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The Association Between Night Time Eating, Fat Intake, and The Incidence of Overweight Among University Students in Medan City

Hubungan Night Time Eating dan Asupan Lemak Dengan Kejadian Gizi Lebih Pada Mahasiswa di Kota Medan

Yatty Destani Sandy[1]*, Erni Rukmana[1], Kanaya Yori Damanik[1], Caca Pratiwi[1]

[1]Program Studi Gizi, Jurusun Pendidikan Kesejahteraan Keluarga, Fakultas Teknik, Universitas Negeri Medan

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Correspondent:
Yatty Destani Sandy
yattysandy@unimed.ac.id

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ABSTRACT

Background: University students are the age group of late adolescents who are still undergoing growth and development. Growth and development must be supported by balanced nutritional intake and healthy eating habits. Currently, an emerging trend is that numerous campus activities and academic demands often lead students to develop nighttime eating habits, typically involving high-fat foods, outside of regular mealtimes.
Objectives: To determine the relationship between nighttime eating, fat intake, and the incidence of overweight among college students.
Methods: The research design was cross-sectional, with purposive sampling technique. A total of 106 students, aged 19-23 years, participated in this study. The instruments used included the Night Eating Diagnostic Questionnaire (NEDQ) to assess night eating habits, a 24-hour food recall questionnaire to estimate fat intake, weight scales and microtoice to calculate Body Mass Index and determine nutritional status. Data analysis was conducted using chi-square and logistic regression.
Results: There was a relationship between night time eating and the incidence of overnutrition (p-value = 0.040). There was also a significant relationship between fat intake and the incidence of overweight (p-value = 0.005) among college students. The results further indicate that adolescents with nighttime eating are 3.785 times more likely to being overweight. Additionally, adolescents with high fat intake are 3,814 times more likely to be overnourished.
Conclusions: Eating habits and nutritional intake are crucial to create healthy and productive adolescents.

INTRODUCTION

The prevalence of overnutrition in university students has increased in various countries, including Indonesia. As a late adolescent age group, students are transitioning from adolescence to adulthood, a period which their nutritional needs must still be adequately met. Growth and development during this require support through proper dietary intake and healthy eating habits. One current phenomenon is that the numerous campus activities and assignment demands often lead to poor eating patterns in students[1]. Irregular eating patterns, such as night time eating, are key risk factors associated with weight gain and overnutrition in this group[2]. In Indonesia, 14.4% of adults aged over 18 are overweight and 23.4% are obese. In North Sumatra, the prevalence of overweight individuals over 18 is 16.6%, while obesity stands at 24.3%. Both figures exceed the national prevalence[3].

The incidence of overnutrition in adolescents can be influenced by several factors such as diet and nutrient intake. A poor diet is common cause of overnutrition in adolescents. One example of a poor diet is the practice of eating at midnight. Eating late at night or outside regular meal times, often referred to as Night Time Eating (NTE) or Night Eating Syndrome (NES), is a major risk factor for weight gain. Night-time eating (NTE) is commonly associated with an increased Body Mass Index (BMI), primarily due to the consumption of foods high in carbohydrates and sugar after dinner or even after waking up in the middle of the night. Research by Maryani indicated that adolescents with midnight eating syndrome are more likely suffer from grade II obesity. Respondents with Night Eating Syndrome (NES) had a 5.52 times greater risk of developing grade II obesity[4]. Late-night eating habits are also linked to a higher risk of chronic diseases such as obesity, metabolic syndrome, and digestive disorders[5].

A longitudinal study reported that subjects with a night time eating habit had a higher chance of obesity and was associated with dyslipidemia. Respondents with a

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night time eating habit were more likely to be obese compared to those without this habit, with an odds ratio (OR) of 2.11 for males and 3.02 for females[6]. The impact of night time eating habits on the risk of obesity was further demonstrated in Park's study, Men with night time eating habits had a higher probability of developing dyslipidemia (hypertriglyceridemia) compared to those without this habit (OR 1.46). with nighttime eating habits were also more likely to develop dyslipidemia than those without this habit (OR 1.66). Having a night time eating habit increases the risk of chronic diseases that can adversely affect health-related quality of life[7].

Another factor contributing to overnutrition in adolescents is nutrient intake. Insufficient intake of essential nutrients can also lead to overnutrition in this group. One such nutrient is fat. Both inadequate and excessive fat consumption have long been as significant factors that contribute to an increased risk of overnutrition and obesity, as fat intake plays an important role in the body's energy balance. Both insufficient and excess fat intake can affect body weight. Fat has a high energy density, and when consumed in excess, particularly outside of regular mealtimes (e.g., at night), the risk of fat accumulation in the body increases[8]. Research by Novela demonstrated that respondents with high fat intake had a 10.341 times higher risk of obesity[9]. High-fat consumption at night time increases insulin resistance and disrupts fat metabolism, thereby slowing down the body's ability to burn calories effectively. Additionally, when fat intake is insufficient or below the body's needs, various metabolic changes will emerge that may negatively affect weight. Research indicates that inadequate energy intake, including insufficient fat, can cause the body to adapt in unfavourable ways. For example, a lack of fat intake can result in a decrease in basal metabolic rate, which means the body burns fewer calories while at rest[10]. This may contribute to fat accumulation if calorie intake from other sources, such as carbohydrates and protein remains high. Furthermore, low fat intake may reduce satiety, prompting individuals to consume more calories from other sources, which potentially lead to weight gain[11].

