Body Fat Percentage Factors in Public Health Student Universitas Negeri Gorontalo

by Sunarto Kadir

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Abstract

Body fat percentage is one of the body compositions, which is the total body fat of a person's body weight. According to Gorontalo Provincial Health Office data, Gorontalo City had the highest rate of obesity in the province in 2013, with a rate of 24.2%. The problem of the study is what factors are related to the body fat percentage in Universitas Negeri Gorontalo students. The research objective was to identify the correlation between BMI, age, gender, nutritional intake, and body fat percentage at the research site. This study relied on an analytical observational research design Cross-Sectional, which involved 160 Public Health students of Universitas Negeri Gorontalo batch 2020. Meanwhile, the total samples of as many as 113 respondents using purposive sampling and data analysis employed Spearman Rank. The result revealed that there were two variables related to percent body fat with each value, including BMI ($r = 0.90$, $p = 0.000$ and nutritional intake ($r = 0.52$, $p = 0.00$) while the two variables unrelated to body fat percentage were age ($r=-0.123$, $p=0.194$) and gender ($r=-0.079$, $p= 0.408$). In conclusion, there is a correlation between BMI and Nutrient Intake with Body Fat Percentage, and vice versa between age and sex in Public Health students at Universitas Negeri Gorontalo. Further, it is advised that students control their weight, food intake, and the impact of being overweight on their disease risk.

Keywords: BMI, Age, Gender, Nutritional Intake, Fat Percentage.

1. INTRODUCTION

Adolescence is the period of peak growth in which the changes can be indicated by a person's physical, cognitive, and psychosocial or behavioral growth. Nutritional issues and physical activity are the common cause of adolescents' problems. Thus, nutrient balance is required in order to achieve optimal health. The government is concerned about nutrition since it is an essential health sector component. Good nutrition is the foundation for public health. Nutrition plays an important role in growth, development, intellectual and productivity. Furthermore, nutritional disorders lead to unoptimal growth. (Andaruni et al., 2019).

The most crucial time for physical development is adolescence when as much as 25% of body height is obtained. Food intake's quality and quantity are the primary factors of adolescent nutritional problems (Fatmah, 2010).

Adolescence growth is also accompanied by hormonal, cognitive, and emotional changes. Additionally, adolescence is a period of nutritional vulnerability for various reasons. First, adolescents require higher nutrients due to increased physical growth and development. Second, eating and eating habits affect both their intake and nutritional needs. Third, adolescents who participate in sports, suffer from chronic illnesses, are pregnant, do extreme diets, are alcoholics, or are drug addicts have particular nutritional needs (Almatsier et al., 2011).

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BMI is one of the relative indicators of a person's body fat used to determine a person's weight and measure a person's weight status against the risk of health issues (Vistabunda,2013).

Supariasa (2012) defined BMI as a simple tool to monitor nutritional status related to being underweight and overweight. Moreover, adult overweight and malnutrition are significant issues. In addition to having risk factors for certain diseases, it can also affect work productivity. There are several ways to lose weight, including; diet, a healthy lifestyle, and exercise. Body fat percentage measurement is one of the tools to assess nutritional status. A higher-than-average body fat percentage indicates a person possesses excessive body fat (Amelia, 2010). Overweight is a worldwide issue, a pre-obesity in which weight is either from excess fat or non-fat with a body mass index of 25.0-27.0.

According to WHO data in 2016, more than 1.9 billion adults aged >18 years were overweight, and 600 million were obese (39%). The total population is male 38%, and female 40%. Based on data Global Nutrition Report, as much as 10% of the adult population in Indonesia is overweight, and as much as 2% is obese (WHO, 2016). Data from the Ministry of Health, Basic Health Research (Riskesdas) in 2018 shows that the prevalence of the adult population over 18 years in Indonesia who was overweight was 13.6%, and 21.8% were obese (Ministry of Health, 2018). Further, based on Riskesdas of the Indonesian Ministry of Health in 2018 regarding overweight, there was a significant rise in the number of proportions in 2007 (8.6%), 2013 (11.5%), and 2018 (13.6%).

