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Association Between Stress Levels and Waist Circumference Among Medical and Health Sciences Students at Universitas Muhammadiyah Sumatera Utara

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Abstract: Stress may influence physiological balance through hormonal mechanisms, particularly increased cortisol levels, which are associated with visceral fat accumulation in the abdominal area. Waist circumference is an important anthropometric indicator for assessing central obesity and cardiometabolic risk. Medical students are vulnerable to stress due to high academic demands, which may affect their health status. **Objective:** This study aimed to determine the association between stress levels and waist circumference among students of the Faculty of Medicine, Universitas Muhammadiyah Sumatera Utara. **Methods:** This observational analytic study used a cross-sectional design. A total of 89 students from the 2022–2024 cohorts were selected using quota sampling based on the inclusion criteria. Stress levels were measured using the Depression Anxiety Stress Scale-42 (DASS-42), while waist circumference was measured using a flexible measuring tape according to standard anthropometric procedures. Data were analyzed using an exact statistical test with a significance level of 0.05. **Findings:** The results showed a statistically significant association between stress levels and waist circumference, with a p-value of 0.011. Students with higher stress levels tended to have a greater proportion of central obesity compared to those with normal stress levels. **Implication:** These findings highlight the importance of stress management and healthy lifestyle promotion in student health programs. **Originality:** This study provides empirical evidence on the relationship between psychological stress and waist circumference among medical students in the Indonesian university context.

Keywords: stress level; waist circumference; central obesity; medical students; DASS-42.

INTRODUCTION

Waist circumference is a simple yet effective anthropometric indicator for assessing body fat distribution, particularly visceral fat stored around internal organs (Indraswari et al., 2021). An increase in waist circumference reflects the accumulation of visceral fat, which is closely associated with the risk of metabolic and cardiovascular diseases such as obesity, type 2 diabetes mellitus, and hypertension (Darsini et al., 2020; Li et al., 2022). Globally, approximately 41.5% of the population experiences central obesity based on findings from a meta-analysis (National & Nutrition Examination, 2021). Data from the National Health and Nutritional Examination Survey (NHANES) in the United States also report similar findings, with the prevalence of central obesity increasing among adults during the 2017–2020 period (National & Nutrition Examination, 2021). In Indonesia, the 2023 Indonesian Health Survey (SKI) reported that the prevalence of central obesity among individuals aged ≥15 years reached 36.8%, with the highest rates found in DKI Jakarta and North Sulawesi (45.7%), as well as Central Papua (44.3%). When viewed by province, the incidence of central obesity in North Sumatra Province, including Medan City as a major population center, was recorded at 41.8% (Kemenkes, 2023b). This figure is above the national prevalence, indicating that the issue of central obesity in North Sumatra is relatively high and requires special attention.

Waist circumference can be influenced by factors such as sociodemographic characteristics (age, education, income), dietary patterns, sedentary lifestyle, as well as stress and genetic factors (Delker et al., 2021; Setyaningsih et al., 2024; Sun et al., 2022; Yimer et al., 2025). One of the main risk factors contributing to increased waist circumference is chronic stress. Prolonged psychological stress can activate the hypothalamic-pituitary-adrenal (HPA) axis, leading to increased secretion of the hormone cortisol. Cortisol, as the primary stress hormone, plays a role in fat metabolism by stimulating lipolysis and redistributing fat to specific areas such as the abdomen, face, and upper back. Sustained elevated cortisol levels can result in the accumulation of visceral fat, thereby contributing to an increase in waist circumference (Sherwood, 2016).

Students, particularly those in the Faculty of Medicine, are a group vulnerable to experiencing stress. High academic demands, such as complex coursework and frequent examinations, are major contributing factors. In addition, students also face social challenges, such as adapting to new environments and building healthy interpersonal relationships. Personal demands, including family expectations and time management, further increase students' psychological burden (Nirwan et al., 2025).

Data from the Ministry of Health of the Republic of Indonesia reveal that 6.1% of individuals aged 15 years and above experience mental health disorders. This figure indicates a concerning situation, especially when associated with increasingly complex social dynamics, academic pressures, and family expectations experienced by adolescents in urban areas such as Medan City (Kemenkes, 2023a). A study conducted at one of the medical faculties in Medan also showed relatively high stress levels: 18.07% experienced mild stress, 54.22% moderate stress, 26.51% severe stress, and 1.20% very severe stress (Imami et al., 2022).