Given this increased risk, it is important to evaluate the factors associated with the incidence of overnutrition. This study aims to determine the association of Night Time Eating and fat intake with the incidence of overnutrition among university students in Medan. This study is expected to provide insights into the health risks faced by university students and help formulate appropriate interventions to prevent the rise of overnutrition among late adolescents.

METHODS

This study employed a quantitative research design with a cross-sectional approach. This research was conducted in June-July 2023at Medan State University and North Sumatra State Islamic University, two major universities in Medan. The study participants were 106 active students aged 19-23 years. A purposive sampling technique was used, and respondents were selected based on the inclusion and exclusion criteria established by the researcher[12]. The inclusion criteria included being physically and mentally healthy, providing informed consent to participate, and being an active college student. The exclusion criteria set were students with medical conditions or those currently following a diet program. Data collected included respondent characteristics such as name, age, gender, and semester, family socioeconomic information (e.g. parents' education level and income). Additional data were collected on Night Time Eating habits, fat intake, and Body Mass Index (BMI). The tools and data collection instruments used included the Night Eating Diagnostic Questionnaire (NEDQ) to determine Night Time Eating, a 24-hour food recall form to estimate fat intake, and digital weight scales and a microtoice for measuring Body Weight and Height which were used to determine the incidence of overnutrition among respondents. This study received ethical approval (Ethical Clearance) on June 7, 2023, from the Faculty of Medicine, Maranatha Christian University. under Decree number No: 130/KEP/VI/2023.This research questionnaire is a validated questionnaire for measuring Night Time Eating in respondents. The questionnaire used is the Night Eating Diagnostic Questionnaire (NEDQ). The questionnaire was distributed directly or offline to respondents. It consists of 21 questions related to midnight eating, including eating and sleeping schedules, respondents' views nighttime eating habits, their awareness of these behaviours, and the presence of pressure associated with these eating patterns. Scores from the NEDQ questionnaire are divided into two categories, namely Non- Nigh Eating Syndrome = normal (indicating that the respondent does not meet the criteria outlined in the questionnaire) and NES = Nigh Eating Syndrome (applies if the respondent meets at least one criterion from point I plus ≥ 3 out of 5 qualifications from criteria point III plus IV and V)[13]. A 24-hour food recall instrument was used to observe respondents' fat intake. The instrument contains data on meal times/hours, types, and amounts of food consumed during the last 1x24 hours. After obtaining fat intake data, the data was then analyzed using the *Nutrisurvey* application. Fat intake is categorized based on the Estimated Average Requirement (EAR) value as outlined by the National Nutrition Adequacy Rate (AKG, 2019). The formula for calculating EAR is AKGx100/120. Fat intake is classified into two categories, namely adequate fat intake and insufficient fat intake. Fat intake is considered adequate if it meets or exceeds the EAR, and deficient if it is below the EAR.[14].

Body size measurements included body weight and height. Body weight was measured using a digital weighing scale with an accuracy of 0.1 kg, while height was measured using a stadiometer (microtoice) with an accuracy of 0.1 cm. These measurements were then interpreted using the Body Mass Index (BMI) with the formula (BW (kg)/H (m)2). Body Mass Index categories are divided into two groups, namely normal nutritional status (BMI 18.5 - 22.9) and overnutrition status (BMI ≥23), based on the National BMI classification[15].

Data analysis involved univariate, bivariate, and multivariate analysis. Univariate analysis contained the frequency distribution of respondents' characteristics, Night Time Eating, and nutritional status. Bivariate analysis was conducted to analyze the relationship

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between the independent variables (Night Time Eating and fat intake) and the dependent variable (incidence of overnutrition), utilizing the Chi-Square test. Multivariate analysis aimed to identify the most influential factors on the incidence of overnutrition and employed multiple logistic regression.

RESULTS AND DISCUSSIONS

The data obtained in this study were analyzed using univariate, bivariate and multivariate. Univariate analysis was conducted to assess the frequency distribution of respondent characteristics and research variables. The results of the analysis of the respondent characteristics are presented in Table 1 below.

Table 1. Frequency Distribution of Student Characteristics in Medan City

Variable	Category	n	(%)
Gender	Male	21	19.8
	Female	85	80.2
Age	Middle adolescence	0	0
	Late adolescence	106	100
Semester	Early	7	6.6
	Middle	54	50.9
	Late	45	42.5
Father's Education	No Formal Education	1	0.9
	Elementary School	5	4.7
	Junior High School	11	10.4
	Senior High School	66	62.3
	College	23	21.7
Mother's Education	No Formal Education	0	0
	Elementary School	3	2.8
	Junior High School	13	12.3
	Senior High School	63	59.5
	College	27	25.5
Parents' Income	< Average Minimum Wage	52	49.1
	≥ Average Minimum Wage	54	50.9

The characteristics of respondents observed (table 1) included gender, age, semester, father's education, mother's education, and parents' income. The predominant gender among the respondents was female, accounting for 80.2%. All respondents in this study were aged 19 years or older, placing them in the late adolescence group. The education level of the respondents' parents, both father and mother, was predominantly high school graduates, representing over59%. Additionally, more than 21% of respondents had parents with a college education. The income distribution of the respondents' parents showed nearly equal percentages for those earning below and above the Average Minimum Wage, based on the minimum wage of Medan City in 2023.

This study also examined an overview of the variables studied, namely Night Time Eating, fat intake, and the incidence of overnutrition. The results of the analysis for each variable are presented in tables and diagrams, as shown below.

