

# The Relationship

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# The relationship of Energy and Fat intakes, Physical Activity to Body Mass Index Among Poltekkes Kemenkes Bengkulu Employees

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**Abstract**—Poltekkes Kemenkes Bengkulu employee is one of the jobs at risk for obesity. Besides, the support of economic capacity is also one of the factors of higher intake of food than the calories removed from physical activity. The study aim was to investigate the relationship between intake of energy and fat, physical activity to body mass index among Poltekkes Kemenkes Bengkulu employees. The cross-sectional study design was conducted on 65 employees consists of 22 men and 43 women aged 23-59 years in Poltekkes Kemenkes Bengkulu located in the city of Bengkulu. Energy and fat intakes were assessed using 2 x 24 hours of Food Recall. Body Mass Index (BMI) was calculated by calculating body weight to height (kg/m<sup>2</sup>). Physical activity was measured using the physical activity questionnaire from FAO for one day. Data were analyzed using Pearson correlation to determine the relationship between energy & fat intake, physical activity, and body mass index. 61,5% of the employee was classified as non-obese. The average energy intake, fat intake, and physical activity was 1425.52 Kcal, 48.09 gram, and 1.78 PAR respectively. The result showed p-value for energy, fat and physical activities were 0,366; 0,638; 0,189, respectively, which means there is no relationship between energy intake, fat intake and physical activity to body mass index. There was no correlation between the intake of energy and fat and physical activity to Body Mass Index. This no relationship occurred because intakes and physical activity are assessed now as well, but BMI is the result of years. This is the limitation of this study.

**Keywords**— Energy intake, Fat intake, Physical Activity, BMI and employees

## I. INTRODUCTION

According to Basic Health Research (Riskesdas) in 2013 the prevalence of adult population in Indonesia with overweight was 13.5 percent, and obesity was 15.4 percent [1]. In 2008, approximately 2.8 million adults died of obesity and 300 million people who were clinically classified as obese was the main triggering factors of degenerative diseases such as diabetes, heart disease, and cancer. Obesity is a condition of body fat gain based on their weight indicated using body mass index [2].

The employees of Poltekkes Kemenkes Bengkulu are one of the jobs at risk for obesity. This is because of the employees were working with relatively light physical activity. Besides, their level of economic supported them to buy a high energy intake of food.

Physical activity is a movement made by the body and its supporting muscles. During physical activity, the muscles did additional energy outside normal metabolism to move, while the heart and lungs need extra energy to deliver nutrients and oxygen throughout the body and remove the remains of the body.

Overweight and obesity is a state of excess weight. Overweight is a condition where a person's weight exceeds the average weight. While obesity is a condition where there is an accumulation of excess body fat, so the weight a person is far above average. Buildups of excess fat in obese people are not evenly distributed in parts of the body. Fat deposition occurs in certain parts, usually in the abdomen or thigh [3].

Obesity is a risk of various diseases and disorders of the body. A person suffering from obesity is at high risk of heart disease, high blood pressure and high blood cholesterol [4] while underweight is a risk of infectious diseases, depression, anemia, diarrhea, and fatigue [5].

The energy requirement in adulthood decreases with age, which is caused by decreased basal metabolism and decreased physical activity. Obese people, usually have higher energy intake than the underweight [6].

## II. METHOD

This research is descriptive analytic with the cross-sectional design were data collection taken at the same time. The study was conducted at Poltekkes Kemenkes Bengkulu, in February 2014. Sixty-five employees of Poltekkes Kemenkes Bengkulu participated in this study.

Energy and fat intake were assessed using 2 x 24 hours of Food Recall. Body Mass Index (BMI) was calculated from dividing body weight and height (kg/m<sup>2</sup>). Physical activity was measured using the physical activity questionnaire from FAO. Data were analyzed using the Spearman correlation test to determine the relationship between energy & fat intake, physical activity, and body mass index.

## III. RESULTS

The results of the study were obtained from 65 samples that had Underweight BMI was 3.1%, 32.3% normal, 27.7% overweight, and 37% obese. The average energy intake of respondent was 1425.52 Kcal which was below their recommended level; total fat intake was 48.09 grams was

lower than RDA and the average physical activity was 1.78 which fell into the category of moderate activity.

Physical activity level categories based on PAL values: a) light (sedentary) 1.40-1.69; b) moderate (active or moderately active) 1.70-1.99; c) heavy (vigorous or vigorously active) 2.00-2.40. 27 people (41.5%) had a light physical activity, 23 people (35.4%) had moderate activity, and 15 people (23.1%) had heavy activity level [17].