Several previous studies have identified a complex and bidirectional relationship between central obesity and psychological distress. Moreover, the relationship between psychological stress and central obesity may be mediated by hormonal imbalances (Viertiö et al., 2021). Another study suggests that psychosocial stress may contribute to abdominal obesity through its interaction with eating behavior, as indicated by low dietary diversity scores (Kim & Kim, 2022). However, some studies have reported inverse findings, where higher stress levels are associated with lower body mass index and waist circumference (Tan & Leung, 2021). In Indonesia, studies have shown that emotional stress plays an important role in increasing the risk of obesity, particularly abdominal obesity, with stronger effects observed in women and individuals with unhealthy lifestyle habits (Putri, 2015).

Considering the urgency and the varying relationships between stress and metabolic indicators such as waist circumference, it is important to further investigate whether there is an association between stress levels and waist circumference among medical students. The general objective of this study is to determine the relationship between stress levels and waist circumference among students of the Faculty of Medicine at Universitas Muhammadiyah Sumatera Utara (UMSU). The specific objectives are: to assess the frequency distribution of stress levels among students of FKIK UMSU; to evaluate the frequency distribution of waist circumference measurements among students of FKIK UMSU; to describe the frequency distribution of demographic characteristics such as age and gender among students of FKIK UMSU; and to determine the relationship between stress levels and waist circumference among students of FKIK UMSU. The research question of this study is whether there is a relationship between stress levels and waist circumference among students of the Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Sumatera Utara (FKIK UMSU).

RESEARCH METHOD

Operational Definition

Table 1. Operational Variables

Variable	Operational Definition	Measurement Tool	Scale	Measurement Outcome
Stress Level	The body's response to any factor that threatens its	Depression Anxiety Stress Scale (DASS-	Ordinal	Normal (0–14) Mild (15–18) Moderate (19–25)

	compensatory ability to maintain homeostasis	42) questionnaire		Severe (26–33) Extremely Severe (>34)
Waist Circumference	An anthropometric indicator used to assess body fat distribution	Flexible measuring tape (NHANES, WHO, IDF)	Nominal	**Male:** Normal (<90 cm) Central Obesity (≥90 cm) **Female:** Normal (<80 cm) Central Obesity (≥80 cm)

Type of Study

This study is an analytical study using a cross-sectional approach. This design was chosen to determine the relationship between stress levels and waist circumference at a specific point in time without any intervention on the variables.

Time and Location of the Study

1. Research Period

   This study is planned to be conducted from October to December 2025.

2. Research Location

   The study will be conducted at the Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Sumatera Utara (FKIK UMSU).

Population and Sample

1. Population

   The population in this study consists of active students from the 2022, 2023, and 2024 cohorts at FKIK UMSU.

2. Sample

   The sampling technique used in this study is quota sampling with proportional allocation based on cohorts. This method was selected because the study population consists of students from three different cohorts; therefore, each cohort is treated as a group (stratum) in determining the sample size. This grouping ensures that each cohort is proportionally represented in the sample, even though the respondents are not selected randomly. After dividing the population into three strata based on cohorts, the sample size for each stratum is determined proportionally using the formula:

$$Sample_1 = \frac{Population_1}{Total\ Population} \times Total\ Sample$$

$$Sample_{2022} = \frac{259}{791} \times 89 \approx 29\ respondents$$

$$Sample_{2023} = \frac{270}{791} \times 89 \approx 30\ respondents$$

$$Sample_{2024} = \frac{262}{791} \times 89 \approx 30\ respondents$$

After determining the number of samples for each cohort, respondents are selected until the quota for each cohort is fulfilled. Thus, each cohort has a sample size proportional to its population.

a. Inclusion Criteria

1) Participants who are willing to take part in the study and sign the informed consent form.

b. Exclusion Criteria

1) History of major abdominal surgery
2) Severe chronic diseases causing edema or ascites (such as congestive heart failure, liver cirrhosis, or kidney disease)
3) Presence of endocrine disorders (such as Cushing syndrome or hypothyroidism) based on self-report
4) Current use of medications that affect metabolism or stress (e.g., corticosteroids, antidepressants, antidiabetic drugs, or weight-loss medications)
5) Congenital abnormalities or physical conditions that interfere with measurement (e.g., scoliosis)
6) Respondents who have recently experienced acute illness with fever or fluid retention within the last two weeks

c. Sample Size Determination

The sample size in this study was determined using the Slovin formula, as follows:

$$n = \frac{N}{1 + Ne^2}$$

n = sample size

N = population size

E = margin of error (desired level of precision)

$$n = \frac{791}{1+(791 \times 0{,}1^2)} \quad n = 88{,}77 \approx 89$$

Thus, the minimum required sample size is approximately 89 respondents.

