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Stress level and emotional eating in obese and non-obese adolescents

Tingkat stres dan emotional eating pada remaja obesitas dan non obesitas

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Abstract

The association between stress factors and emotional eating can contribute to the development of obesity. Boredom, stress, anxiety, and depression can lead to emotional eating, which involves the consumption of food to cope with negative emotions. Emotional eating often involves the consumption of high-calorie, comfortable foods that can contribute to weight gain. This study aimed to analyze the differences in stress levels and emotional eating between obese and non-obese adolescents. This research was conducted in May 2023 using an observational case-control study comparing obese and non-obese adolescents in a special region of Yogyakarta. A total of 139 respondents who attended this study were selected using multistage random sampling. Stress levels were measured using the Perceived Stress Scale-10 (PSS-10) questionnaire and emotional eating was assessed using the Emotional Eater Questionnaire (EEQ). Data were collected and analyzed using the Mann-Whitney test. Results: Most respondents had high stress levels (49,6%) and low emotional eaters (43,9%). There were differences in stress levels (p=0,004) and emotional eating (p=0,000) between the obese and non-obese adolescents. Conclusions, stress levels and emotional eating were different in obese and non-obese adolescents.
Keywords: Stress, Emotional Eating, Obese, Non-Obese, Adolescents

Abstrak

Hubungan antara faktor stres dan *emotional eating* dapat berkontribusi pada perkembangan obesitas. Bosan, stres, kecemasan, dan depresi dapat menyebabkan *emotional eating*, yang melibatkan mengkonsumsi makanan yang tinggi kalori dan kenyamanan untuk mengatasi emosi negatif. Penelitian ini bertujuan untuk menganalisis perbedaan dalam tingkat stres dan *emotional eating* pada remaja obes dan non-obes. Metode, studi kasus-kontrol observasional antara kelompok remaja obes dan non-obes berlokasi di Kota Yogyakarta, 139 siswa yang menjadi responden penelitian ini dipilih menggunakan pengambilan sampel dengan metode *multistage random sampling*. Tingkat stres diukur dengan menggunakan kuesioner (PSS-10) dan data *emotional eating* didapatkan dengan pengisian kuesioner Emotional Eater Questionnaires (EEQ). Data yang dikumpulkan kemudian dianalisis menggunakan uji *Mann Whitney*. Hasil, responden sebagian besar memiliki tingkat stres tinggi (49,6%) dan *emotional eating* rendah (43,9%). Ada perbedaan dalam tingkat stres (p=0,004) dan makan emosional (p =0,000) antara kelompok remaja obes dan non-obes. Kesimpulan, terdapat perbedaan tingkat stres dan *emotional eating* pada remaja obes dan non-obes.
Kata Kunci: stres, *emotional eating*, obesitas, non-obese, remaja

Introduction

The prevalence of obesity among adolescents is increasing globally (Bibiloni et al., 2014). This can be associated with a variety of variables, including changes in dietary habits, increased sedentary behaviors, and the impact of environmental factors (Hoare et al., 2016). The development of obesity in adolescence has been associated with a variety of health complications such as type 2 diabetes, cardiovascular disease, musculoskeletal diseases, and mental health disorders (Longo et al., 2019).

The previously discussed health effects may continue throughout an individual's adult life, leading to decreased standards of life and increased health care costs. Adolescents diagnosed with obesity frequently face condemnation and discriminatory treatment, leading to a negative impact on their self-esteem, body image perceptions, and social integration (Rahman et al., 2018). The interactions between psychological factors might contribute to a self-perpetuating cycle of weight gain and emotional discomfort. The prevalence of obesity has significant financial implications for the healthcare system and society, primarily stemming from escalated healthcare costs and diminished productivity (Vallis, 2016).

