did not experience stress by 88.67%, while students experiencing mild stress were 9.43%, and moderate stress was 1.90%. Female students were more susceptible to stress than males, where 60% of female students had a mild stress category, and 100% had a moderate stress category. It follows a study by Matud (2004), reporting the same result that stress level in females was higher than males since females have a coping mechanism focusing on emotions or feelings, leading them to more somatic symptoms and psychological pressures than males.[7] It is also reinforced by McDonough and Walter in 2001, asserting that the distress score of females was higher than males due to different stress responses between them are related to hypothalamic-pituitary-adrenal (HPA) activities related to cortisol hormone adjustment and sympathetic nervous system.[8]

It contrasts a study by Kaistha et al. (2013) in India that male students had a higher stress percentage than males by 53.3%.[9] Theoretically, this difference is due to increased hormones in females from the pre-menstruation cycle that increases cortisol, leading to stress,[10] and when exposed to stressors, the HPA (Hypothalamic Pituitary Adrenal) axis will secrete ACTH (Adrenocorticotropic Hormone). Females are more sensitive than males; therefore, cortisol is easy to build and causing stress.[11]

Tabel 2. Frequency Distribution of Student Stress Level in Percentage Based on Gender

Stress Level	Gender				Total	
	Male		Female			
	n	%	n	%	n	%
Normal	25	53.2	22	46.8	47	100
Mild	2	40.0	3	60.0	5	100
Moderate	0	0.0	1	100.0	1	100

Distribution of Student Nutritional Status on Gender

In the table 3., based on the nutritional status during the study, male students had a better nutritional status than female students. It contrasts the past nutritional status of female students, in which they had a better nutritional status than males. During the study, female students' body was more proportional than male students. The thin body was observed more in male students, while female students dominated obese body.

Based on the frequency distribution table of nutritional status in percentage based on gender, male students had better nutritional status than female students. It is in line with a study in New Delhi, demonstrating female children with worse malnutrition conditions than males. It is due to the high poverty rate that reduces nutritional intake and gender discrimination where male children have a better social value.[12] However, it does not follow a study by Dian in 2016, revealing that the female child frequency with good nutritional status was higher than males due to the faster growth rate in females.[13]

Conversely, the past nutritional status of female students was better than males. Buhendwa in 2017 stated that female children had a better nutritional prevalence than males, with a short prevalence of 9.8% in males and 3.4% in females.[14] However, it is different from Kunwar'sstudy, where the prevalence of short female children was higher than in male children.[12] During the study, male students' body was more proportional than female students. Obese and scrawny body figures were discovered more in female students. It follows a study by Buhendwa in 2017, stating that female children had a more disproportional body than male children by 8.6%.[14] Besides, a study by Lazzeri in 2008 revealed that male children had a taller body proportion than female children, by 63.9%.[15]

In theory, Eberhardie stated differences between the nutritional needs of males and females. Male physical activities are more significant than females; hence, their nutritional need is higher. Furthermore, females consider their body image more than males; thus, many females postpone or reduce their diet to have a perfect body image. Determining the amount of nutritional need for teenagers is vital since teenagers' growth and development are different between males and females.[16]

Tabel 3. Frequency Distribution of Student Nutritional Status in Percentage Based on Gender

Nutritional Status Based on the Anthropometric Index and Z-Value		Gender				Total	
		Male		Female			
		n	%	n	%	n	%
BB/U	< -3	1	100.0	0	0.0	1	100
	-3 to <-2	3	75.0	1	25.0	4	100
	-2 to 2	8	53.3	7	46.7	15	100
	> 2	0	0.0	0	0.0	0	0.0
TB/U	< -3	0	0.0	0	0.0	0	0.0
	-3 to < -2	1	100.0	0	0.0	1	100
	-2 to 2	0	0.0	2	100.0	2	100
	> 2	0	0.0	0	0.0	0	0.0
IMT/U	-3 to <-2	1	100.0	0	0.0	1	100
	-2 to 1	11	47.8	12	52.2	23	100
	> 1 to 2	1	20.0	4	80.0	5	100
	> 2	1	100.0	0	0.0	1	100

The Relationship between Stress Levels and Nutritional Status

The table 4. illustrates that non-stressed students had a good nutritional status during the study. Conversely, the past nutritional status was malnutrition for stressed students. During the study, students with a proportional body mostly did not experience stress.

Based on the normality test of nutritional status, the p-value in BB/U was 0.279, 0.697 for TB/U, and 0.762 for IMT/U with a significance level of $p>0.05$, indicating that the nutritional status based on BB/U, TB/U, and IMT/U indices was normally distributed. The normality test of stress level obtained a significance value (p) of 0.363 with a significance level of $p>0.05$, indicating that stress level was normally distributed.