Data Collection Techniques

Data collection in this study was conducted using two main methods: questionnaire distribution in printed form and anthropometric measurement. After providing informed consent, respondents were asked to complete the DASS-42 questionnaire, followed by waist circumference measurement.

Guidelines from NHANES recommend the following procedure for measuring waist circumference (Health & Survey, 2021):

1. The respondent stands upright with the upper clothing lifted above the waist
2. The respondent crosses their arms and places hands on the opposite shoulders (as in a hugging position) to expose the waist area
3. The examiner stands on the right side of the respondent and palpates the right iliac crest
4. A horizontal line is marked just above the highest lateral border of the right iliac crest along the midaxillary line (a vertical line from the armpit downward)
5. The measuring tape is wrapped horizontally around the waist, parallel to the floor, and in contact with the skin without compressing soft tissue. The zero end of the tape is positioned below the measurement value
6. Measurement is taken at the end of normal expiration and recorded to the nearest 0.1 cm

Data Processing and Analysis

The collected data will be processed using the latest version of SPSS software.

1. Data Processing

   Before analysis, the data will undergo several processing stages, including:

   a. Editing: Rechecking the completeness and consistency of the data collected through questionnaires.

   b. Coding: Assigning numerical codes to each respondent's answer to facilitate statistical analysis.

   c. Data Entry: Entering the coded data into SPSS software.

d. Cleaning: Removing input errors, duplicates, or inconsistent data to ensure data quality.

Data Analysis

The statistical analyses used in this study include:

1. Univariate Analysis
   This analysis is used to describe the frequency distribution and percentages of each variable, including the independent variable (stress level), the dependent variable (waist circumference), as well as respondents' characteristics such as age and gender.
2. Bivariate Analysis
   This analysis is used to assess the relationship between two variables, namely stress level and waist circumference. The statistical test applied is the Chi-Square test. If more than 20% of the cells have an expected value of less than 5, an alternative test such as Fisher's Exact Test will be used to ensure the validity of the results.

RESULT

This study was conducted using a printed questionnaire distributed directly to the research subjects to determine the relationship between stress levels and waist circumference among students of the Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Sumatera Utara. A total of 89 respondents participated in this study.

Univariate Analysis

Distribution of Respondent Characteristics Based on Demographics

Table 2. Demographic Distribution of Respondents

	Category	n	%
Age	18	2	2.2%
	19	24	27%
	20	32	36%
	21	22	24%
	22	6	6.7%
	23	3	3.4%
Gender	Male	16	18%
	Female	73	82%

Based on the table above, 2 respondents (2.2%) were aged 18 years, 24 respondents (27%) were 19 years old, 32 respondents (36%) were 20 years old, 22 respondents (24%) were 21 years old, 6 respondents (6.7%) were 22 years old, and 3 respondents (3.4%) were 23 years old. The average age of respondents was 20.17 years, with the most frequent age being 20 years (Mode = 20 years).

Based on gender, 73 respondents (82.0%) were female and 16 respondents (18.0%) were male. This indicates that females were the dominant category in this study (Mode = Female).

Distribution of Respondent Characteristics Based on Variables

Table 3. Distribution of Respondent Characteristics Based on Variables

Variable	Category	Male		Female		Total	
		(n)	(%)	(n)	(%)	(n)	(%)
Stress Level	Normal	10	11.2%	32	36.0%	42	47.2%
	Mild	3	3.4%	14	15.7%	17	19.1%
	Moderate	3	3.4%	11	12.4%	14	15.7%
	Severe	0	0.0%	11	12.4%	11	12.4%
	Extremely Severe	0	0.0%	5	5.6%	5	5.6%
	Total	16	18.0%	73	82.0%	89	100%
Waist Circumference	Normal	7	7.9%	42	47.2%	49	55.1%
	Central Obesity	9	10.1%	31	34.8%	40	44.9%
	Total	16	18.0%	73	82.0%	89	100%

Based on the stress level variable in the table above, the frequency distribution among males showed 10 respondents (11.2%) in the normal category, 3 respondents (3.4%) in both mild and moderate stress categories, and none (0.0%) in severe and extremely severe stress categories, with the highest frequency in the normal category (Mode = Normal).

