



Article

INDICATOR PHYSICAL FITNESS USING NORMAL AND OVERWEIGHT BODY MASS INDEX MEASUREMENT METHOD IN STUDENTS

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ABSTRACT

Background. Everyone should place a high premium on physical fitness because a fit body allows one to perform everyday chores and responsibilities at their best. Body mass index, which measures dietary status, is one element that affects physical fitness. (BMI). This study intends to assess the physical health and BMI of students at the Adventist University of Indonesia's Faculty of Nursing. With Spearman's rho test, this study technique is quantitative. There were 70 participants who voluntarily and consciously gave their consent. The Zuchora Physical Fitness Test, height measuring equipment, and weight scales were the research tools employed. Results: A significant negative connection between BMI and physical fitness, speed, and arm strength was found using the Spearman Rho test ($p.05$). Jumping ability, flexibility, endurance, and muscle strength did not have a significant association with BMI ($p > 0.05$), however. The findings of this study suggest that BMI has an impact on physical fitness in terms of arm speed and strength. The speed and arm strength decrease as BMI increases.

I. INTRODUCTION

Physical Fitness is a major component of a person's physical health. This can be a comprehensive indicator that reflects heart-lung endurance, muscle strength, speed and body flexibility (Zhang et al., 2021). So with optimal physical fitness a person is able to carry out daily activities without feeling excessively tired. *Physical fitness* can be influenced by various factors including nutritional status (Aprianto, 2021). Own *physical fitness* Good health determines better health in children, adolescents and parents, thus it is necessary to pay attention to nutritional status (Chen et al., 2022). Nutritional status can simply be assessed by measuring the Body Mass Index (BMI) (Nugroho, 2020). Measuring BMI requires measuring body weight and height which will be calculated using the BMI formula and matched with nutritional status. Good nutrition contains carbohydrates, fats, proteins needed for energy needs for physical activity. However, excess nutrition can also cause weight gain and obesity (Miqdaddiati, 2021).

Basic health research data (Riskseddas) 2023 shows that the number of Indonesian teenagers who are obese is quite high, namely 13.5% (Nugroho, 2020). This will affect the level *physical fitness* in cardiovascular health, bone health, adiposity and mental well-being (Basterfield et al., 2022). *Physical fitness* tends to increase with age but decreases with increasing body mass index (Puchalska-Sarna et al., 2022).

Busy work in hospital practice and busy schedules result in a lack of physical activity in nursing students *physical fitness* decreases and body mass index increases which has an impact on a person's health. This is what prompted the research with the title *Physical Fitness Based on Normal Body Mass Index and Overweight For Students of the Faculty of Nursing*.

II. METHODS

The method in this research is quantitative and correlational using the Spearman's rho test (Suhron, 2024). The respondents for this research were 70 nursing faculty students who voluntarily used informed consent. This research uses assessment *physical fitness* by K. Zuchora's, namely: which assesses speed, jumping ability, arm strength, flexibility, endurance and muscle strength, with a rating scale from minimal to extraordinary as in the table below:

Table 1.
Assessment *Physical Fitness*

Difficulty level	Mark
Minimal	1
Satisfying	2
Good	3
Very good	4
Very good	5
Extraordinary	6

Body Mass Index data is calculated using a formula where the result of body weight (kg) is divided by the result of the square of body height (m). This research was conducted on nursing students at Indonesian Adventist University in January 2023.

This research has been declared ethically appropriate by the Health Research Ethics Committee (KEPK)- FIK UNAI with letter number: 258/KEPK-FIK.UNAI/EC/XI/22

III. RESULT

Table 2
Types of Characteristics

No	Gender	Frequency	%
1	Woman	45	64,3
2	Man	25	35,7

Based on Table II. There are characteristic types according to gender, namely 45 women (64.3%) and 25 men (35.7%).

Table 3
Body Mass Index Status

No	Status IMT	Frequency	%
1	Normal	40	57,1
2	Overweight	30	42,9

Based on Table III. There was a body mass index status with a normal number of 40 people (57.1%) and overweight 30 people (42.9%).

Table 4.
Distribution of variables - speed variables, jumping strength, arm strength, flexibility, endurance, muscle strength.

No	Index physical fitness	Speed		Jumping ability		Arm strength		flexibility		Resilience		Muscle strength	
		f	%	f	%	f	%	f	%	f	%	f	%
1	Minimal	1	1,4	29	41,4	18	25,7	11	15,7	61	87,1	55	78,6
2	Satisfying	3	4,3	18	25,7	36	51,4	13	18,6	8	11,4	15	21,4
3	Good	22	31,4	6	8,6	8	11,4	28	40,0	1	1,4		
4	Very good	33	47,1	7	10,0	8	11,4	10	14,3				
5	Very good	11	15,7	10	14,3			8	11,4				
6	Extraordinary												

Based on Table IV. results were found *physical fitness* test with speed results of at least 1 person (1.4%) satisfactory 3 people (4.3%) good 22 people (31.4%) very good 33 people (47.1%) very good 11 people (15.7%) . Jumping ability with minimum results 29 people (41.4%) satisfactory 18 people (25.7%) good 6 people (8.6%) very good 7 people (10.0%) very good 10 people (14.3) . Arm strength with minimum results 18 people (25.7%) satisfactory 36 people (51.4%) good 8 people (11.4%) very good 8 people (11.4%). Flexibility with minimum results 11 people (15.7%), satisfactory 13 people (18.6%) good 28 people (40.0%) very good 10 people (14.3%) very good 8 people (11.4%) . Resilience with minimum results for 61 people (87.1%), satisfactory

for 8 people (11.4%) good for 1 person (1.4%). Muscle strength with minimum results for 55 people (78.6%), satisfactory for 15 people (21.4%).

