



EFFECT OF THE BODY MASS INDEX TO BODY FAT

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Abstract

Many sports nutritionist noted that the loss of weight, or more accurately, to lose body fat, is the main reason athletes asking for nutritional counseling. This study aims to determine the effect of BMI on body fat. The place of research was conducted at the martial arts athlete of the Indonesian National Sports Committee (KONI), Karawang Regency. This research method uses causal studies and path analysis testing. This study uses 14 respondents as research samples drawn based on purposive sampling with the criteria of athletes who are actively training for more than 2 years and have excess weight. The research instrument used to collect BMI data with tanita and microtoise scales to measure BMI and BIA to determine body fat. The findings of this study are the coefficient value of the BMI pathway to body fat of -0.368 with a value of -4.127. Therefore the value of t -test is smaller than the value of the table at $dk = 9$ for $\alpha = 0.05$ of -2.26 and the probability value of Sig. (0.003) < significant level (0.05), then H_0 is rejected and H_1 is accepted, which means there is a significant negative direct effect of BMI on body fat. In conclusion, there is a direct negative and significant effect of BMI on body fat, meaning that the better the BMI, the athlete does not guarantee good body fat.

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INTRODUCTION

For a long time, there have been many health problems, both nationally and globally, one of which is caused by lifestyle. Most lifestyle diseases are related to non-infectious diseases such as being overweight or obese marked by a distended stomach. Distended stomach means the presence of body fat or a percentage of excess body fat.

The average incidence of obesity is caused by excess nutrients. In addition, obesity, especially abdominal obesity, is associated with an increase in all causes, cardiovascular, or cancer deaths. In addition to various psychology-related outcomes of obesity, obesity is associated with an increased risk for a number of mental disorders namely, depression, bipolar disorder, panic disorder, anxiety, or many others which have a large impact on public health for example, dealing with large bodies and being overweight makes it easy and increased mortality, disability and reduced quality of life.

The phenomenon of obesity or excess body fat and weight control techniques in preventing attempts of disturbances still requires the best effort results as a success factor or determinant of lifestyle intervention.

What effort needs to be obtained? (Sharkey, 2012) explains "Are there things like ideal body weight? One must first try to reduce body fat to a minimum: the minimum amount of fat consistent with good health and nutrition may be around 5% for youth and 11% for young women. Wrestlers often have as little as 5%, and while a female runner has a low of 7% (male marathon runners often measured below 5%). This does not suggest that all men and women should try to reach this level. I offer them just to show the level *body fat* minimum% as possible according to health and performance".

According to experts, many people have good taste and can eat anything and at any time. Often their digestive organs are more effective for ordinary people, so even a little food is enough to meet the needs of the body. Overweight is caused by eating too much. Because excess food causes a buildup of body fat leading to obesity.

1. Body Fat

Body fat is kind of fat in the human body. Human body fat consists of two main parts namely fat free tissue (lean tissue) and fat tissue (adiposity). The body fat concept is the amount of body fat as a proportion of your body weight from certain conditions such as high blood pressure, heart disease, diabetes and cancer.

According to (Lanham-New et al., 2016) "Obesity is defined as excess body fat. People of different sizes, have different amounts of body fat, identification of obesity can't be done based on the amount of absolute fat. For example, the first person with body fat of 20 kg and body weight of 60 kg has a body fat percentage of 33%:

$$20/60 \times 100 = 33\%$$

The second person who has 24% kg of fat, but whose body weight is 80 kg has 30% body fat.

$$24/80 \times 100 = 30\%$$

The first person has less total fat, but a greater percentage of body fat than the second person.

2. BMI

Table 1. ACSM recommended levels of percent body fat

Jenis kelamin	Usia (Tahun)					
	Essential	Minimal	Athletic	≤34 tahun	35-55 tahun	≥56 tahun
Pria	3-5	5	5-13	8-22	10-25	10-25
Wanita	8-12	8-12	12-22	20-35	23-38	25-38