Among females, 32 respondents (36.0%) were in the normal category, 14 respondents (15.7%) in mild stress, 11 respondents (12.4%) in both moderate and severe stress categories, and 5 respondents (5.6%) in extremely severe stress, with the highest frequency also in the normal category (Mode = Normal).

Based on the waist circumference variable, among males, 7 respondents (7.9%) were in the normal category and 9 respondents (10.1%) were classified as having central obesity, with central obesity being the most frequent category (Mode = Central Obesity).

Among females, 42 respondents (47.2%) were in the normal category and 31 respondents (34.8%) were classified as having central obesity, with the normal category being the most frequent (Mode = Normal).

Overall, the frequency distribution of stress levels showed 42 respondents (47.2%) in the normal category, 17 respondents (19.1%) with mild stress, 14 respondents (15.7%) with moderate stress, 11 respondents (12.4%) with severe stress, and 5 respondents (5.6%) with extremely severe stress, with the highest frequency in the normal category (Mode = Normal).

Meanwhile, the distribution of waist circumference showed 49 respondents (55.1%) in the normal category and 40 respondents (44.9%) in the central obesity category, with the normal category being the most frequent (Mode = Normal).

Bivariate Analysis

This analysis aims to determine the relationship between stress levels and waist circumference among students at the Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Sumatera Utara.

Table 4. Cross-Tabulation Results

Gender	Stress Level	Normal Waist		Central Obesity		Total		P-value
		(n)	%	(n)	%	(n)	%	
Male	Normal	4	4.5%	6	6.7%	10	11.2%	0.802*
	Mild	1	1.1%	2	2.2%	3	3.4%	
	Moderate	2	2.2%	1	1.1%	3	3.4%	
	Severe	0	0.0%	0	0.0%	0	0.0%	
	Extremely Severe	0	0.0%	0	0.0%	0	0.0%	
	Total	7	7.9%	9	10.1%	16	18.0%	
Female	Normal	27	30.3%	5	5.6%	32	36.0%	<0.001*
	Mild	7	7.9%	7	7.9%	14	15.7%	
	Moderate	3	3.4%	8	9.0%	11	12.4%	
	Severe	0	0.0%	0	0.0%	0	0.0%	
	Extremely Severe	2	2.2%	3	3.4%	5	5.6%	
	Total	42	47.2%	31	34.8%	73	82.0%	
Total		49	55.1%	40	44.9%	89	100%	

Fisher's Exact Test

Based on the analysis of the relationship between stress levels and waist circumference by gender, it was found that several cells in the contingency table had expected counts less than 5. Therefore, the assumptions for the Chi-Square test were not fully met. Consequently, the interpretation of the results refers to the Fisher–Freeman–Halton Exact Test.

Among male respondents (n = 16; 18.0%), in the normal stress category, 4 individuals had normal waist circumference and 6 had central obesity. In the mild stress category, 1 individual had normal waist circumference and 2 had central obesity. In the moderate stress category, 2 individuals had normal waist circumference and 1 had central obesity. No respondents were found in the severe or extremely severe stress categories. The majority of male respondents were in the normal stress category, both with normal waist circumference (4 individuals; 4.5%) and central obesity (6 individuals; 6.7%). Mild and moderate stress levels were observed only in a small proportion of respondents, while no cases of severe or extremely severe stress were identified. The Fisher's Exact Test result showed no significant relationship between stress levels and waist circumference among males ($p = 0.802$).

Among female respondents (n = 73; 82.0%), in the normal stress category, 27 individuals had normal waist circumference and 5 had central obesity. In the mild stress category, both normal waist circumference and central obesity were found in 7 individuals each. In the moderate stress category, 3 individuals had normal waist circumference and 8 had central obesity. In the extremely severe stress category, 2 individuals had normal waist circumference and 3 had central obesity. Most female respondents were in the normal stress category with normal waist circumference (27 individuals; 30.3%). However, the proportion of central obesity tended to increase with higher stress levels, particularly in the moderate and extremely severe categories. Based on Fisher's Exact Test, there was a statistically significant relationship between stress levels and waist circumference among females ($p < 0.001$).