According to the WHO, obesity is becoming a global issue. Indirect obesity increases mortality rate. The Global Burden of Disease reported four million obesity-related deaths in 2017 (*Global Burden of Disease Study 2017*, 2017). Obesity caused 5,5% of the deaths, whereas underweight caused 0,7%. According to statistics derived from the National Health and Nutrition Examination Survey (NHANES) conducted in 2015-2016, there is a substantial occurrence of obesity among adolescents in the United States. Specifically, the survey revealed that 20,6% of individuals aged 12-19 in the U.S. were classified as obese. Based on the findings of Riskesdas (2013), the prevalence of obesity among adolescents aged 16-18 in Indonesia was 7,3%. This figure comprised 5,7% overweight individuals and 1,6% were classified as obese. In contrast, the prevalence of obesity among the same age group experienced a notable increase in 2018, reaching 16%. This increase was primarily driven by an increase in the proportion of overweight individuals, accounting for 11,2%, whereas the remaining 4,8% were classified as obese (RISKESDAS, 2018).

Adolescence is a phase in which individuals are vulnerable to increased stress events (Krishnaveni et al., 2021). The World Health Organization (WHO) estimates that 20% of adolescents aged 10-19 years have mental health disorders (WHO 2001). Previous research has shown that stress is associated with increased food consumption (Turton et al. 2017). The response to negative emotions in the form of increased consumption of unhealthy foods is referred to as emotional eating (Barnhart, 2021).

Emotional eating refers to the tendency to eat in response to negative emotions. Someone with emotional eating reacts to negative emotions not as a response to feelings of hunger, but as a coping strategy for these negative feelings (Limbers & Summers, 2021). Individuals with emotional eating habits tend to consume foods that are high in fat, sugar, and calories, which is positively related to the incidence of obesity (Limbers & Summers, 2021). Research has shown that stress levels are related to emotional eating and weight gain (Shriver et al., 2021).

Previous research found a correlation between negative emotions and increased food intake (Turton et al., 2017). The habit of responding to negative or positive emotions, such as an increase in the consumption of unhealthy foods, is an outcome that has been referred to as emotional eating, which has been associated with an increased tendency towards unhealthy dietary choices (Barnhart et al., 2021). Most school-age adolescents perceive school as a stressor and source of negative emotions, which might potentially contribute to the development of emotional eating habits (Rahmad et al., 2020; Chamberlin et al., 2018).

Stress has been linked to weight gain and dietary habits that might contribute to obesity, such as the increased consumption of energy-dense foods, saturated fats, sugars, and an insufficient diet (Richardson et al., 2015). When emotional eating disorders are not managed effectively, there is an increased risk of developing obesity and an increased tendency to consume higher amounts of fast food (Wijnant et al., 2021).

Numerous studies have been conducted on the factors related to stress levels and

emotional eating in adolescents with obesity. However, the current study mostly focused on examining the relationship and influence of these variables on the prevalence of obesity among adolescents. This study aims to examine the differences in stress levels and emotional eating tendencies between adolescents who are obese in comparison to those who are not obese.

Methods

This observational analytical case-control study was conducted in the Special Region of Yogyakarta in May 2023. Respondents were selected using multistage random sampling, and the openepi.com website (Open-Source Epidemiologic Statistics for Public Health*)* was used for counting. The numerical values included in the formula were obtained from a study conducted by Sumiyati et al. (2022) entitled "Hubungan antara Konsumsi *Fast Food* dengan Kejadian Obesitas Pada Remaja." Based on the variable calculation, a sample size of 122 respondents was obtained for this study, with a follow-up loss rate of 10%. Consequently, the minimum sample size required for this study was 134.

The inclusion criteria for this study were as follows: State Senior High Schools 2 and 4 Yogyakarta, and Ma'arif Vocational High School. Aged 15-18 years old, want to be a respondent. The case group consisted of obese respondents, while the control group comprised non-obese respondents. Adolescents with chronic diseases, anxiety disorders, or depression were excluded from this study.

