

Emotional eating, snacking behavior and nutritional status among adolescents

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ABSTRACT

The tendency to eat in response to stress known as emotional eating (EmE). Individuals with EmE usually has been change their dietary pattern towards more unhealthy snacking which contribute to overweight. This study aims to examine the interrelationship between EmE, snacking behavior and nutritional status among adolescents. This was an analytic observational with a cross sectional design study. It was conducted in Surakarta, on August 2019. Total 140 adolescents aged 14-17 years were selected. The data of EmE were measured by Emotional Eater Questionnaire (EEQ), data of snacking behaviour measured by food frequencies questionnaire (FFQ), and BMI were measured using weight scale and microtoice. Data were analyzed by descriptive, bivariate and binary logistic using SPSS v.23. There was significantly difference of EmE and snacking behavior in underweight, normal, and overweight adolescents. We found that underweight (4.17 ± 3.16) and normal individuals (4.97 ± 4.19) were not an emotional eater, and less sweet snacks and sweet drinks consumption while overweight individuals were an emotional eater (14.26 ± 6.04) and eat more sweet snacks, and sweet drinks ($p < 0.001$) during negative emotional states. It was shown that emotional eating and snacking behavior were found higher in overweight than underweight and normal individuals.

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1. INTRODUCTION

Adolescence is a transitions period between childhood and adulthood. Pubertal transition is characterized by physically growth, cognitive and psychosocial development. An adolescent will experience a 'period of storm and stress' which emotional tension occurs as the result of physical, psychosocial, and hormonal changes. This situation makes adolescents tend to get more psychological stress and cause negative emotions such as anxiety, depression, and stress [1]. In the state of emotional tension in response to a difficult experience also results in physiological and behavioral changes, including eating behavior [2]. The tendency to eat in response to the negative emotions is well known as emotional eating (EmE) [3]. Some individuals use Emotional Eating (EmE) as a method of escaping emotional distress. Adolescents with emotional eating disorder tend to feel excessive hunger and increasing the frequency of snacking sweet high energy-dense foods such as cake, ice cream, chocolate and soda. Several studies have shown that increased frequencies of snacking habits implicated in increased body weight and risk for overweight and obesity in the various age group [4-6]. Moreover, using food in response to stress has been identified as a mediator between stressful life experience and indicator of obesity [7].

According to WHO, approximately 18% children and adolescents aged 5-19 years are considered overweight and obese. Children and adolescent with overweight and obesity are higher risk for developing

the same problem in adulthood and cause many chronic diseases, including coronary heart disease, type 2 diabetes, and certain cancers [8-9]. In Indonesia, overweight and obesity is still high prevalent. In 2013, prevalence of overweight among adolescents aged 16-18 still 7.3% (5.7% overweight; 1.6% obesity). Central Java is one of the highest prevalence of obesity case with 1.8%, and Surakarta City is the highest prevalence of overweight and obesity case with 6.4% and 5.9% [10].

2. RESEARCH METHOD

This was an analytic observational with a cross sectional design study. It was conducted in four high school in Surakarta, on August 2019. Total population in this study was 2754 adolescents, and sample size was counted by Open Epi application. Total 140 adolescents aged 14-17 years was sampling by cluster random sampling technique. Subject who consumed anti-depressants, anti-anxiety, mood stabilizers, anti-psychotic medication, appetite stimulant, and drugs stimulate weight gain were not included. Also, subject who was on menstrual period, or fasting were exclude from the study.

Dependent variable on this study was nutritional status, and independent variable was emotional eating and snacking behavior. Definition of nutritional status in this study was nutritional status of adolescents which measured by counted weight (kg) per height (m²) (BMI) per age. Definition of emotional eating in this study was the tendency to eat in response to the negative emotions during a month ago which measured by Emotional Eater Questionnaire (EEQ). EEQ consisted of 10 question about emotional eating with Likert Score 0 for never, 1 for sometimes, 2 for usually, and 3 for always. The results of EEQ would be classified into 4 which 0-5 was "non emotional eater"; 6-10 was "Low emotional eater"; 11-20 was "Emotional eater"; and 20-30 was "Very Emotional Eater". Snacking behavior is frequency of salty-sweet high fat and energy-dense snacks consumption during a month ago which measured by Food Frequency Questionnaire (FFQ). FFQ will consisted of high density snack or drink with Likert score 0 for never, 1 for 2-3 times a month, 2 for 2-3 times a week, 3 for daily, 4 for a couple times a day.