Table 2. Night Time Eating Habits Among College Students in Medan City

Variable	Category	n	(%)
Night Time Eating	Normal	24	22.6
	Nigh Eating Syndrome (NES)	82	77.4

A total of 77.4% of respondents exhibited Night Time Eating habits categorized as Night Eating Syndrome (NES), while only 22.6% were classified in the normal eating category. This indicates that the majority of the respondents engage in late-night eating habits, highlighting NES as a significant issue among university students. Based on questionnaire results, it appears that most respondents expressed a strong desire to eat at midnight. This desire is triggered by, among others, working on assignment deadlines late into night necessitating food for companionship while studying. Other reasons given by the respondents were the habit of watching dramas/series until late, playing games, and experiencing hunger in the middle of the night. The research data also showed that respondents did not feel bothered by their midnight eating habits, continuing to eat at midnight without any serious concern.

Night Eating Syndrome (NES) is an eating disorder characterized by disordered eating patterns, in which individuals consume most of their calories at night, particularly after dinner or during the evening[16]. NES is a combination of eating and sleeping disorders, with individuals often binge eating at night and may wake up from sleep to eat. If left untreated, NES can lead to weight gain, obesity and other metabolicissues[17]. The high prevalence of NES among university students is an interesting phenomenon to analyze, as this group frequently experiences drastic lifestyle changes and faces high psychosocial pressure. Research conducted on students in Brazil showed that of the 900 students studied, 23.47% experienced NES[18]. Several factors that

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may contribute to the high prevalence of NES in university students, including changes in lifestyle and sleep patterns, academic and emotional stress, social influences and campus environment, and limited knowledge about nutrition and diet[19].

The high prevalence of NES among college students can have a serious impact on their physical and mental health. Excessive calorie consumption at night due to NES can lead to weight gain, obesity, and metabolic problems such as insulin resistance and dyslipidemia[20,21]. In addition, an irregular evening meal pattern can worsen sleep quality, increase the risk of chronic sleep disorders, and contribute to decreased academic performance. Research on medical students indicates a decline in learning achievement , evidenced by lower course grades among those experiencing NES[22]. Psychologically, NES is often associated with feelings of shame, guilt and low self-esteem, which can exacerbate mental health issues such as depression and anxiety. Social perceptions surrounding disordered eating habits and weight gain can also affect students' emotional well-being. This aligns with research conducted on university students in Palestine which showed a significant relationship between NES and mental health. Students with NES are considerably more likely to experience mental health problems compared to those without NES[23].

Table 3. Fat intake among university students in Medan City

Variable	Category	n	(%)
Fat intake	sufficient (≥EAR)	46	43.4
	deficient (<EAR)	60	56.6

It was found that 56.6% of respondents had fat intake in deficient category (<EAR), while 43.4% of respondents had fat intake in the sufficient category (≥EAR). This indicates that some respondents' fat intake still fails to meet daily nutritional needs. The recommendation for fat intake in respondents according to the National Nutrition Adequacy Rate is 65 gr/day for women and 75 gr/day for men[24]. In this study, the reference used by researchers in determining fat intake is the Estimated Average Requirement (EAR) value. The EAR reference was used because, as of now, there is no standardized cut-off point related to fat intake. The results of the study only show whether the respondent's fat intake is sufficient or below the EAR value, without considering whether intake exceeds the recommended amount.

Deficient fat intake among respondents results from inadequate food consumption that aligns with balanced nutrition. This is reflected in the 24-hour food recall data, which shows that there are still many respondents do not eat regularly or follow balanced meal recommendations of the contents of my plate. Many respondents only eat 1-2 times a day with small portions and the types of food consumed are not diverse. Consistent with research on students in Bali, 66% were found to have fat intake below their daily requirements[25]. Meanwhile, 93.7% of students in Sorong experienced insufficient fat intake[26]. A significant portion of the foods consumed by respondents are low-fat foods, such as snacks or light meals that do not provide sufficient fat intake. College students often have busy schedules, juggling classes, assignments, extracurricular activities, and part-time jobs, which causes them to not always pay attention to balanced diets. Foods consumed are often chosen based on convenience and availability, rather than nutritional value. For example, college students may prefer low-fat snacks and light meals. In addition, irregular eating habits, such as skipping meals or relying on snacks, can further contribute to deficient fat intake. College students who skip breakfast or dinner tend to replace meals with snacks that are low in fat and nutrients.

Another factor that can cause students to have inadequate fat intake is the social environment. Peer influence and the campus play an important role. Many students live in dormitories or boarding houses, where the eating habits of their friends can influence their own dietary choices. If their friends have low-fat eating habits or avoid fats, then students may feel encouraged to adopt similar patterns. When fat intake short of daily needs, it can lead to several negative health impacts, including decreased cognitive function, hormonal and immune system disorders, and reduced nutrient absorption[27].