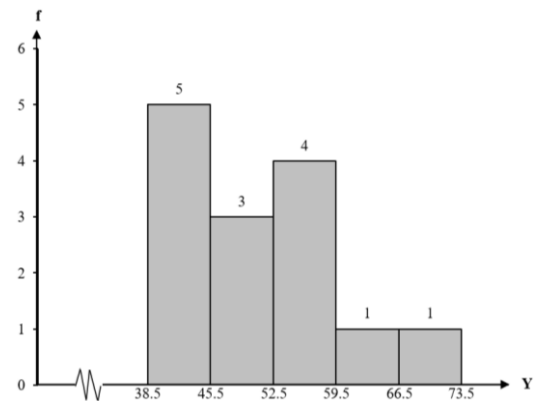
Body mass index (BMI) was first discovered around the late 19th century by an anthropologist from Belgium named Adolphe Quetelet. In general, the purpose of BMI is to determine the weight condition, one of which is obesity. According to (Shearer et al., 2020: 4) "Obesity is usually determined by body mass index (BMI). This measure is used to measure obesity in the general population, but does not provide information about body composition (muscle versus adipose) or distribution of adipose deposits in individuals. " Also according to (Badriah, 2014) "there is a simple way to check whether the diet is good enough or not, by using the body mass index (BMI) method. BMI is a simple tool or way to monitor the nutritional status of adults, especially those related to underweight and overweight. Underweight can increase the risk of infectious diseases, whereas more weight will increase the risk of generative diseases. Therefore, maintaining a normal body weight allows a person to reach a longer life expectancy ". This is confirmed by the research conducted (Barte, Veldwijk, Teixeira, Sacks, & Bemelmans, 2014: 792). "Research title: Differences in body weight in different classes of BMI: Meta-analysis of the effects of interventions with diet and exercise, concluded: average weight change during lifestyle interventions differed only to a small extent between people with BMI 25-40. This means that interventions are equally suitable for these IMT classes."

This perceived trap of BMI has led to the development of various methods for measuring adiposity.

METHODS

This research method is causal study and path analysis. Causal studies explain the effect of changing value variations in a variable on changes in value variation. In

causal research, the independent variable as a cause and the dependent variable as an effect variable.



Picture 1. Histogram of Body Fat

Then the variables in the path analysis consist of exogenous (as a cause) and endogenous (as a result) variables. This is based on the study of the objectives to be achieved in this study. The place of research was carried out in the athletes environment of the Indonesian National Sports Committee (KONI), Karawang Regency.

The samples in this study were 14 people, taken using purposive sampling techniques, with the criteria, namely athletes who actively practice for 2 years and over and have excess weight .

RESULT

1. Based on the study results of body fat variables, the mean = 50.00; standard deviation = 9.92; variance = 98,3077; median = 47.5; and mode = 39. Grouping body fat data can be seen in the frequency distribution table as follows.

Table 2. Distribution Frequency of Body Fat Scores

No	Kelas Interval	Batas		Frekuensi		
		Bawah	Atas	Absolut	Relatif	Kumulatif
1	39 - 45	38,5	45,5	5	35,71%	35,71%
2	46 - 52	45,5	52,5	3	21,43%	57,14%
3	53 - 59	52,5	59,5	4	28,57%	85,71%
4	60 - 66	59,5	66,5	1	7,14%	92,86%
5	67 - 73	66,5	73,5	1	7,14%	100%
				14	100%	

Based on table 3 above, the histogram will then be made. There are two axes needed in making the histogram, namely the vertical axis as the absolute frequency axis, and the horizontal axis as the body fat score axis. In this case on the horizontal axis written limits of the interval class ranging from 38.5 to 73.5. These prices are obtained by subtracting the number 0.5 from the smallest data and adding the number 0.5 for each class boundary at the highest limit. Histogram graph of the distribution of body fat data as in the following figure.

- Based on the results of the study of body mass index variables (BMI), the mean = 50.07; standard deviation = 10.01; variance of 100,2253; median = 48.0; and mode = 48. Grouping of IMT data can be seen in the frequency distribution table as follows.

Table 3. BMI Score Frequency Distribution

No	Kelas Interval	Batas		Frekuensi		
		Bawah	Atas	Absolut	Relatif	Kumulatif
1	39 - 45	38,5	45,5	5	35,71%	35,71%
2	46 - 52	45,5	52,5	5	35,71%	71,43%
3	53 - 59	52,5	59,5	2	14,29%	85,71%
4	60 - 66	59,5	66,5	1	7,14%	92,86%
5	67 - 73	66,5	73,5	1	7,14%	100%
				14	100%	

Table 4. ANAVA for Test of Significance and Linearity of Regression Equations $\hat{Y} = 90,544 - 0,810X_1$

Sumber Varians	dk	JK	RJK	F _{hitung}	F _{tabel} $\alpha = 0,05$
Total	14	36278			
Koefisien (a)	1	35000,00			
Regresi (b/a)	1	854,25	854,25	24,191 **	4,75
Residu	12	423,75	35,31		
Tuna Cocok	9	366,58	40,73	2,137 ^{ns}	8,81
Galat	3	57,17	19,06		

Based on table 4 above, the histogram will then be made. There are two axes needed in making a histogram namely the vertical axis as the absolute frequency

axis, and the horizontal axis as the IMT score axis. In this case on the horizontal axis written limits of the interval class ranging from 38.5 to 73.5. These prices are obtained by subtracting the number 0.5 from the smallest data and adding the number 0.5 for each class boundary at the highest limit. The histogram graph of the distribution of the IMT data is shown in Figure 2 below