Statistical analyses were performed with SPSS V.23 (SPSS Inc., Chicago, IL, USA). Normality of data distribution was examined by Kolmogorov-Smirnov and non parametrics test were used because the data were abnormal. Bivariate test between each variable was examined by Kruskal-Wallis and Mann-Whitney U test. Mutivariate test was examined by Binary Regression. Value of P<0.005 was considered as significant. Anonymity, confidentiality, and written informed consent were obtained from all subjects. The trial was approved by the Ethics Committee of Medicine Faculty of Sebelas Maret University, Surakarta No.314/UN27.06/KEPK/2019.

3. RESULTS AND DISCUSSION

3.1. Characteristic of subjects

At the beginning of the study, 144 subjects participated in this study, but four subjects did not complete the questionnaire and excluded. Therefore, the statistical analysis was performed on 140 subjects who completed the study. Characteristics of the study population including age, grade, pocket money, parent's education, parent's occupation, and family income were presented in Table 1. The majority of subjects (58.6%) were 11th grade student in high school, and the rest were 10th grade. Based on the average pocket money, 77.9% of subjects had an average pocket money which was 20.807.00 IDR per day. The majorities of subject's parent were bachelor, and worked as private employees, or entrepreneurs, while the majority of subject's mothers were housewives. The majority of subject' parents had an income above the Surakarta City Regional Minimum Wage in 2019 which was 1.802.700.00 IDR per month.

Table 1. Characteristic of subjects

Category	F	%
Age (years)		
14	5	3.6
15	57	40.7
16	68	48.6
17	10	7.1
Grade		
10 (1 st grade)	58	41.4
11 (2 nd grade)	82	58.6
Pocket Money*		
Under Average	109	77.9
Above Average	31	22.1
Father Education		

Elementary	5	3.6
Junior High	12	8.6
Senior High	57	40.7
University	66	47.1
Father Occupation		
Civil servants	34	24.3
State-Owned Enterprises	7	5.0
Entrepreneur/private employee	81	57.9
Farmer/Laborer	15	10.7
Retired	3	2.1
Father Income**		
<Regional Minimum Wage	18	8.6
≥Regional Minimum Wage	122	91.4
Mother Education		
Elementary	6	4.3
Junior High	10	7.1
Senior High	59	42.1
University	65	46.4
Mother Occupation		
Civil servants	29	20.7
State-Owned Enterprises	2	1.4
Entrepreneur/private employee	39	27.9
Farmer/Laborer	1	0.7
Housewives	69	49.3
Mother Income**		
No income	69	49.3
<Regional Minimum Wage	20	14.3
≥Regional Minimum Wage	51	36.4

Note: (*) Average of pocket money 20.807,00 IDR per day

(**) Surakarta Regional Minimum Wage 2019 was 1.802.700,00 IDR per month

3.2. Bivariate analysis

Nutritional status distribution based on gender is presented in Table 2. It can be seen that the majority of subjects (53.6%) are female. The prevalence of underweight adolescents in this study was 8.5%, with a higher prevalence of underweight among boys (5.0%) than girls (3.6%). Most (67.1%) of subjects were normal with the prevalence of normal among girls (40.0%) were higher than boys (27.1%). The prevalence of overweight in this study is relatively high at 24.3% with the prevalence of overweight among boys (14.3%) higher than girls (10.0%).

Table 2. Characteristics of subject based on nutritional status and gender

	Boys		Girls		Total		P*
	n	%	n	%	n	%	
Underweight	7	5.0	5	3.6	12	8.5	0.126
Normal	38	27.1	56	40.0	94	67.1	
Overweight	20	14.3	14	10.0	34	24.3	
Total	65	46.4	75	53.6	140	100	

*Chi-square test with significant $p < 0.05$

These present study showed that the prevalence of adolescents with normal nutritional status was 67.1%, underweight was only around 8.5%; while overweight was relatively high at 24.3%. This result is consistent with the situation in Indonesia which still experiencing double burden problems [11]. The present results support the prior research who found a higher prevalence of underweight among male adolescents than female adolescents [12]. However, from the chi-square test the difference of nutritional status based on gender was not statistically significant. This was also consistent with the prior research who found that gender differences were not related to nutritional status [13]. But another study found that overweight was closely correlated with gender [14].