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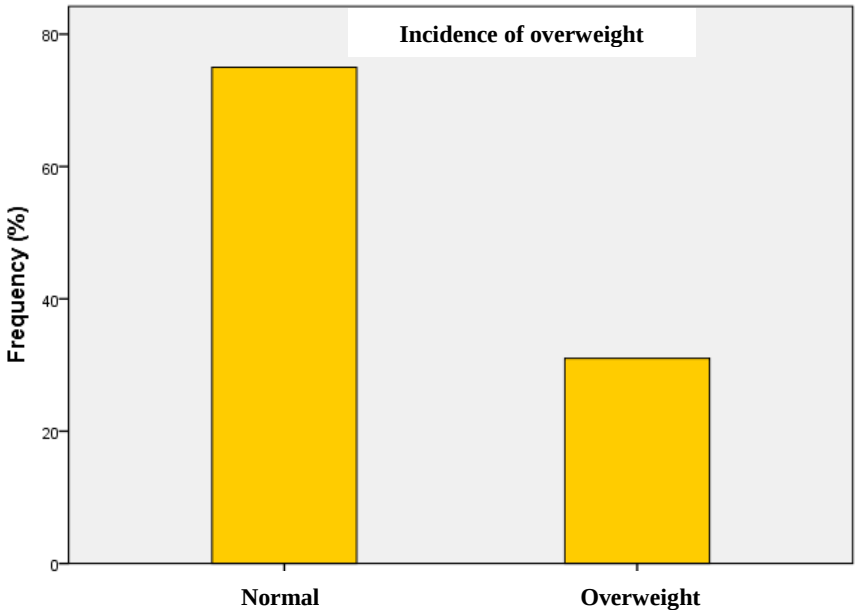

Figure 1. Incidence of overweight among university students in Medan City

The prevalence of overnutrition among respondents was 29.2%. Although this figure is lower than that of those without overnutrition, it remains significant and requires serious attention. The incidence of overnutrition nearly 30% represents a health issue that must be addressed immediately. Students experiencing overnutrition are at increased risk for various health problems. Based on the results of this study, the incidence of overnutrition among respondents appears to be influenced by factors such as irregular eating patterns, poor eating habits, lack of physical activity, stress and environmental influences.

The incidence of overnutrition among university students has become an increasingly concerning issue, especially in the context of the lifestyle and dietary changes that occur when they transition to university life. Many university students experience significant changes in their eating habits, often driven by academic stress, easy access to fast food, and changes in physical activity[28,29]. One key factor contributing to overnutrition is the changing social environment and unhealthy eating habits. Many college students consume fast food and high-calorie snacks, while their fruit and vegetable intake tend to be low. Research shows that college students often skip meals and neglect a healthy diet, preferring foods high in calories and low in nutrients, which can contribute to weight gain and increased the risk of obesity[30]. Poor eating habits are often compounded by staying up late and lack of physical activity, both of which are common among college students[31]. The lack of physical activity also plays a role in this problem, as students who spend long hours studying or relaxing tending to move less[32,33].

Overnutrition on university students can have significant consequences in terms of both physical and mental health. Being overweight increases the risk of many chronic diseases, including type 2 diabetes, hypertension, and cardiovascular disease[34,35]. Psychologically, overnourished students often experience mental health problems, such as depression and anxiety. Students facing high academic stress often rely on food as a way to vent their emotions, which can exacerbate the issue of overnutrition[36]. Additionally, overnutrition can also affect students' academic performance. Both overnourished and undernourished students tend to have poorer academic performance compared to those with normal nutritional status[37]. Students who are overweight may also experience insecurity and body image issues, which can negatively affect their social interactions, worsen their mental health, and reduce their overall quality of life[38].

Bivariate analysis in this study used the chi-square test. This test was conducted to examine the relationship between night time eating and the incidence of overnutrition, as well as the relationship between fat intake and the incidence of overnutrition. The results of the analysis are presented in Table 4 below.

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Table 4. Chi-square test results of the relationship between night time eating and overweight and the relationship between fat intake and overweight

Night Time Eating	Nutritional status				Total		p-value
	Normal		Overweight				
	n	%	n	%	n	%	
Normal	21	19.8	3	2.8	24	22.6	
Nigh Eating Syndrome (NES)	54	50.9	28	26.4	82	77.4	0.040
Total	75	70.8	31	29.2	106	100	
Fat Intake	**Nutritional status**				**Total**		**p-value**
	Normal		**Overweight**				
	n	**%**	**n**	**%**	**n**	**%**	
Sufficient	39	36.8	7	6.6	46	43.4	
Deficient	36	34	24	22.6	60	56.6	0.005
Total	75	70.8	31	29.2	106	100	

The results of the analysis showed a significant relationship between Night Time Eating and fat intake with the incidence of overweight in college students. Based on the study's results, Night Time Eating has a significant relationship with the incidence of overweight, as indicated by a p-value = 0.040. Statistically, a p-value below 0.05 indicates that this relationship is substantial, meaning that eating habits at night contribute to an increased risk of overnutrition among university students. According to Ha and Song, irregular eating patterns, especially high-calorie consumption at night, may contribute to increased body weight and obesity[39]. Late dinners and nighttime eating habits are associated with cardiometabolic risk factors, including obesity. Calorie consumption after 8 pm was found to have a positive correlation with higher Body Mass Index (BMI), confirming that poor evening eating patterns can contribute to weight gain[6].

The data showed that students with normal Night Time Eating had less overnutrition (2.8%). Meanwhile, 26.4% of students with Night Eating Syndrome (NES) experienced overnutrition. These results suggest that individuals without NES are less at risk of overnutrition. Conversely, individuals with NES have a higher likelihood of experiencing overnutrition. Individuals who consume food at night tend to have a higher risk of obesity compared to those who do not have this habit. Other studies have noted that nighttime eating disorders may be associated with more serious health problems, including metabolic disorders[40]. According to the literature, NES is often associated with higher caloric intake at night, which is not balanced by physical activity. Research by Kwan also shows that NES can cause significant energy imbalance, leading to weight gain and obesity[41]. This condition is aggravated by disrupted circadian rhythms and sleep disorders, which cause the body's metabolism to be inefficient in processing calories consumed at night. Currently, more than 80% of students report poor sleep quality[42]. This study is consistent with Maryani's research which shows a significant relationship between Night Eating Syndrome (NES) and obesity (p-value = 0.016)[4] .

