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## Type of Personality, Food Consumption and Physical Activity Levels as Determinants of Overweight and Obesity among Urban Adolescents

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### ABSTRACT

Obesity is a global epidemic, it was health issues that must be addressed immediately. There was a very significant increase in the prevalence of overweight and obesity of adolescents. Several studies showed that social support related to eating disorders and physical activity of adolescents causes of overweight and obesity. Other study showed that personality contributes to health outcomes and it was associated with a controllable risk factor such as obesity. The aim of the study was to measure the relationship of personality type, fatty food consumption, and physical activity level to overweight and obesity among adolescents. We used a case-control design with 270 subjects. Case population was vocational or senior high school students with overweight or obesity and the control population was vocational or high school students without overweight or obesity. Data analysis used chi-square test with 95% confidence level ( $\alpha = 0.05$ ) and Odds Ratio (OR). The results showed that there was no significant relationship between personality type and overweight or obesity ( $p > 0.05$ ). There was a significant relationship between the consumption of fatty foods ( $p = 0.001$ ), the level of physical activity ( $p = 0.040$ ) and overweight or obesity among adolescents.

**Keywords:** Adolescents, Overweight, Obesity, Personality, Fatty foods, Physical activity

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### INTRODUCTION

#### Background

Obesity has become a worldwide health problem, WHO states that obesity is a global epidemic, so it is health issues that must be addressed<sup>(1)</sup>. Previous study mentioned that the prevalence of overweight or obesity in 2013 increased among children and adolescents (<20 years) in the worldwide, while in developed countries there were 23.8% boys (22.9-24.7) and 22.6% girls (21.7-23.6) with overweight or obesity<sup>(2)</sup>. The prevalence of overweight and obesity also increased in children and adolescents in developing countries, from 8.1% (7.7-8.6) to 12.9% (12.3-13.5) for boys and from 8.4% (8.1-8.8) to 13.4% (13.0-13.9) in girls<sup>(2)</sup>. The prevalence of overweight and obesity in children and adolescents (<20 years) in Indonesia was 6.0% (5.7-7.3%) for males and 10.0% (8.3-12.1%) for female<sup>(2)</sup>. Study from RISKESDAS (Basic health research) showed that there was a very significant increase in the prevalence of overweight and obesity of adolescents (16-18 years) from 1.4% in 2010 to 7.3% in 2013<sup>(3),(4)</sup>. The prevalence of adolescents (16-18 years old) with overweight and obesity showed that Banjarbaru city was the highest in South Kalimantan, that was 14.8% (11.8% overweight and 3.0% obesity). It was higher than prevalence rate of South Kalimantan Province, that was 7.4% (overweight 5.0%, obesity 2.4%) and also compare with the national prevalence rate, that was 7.3% (overweight 5.7%, obesity 1.6%)<sup>(4)</sup>.

Overweight and obesity have a negative impact on physical and psychosocial well-being. Obesity is associated with a higher risk for insulin resistance, type 2 diabetes mellitus, the risk of hyperlipidemia and cardiovascular disease during childhood and adolescence. Adolescents with obese or overweight have risk coronary heart disease and atherosclerosis, after being followed for 55 years<sup>(5),(6)</sup>. These findings were similar with the previous study that mentioned, obesity during adolescence was closely related to the risk of death in middle age.

Also the risk of colon cancer, as well as respiratory diseases such as asthma and emphysema, also increases 2-3 times.

Low self-esteem is a major concern of overweight and obesity in childhood and adolescence. Overweight and obesity during childhood and adolescence can lead to decrease of confidence, negative perceptions, and depression. Obesity causes varying effects in adolescents, from frustration and other negative feelings due to body image and low self-esteem.

The worldwide epidemic of overweight and obese among children and adolescents increase over the last 2 decades. It is predicted that obesity will be the first health problem in 2025. A genetic factor was the risk of overweight and obesity, about 50%, whereas genetic or endocrinal diseases were less than 10%. Environmental, psychological and social factors also influence overweight and obesity in recent years<sup>(7),(8)</sup>.

Historically overweight and obesity were associated with an imbalance between food intake and energy expenditure. Recent research showed that genetic, physiological and behavioral factors had an important role in the etiology of obesity<sup>(9)</sup> The factor that influence overweight and obesity in adolescence was a complex interaction between genes, behavior and lifestyle, eating behavior and socioeconomic factors<sup>(10)</sup>. Personality type was a variable that influences behavior to overweight and obesity control among adolescents. It refers to the findings of various studies that personality was associated with behaviors to control obesity<sup>(11),(12)</sup>.