The difference of emotional eating and snacking behavior based on the nutritional status of subjects were presented in Table 3. It can be seen that the average of emotional eating score of subjects with underweight, normal, and overweight were 4.17 ± 3.16 , 4.97 ± 4.19 , 14.26 ± 6.04 , respectively. From the Kruskal Wallis test, obtained p value < 0.001 which means there were differences in emotional eating scores based on the nutritional status of subjects. In Table 3 also could be seen the frequencies of snack consumption with indicators of sweet snacks, salty snacks, one meal dish and sweet drinks. The score of sweet snack consumption in underweight, normal, and overweight subjects were 1.39 ± 0.57 , 2.41 ± 0.79 , 5.08 ± 1.81 respectively, with p value < 0.001 . The score of salty snacks consumption in

Emotional eating, snacking behavior and nutritional status among adolescents (Yulia Rachmawati)

underweight, normal and overweight subjects were 2.06 ± 0.57 , 3.34 ± 1.19 , 5.40 ± 2.19 , respectively, with a p value <0.001 . The score of one dish meal consumption in underweight, normal and overweight subjects were 1.81 ± 0.73 , 2.60 ± 1.22 , 3.86 ± 1.47 respectively, with p value <0.001 . The score of sweet snack consumption in underweight, normal, and overweight subjects were 1.93 ± 0.94 , 2.86 ± 1.50 , 4.74 ± 2.26 respectively, with p value <0.001 . Therefore, there were significant differences in the snacking behavior (sweet snack, salty snack, one dish meal, sweet drink) among underweight, normal and overweight subjects.

Table 3. Difference of emotional eating and snacking behavior based on nutritional status

	Underweight		Normal		Overweight		p^*
	Mean	SD	Mean	SD	Mean	SD	
<i>Emotional Eating</i>							
Non-EE	2.38	1.68	2.62	1.99	2.50	3.53	
LEE	7.75	2.06	8.14	1.41	7.86	1.21	
EE	-	-	14.00	1.41	14.71	2.93	$<0.001^*$
VEE	-	-	21.50	0.71	21.86	1.36	
Rerata	4.17	3.16	4.97	4.19	14.26	6.04	
<i>Snacking Behaviour</i>							
Sweet Snacks	1.39	0.57	2.41	0.79	5.08	1.81	$<0.001^*$
Salty Snacks	2.06	0.57	3.34	1.19	5.40	2.19	$<0.001^*$
One dish meal	1.81	0.73	2.60	1.22	3.86	1.47	$<0.001^*$
Sweet Drink	1.93	0.94	2.86	1.50	4.74	2.26	$<0.001^*$

Note: Non-EE: Non-Emotional Eater; LEE: Low Emotional Eater; EE: Emotional Eater; VEE: Very Emotional Eater; *Uji Kruskal Wallis test signifikan $p<0.05$

From the present results, emotional eating occurred among 49.3% of subjects both boys and girls. However, the prevalence of emotional eating among girls was slightly higher than boys. It was consistent with the previous research which found that emotional eating were higher prevalent in girls than boy. This was because women tend to experienced negative emotions such as stress (perceived stress), worry (worries), and anxiety (anxiety) psychologically, while men tend to experienced negative emotions only confusion (confused mood) feeling [15]. But, from the results of the average emotional eating score by gender, it was found that the average emotional eating score among boys was higher than girls, although not significantly different. This could be caused by the prevalence of overweight boys was higher than girls. This was supported by prior research which found that emotional eating were higher prevalent among overweight than underweight individuals [16].

Emotional eating was usually caused by several factors such as alexithymia, emotional regulation, and genetic disorders. Genetic factors were related to the Hypothalamic Pituitary Adrenal (HPA) response to stress by cortisol secretion, through a system called the serotonergic brain system. In the serotonergic brain system, the serotonin transporter gene (5-HTT-SLC6A4) had to regulate serotonin secretion which will stabilize appetite and body weight. If there was a disruption in the serotonergic brain system such as the occurrence of polymorphisms in the 5-HTTLPR allele gene, it will cause a decrease in serotonin secretion and cause feelings of depression and cause emotional eating disorders [17].