The results also showed that fat intake had a significant relationship with the incidence of overnutrition in university students, with a p-value = 0.005. This suggests that the level of fat intake that does not meet daily needs is an important risk factor for the incidence of overnutrition among university students. The study found that students with adequate fat intake were less likely to be overweight (6.6%). Meanwhile, 22.6% of students with insufficient fat intake were overweight. This data suggests that individuals who meet their daily fat intake are less likely to be overnourished. Conversely, those who do not meet their daily fat intake are more likely to be overnourished. Although it may seem contradictory, several factors contribute to weight gain despite insufficient fat intake. Insufficient fat intake can contribute to weight gain in a complex manner. This can be explained by considering the various factors that affect a person's nutritional status, including diet quality, type of fat consumed and total energy balance. Weight gain in respondents with insufficient fat intake is thought to be due to excessive calorie consumption from carbohydrates or protein. The increase in calories does not only come from fat, but from carbohydrates and protein[43]. Consuming low amounts of fat followed by high consumption of refined carbohydrates can lead to overnutrition. Paying attention to the quality of fat consumed is also essential. While a person may consume a low amount of fat, if most of the fat they consume is saturated or trans-fat, the risk of overnutrition may increase. Saturated fat can improve nutritional status[44].

After obtaining significant results from the bivariate analysis, the next step was to conduct multivariate data analysis. This analysis performed using multiple logistic regression tests to determine the extent to which the independent variables affect the dependent variable and to identify which variable has the most influence on the incidence of overnutrition. The test results also indicated the degree of risk for each variable. The regression test results are presented in Table 5 below.

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Table 5. Multiple Logistic Regression Test of the Relationship between Night Time Eating and Fat Intake with the Incidence of Over Nutrition in College Students in Medan City

Variable	Sig	OR	95% CI
Night Time Eating	0.049	3.785	1.007-14.226
Fat Intake	0.007	3.814	1.441-10.095

The results of the analysis indicate that both independent variables significantly influence the occurrence of overnutrition. Odd Ratio (OR) data show that students with Night Time Eating habits have a 3.785 times greater risk of experiencing overnutrition compared to those without these habits. This odds ratio suggests that the habit of eating at night is a strong factor contributing to an increased the risk of overnutrition. This can be explained through several physiological mechanisms, where food consumed at night may not be digested and metabolized optimally, leading more energy is stored as fat. Practically, these results suggest that reducing or regulating meal times, especially at night, may help lower the risk of overnutrition among university students. Irregular eating patterns, particularly those occurring at night, disrupt metabolism and increase the risk of obesity[45].

Night time eating is associated with an elevated risk of overnutrition and obesity. The underlying mechanisms involve disruptions of metabolism and circadian rhythms, along with psychological factors that may influence eating patterns. Consuming food at times that do not match the body's natural circadian rhythms can disrupt metabolic processes, including glucose and lipid regulation[46]. Night-time food eating tends to be less controlled, resulting in more high-calorie food choices that can lead to weight gain.

Fat intake was also found to have a significant association with the incidence of overnutrition, suggesting that the relationship between fat intake and the risk of overnutrition cannot be ignored. In terms of risk, students with insufficient fat intake have a 3.814 times greater risk of being overnourished compared to those with adequate fat intake. Students with fat intake that does not meet daily adequacy will have a 3.814 times risk of being overnourished compared to students whose fat intake is adequate or meets daily needs. When fat intake is too low, the body may struggle to regulate hormones involved in appetite and metabolism, such as leptin and ghrelin[47]. This disruption can result in increased appetite and a higher calorie intake from other sources which may contribute to weight gain.

On the other hand, a balanced and sufficient intake of fat is essential for maintaining optimal health and body function. Healthy fats, such as omega-3 fatty acids, play a key role in weight regulation and fat metabolism[48]. When fat intake is insufficient, the body may not be able to utilize fat efficiently and will seek alternative energy sources, which often come from protein and carbohydrates. This shift can lead to a decrease in muscle mass and a slower metabolism, which in turn can affect overall body weight[49]. In summary, the relationship between deficient fat intake and weight gain is the result of a complex interaction between caloric intake, metabolism and hormonal regulation. Therefore, it is crucial to consider fat intake within the context of a balanced diet to maintain a healthy weight.

Night time eating habits and high fat intake can mutually reinforce the risk of overnutrition. College students, as an adolescent age group transitioning to independent lifestyle, are particularly susceptible to unhealthy eating patterns, including Night Time Eating and inappropriate fat consumption. A previous study found that irregular dietary changes among university students, such as frequent consumption of fast food consumption, insufficient fat intake, and nighttime eating habits, increased the prevalence of obesity and overnutrition[50]. This is relevant to the findings of this study, which showed that students with a late-night eating pattern and inadequate fat intake were at a higher risk of overnutrition. One of the strengths of this study focuses on a contemporary issue among adolescents, namely night-time eating their relationship with fat intake. Data collection was carried out directly to minimize data errors and incomplete responses, thereby enhances the accuracy of the information provided by respondents. However, a limitation of this study is its exclusion of other potential confounding variables, such as physical activity, which could have influenced the results.