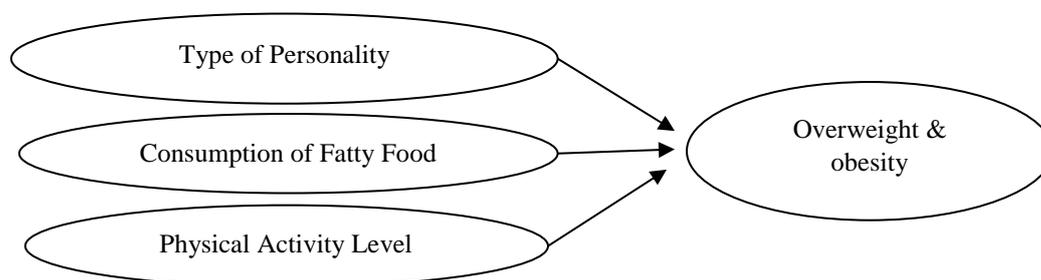


Figure 1. Factors that influence overweight and obesity among adolescents

## Purpose

Based on these findings, the purpose of this study was to examine the relationship between personality type, consumption of fatty foods and physical activity level to overweight and obesity among adolescents in urban city.

## METHODS

This procedure was granted ethical clearance by IRB (Institutional Review Board) from Health Research Ethics Committee, Faculty of Public Health, Airlangga University with number 335-KEPK. This research was observational analytic, used case-control design. Variables in this study were Personality Type, consumption of fatty foods, physical activity level, and overweight & obesity.

We used probability sampling with cluster random sampling technique. The step of cluster used two steps. The first step was the selection of sample based on areas in Banjarbaru city; the category of the urban area (North Banjarbaru Sub-district and South Banjarbaru Sub-district) and non-urban area (Liang Anggang Sub-district, Cempaka District, and Ulin Subdistrict). The second step was selection of sample case unit, by screening overweight or obesity students, by enrolling all students and selecting students who meet inclusion and exclusion criteria. This study was conducted at 8 senior high schools in Banjarbaru City; SMA Negeri 1, SMA PGRI 2, SMK Negeri 1 and SMK Borneo Lestari (central area of the city) and SMA Negeri 3, SMA Nurul Ma'ad, SMK Negeri 4 and SMK Bhakti Bangsa Banjarbaru (non-urban area). Data were collected for 6 months. The sample was 270 adolescents of Banjarbaru high school students, total of cases were 135 (overweight and obese adolescents) and 135 adolescents as control (subjects who were not overweight and obese or normal). Analysis of this study used quantitative methods: 1). Descriptive statistics were used to analyze the description of each variable studied by using frequency table and percentage; 2). Inferential analysis was used to analyze the relationship of personality type variable, fatty food consumption and physical activity level to overweight and obesity of urban adolescents using chi-square test with 95% confidence level ( $\alpha = 0.05$ ) and Odds Ratio (OR).

Personality types were measured using the Myers Briggs Type Indicators (MBTI) questionnaire from the Institute for Assessment and Development of Applied Psychology, Faculty of Psychology, Airlangga University to collect data regard personality type among adolescents. The consumption of fatty foods was measured using a questionnaire adapted from the health research questionnaire of health ministry Indonesia in 2013 to collect data on the consumption habits of fatty foods from adolescents<sup>(4)</sup>. The level of physical activity was measured using an open questionnaire about the patterns of physical activity that performed by the respondent every day. To calculate a person's energy needs were conducted by grouping the level of energy expenditure based on the type

of activity, such as educational activities, worship activities, hard activities, sports activities, personal activities in general, recreational activities, transportation, sleeping, etc.<sup>(13)</sup>. While each activity based on type and duration can be converted into energy unit (kkal) according to WHO (14). Overweight and obesity was determined by using an anthropometric scale to obtain body mass index (BMI). To determine height, we used Microtoise with a capacity of 200 cm and a precision of 0.1 cm. To determine weight, we used digital scale, serenity brand with capacity of 200 kg and 0.1 kg accuracy using 4-AA size batteries, before collecting the data, we conducted calibration at Calibration Laboratory, Regional Legal Standard Metrology Center III Banjarbaru, Directorate of Metrology, Directorate General of Consumer Protection and Orderly Commerce Ministry of Trade of the Republic of Indonesia (Calibration Certificate number 212 / PKTN.4.11 / SERT / KAL / 11/2016).