The present results showed a relationship between snacking frequencies with nutritional status using BMI per age indicators. We found that higher frequencies of snacking would positively affects the BMI score. This results supported by a cohort study which found that people who highly frequent of snacking experienced significant weight gain during the follow-up study. Individuals with highly frequent snacking behavior had 69% higher risk of overweight and obesity [18]. From the present results was also found that underweight to normal adolescents preferred to consume the type of salty snacks. Overweight adolescents preferred the type of sweet snacks and sugary drinks. Food preferences based on nutritional status theory was reported that individuals with overweight and obese tend to like snacks with sweet taste (bread, cakes, biscuits, chocolate), or sweet and milky drinks (tea, coffee, chocolate). Underweight individuals tend to choose boiled snacks, fruit and dairy products.

3.3. Multivariate analysis

Multivariate analysis between emotional eating, snacking behavior and nutritional status were presented in Table 4. It was known that the emotional eating variable had p value $=0.008$ and sweet snack variables had p value <0.001 , so it was statistically significant. In other words, emotional eating variables and sweet snack consumption simultaneously affect the nutritional status of subjects. While other variables such as the salty snacks ($p=0.080$), one meal dish ($p=0.191$), and sweet drinks ($p=0.149$) consumption were not statistically significant (>0.05) so these variables were not simultaneously affect the nutritional status of

subjects. From the results above we obtained the regression equation $Y=17.131+0.183 X_1+2.213 X_2-0.493 X_3-0.381 X_4-0.304 X_5$ and resulted as R^2 68.9%.

Table 4. Regression of emotional eating, snack behavior and nutritional status

	B	t	Nutritional Status (Body Mass Index)		p*	R ²
			CI 95% Lower	Upper		
<i>Emotional Eating</i>	0.183	2.711	0.050	0.317	0.008*	
Snacking Behaviour						
Sweet Snacks	2.213	5.587	1.429	2.996	<0.001*	
Salty Snacks	-0.493	-1.764	-1.046	0.060	0.080	
One dish meal	-0.381	-1.314	-0.953	0.192	0.191	0.689
Sugary Drink	-0.304	-1.452	-0.718	0.110	0.149	

Note: Non-EE: Non-Emotional Eater; LEE: Low Emotional Eater; EE: Emotional Eater; VEE: Very Emotional Eater; *Binary Linier Regression test significant p<0.05

In this study, it was known that there was a relationship between emotional eating, snacking behavior, and nutritional status. Emotional eating disorders can changes the snacking behavior and contribute to changed nutritional status. In another words, individual with emotional eating or known as emotional eater tend to consumed higher frequent of snacking which cause higher body mass index which contributes to overweight. This result supported by previous study which found that overweight individuals tend to overeating during emotional states compared to underweight or normal individuals [18]. Previous research also found that adolescents who experienced emotional eating tend to consume sweet high energy-dense foods [15]. This was also found that emotional eating was positively related to higher consumption of high energy-dense, sweet, and high fat snack [20].

Children or adolescents who were experienced emotional eating tend to had restrained eater habits before. Individuals who usually restrained eating were usually able to control their eating strategies when the emotional state is neutral or positive, but when experienced stress or another negative emotions, it became uncontrollable so it affected the eating behavior [21]. The interrelationship between emotional eating, snacking behavior and nutritional status also supported by prior study which found that food was a comforting agent that provides comfort after consumed [22]. Physiologically, snack, especially sweet snacks, contained tryptophan which can help increased the serotonin hormone which raise sense of happiness, calm, and reducing the negative emotions [23]. Consequently, increased of calorie intake and imbalance sugar, high fat, low fiber diet contributes to higher BMI and risk of overweight and obesity [24]. Somehow, it could be also become a reciprocal relationship which individual with overweight and obesity could be very emotional eating and influenced the frequencies of snacking that cause the overweight or obesity could get worse [25].

4. CONCLUSION

Increased frequency of high density snack consumption due to emotional eating correlated with an increased of body mass index and contributes to overweight. And it was shown that emotional eating disorder and sweet-high density snacking behavior were found higher in overweight than underweight and normal individuals.

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