This study began with screening using anthropometric measurements. Weight and height were measured and classified using the Z Score. A Z score >+2 will be added to the obesity group, while a Z score ≤2 SD will be added to the non-obese group (Kemenkes RI, 2020). Stress levels were measured using the *Perceived Stress Scale*-10 (PSS-10) which can be used to measure individual stress levels over the last month. Stress levels were categorized as normal (score 0-7), low (score 8-11), moderate (score 12-15), high (16-20), and very high (score ≥21). Emotional eating was measured using the *Emotional Eater Questionnaires* (EEQ). This scale identifies the relationship between negative emotions and individual food intakes. The total scores from the measurement will be classified into non-emotional eaters (score 0-5), low emotional eaters (score 6-10), emotional eaters (11-20), and very emotional eaters (21-30).

The normality of the data was tested using the Kolmogorov Smirnov test, as the data were not normal, and the difference test was performed using the Mann Whitney test. This study was approved by the research ethics committee of the Faculty of Medicine, Universitas Sebelas Maret. No: 99/UN27.06.11/KEP/EC/2023.

Result and Discussion

Table 1 presents the results obtained by answering a questionnaire with a sample of 139 respondents.

Table 1. Characteristics of respondents

Variables	n	%
Gender		
Male	43	30,9
Female	96	69,1
Ages		
15	10	7,2
16	51	36,7
17	55	39,6
18	23	16,5
Pocket Money		
< Rp 10.000	11	7,9
≥ Rp 10.000	128	92,1
Stress Level		
Low	6	4,3
Moderate	36	25,9
High	69	49,6
Very High	28	20,1
Emotional Eating		
Non-emotional eater	21	15,1
Low Emotional Eater	61	43,9
Emotional Eater	54	38,8
Very Emotional Eater	3	2,2

Most respondents, representing 39,6% of the total sample, were 17 years old. According to the gender characteristics, the proportion of female respondents exceeded that of male respondents, including females (69,1%) and males (30,9%). Most respondents (42,4%), indicated that their income was primarily derived from their parents. In addition, a significant proportion of respondents (92,1%),

reported receiving pocket money of more than Rp 10,000 each day. The group of respondents classified as having high stress levels showed the highest proportion, representing 69% of the total. According to the data presented in Table 1, a significant proportion of the participants could be classified as Low Emotional Eaters, 43,8% of the total sample.

The participants in the study were between the ages of 15 and 18, which describes a developmental stage characterized by the transition from middle adolescence to late adolescence. This age range is vulnerable to stress. Many teenagers encounter challenges when attempting to adjust to transitions and changes during their developmental stages. Furthermore, it is important to note that the incidence of stress is particularly elevated among middle-aged adolescents. This phenomenon can be attributed to a combination of social and environmental variables and the stress associated with the study. Adolescents who encounter stress are distinguished by the presence of anxiety disorders, alterations in affective states, and development of eating problems (Salmela-Aro, 2017).

Table 2. Differences in emotional eating and stress level

Variable	Nutritional status		ΔMean ± SD	p-value
	Obese (n=70) Mean ± SD	Non- Obese (n=69) Mean ± SD		
Emotional Eating	1,6 ± 0,71	0,95 ± 0,62	0,65 ± 0,09	0,000
Stress Level	3,04 ± 0,76	2,66 ± 0,76	0,38 ± 0	0,004

Table 2 shows the results of the Mann-Whitney test in both groups (obese and non-obese); there were differences in stress level and emotional eating in obese and non-obese adolescents ($p<0,05$). Stress can be experienced by various age phases, but adolescents are one of the age groups that are vulnerable to experiencing this. Most high school students face daily stress owing to academic competition. Anxiety causes fatigue, depression, insomnia, mood swings, and decreased grades (Khan & Alam, 2015).

Emotional eating is an eating disorder associated with poor food choices or preferences, overeating, and higher body mass index (BMI). In adolescence, emotional eating is a response to relatively common emotions, especially for female students (Webb et al., 2021).