## RESULTS

### Characteristics of Respondents

The results showed that 51.1% or 138 respondents were male, total sample for case was 69 male (overweight / obese) and total sample for control was 69 male (adolescents who were not overweight/obese), while total respondents for female were 48.9% or 132 respondents, total sample for case was 66 female and total sample for control was 66 female. Based on age, 26.7% or 72 respondents were early adolescence category (13-15 years), Total sample for case was 36 and total sample for controls was 36, and these respondents were in grade X senior high school, while 73.3% or 198 respondents were late adolescents (16 -19 years), Total sample for case was 99 and total sample for controls was 99, and these respondents were in grade Xi and XII, senior high school. The results showed most of respondents whose father's occupation as a private employer with total percentage of 57.8% or 156 respondents, and 21.5% or 58 respondents were civil servants. The percentage of cases compared to the controls was no different in terms of the occupation of the father. The results of the study showed the most mother's occupation as a housewife with a percentage of 58.9%. The second largest number of respondents was 59 people (21.9%) as civil servants and 34 respondents were private workers (12.6%). The other occupations were doctor, merchant, Indonesian national army, driver, and etc.

### Descriptive Statistic and Correlations between Variables and Overweight or Obesity among Adolescents.

Table 1 showed that descriptive statistics of variables. Total respondents with overweight were 23.0% and total respondents with obesity were 27.0%. Most of the respondents had extroverted personality types (62.6%). In term of consumption of fatty foods, most of respondents had not frequent category (61.5%). In term of physical activity levels, Most of the respondents were mild category PAL 1.40-1.69 (52.6%).

Table 2 showed the correlations between variables and overweight & obesity. The consumption of fatty foods and activity levels had a significant relationship with the incidence of overweight and obesity. But the personality type had no significant relationship with overweight & obesity.

Table 1. Description of Variables

Variables	Frequency	%
Overweight and obesity		
Normal	135	50.0
Overweight	62	23.0
Obesity	73	27.0
Total	270	100.0
Personality Types		
Extrovert	169	62.6
Introvert	101	37.4
Total	270	100.0
Consumption of fatty foods		
Frequent	104	38.5
Not frequent	166	61.5
Total	270	100.0
Physical activity levels		
Very mild PAL<1.40	70	25.9
Mild PAL 1.40-1.69	142	52.6
Moderate PAL 1.70-1.99	48	17.8
Severe PAL 2.00-2.40	10	3.7
Very severe PAL >2.40	0	0.0
Total	270	100.0

Table 2. Correlation between personality types, consumption of fatty foods, physical activity levels

Personality Types	Overweight and obesity					
	Overweight & obesity		Normal		Total	
	n	%	n	%	n	%
Extrovert	81	60	88	65.2	169	62.6
Introvert	54	40	47	34.8	101	37.4
Total	135	100	135	100	270	100
p value = 0.379; OR= 0.801; CI: 0.489-1.313						
Consumption of fatty foods						
Frequent	66	48.9	38	28.1	104	38.5
Not frequent	69	51.5	97	71.9	166	61.5
Total	135	100	135	100	270	100
p value = 0.001; OR = 2.442; CI: 1.302-3.439						
Physical Activity Levels						
Very mild PAL<1.40	35	25.9	35	25.9	70	25.9
Mild PAL 1.40-1.69	82	60.8	60	44.5	142	52.6
Moderate PAL 1.70-1.99	15	11.1	33	24.4	48	17.8
Severe PAL 2.00-2.40	3	2.2	7	5.2	10	3.7
Very severe PAL >2.40	0	0.0	0	0.0	0	0.0
Total	135	100	135	100	270	100
p value = 0.040; OR = 7.16; CI: 5.20-9.85						

**DISCUSSION**

The result showed that adolescents with overweight were 23.0% and obesity was 27.0%. A person's nutritional status (including adolescents) is actually a function of balance between eating and using nutrients for body functions. If excessive consumption than the need for functional body, it has effect on overweight and obesity. This finding is consistent with previous study from Effendy (2013), it mentioned that individuals with normal nutritional status, there was a balance of energy. Foods that consumption contains polysaccharides (carbohydrates), fats and proteins. It was source of energy or an ATP producer (Adenosine Tri-Phosphate), and be continued with metabolism process. Fat is hydrolyzed (broken down) into fatty acids and glycerol, polysaccharides into hexoses and pentose, proteins into amino acids. These processes provide energy through the Krebs cycle. Then the energy is used by various cellular functional systems<sup>(15)</sup>. According to Bandini (2015), obesity is the impact of energy input (energy intake) was exceeds than energy expenditure by the body. This energy becomes fat. A long-lasting energy imbalance can lead to weight gain<sup>(16)</sup>. Furthermore, Guyton & Hall (2010) also mentioned that the main cause of obesity is the imbalance between energy intake and energy expenditure. Any excess energy of 9.3 calories into the body, about 1 gram of fat will be stored<sup>(17)</sup>.