Table 5.

Variable Relationships *Physical Fitness* with Body Mass Index

No	Variable	p	r
1	Physical fitness (speed) and BMI	.001	-.397**
2	<i>Physical fitness</i> (jumping ability) and BMI	.439	-.094
3	<i>Physical fitness</i> (arm strength) and BMI	.003	-.348**
4	<i>Physical fitness</i> (flexibility) and BMI	.567	.070
5	<i>Physical fitness</i> (resilience) and BMI	.322	-.120
6	<i>Physical fitness</i> (muscle strength) and BMI	.545	-.074

Based on Table V, variable relationships were found *physical fitness* with body mass index, namely that there is a significant relationship between *physical fitness* (speed) and BMI with a value of $p = .001$ and $r = -.397^{**}$ there is no relationship between *physical fitness* (jumping ability) and BMI with a value of $p = .439$ and $r = -.094$ there is a significant relationship between *physical fitness* (arm strength) and BMI with values of $p = .003$ and $r = -.348^{**}$ there is no relationship between *physical fitness* (flexibility) and BMI with a value of $p = .567$ and $r = .070$ there is no relationship between *physical fitness* (endurance) and BMI with a value of $p = .322$ and $r = -.120$ there is no relationship between *physical fitness* (muscle strength) and BMI with $p = .545$ and $r = -.074$

IV. DISCUSSION

1. Relationship between body mass index and speed

The results of the BMI test with speed used the Spearman's rho correlation test where there were results of $p = .001$ and $r = -.397^{**}$ which had a significant relationship between body mass index and speed. The higher the BMI value, the lower the speed value. Likewise, the lower the body mass index value of a person or within normal limits, the higher the speed value. Previous research found that body mass index affects speed. This research also shows the influence of a person's leg length and high BMI so that they have difficulty moving (Elsa, 2017). Other research shows that obesity has a bad influence on energetic gait and balance (Primavesi et al., 2021)

2.The relationship between body mass index and arm strength

The results of the test for the relationship between BMI and arm strength found a value of $p = .003$ and $r = -.348$. This means that there is a significant relationship between BMI and the respondent's arm strength. The r value shows a negative value, meaning that the two variables have a negative relationship. If BMI increases, arm strength decreases.

The results of previous research support the results obtained, namely that respondents with a high BMI tend to have less arm strength. This research shows that arm strength is determined by body mass index. The more ideal a person's BMI value, the higher the arm strength (Baihaqi & Hariyanto, 2022; El Muniri et al., 2022).

3. The relationship between body mass index and jumping ability

Based on the test results between BMI and jumping ability, the values $p = .439$ and $r = -.094$, where there is no significant relationship between BMI and jumping ability.

The results of previous research are different from this research. There is a significant correlation between body mass index and jumping ability. Researchers claim that the lower the BMI, the better the jumping ability (P. Bagus et al., 2022). A person's jumping ability is influenced by age, gender, and frequent jumping practice (Karatrantou et al., 2019; Philpott et al., 2021)

4. Relationship between body mass index and flexibility

Based on the data observed from the Spearman test, the values $p = .567$ and $r = .070$ were found. so that BMI and flexibility show that there is no significant relationship between the variables. In contrast to the results of research conducted at Andalas University which showed that there was a weak relationship in a negative direction between BMI with flexibility for male students (Lubis, 2015). Similarly, research conducted in Brazil on overweight runners found that there was a correlation between BMI and flexibility (Alves Marques, 2020)

5. The relationship between body mass index and endurance

Based on the test results between BMI and endurance, the values $p = .322$ and $r = -.120$. So it can be concluded that there is no significant relationship between BMI and resilience.

In accordance with previous research which concluded that there was no relationship between BMI and resilience in male respondents in Medan (Sibuea&Wahyu, 2022). Research on teenagers aged 7-18 years in China states that resilience is influenced by age, where the older you get, the stronger a person's resilience is expected to be (Chen et al., 2022).

6. The relationship between body mass index and muscle strength

The test results showed that the relationship between BMI and muscle strength was found to be $p = .545$ and $r = -.074$, meaning that the relationship between BMI and muscle strength was not found and the direction of the relationship was negative so that the lower the BMI, the relatively higher the muscle strength value and vice

versa. A study of fithai athletes in Malang with 9 participants showed the same findings where there was no correlation between BMI and muscle strength as assessed by the results of doing sit ups (Baihaqi & Eko, 2020).

V. CONCLUSION

From the results of this study it can be concluded that BMI affects arm speed and strength in a negative direction, so that the higher the BMI, the lower the arm strength and speed. However, the correlation between BMI and jumping ability, flexibility, endurance and muscle strength does not show a relationship between the variables. Suggestion: this research was conducted to see the relationship between physical fitness and BMI and future researchers need to add variables to measure physical fitness based on BMI but comparing it with age.

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