CONCLUSIONS

The results of the study indicate a significant relationship between the habit of eating at midnight (Night Time Eating) with the incidence of overweight. Additionally, there is also a significant relationship between fat intake and the incidence of overweight among college students. The findings show that adolescents with the habit of eating at midnight (Night Time Eating) are 3.785 times more likely to experience overnutrition, while adolescents with high fat intake are 3.814 times more likely to be overnourished. Eating habits and nutrient intake are crucial factors to consider in promoting the healthy and productive adolescents. Further research is needed to explore the influence of physical activity factors and macronutrient intake on the incidence of overnutrition.

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CONFLICT OF INTEREST AND FUNDING DISCLOSURE

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AUTHOR CONTRIBUTIONS

YS: drafting the conceptual framework, data analysis, writing the article draft, reviewing and editing the article; ER: drafting the research methodology, writing the article draft; KYD: analyzing the problems, objectives, formulations, and research hypotheses, writing the article draft; CP: drafting the discussion of the data analysis results, writing the article draft.

REFERENCES

1. Ivanka, S. & Susilowati, Y. Pengaruh Pola Makan Dan Stres Akademik Terhadp Kejadian Gastritis Pada Mahasiswa Di Era Pandemi Covid-19 Di Universitas Yatsi Madani Tahun 2022. *Nusant. Hasana J.* **2**, 148–154 (2023).
2. Telleria-Aramburu, N. & Arroyo-Izaga, M. Risk factors of overweight/obesity-related lifestyles in university students: Results from the EHU12/24 study. *Br. J. Nutr.* **127**, 914–926 (2022). https://doi.org/10.1017/S0007114521001483.
3. Kemenkes. *Survey Kesehatan Indonesia (2023) Dalam Angka*. (2023).
4. Maryani, D., Iqbal, M., Suryana, A. L., Widyawati, A. & Jannah, M. Hubungan Sindrom Makan Malam dengan Obesitas pada Mahasiswa di Politeknik Negeri Jember. *HARENA J. Gizi* **4**, 56–63 (2023).
5. Kim, Y., Kwak, J. H. & Paik, J. K. Association of Night Eating Habits with Health-Related Quality of Life (HRQoL) in University Students. in *Healthcare* vol. 10 640:1–8 (MDPI, 2022). https://doi.org/10.3390/healthcare10040640.
6. Yoshida, J., Eguchi, E., Nagaoka, K., Ito, T. & Ogino, K. Association of night eating habits with metabolic syndrome and its components: a longitudinal study. *BMC Public Health* **18**, 1–12 (2018). https://doi.org/10.1186/s12889-018-6262-3.
7. Park, B. *et al.* Multimorbidity and health-related quality of life in Koreans aged 50 or older using KNHANES 2013–2014. *Health Qual. Life Outcomes* **16**, 1–10 (2018). https://doi.org/10.1186/s12955-018-1016-6.
8. Hadi, A. J. *Obesitas dan Melek Gizi: Intervensi Peer Educator Gizi Melalui Pendampingan*. (Epigraf Komunikata Prima, 2021).
9. Novela, V. Hubungan Konsumsi Zat Gizi Mikro Dan Pola Makan Dengan Kejadian Obesitas. *J. Hum. Care* **4**, 190–198 (2019). https://doi.org/10.32883/hcj.v4i3.549.
10. Lisnawati, N. & Haryanto, I. Hubungan Asupan Zat Gizi dengan Komposisi Tubuh Remaja. *J. Holist. Heal. Sci.* **2**, 340463 (2018). https://doi.org/10.51873/jhhs.v2i2.32.
11. Damayanti, A. P., Koerniawati, R. D. & Siregar, M. H. Hubungan Body Image dan Asupan dengan Status Gizi Siswa SMA Negeri 6 Pandeglang. *J. Gizi Kerja dan Produkt.* **4**, 174–183 (2023). https://doi.org/10.52742/jgkp.v4i2.201.
12. Ahmad, E. H. *et al. Metodologi Penelitian Kesehatan*. (Rizmedia Pustaka Indonesia: Yogyakarta., 2023).
13. Nolan, L. J. & Geliebter, A. Factor structure of the Night Eating Diagnostic Questionnaire (NEDQ) and an evaluation of the diagnostic criteria of the night eating syndrome. *J. Eat. Disord.* **7**, 1–10 (2019). https://doi.org/10.1186/s40337-019-0268-9.
14. Roman-Viñas, B. & Serra-Majem, L. Nutritional Adequacy Assessment. in *Encyclopedia of Food Security and Sustainability* (eds. Ferranti, P., Berry, E. M. & Anderson, J. R.) 236–242 (Elsevier, 2019). doi:https://doi.org/10.1016/B978-0-08-100596-5.22037-4. https://doi.org/10.1016/B978-0-08-100596-5.22037-4.
15. Kemenkes. *Peraturan Menteri Kesehatan Republik Indonesia Nomor 41 Tahun 2014 tentang Pedoman Gizi Seimbang*. (2014).
16. Bargagna, M. & Casu, M. Night Eating Syndrome: A Review of Etiology, Assessment, and Suggestions for Clinical Treatment. *Psychiatry Int.* **5**, 289–304 (2024). https://doi.org/10.3390/psychiatryint5020020.
17. Salman, E. J. & Kabir, R. *Night Eating Syndrome*. (StatPearls Publishing, Treasure Island (FL), 2023).
18. Abreu, D. D. C., da Silva, J. P. C., da Silva Paiva, L., dos Santos Figueiredo, F. W. & do Souto, R. P. Night eating syndrome among university students: are aspects of academic life associated with eating disorders? *J. Hum. Growth Dev.* **33**, 173–183 (2023). https://doi.org/10.36311/jhgd.v33.14933.
19. Li, L. Effects and Influencing Factors of Night Eating Syndrome: A Review of the Literature. in *2021 4th International Conference on Humanities Education and Social Sciences (ICHESS 2021)* 403–410 (Atlantis Press, 2021). https://doi.org/10.2991/assehr.k.211220.070.
20. Leksono, A. P., Dieny, F. F., Noer, E. R. & Margawati, A. Night Eating Syndrome, Pola Tidur, Dan Kebiasaan Konsumsi Sugar-Sweetened Beverage Berdasarkan Tipe Metabolik Pada Mahasiswa Obese. *AcTion Aceh Nutr. J.* **7**, 136–145 (2022). https://doi.org/10.30867/action.v7i2.617.
21. Pavlyshyn, H., Kozak, K. & Marushchak, M. Association between night eating syndrome in overweight and obese children 10-17 years of age and dyslipidemia. *Rom. J. Diabetes Nutr. Metab. Dis.* **28**, 69–76 (2021).
22. Ahmad, M. *et al.* Relation between night eating syndrome and academic grades among university students. *Turkish J. Endocrinol. Metab.* **23**, (2019). https://doi.org/10.25179/tjem.2018-63015.
23. Hamdan, M. *et al.* Night eating syndrome is associated with mental health issues among palestinian undergraduate students-cross sectional study. *J. Eat. Disord.* **11**, 1–11 (2023).