Gorontalo Province is ranked second in Indonesia, with obesity prevalence above the national prevalence of 21%. Meanwhile, the national prevalence is 15.4%. The highest obesity prevalence is in Gorontalo City at 24.2%, and the lowest is in Boalemo District at 13.6% (Ministry of Health, 2013). Moreover, a physical examination is required to determine the risk of non-communicable illnesses, given the high prevalence of obesity. In addition, being overweight as pre-obes is frequently not considered an issue, which leads people to ignore their body fat. In order to achieve optimal growth and development, a balanced intake of nutrients is needed. The imbalance of needs will cause nutritional issues. According to Basic Health Research in 2013, the prevalence of underweight adolescents (16-18 years) was relatively the same in 2007 and 2013, and the prevalence of very underweight increased by 0.4%. Conversely, the prevalence of obesity increased from 1.4% (2007) to 7.3% (2013). The population's prevalence aged > 18 years was 8.7% underweight, 13.5% overweight and 15.4% obese.

Based on initial data in the form of BMI measurements conducted on 20 students of the Public Health Department, there was 1 student in the obese category, 4 in the overweight category, 7 in the underweight category, and 8 in the normal category. Meanwhile, the said samples in

terms of nutrient intake based on interviews, t were 100% diverse and balanced, which consumed food from carbohydrates and fats. Thus, the researcher seeks "Body fat Percentage Factors in Public Health Students, Universitas Negeri Gorontalo."

2. RESEARCH METHOD

The research was conducted in Universitas Negeri Gorontalo, Department of Public Health, from November 16 to December 16, 2021.The research design used is Cross Sectional. The research variables employed are independent variables, including Body Mass Index, Age, Gender, and Nutrient Intake, meanwhile, the dependent variable is body fat percentage.

The research population involved 160 students of Universitas Negeri Gorontalo in the Department of Public Health batch 2020, as well as 113 respondents as the samples using purposive sampling.

Primary data is obtained by the subject's data collection (interviews, questionnaires, observations) on the object (Ariani, 2014). In addition, the primary data applied is the interview method using a questionnaire and observation sheets.

Secondary data is data obtained from the data collector or processed primary data The data analysis technique used was Univariate, Bivariate, and Rank-Spearman Tests.

3. DISCUSSION

3.1 Research Findings

3.1.1 Location Overview

137 students in the academic year 2017-2011, 142 students in the academic year 2011/2012, 98 students in the academic year 2012/2013, and 111 students in the academic year 2013/2014 were registered. 60% of students come from Gorontalo province and 40% from other Sulawesi provinces. Public Health Laboratories, Computer Laboratories, Faculty, and Department Libraries provide a collection of books on the field of public health.

3.1.2 Sample Characteristics

1. Respondent's Distribution by age (Year)

Table 1 Frequency Distribution of Respondents by Age (Year)

Age (Year)	Amount	
	n	%
19	95	84.1
20	17	15.0
22	1	0.9

	Amount	
Total	113	100.0

Source: Primary Data, 2021

Table 1 demonstrates that most respondents were at the age of 19 years, as many as 95 people or 84.1%, and the lowest was in the 22 year age group, namely 1 person or 0.9%.

2. Respondents Distribution by gender

Table 2 Distribution of Respondents' Frequency by Gender

Gender	Amount	
	n	%
Male	15	13.3
Female	98	86.7
Total	113	100.0

Source: Primary Data, 2021

Table 2 reveals that of 113 respondents, the most respondents based on gender were female, 98 respondents or (86.7%) while male respondents were 15 respondents (13.3%).

3.1.3 Univariate Analysis

1. Frequency Distribution of Respondents Based on Body Mass Index

Table 3 Frequency Distribution of Respondents Based on Body Mass Index

Body Mass Index (BMI)	Amount	
	n	%
Normal (18.5-25.0)	50	44.2
Overweight (25.1-27.0)	49	43.4
Obesity (>27.0)	14	12.4
Total	113	100,0

Sources: Primary Data, 2021

Table 3 shows that based on the BMI of 113 respondents, it was discovered that 50 respondents (44.2%) had normal BMI, while 49 respondents (43.4%) had overweight BMI, and 14 respondents (12.4%) had obese BMI.