Based on the relationship analysis between stress level and nutritional level of BB/U index using the Pearson Correlation test and a significance level of $\alpha = 5\%$, the correlation coefficient score was 0.078, meaning that the relationship strength between stress level and nutritional status according to BB/U was 0.078, i.e., no correlation with a negative relationship an a significance value (p) of 0.743. It is higher than

the significance level of α = 5%, indicating that stress level had an insignificant relationship with nutritional status based on BB/U.

In TB/U, using the Pearson Correlation test and a significance level of α = 5%, the correlation coefficient score was 0.199, meaning that the relationship strength between stress level and nutritional status according to TB/U was 0.199, i.e., no correlation with a negative relationship an a significance value (p) of 0.801. It is higher than the significance level of α = 5%, indicating that stress level had an insignificant relationship with nutritional status based on TB/U.

Based on the relationship analysis between stress level and nutritional level of IMT/U index using the Pearson Correlation test and a significance level of α = 5%, the correlation coefficient score was 0.013, meaning that the relationship strength between stress level and nutritional status according to IMT/U was 0.013, i.e., no correlation with a negative relationship an a significance value (p) of 0.944. It is higher than the significance level of α = 5%, indicating that stress level had an insignificant relationship with nutritional status based on IMT/U.

Based on the frequency distribution table of the stress level based on nutritional status, stressed students had good nutritional status during the study. Conversely, the past nutritional status revealed that most stressed students were those with nutritional issues. During the study, students with a proportional body mostly did not experience stress.

The Pearson Correlation analysis test results obtained an insignificant relationship between stress level and nutritional status based on BB/U, TB/U, and IMT/U indices with a significance value (p) of 0.743, 0.801, and 0.944, respectively. It is in line with a study by Saat in Kuala Lumpur, demonstrating an insignificant relationship between stress and nutritional status. This condition may be caused by eating time allocation, environmental support, and individual factors.[17] However, it contrasts the study results from Masdar, showing a statistically significant relationship between stress and respondents' nutritional status with p=0,003. Stress will affect one's diet to lead them to consume high-calorie or high-fat food.[18]

In theory, Nasrani stated that the primary hormone responses in stress are activating CRH and ACTH systems. The process incorporates hypothalamus stimulus, causing corticotrophin-releasing hormone (CRH) secretion. It then stimulates the hypophysis anterior to secrete ACTH. CRH and CTH secretion increase cause cortex adrenal to excessively release cortisol. During stress, the body will release the cortisol hormone. A high cortisol hormone level will trigger the body to release insulin, leptin, and the neuropeptide Y (NPY) system that causes hunger, resulting in the desire to eat. It causes visceral fat accumulation and increases IMT.[19] Besides, Sominsky's theory states that in an acute stress condition, released CRH can inhibit neuropeptide Y (NPY)/agouti-related peptides (AGRP) in the arcuate hypothalamus (ARC) nucleus. Neuropeptide Y and AGRP can stimulate eating behavior and suppress energy release. Therefore, acute stress will suppress appetite. Urocortin, a CRH family, can also hinder appetite. Urocortin is reported to inhibit ghrelin secretion, a hormone stimulating appetite.[20]

Tabel 4. Frequency Distribution of Stress Level in Percentage Based on Nutritional Status

Stress Level	Nutritional Status												Total Students Based on Stress Level	
	BB/U				TB/U				IMT/U					
	Normal		Abnormal		Normal		Abnormal		Normal		Abnormal			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Normal	15	68.4	4	31.6	1	50.0	1	50.0	20	76.9	6	23.1	47	100.0
Stress	0	0.0	1	100.0	1	100.0	0	0.0	3	75.0	1	25.0	6	100.0

Conclusion and Acknowledgement

The study results conclude that stress level did not relate to the nutritional status of eighth-grade students of SMP Negeri 56 Surabaya, both the current status (BB/U and IMT/U indices) and the past status (TB/U). It is due to different assessments among individuals against stressors and the difference in stressor intensity perceived by individuals. Therefore, a prolonged study period with the same stressor intensity is required to illustrate the relationship between stress level and nutritional status. Furthermore, samples have unequal distribution and a small sample size. Thus, it is recommended for future researchers to have a bigger sample size.

Conflict of Interest: No conflict of interest.

Ethical Clearance: Health Research Ethics Committee Universitas Airlangga School of Medicine Surabaya, Indonesia: No. 223/EC/KEPK/FKUA/2020

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Abbreviation

1) BPS -Badan Pusat Statistika

2) DASS - *Depression, Anxiety Stress Scale*

3) IMT/U - BMI for Age

4) TB/U - Height for Age

5) BB/U - Weight for Age

6) UNICEF - *United Nations Children's Fund*

7) WHO - *World Health Organization*

8) SMP - Sekolah Menengah Pertama/ Junior High School

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