How to cite: *Sandy, Y. D., Rukmana, E., Damanik, K. Y., & Pratiwi, C. (2024) The Association Between Night Time Eating, Fat Intake, and The Incidence of Overweight among University Students in Medan City: Hubungan Night Time Eating dan Asupan Lemak dengan Kejadian Gizi Lebih pada Mahasiswa di Kota Medan. Amerta Nutrition, 8(3SP), 141–150.*

https://doi.org/10.1186/s40337-022-00727-2.
24. AKG. *Peraturan Kementerian Kesehatan Republik Indonesia Nomor 28 Tahun 2019 Tentang Angka Kecukupan Gizi Yang Dianjurkan Untuk Masyarakat Indonesia*. (2019).
25. Mawitjere, M. C. L., Amisi, M. D. & Sanggelorang, Y. Gambaran asupan zat gizi makro mahasiswa semester IV Fakultas Kesehatan Masyarakat Universitas Sam Ratulangi saat pembatasan sosial masa pandemi covid-19. *KESMAS* **10**, 1–11 (2021).
26. Fatie, S. D., Briliannita, A. & Florensia, W. Gambaran Asupan Zat Gizi Makro Dan Status Gizi Mahasiswa Poltekkes Kemenkes Sorong Pada Masa Pandemi Covid 19. *Nurs. Arts* **15**, 81–92 (2021).
27. Alamsyah, P. R. *et al. Gizi dan Kesehatan Masyarakat*. (Sada Kurnia Pustaka: Banten., 2024).
28. Khattab, R. *et al.* COVID-19 Pandemic Afflicts Lifestyle and Dietary Habits of Female University Students. *Int. J. Community Med. Public Heal.* **9**, 3418–3425 (2022). https://doi.org/10.18203/2394-6040.ijcmph20222202.
29. James, D. G. & Miller, D. M. J. Impact of food intake habits on weight among university of Guam students. *J Educ Hum. Dev* **5**, 32–39 (2016). https://doi.org/10.15640/jehd.v5n2a5.
30. Jehi, T., Khan, R., Halawani, R. & Dos Santos, H. Effect of COVID-19 outbreak on the diet, body weight and food security status of students of higher education: A systematic review. *Br. J. Nutr.* **129**, 1916–1928 (2023). https://doi.org/10.1017/S0007114522002604.
31. Friebohle, L., Ward, M. & Habtemariam, M. Nutritional Awareness of Undergraduate Healthcare Students. *Nurs. Heal. Sci. J.* **3**, 386–391 (2023). https://doi.org/10.53713/nhsj.v3i4.268.
32. Nurkhopipah, A., Probandari, A. & Anantanyu, S. Kebiasaan Makan, Aktivitas Fisik Dan Indeks Massa Tubuh (Imt) Mahasiswa S-1 Universitas Sebelas Maret Surakarta. *J. Kesehat. Kusuma Husada* 19–25 (2018) doi:10.34035/jk.v9i1.342. https://doi.org/10.34035/jk.v9i1.342.
33. Bashir, A. I. *et al.* The prevalence of obesity and the relationship of food intake in the body weight of medical students of Hail University–Northern Saudi Arabia. *Egypt. Acad. J. Biol. Sci. C, Physiol. Mol. Biol.* **11**, 31–36 (2019). https://doi.org/10.21608/eajbsc.2019.30334.
34. Boukrim, M., Obtel, M., Kasouati, J., Achbani, A. & Razine, R. COVID-19 and confinement: Effect on weight load, physical activity and eating behavior of higher education students in southern Morocco. *Ann. Glob. Heal.* **87**, 1–11 (2021). https://doi.org/10.5334/aogh.3144.
35. Nisa, H., Yuliana, A. D., Salsabila, S. F. & Fadhillah, A. N. Hubungan Karakteristik Individu Dan Gaya Hidup Sedentari Dengan Status Gizi Lebih Pada Mahasiswa Di Masa Pandemi Covid-19: Relationships Of Individual Characteristics And Sedentary Lifestyle With Overnutrition In University Students During The Covid-19 Pa. *Qual. J. Kesehat.* **16**, 55–63 (2022). https://doi.org/10.36082/qjk.v16i1.519.
36. Multazami, L. P. Hubungan Stres, Pola Makan, Dan Aktivitas Fisik Dengan Status Gizi Mahasiswa. *Nutr. Nutr. Res. Dev. J.* **2**, 1–9 (2022). https://doi.org/10.15294/nutrizione.v2i1.52293.
37. Nurmadinisia, R. & Hidayat, Y. A. Hubungan Status Gizi Dan Indeks Prestasi Dengan Asupan Gizi Sebagai Faktor Resiko. *J. Mitra Kesehat.* **3**, 87–93 (2021). https://doi.org/10.47522/jmk.v3i2.82.
38. Majid, M. Perbedaan Tingkat Pengetahuan Gizi, Body Image, Asupan Energi Dan Status Gizi Pada Mahasiswa Gizi Dan Non Gizi Fakultas Ilmu Kesehatan Universitas Muhammadiyah Parepare. *J. Ilm. Mns. Dan Kesehat.* **1**, 24–33 (2018). https://doi.org/10.31850/makes.v1i1.99.
39. Ha, K. & Song, Y. Associations of meal timing and frequency with obesity and metabolic syndrome among Korean adults. *Nutrients* **11**, 1–14 (2019). https://doi.org/10.3390/nu11102437.
40. Arcaz, A., White, N. & Mekonnen, A. J. Diagnosing a nocturnal eating disorder in an average-weight man. *BMJ Case Reports CP* **15**, e246197 (2022). https://doi.org/10.1136/bcr-2021-246197.
41. Kwan, Y. Q., Lee, S. S. & Cheng, S.-H. Night eating syndrome and its association with sleep quality and body mass index among university students during the Covid-19. *Malaysian J. Soc. Sci. Humanit.* **6**, 371–383 (2021). https://doi.org/10.47405/mjssh.v6i8.944.
42. Sandy, Y. D., Rukmana, E., Damanik, K. Y. & Permatasari, T. Kualitas Tidur Dan Asupan Energi Terhadap Indeks Massa Tubuh Mahasiswa Di Kota Medan. *PREPOTIF J. Kesehat. Masy.* **7**, 16475–16482 (2023). https://doi.org/10.20884/1.jgipas.2023.7.1.8556.
43. Sulaiman, Y. *et al. Dasar-Dasar Ilmu Gizi*. (Yayasan Penerbit Muhammad Zaini: Aceh, 2022).
44. Koochakpour, G. *et al.* Evaluating the interaction of common FTO genetic variants, added sugar, and trans-fatty acid intakes in altering obesity phenotypes. *Nutr. Metab. Cardiovasc. Dis.* **29**, 474–480 (2019). https://doi.org/10.1016/j.numecd.2019.01.005.
45. St-Onge, M.-P. *et al.* Meal timing and frequency: implications for cardiovascular disease prevention: a scientific statement from the American Heart Association. *Circulation* **135**, e96–e121 (2017). https://doi.org/10.1161/CIR.0000000000000476.
46. Noviasty, R. & Susanti, R. Perubahan Kebiasaan Makan Mahasiswa Peminatan Gizi Selama Masa Pandemi Covid 19. *J. Kesehat. Masy. Mulawarman* **2**, 90–99 (2020). https://doi.org/10.30872/jkmm.v2i2.5079.
47. Ramadhani, F., Hatta, H., Nuryani, Yusuf, N. & Suwignyo. Relationship Between Nutrion Intake, Family Income and Stress Levels With Obesity In Adolecents: Hubungan Asupan Gizi, Pendapatan