The results showed that there was no significant relationship between personality type and overweight and obesity among adolescents. The percentage of Extrovert was higher in control group (65.2%) than case group (60.0%). This result was different with previous studies that mentioned extraversion was found in overweight and obese categories<sup>(12),(18)</sup> because the extrovert type is active and loss of appetite. It has effect on the breakdown of body's glycogen into the energy needs. Otherwise, the percentage of introverted was higher in case (40.0%) than control (34.8%). The introvert type has characteristic, such as being careful in making decisions. Type of melancholic (introvert-progressive) character will pay attention to food to caloric value. However, this attitude is vulnerable to make bored will healthy food and they will consume junk food<sup>(18)</sup>. In addition, there are types of introverts that have the basic character phlegmatic (introvert-conservative) that has characteristics like slow metabolism and has favorite foods, such as fried noodles, fries, meatballs, bread, fried rice or instant food. It has effect on overweight and obese.

The results showed that the percentage of frequent categorized in consumption of fatty foods in overweight and obesity was higher (48.9%) than control group (28.1%), otherwise the percentage of not frequent categorized in consumption of fatty foods was higher in the control group (71.9%) than case group (51.1%). The consumption of fatty foods had a significant relationship with overweight and adolescent obesity. The previous study mentioned that fat consumption had a very strong relationship with obesity. Fat and oil produce higher energy than carbohydrates and proteins. Each gram of fat produces 9 kilos of calories while carbohydrates and protein are only 4 kilocalories<sup>(19)</sup>.

One of the causes of obesity is a change in the pattern of life and has a western diet. Patterns of life were suspected as the cause of obesity among adolescents. Western diets mean typically poor in fiber and high in fat,

carbohydrate, and sodium<sup>(20)</sup>. This pattern of life is triggered by food advertisements. It can attract adolescent to buy these kinds of foods and become a habit or lifestyle. Another lifestyle is eat in a restaurant or cafe and consuming many kinds of food with high calories.

The results showed that the percentage of physical activity level with mild category was higher in the case (60.7%) than the control (44.4%), while the percentage of moderate physical activity was higher in the control group (24.4%) than cases (11.1%). The level of physical activity has a significant relationship with the incidence of overweight and obesity among adolescents. The results of this study were consistent with the previous study that adolescents with obesity had lower activities<sup>(21)</sup>. A factor that leads physical activity becomes very mild because students are less in sports or other activities that release energy. Activities include sitting at school, watching television, sitting in front of a computer and a little time for sports activities. It was also similar with the previous study that 50.9% of obese children have a mild level of physical activity, including sitting in all day school, no sports activities during school, watching television, and lack of playing outside<sup>(22)</sup>.

Inactive students more risk to get overweight and obesity than students who active and do physical activity. The energy expenditure for daily physical activity is determined by the type, intensity, and duration of physical activity. No activity causes the calories that were used is smaller than the calories that were consumed<sup>(23)</sup> and it was associated with weight gain<sup>(21)</sup>. Study was conducted by Huriyati (2004) among 280 junior high school students in Yogyakarta and Bantul, the result showed that adolescents with obesity more likely to spend more time in non-physical activities than non-obese adolescents. This is due to technological advances and tends to conduct no activities<sup>(24)</sup>. Strategies for increasing physical activity should increase physical activity. Schools have a unique combination of factors, including facilities, fitness instructors, and consultant, which makes them familiar with the environment to learn about physical activity.

## CONCLUSION

Our findings showed that there was no significant relationship between personality type and overweight and obesity, while the consumption of fatty foods and physical activity levels had a significant relationship with overweight and obesity among adolescents.

Adolescent should aware regard body weight and control using weight scale, and not frequent to consume fatty foods. They also need to increase physical activity such as: sport or doing physical activity. It needs to develop and evaluate adolescent's development. Further study is needed to measure social support from family, parents, and peer groups.

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