Table 5. Results of Bivariate Analysis

Stress Level	Waist Circumference		Total		p-value
	Normal	Central Obesity			
	(n)	%	(n)	%	n (%)
Normal	31	73.8%	11	26.2%	42 (100%)
Mild	8	47.1%	9	52.9%	17 (100%)
Moderate	5	35.7%	9	64.3%	14 (100%)
Severe	3	27.3%	8	72.7%	11 (100%)
Extremely Severe	2	40.0%	3	60.0%	5 (100%)

Fisher's Exact Test

Based on the results of the analysis between stress levels and waist circumference overall, there are differences in the proportion of central obesity across each stress level. Among respondents with normal stress levels, 31 individuals had normal waist circumference and 11 had central obesity. In the mild stress group, 8 individuals had normal waist circumference and 9 had central obesity. In the moderate stress group, 5 individuals had normal waist circumference and 9 had central obesity. In the severe stress group, 3 individuals had normal waist circumference and 8 had central obesity. In the extremely severe stress group, 2 individuals had normal waist circumference and 3 had central obesity.

The proportion of central obesity among respondents with normal stress levels was 26.2%. This proportion increased to 52.9% in the mild stress group and continued to rise to 64.3% in the moderate stress group. In the severe stress group, the proportion reached its highest value at 72.7%.

In the extremely severe stress group, the proportion of central obesity was 60.0%, which is slightly lower than in the severe stress group. However, overall, there is a clear trend indicating that higher stress levels are associated with a greater proportion of respondents experiencing central obesity.

In the overall analysis of respondents (n = 89), the Fisher–Freeman–Halton Exact Test yielded a p-value of 0.011. This test was used because more than 20% of the cells in the contingency table had expected counts of less than 5, violating the assumptions of the Chi-Square test. Therefore, it can be concluded that there is a statistically significant relationship between stress levels and waist circumference.

DISCUSSION

Relationship Between Stress Levels and Waist Circumference

In this study, most respondents were 20 years old. This finding is consistent with studies by Nirwan et al., which indicate that the majority of medical students fall within the early adulthood age range, particularly 19–21 years, a transitional academic phase characterized by high adaptation demands. Similar findings were also reported by Imami et al. among medical students, where the age group of 20 years was the most dominant in the respondent distribution (Imami et al., 2022; Nirwan et al., 2025). At this age, changes in body fat composition may not yet be fully manifested as increased waist circumference. This is supported by the study of Indraswari et al., which found that although variations in visceral fat were present, most respondents still had waist circumferences within normal limits (Indraswari et al., 2021).

Based on gender, the respondents in this study were predominantly female. This finding is in line with research by Viertiö et al., which reported that females tend to have higher levels of psychological distress compared to males and are generally more responsive in participating in questionnaire-based health studies (Viertiö et al., 2021).

In terms of stress levels, most respondents were in the normal stress category. This result is consistent with studies by Nirwan et al. and Imami et al., which reported that although students face considerable academic pressure, the majority remain within normal to mild stress levels, likely influenced by individual coping and adaptation abilities (Imami et al., 2022; Nirwan et al., 2025).

The bivariate analysis showed a statistically significant relationship between stress levels and waist circumference among medical students (p-value = 0.011). These findings are consistent with several previous studies emphasizing the role of behavioral changes due to stress in the development of central obesity. A study conducted in Korea found that individuals with higher stress levels tend to have lower dietary diversity (Kim & Kim, 2022).

Based on the Food Frequency Questionnaire (FFQ) results from the Korean Genome and Epidemiology Study (KoGES), individuals with higher stress levels more frequently consumed refined grain-based foods. These foods include white rice, pasta, white bread, cakes, donuts, and various processed products. High consumption of refined grains is known to have a high glycemic index and low fiber content, which can trigger increased insulin response and lead to imbalanced nutrient intake and excess energy. This excess energy is then stored as fat, particularly in the abdominal area, thereby increasing the risk of central obesity (Kim & Kim, 2022).