Significance Test and Body Fat Linearity Regression for BMI

From the calculation results for compiling a regression equation model between body fat and BMI obtained a regression constant a = 90.544 and a regression coefficient b = -0.810. Thus the relationship model of simple regression equation is $Y = 90.544 - 0,810X_1$. Before the regression equation model is further analyzed and used in drawing conclusions, first the significance and linearity of the regression equation is tested. The results of the calculations of significance and linearity are arranged in the following ANAVA table. Regression equation $y = 90.544 - 0,810X_1$, for the significance test, the F_{count} of 24.191 is greater than the F_{table} (0.05; 1; 12) 4.26 at $\alpha = 0.05$. Because F_{arithmetic} > F_{table} then the regression equation is declared significant. For the linearity test, the F_{count} is 2.137,

smaller than the $F_{table (0.05; 9; 3)}$ at 8.81 at $\alpha = 0.05$. Because $F_{arithmetic} < F_{table}$, the distribution of points estimated to form a linear line is acceptable.

Based on this study explanation results to answer the hypothesis of a direct negative effect of BMI on body fat, the hypotheses tested were:

$H_0: \beta_{y1} \geq 0$

$H_1: \beta_{y1} < 0$

Then the BMI value pathway coefficient for body fat = -0,368 with the value of $-t_{count} = -4,127$. Because the t_{count} value is smaller than the t_{table} value at $dk = 9$ for $\alpha = 0.05 = -2.26$ and the probability value Sig. (0.003) < significance level (0.05), then H_0 is rejected and H_1 accepted, which means there is a negative direct influence IMT variable to variable significant body fat.

DISCUSSION

Analysis results of hypotheses produce findings that BMI has a direct negative effect on body fat. Based on these findings it can be concluded that body fat is directly affected negatively by BMI. Increased BMI will result in a decrease in body fat statistical results. This study are in line with some opinions that BMI is basically to find out and determine your weight thin, ideal, overweight or obese. The achievement of body fat that is marked by a distended stomach or obesity in BMI is very large negative influence. This can be seen from the fact that can be used as an argument: The fact according to (Kerri Winter Stone, 2013: 25), "Body composition is the total fat and muscle mass in the body and is usually said to be the percentage of total body mass, that is fat or percentage of body fat. If an athlete is considered "thin" the athlete generally has a lot of muscle or less fat". Then according to (Shigeo Haruyama, 2015: 85) "people who have a little muscle tissue. Maybe, they have high body fat, although not too fat. Though people like this

tend not to think about body shape. Blockage of blood vessels does not depend on appearance. "

Also according to (Phaidon L. Toruan, 2015: 28) "For example there are two people, Rina and Rini. They both weigh 50 kg with a height of 160 cm. both are measured using the same tool, for example using a body fat monitor. The result, the percentage of fat is different. At a 20 percent fat percentage, Rina's body fat means only 10 kg, while Rini with a 30 percent fat percentage means 15 percent body fat. That way the appearance of the two is also much different, Rina looks dense and slim which occurs due to "fat" muscle mass, while Rini looks fat because it has a lot of fat mass. "

When they were children, they did not believe that thin was good, fat was bad and tended not to look for solutions. So that when they grow up they don't care about health like being overweight. Although they know that there are many advantages to reducing body fat or ideal body. (Tumminello, 2014: 1-3) "the benefits of losing body fat such as better sports performance, improved strength, better cardio conditioning, increased energy, healthier joints, healthier weight, less stress, less anxiety and depression, and better sleep".

Limitations Of The Research

This study only explains the effect of BMI on body fat in KONI athletes in Karawang District, so it is still necessary to conduct research with a wider number of samples, to be generalized in general.

In this study the data obtained only through BMI with *tanita* scales and microtoise to measure BMI and *Bioelectrical impedance analysis* (BIA) to determine body fat given by selected respondents who meet the requirements of 2 variables.

The research instrument that was distributed to respondents to respondents was only conducted once, based on valid and reliable statistical calculations, therefore the weaknesses of the instruments used still remained.

The limitations of this study will provide opportunities for advanced researchers who will continue and test other factors related to body fat.

CONCLUSION

1. Conclusion

Based on the data, the results of the analysis and the discussion, it can be concluded that there is a direct negative and significant effect of BMI on body fat, meaning that the better the BMI does not guarantee the athlete's body fat either.

2. Suggestion

a. From this study results it is known that BMI provides a negative and significant effect on body fat, so athletes also need to pay attention to body growth and development so that the problem of increasing body fat does not come later.

b. For the public, the author suggests, body is a favor to be thankful for, we need to lose weight or lose body fat as well as possible in order to stay healthy. In this study, researchers want to motivate to be grateful for your current health. Gratitude also helps in treating various diseases such as prolonged stress. Because gratitude is not necessary to have luxury items or whatever, but to be thankful that when you wake up there is no medical equipment or aids attached to your body, which means be grateful when you wake up you still feel healthy.

c. Other researchers to improve the quality of body fat reduction. Then the trainers, doctors and other coaches need to develop various forms of BMI in terms of

basal metabolic rate (BMR) which increases the result of decreasing body fat.

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