How to cite: *Sandy, Y. D., Rukmana, E., Damanik, K. Y., & Pratiwi, C. (2024) The Association Between Night Time Eating, Fat Intake, and The Incidence of Overweight among University Students in Medan City: Hubungan Night Time Eating dan Asupan Lemak dengan Kejadian Gizi Lebih pada Mahasiswa di Kota Medan. Amerta Nutrition, 8(3SP), 141–150.*

Keluarga, dan Tingkat Stres Dengan Obesitas Pada Remaja. *KESMAS UWIGAMA J. Kesehat. Masy.* **7**, 271–279 (2021). https://doi.org/10.24903/kujkm.v7i2.1049.

48. Rahayuningsih, A. N. & Muniroh, L. Hubungan Aktivitas Fisik, Asupan Kalsium dan Lemak dengan Obesitas Sentral pada Tenaga Kerja Perkantoran. *Media Gizi Kesmas* **11**, (2022). https://doi.org/10.20473/mgk.v11i2.2022.351-357.

49. Listyawardhani, Y. & Yunianto, A. E. Tingkat Kecukupan Protein dan Lemak dengan Kejadian Underweight pada Balita. *J. Keperawatan Prof.* **5**, 115–121 (2024). https://doi.org/10.36590/kepo.v5i1.1002.

50. Mohammadbeigi, A. *et al.* Fast food consumption and overweight/obesity prevalence in students and its association with general and abdominal obesity. *J. Prev. Med. Hyg.* **59**, E236 (2018).

How to cite: *Sandy, Y. D., Rukmana, E., Damanik, K. Y., & Pratiwi, C. (2024) The Association Between Night Time Eating, Fat Intake, and The Incidence of Overweight among University Students in Medan City: Hubungan Night Time Eating dan Asupan Lemak dengan Kejadian Gizi Lebih pada Mahasiswa di Kota Medan. Amerta Nutrition, 8(3SP), 141–150.*