TABLE 1 DESCRIPTION OF ENERGY & FAT INTAKES, PHYSICAL ACTIVITY, AND BMI

Variable	Min	Max	Mean
Energy intake (Kcal)	41	2779	1425.52
Fat intake (gram)	5	107	48.09
Physical activity level (PAR)	1.4	2.4	1.78
BMI (kg/m <sup>2</sup> )	18.09	35.71	24.57

TABLE 2. STATISTICAL ANALYSIS

Variable		Energy Intake	Fat Intake	Physical activity level
Body Mass Index (BMI)	r	0,114	0,060	0,165
	p	0,366	0,638	0,189
	n	65	65	65

There was no significant correlation between the level of energy intake with Body Mass Index of Poltekkes Kemenkes Bengkulu staff. There was no significant correlation between the level of fat intake with BMI of Poltekkes Kemenkes Bengkulu employees. Spearman correlation was 0.060 showed that the strength of the correlation is very weak with negative direction, where the higher fat intake, the smaller the body mass index of respondents. There was no significant correlation between the level of physical activity with the Body Mass Index on Poltekkes employees Kemenkes Bengkulu.

**IV. DISCUSSION**

**A. Energy intake with Body Mass Index**

There was no significant correlation between the level of energy intake with BMI. This is in line with the result of research conducted in Sukoharjo, Surakarta, Middle Java about "Relationship of Energy Intake and Physical Activity with Index Body Mass in Young Women in Madrasah Aliyah Al Mukmin" that showed no relationship between energy intake with body mass index of adolescents in Madrasah Aliyah Al Mukmin [13].

This is due to several other factors that can affect a person's body mass index, such as genetic factors, economic, social status, physical activity, environment, and eating habits. The energy intake of a person can also be affected by several factors such as age, weight, diet and socioeconomic status [7].

The energy requirement of a person depends on age, sex, weight and body shape [8]. Energy is needed by humans to sustain life, support growth and perform physical activity. Energy intake can be obtained from foods containing carbohydrates, protein, and fat [6].

The results of this study are also in line with research conducted in east Jakarta of 113 high school student that showed there is no relationship between energy intake with

the incidence of excess body weight evidenced by the value of  $p = 0.748$  [14].

Excess energy intake will lead to weight gain and need to be monitored by measuring the BMI to determine suitability with height. Being overweight increases the risk of degenerative diseases such as coronary heart disease, hypertension, diabetes, and gallstones. Efforts to lose weight to normal limits can reduce the risk [4].

According to the Ministry of Health (1997), many factors that affect the adequacy of nutrients such as gender, weight, height, daily activities, and certain circumstances.

Various theories have explained that the mechanism of energy intake is closely related to nutritional status based on BMI. Excess energy from food sources of energy sources will be stored as body fat [6] changes in body fat due to excessive intake of this energy can lead to excess body weight that will affect the BMI of a person.

**B. Fat intake with Body Mass Index**

There is no correlation between fat intake with BMI. The mechanisms associated with fat intake with nutritional status have been described in various theories. A detailed explanation stated that fat consumption leads to an increase in energy intake that can affect nutritional status based on BMI [9]. This is because fat contains twice as much energy than carbohydrates and proteins. Besides, high-fat foods have a more delicious taste than low-fat foods that trigger a person tends to overeat [10].

A study in Australia of 1585 children and adolescent regarding the relationship of energy and fat intake with overweight youth showed no differences in energy and fat intake in obese and non-obese teenagers [16].

Another reason is the high-fat energy content but has little effect on gastrointestinal volume and bloating. The statement also supports that a person can consume large amounts of fatty foods.

**C. Physical Activity with Body Mass Index**

Physical activity is the movement of the body produced by skeletal muscles that release energy. Adequate physical activity in adults can lower the risk of hypertension, coronary heart disease, stroke, diabetes, and cancer. Various studies concluded a significant association between physical activity and the incidence of obesity, the lower the risk of obesity with high physical activity [11].

This study results in line with the result of research conducted in Semarang City with a sample of 79 high school student about the relationship between consumption and physical activity with BMI. Test results of the relationship between physical activity with BMI obtaining p value 0.481, it was concluded that there was no relationship between physical activity and student BMI [15].

In this study, it is known that female workers have higher activity than male workers. Substantial activity was carried out by workers with overweight and obese (53.3%) more than workers with normal and underweight (46.7%). Research in Finland shows that obesity participants have less physical activity than average weight and overweight participants, especially women. Physical activity decreased with age and increased BMI for both sexes, but showed a deeper decline among women [12].

#### V. CONCLUSION

Average energy intake of Poltekkes Kemenkes Bengkulu employee was less than recommended energy intake, total fat intake is less than recommended fat intake, and average physical activity was moderate. More than half of employees were classified as overweight and obese, and a small percentage of employees had underweight BMI. Almost half of the employee of Poltekkes Kemenkes Bengkulu had sedentary activity. There was no correlation between energy intakes ( $p=0.366$ ,  $r=0.114$ ), fat intakes ( $p=0.638$ ,  $r=0.060$ ), and physical activity ( $p=0.189$ ,  $r=0.165$ ) with BMI among employees of Poltekkes Kemenkes Bengkulu.

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