A similar mechanism has also been reported in studies on emotional eating among students. In such studies, most respondents experiencing emotional eating reported a tendency to consume combinations of high-energy, sweet, and salty foods. Approximately 46.92% of respondents preferred a combination of all three types of foods, while 25.38% preferred combinations of two types, such as high-energy with sweet foods, sweet with salty foods, or high-energy with salty foods. This pattern reflects a preference for energy-dense foods which, when consumed repeatedly under stress, can increase total caloric intake and contribute to visceral fat accumulation (Ningtyas & Isaura, 2024). However, some studies have reported contrasting findings. A study conducted among adults in China found an inverse relationship between stress levels and body mass index as well as waist circumference, where individuals with higher stress levels actually had lower adiposity (Tan & Leung, 2021). This finding, based on data from the China Health and Nutrition

Survey 2015, involved a population with different sociodemographic and cultural characteristics compared to students. In this population, stress was more often associated with increased physical activity, decreased appetite, and coping patterns oriented toward self-control and work responsibility, thus not necessarily accompanied by increased energy intake. Traditional dietary patterns, such as higher consumption of vegetables, grains, and home-cooked meals, also contributed to lower intake of high-sugar and high-fat foods. These differences may explain the variation in findings across studies (Tan & Leung, 2021).

In this study, the respondents were medical students who have specific characteristics, such as high academic demands, intensive study loads, and continuous psychological pressure. Previous studies have indicated that medical students are particularly vulnerable to academic stress due to dense curricula and high performance expectations (Imami et al., 2022; Nirwan et al., 2025). Chronic stress in this group may simultaneously trigger hormonal changes and alterations in eating behavior, thereby increasing the risk of central obesity (Delker et al., 2021; Kim & Kim, 2022)Therefore, the academic and environmental context of the respondents must be considered when interpreting these findings.

Overall, the results of this study strengthen the evidence that psychological stress is an important factor associated with increased waist circumference as an indicator of central obesity. Waist circumference itself has been recommended as an important clinical indicator in assessing the risk of visceral obesity and cardiometabolic diseases (Darsini et al., 2020; Ross et al., 2020). These findings have practical implications for educational institutions, particularly medical faculties, to not only emphasize academic achievement but also pay attention to students' mental health. Promotive and preventive efforts through stress management education, strengthening psychosocial support, and promoting healthy lifestyles are expected to help reduce the risk of central obesity and its long-term health consequences (Kemenkes, 2023b).

Study Limitations

This study has several limitations that should be considered. The scope of the study was limited to students of the Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Sumatera Utara; therefore, the findings cannot yet be generalized to broader populations with different characteristics. In addition, the demographic characteristics collected were still limited and did not include other variables such as ethnicity, occupation, socioeconomic status, and other relevant demographic factors. Furthermore, this study did not examine respondents' dietary patterns and diet history in detail; thus, the influence of nutritional intake and dietary habits on waist circumference could not be comprehensively analyzed. Physical activity or exercise patterns were also not assessed as variables that may influence changes in body composition. Moreover, this study did not evaluate the respondents' emotional coping mechanisms in dealing with stress, which may indirectly affect eating behavior and physical condition.

CONCLUSION

This study found that stress levels were significantly associated with waist circumference among students of the Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Sumatera Utara. Although most respondents were categorized as having normal stress levels and normal waist circumference, the proportion of central obesity tended to increase among students with higher stress levels. This finding indicates that psychological stress may be an important factor related to central obesity risk among medical and health scien**ce.**

The main scientific contribution of this study lies in providing empirical evidence regarding the association between stress levels and waist circumference in the context of medical and health sciences students. This study adds to the understanding that central obesity is not only related to physical and dietary factors, but may also be associated with psychological conditions, particularly stress. Therefore, the findings support the importance of integrating stress management, mental health promotion, and healthy lifestyle programs within the academic environment.

However, this study has several limitations. The cross-sectional design does not allow causal conclusions to be drawn between stress levels and waist circumference. In addition, this study was conducted only among students of one faculty at one university, so the findings cannot be generalized to broader populations. Other potential factors influencing waist circumference, such as dietary intake, physical activity, sleep patterns, body mass index, and coping mechanisms, were not analyzed in depth. Future studies are recommended to involve larger and more diverse populations, use longitudinal designs, and include additional variables to obtain a more comprehensive understanding of the relationship between psychological stress and central obesity.

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