2. Frequency Distribution of Respondents Based on Nutrient Intake

Table 4 Distribution of Respondents' Frequency Based on Nutrient Intake

Nutritional Intake	Amount	
	n	%
Poor: <80%	2	1.8
Good: 80-110%	29	25.7
Over: >110%	82	72.6
Total	113	100.0

Source: Primary Data, 2021

Table 4 indicates that among 113 respondents, 2 (1.8%) had a poor nutrient intake, while 29 respondents (25.7%) had a good nutrient intake, and 82 respondents (72.6%) had excessive nutrient intake. Further, the respondents were dominated by the overweight category, namely 88 respondents (61.6%) and vice versa, with 56 respondents (38.9%)

3. Frequency Distribution of Respondent Based on Body Fat Percentage

Table 5 Frequency Distribution of Respondents Based on Body Fat Percentage

Body Fat Percentage	Amount	
	n	%
Healthy	42	37.2
Overfat	58	51.3
Obesity	13	11.5
Total	113	100.0

Sources: Primary Data, 2021

Table 5 shows that among 113 respondents, there were 42 respondents (37.2%) with healthy body fat percentage, followed by 58 respondents (51.3%) with overfat body fat percentage, and 13 respondents (11.5%) with obesity.

3.1.4 Bivariate Analysis

1. Body Mass Index by Body Fat Percentage

Based on the analysis of the samples, the obtained test result is shown in table 6.

Table 6 Analysis of Body Mass Index with Body Fat Percentage on Public Health Department Students, Universitas Negeri Gorontalo.

| BMI | Body Fat Percentage | | | | | | Amount | | r value | p-value |
| | Healthy | | Overfat | | Obesity | | | | | |
	n	%	n	%	n	%	n	%		
Normal	42	84.0	8	16.0	0	0	50	100.0	0.902	0.00
Overweight	0	0.0	49	100.0	0	0.0	49	100.0		
Obesity	0	0.0	1	7.1	13	92.9	14	100.0		
Total	42	37.2	58	51.3	13	11.5	113	100.0		

Source: Primary Data, 2021

Table 6 demonstrates that of the 50 respondents with a normal BMI, there were 42 respondents (84.0%) included in the Healthy category. In comparison, out of 49 respondents with overweight BMI, there were 49 people (100%) in the overfat category. Further, out of 14 respondents with obese BMI, 13 people (92.9%) were in the obesity category. For the values of p 0.05 and r = 0.90, respectively. Therefore, it can be concluded that Body Mass Index is related to Percent Body Fat.

2. Age with Body Fat Percentage

Based on the analysis of the samples, the obtained test result is shown in table 7.

Table 7 Analysis of Age with Body fat Percentage on Public Health Department Students, Universitas Negeri Gorontalo.

| Age | Body Fat Percentage | | | | | | Amount | | r value | p-value |
| | Healthy | | Overfat | | Obesity | | | | | |
	n	%	n	%	n	%	n	%		
19	33	34.7	50	52.6	12	12.6	95	100.0	-0.123	0.194
20	9	52.9	7	41.2	1	5.9	17	100.0		
22	0	0.0	1	100.0	0	0.0	1	100.0		
Total	42	37.2	58	51.3	13	11.5	113	100.0		

Source: Primary Data, 2021.

Table 7 shows that of the 95 respondents aged 19 years with healthy category of body fat percentage were 33 students (34.7%), while overfat category as many as 50 students (52.6%), and obesity as many as 12 people (12, 6%). Followed by 17 respondents aged 20 years with healthy category of body fat percentage were 9 students (52.9%), meanwhile overfat was 7 students (41.2%), as well as obesity was 1 student (5.9%). Next, based on 1 respondent aged 22 years with healthy category of body fat percentage was 0 student (0%), overfat as many as 1 student (100%) and obesity as many as 0 students (0%). For the r value = -0.123 and the value of p> 0.05. Hence, age is not correlated with Body Fat Percentage.

3. Gender with Body Fat Percentage

Based on the analysis of the samples, the obtained test result is shown in table 7.

Table 8 Analysis of Gender with Body Fat Percentage on Public Health Department Students, Universitas Negeri Gorontalo.

| Gender | Body Fat Percentage | | | | | | Amount | | r value | p-value |
| | Healthy | | Overfat | | Obesity | | | | | |
	n	%	n	%	n	%	n	%		
Man	4	26.7	9	60.0	2	13.3	15	100.0	-0.079	0.408
Woman	38	38.8	49	50.0	11	11.2	98	100.0		
Total	42	37.2	58	51.3	13	11.5	113	100.0		

Source: Primary Data, 2021.