The respondents were adolescents aged 15-18 years and most of the respondents had high stress levels (49,6%). A recent study stated that around 20-25% of adolescents aged 13-17 years would experience mental health problems, and the number would continue to increase. The average age of these mental disorders begins in childhood (6 years of age with anxiety disorders), pre-adolescence (behavioral disorders), and continues into adolescence (mood disorders). Unfortunately, even though the symptoms of mental health disorders appear, many do not seek treatment until the event occurs for years (Sessa & Abington, 2016).

Adolescence is characterized by psychosocial and physiological changes that make adolescents more vulnerable to stress. Academics are the most common cause of stress because at this stage, academic achievement plays a role in their education and future careers (Rentala et al., 2019). Academic stress occurs because too many assignments are given, competition with other students, test preparation, and social relationships are lacking in the school environment. Adolescents who experience stress experience a decrease in academic performance, hinder their abilities in school life, and engage in deviant behavior (Subramani, Chellamuthu. Subramanian, 2017). Another study showed that academic stress can also be caused by family factors, peers, and the education system (Hosseinkhani et al., 2020).

Academic stress has been found to be associated with emotional eating among college students. Several studies have shown that higher levels of academic stress are linked to increased consumption of unhealthy foods such as high-fat/high-sugar snacks and junk food (Finch & Tomiyama, 2015). Additionally, academic stress has been found to be a significant risk factor for emotional eating behaviors (Caso et al., 2020).

It is important to note that the COVID-19 pandemic has further exacerbated the mental health challenges faced by college students, including increased stress and anxiety (Mialki et al., 2021). Therefore, addressing academic stress and promoting healthy coping strategies may be crucial for preventing and managing emotional eating behaviors among college students.

Perceived stress levels have been found to affect adolescents' eating behavior. Higher levels of stress have been associated with emotional and external eating patterns (Shah et al., 2023). Stress can also influence coping strategies used by adolescents, with emotional eating being a potential maladaptive coping mechanism. The relationship between stress and emotional eating may be mediated by factors, such as self-control skills and emotion regulation (Shriver et al., 2021).

Most respondents had low emotional eaters (43,9%) and emotional eaters (38,8%). Emotional eating is common among adolescents when they explore and engage in stressful life events. Emotional eating is one way of coping with negativity and confusion in everyday life to relieve stress (Koshy et al., 2022). Emotional eating is associated with weight gain and difficulty losing weight. Compared to non-emotional eaters, emotional eaters reported consuming more sweets, high fat, and frequent snacking as a response to stressors. Emotional eating is also associated with increased body mass index (BMI), waist circumference, and body fat (Braden et al., 2018; Fayasari & Lestari, 2022).

Individuals who experience emotional eating usually change their eating habits to become unhealthy, often snacking and contributing to obesity. Rachmawati et al. (2019) showed that there were significant differences in respondents based on their nutritional status. Respondents with normal nutritional status and underweight were not emotional eaters, while respondents with overweight nutritional status were emotional eaters with a habit of consuming more sweet drinks, eating large portions, and frequent snacking. Another study also found that obese adolescents are more at risk of experiencing emotional eating and are associated with the incidence of obesity (Koshy et al., 2022).

Stress can also increase the risk of obesity in adolescents. During stress, hormones that increase appetite are activated by the hypothalamus-pituitary-adrenal axis and sympathetic nervous system. An increase in the hormone cortisol is associated with an increase in appetite, especially for foods high in sugar and fat. In addition, under stress, there is an increase in the hormones leptin, corticotropin, and neuropeptides, which are regulated by cortisol, which functions as an appetite stimulant (Tajik et al., 2014). A prior study conducted on 437 respondents found that stress causes negative emotions that are significantly related to the consumption of sweet and fatty foods. In addition, stress causes emotional eating and unhealthy eating habits and contributes to obesity (Michels et al., 2012).

Conclusion

This study concluded that there are differences in the levels of stress and emotional eating between obese and non-obese adolescents. Health care units are expected to be able to provide nutritional education and counselling services to adolescents to improve their awareness of nutrition and the importance of balanced nutritional consumption. This intervention has the potential to assist adolescents in making healthy dietary choices and decreasing their habits towards emotional eating.

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