Table 8 reveals that of the 15 male respondents with body fat percentage in the healthy category were as many as 4 people (26.7%), overfat as many as 9 people (60.0%), and obesity as many as 2 people (13.3%). Meanwhile, out of 98 female respondents, the body fat percentage in the healthy category was 38 students (38.8%), overfat as many as 49 students (50.0%), and obesity as many as 11 students (11.2%). For the r value = -0.079 and the value of p> 0.05. In conclusion, gender is not correlated with Body Fat Percentage.

4. Nutrient Intake by Body Fat Percentage

Based on the analysis of the samples, the obtained test result is shown in table 8.

Table 9 Analysis of Nutrient Intake with Body Fat Percentage on Public Health Department Students, Universitas Negeri Gorontalo

Nutrient Intake	Body Fat Percentage						Total		r value	p-value
	Healthy		Overfat		Obesity					
	n	%	n	%	n	%	n	%		
Poor	2	100.0	0	0.0	0	0.0	2	100.0	0.52	0.00
Normal	21	72.4	8	27.6	0	0.0	29	100.0		
More	19	23.2	50	61.0	13	15.9	82	100.0		
Amount	**42**	**37.2**	**58**	**51.3**	**13**	**11.5**	**113**	**100.0**		

Source: Primary Data, 2021.

Table 9 indicates that of the 2 respondents who were deficient in nutrient intake, 2 students (100%) had normal body fat percentage category, while of the 29 respondents with normal nutritional intake, there were 21 students (72.4%) including in the normal category. Next, out of 82 respondents with excess nutritional intake, 50 students (61.0%) were included in the overfat category. For the r value = 0.52 and the value of p < 0.05. Henceforth, Nutrient Intake is related to the Percent Body Percentage.

3.2 Discussion

1. The Correlation between BMI and Body Fat Percentage

The findings revealed that of the 50 respondents with a normal BMI, the most respondents with a healthy category of body fat percentage were 42 respondents (84.0%), while of 49 respondents with overweight BMI, there were 49 respondents (100.0%), include in the overfat category. Further, out of 14 respondents with obese BMI, there were 13 respondents (92.9%) in the obesity category. The data analysis result obtained r value = 0.90, meaning that it has a very strong correlation and p-value = 0.00, which the p-value = < α (0.05). Thus, there is a correlation between BMI and body fat percentage. Based on the results of 50 respondents with normal BMI, 42 respondents had a healthy body fat percentage resulting from a healthy lifestyle and a regular diet. While 49 respondents with overweight BMI, 49 were in the overfat category, which was caused by bad lifestyle and bad eating habits. Based on the Pearson correlation test, it was found that there was a correlation between BMI and fat percentage (p = 0.000). This is in line with research results by Siti Nur Fatimah, Ieva B Akbar, Ambrosius Purba, Vita Murniati Tarawan, Gaga Irawan Nugraha, Putri Tessa Radhiyanti, and Titing Nurhaya that the coefficient is positive, it means that there is a positive relationship between the BMI value and the fat mass percentage, the higher the BMI will increase the fat mass percentage. Therefore, there is an equivalence in the increase in BMI with the examination of fat mass based on subcutaneous fat thickness. Thus BMI is relevant to be used to predict body fat mass (Fatimah et al. 2017).

Overweight has a strong correlation with a high percentage of body fat. When a person enters adolescence, their body composition changes. Young women store more fat, which causes their percentage of body fat to be higher than that of teenage boys, whereas teenage boys undergo an increase in muscle mass and body tissue. Early adolescence typically has a body fat proportion of 15–20% of body weight (Sholichah et al., 2021).

A higher BMI will increase the fat mass percentage. Therefore, there is an equivalence between the increase in BMI and the body fat mass measurement based on subcutaneous fat thickness, which BMI is relevant to be used to predict body fat mass (Fatimah et al. 2017).

2. The Correlation between Age and Body fat Percentage

The result discovered that of the 95 respondents aged 19 years with healthy category of body fat percentage were 33 students (34.7%), while overfat category as many as 50 students (52.6%), and obesity as many as 12 people (12, 6%). Followed by 17 respondents aged 20 years with healthy category of body fat percentage were 9 students (52.9%), meanwhile, overfat was 7 students (41.2%), as well as obesity, was 1 student (5.9%). Next, based on 1 respondent aged 22 years with healthy category of body fat percentage was 0 student (0%), overfat as many as 1 student (100%) and obesity as many as 0 students (0%).

The results showed that of the 95 respondents who were at the age of 19 years with the percent body fat in the healthy category, namely 33 people (34.7%), overfat as many as 50 people (52.6%) and obesity as many as 12 people (12, 6%), of 17 respondents who are at the age of 20 years with body fat percent in the healthy category, namely 9 people (52.9%), 7 people overfat (41.2%) and obesity as much as 1 person (5, 9%), while 1 respondent who is at the age of 22 years with a percent body fat is in the healthy category, namely 0 people (0%), overfat as much as 1 person (100%) and obesity as much as 0 people (0%). The data analysis result using the Rank-Spearman test obtained r value = 0.123 and p-value > 0.05. Therefore, there is no correlation between age and body fat percentage. Body composition development has begun rapidly since childhood, including body fat, an indicator of health. Sufficient body fat is necessary for girls to develop the reproductive system, including preparation for menarche.

In general, body fat will increase at the age of more than 20 to 40 years, or from early adulthood to middle age in men and old age in women. The increase in body fat in question is

related to physical activity, which decreases with age.

3.   Correlation between Gender and Body Fat Percentage

The result found that of the 15 male respondents with body fat percentage in the healthy category were as many as 4 people (26.7%), overfat as many as 9 people (60.0%), and obesity as many as 2 people (13, 3%). Meanwhile, out of 98 female respondents, the body fat percentage in the healthy category was 38 students (38.8%), overfat as many as 49 students (50.0%), and obesity as many as 11 students (11.2%). The data analysis result using the Rank-Spearman test obtained r value = -0.079 and p-value > 0.05. Hence, there is no correlation between gender and body fat percentage.

The Centers for Disease Control and Prevention claim that women in Asia are more likely to be overweight or obese than men in Asia. Male body composition is composed mostly of muscle mass compared to fat mass. The normal ratio between body fat and body weight is around 16-28% in women and 12-23% in men (Hasdianah et al., 2014).

The American College of Sports Medicine states that women's typical body fat levels should range from 20 to 32 percent. As for men, it accounts for 10 to 22% of their physical state. Women with a body fat percentage above 32% and men with a body fat percentage over 26% are considered obese because they have excessive levels of body fat.

The American College of Sports Medicine states that women's typical body fat levels should range from 20 to 32 percent. As for men, it accounts for 10 to 22% of their physical state. Women with a body fat percentage above 32% and men with a body fat percentage over 26% are considered obese because they have excessive levels of body fat.

4.   The Correlation between Nutrient Intake and Body Fat Percentage

The result revealed that 2 respondents with deficient nutrient intake, there were 2 students (100%) had normal body fat percentage category, while of the 29 respondents with normal nutritional intake, there were 21 students (72.4%) included in the normal category. Next, out of 82 respondents with excess nutritional intake, 50 students (61.0%) were included in the overfat category.

The data analysis result using the Rank-Spearman test obtained r value = -0.52, meaning that it has a strong correlation, and obtained p value = 0.00, which the p-value < α (0,05). Hence, there is no correlation between nutritional intake and body fat percentage.

Further, among 2 respondents with deficient nutrition intake, there were 2 respondents with body fat percentage in healthy category due to their predominance in consuming more fat than carbohydrates, proteins, and vitamins. While from 82 respondents with excess nutritional intake, there were 50 respondents with body fat in the overweight category, which

resulted from a large portion of breakfast habits and lack of exercise.

Research conducted by Anwar et al. (2016) obtained the results of a correlation test showing that the nutrient intake variable has a significant correlation with the body fat percentage in softball athletes at KONI Banten with a p-value of <0.05. The results of the study were in line with Nurfatimah's research result (2015), who discovered a substantial correlation between nutritional intake and body fat percentage.

This is in line with Heriyanto's (2012) theory that factors including nutrient intake, education, nutritional understanding, family income, physical activity, and lifestyle can all impact a person's body fat percentage. Bad eating patterns are common nowadays, some people frequently eat foods that are high in energy (fat, protein, carbohydrates).

4. CONCLUSION

1.   There is a correlation between BMI and Body Fat Percentage with r value = 0,902 as well as a significant value of p = 0,000, which the p value < (0.05).

2.   There is correlation between age and body fat percentage with r value = -0,123 as well as with a significant value of p = 0,149

3.   There is no correlation between Gender and Body Fat Percentage with r value = 0,079 and significant value of p = 0,408

4.   There is a correlation between Nutritient Intake and Body Fat Percentage with r value = 0,52 and a significant value of p = 0,000.

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