

RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND THE OCCURRENCE OF OBESITY BASED ON BODY FAT PERCENTAGE IN ELDERLY AT GRIYA USIA LANJUT ST. YOSEF SURABAYA

Michael Salvatore Nanjong¹, Yudita Wulandari², Pauline Meryana³

Email Correspondence: med.michael.s.20@ukwms.ac.id¹

ABSTRACT

Background: The Central Statistics Agency reported that the population of Indonesians aged 65 and over has risen by 25%, increasing from 25 million in 2019 to 80 million by 2050. The expanding geriatric demographic may result in health complications among seniors, including a heightened risk of obesity. This health issue requires attention. Body Mass Index (BMI) is the predominant tool for evaluating obesity; nevertheless, it has limitations when compared to skinfold calipers, which measure obesity based on adipose tissue mass. **Objective:** To ascertain the correlation between the frequency of physical activity categorized as rare, occasional, and regular, and the incidence of obesity assessed via skinfold calipers in the elderly population. The research design employed is cross-sectional. The study population comprises senior adults at Griya Usia Lanjut St. Yosef Surabaya. The research sample comprises older adults at Griya Usia Lanjut St. Yosef Surabaya who satisfies the inclusion and exclusion criteria. The requisite minimum sample size for this investigation is 32 older participants. The research employs purposive sampling for the selection of samples. The employed data analysis approach is the contingency coefficient correlation test. **Results:** The research revealed that 13 senior persons with infrequent to occasional physical exercise exhibited obesity, with body fat percentages surpassing 25% for men and 32% for women. Nineteen senior persons engaged in seldom to frequent physical activity did not exhibit obesity, maintaining body fat percentages below 25% for males and below 32% for women. The contingency coefficient test yielded a p-value of 0.003 (< 0.05). This study yielded a correlation coefficient of 0.516, signifying a moderate strength in the association between the two variables. **Conclusion:** A correlation exists between physical activity and the prevalence of obesity as determined by body fat percentage in the older population.

Keywords: Physical activity, obesity, body fat percentage, elderly.

¹ Undergraduate Program Faculty of Medicine, Widya Mandala Catholic University

² Department of Internal Medicine, Faculty of Medicine, Widya Mandala Catholic University

³ Department of Neurology, Faculty of Medicine, Widya Mandala Catholic University

INTRODUCTION

Obesity is a risk factor for various non-communicable diseases including cardiovascular disease, stroke, type 2 diabetes, hypertension, as well as osteoarthritis, and its effects are more severe in the elderly¹. Data from the Basic Health Research in 2010 (Riskesdas) indicates the percentage of obesity in elderly men aged 60-64 years and ≥ 65 years to be 7.1% and 4.2%, respectively. For elderly women in the same age categories, the percentages are 12.4% and 7.5%, respectively². Subsequently, data from Riskesdas 2018 shows an increase, with percentages for elderly men aged 60-64 years and ≥ 65 years becoming 12.6% and 8.0%, while for elderly women in the same age categories, the percentages become 26.1% and 15.4%³.

According to the Ministry of Health of Indonesia (KEMENKES), Obesity occurs due to an imbalance between the energy intake (energy intake) and the energy expended (energy expenditure), causing an excessive accumulation of fat in the body⁴. Physical activity is a crucial part of the etiology of obesity⁵. A lack of physical activity can lead to an increased risk of excessive fat accumulation or obesity⁶. However, physical activity can also be used

as a preventive and therapeutic measure for overweight and obesity⁷. Physical activity encompasses all forms of body movement resulting from skeletal muscle contractions, characterized by frequency, intensity, and duration that exceed the Resting Metabolic Rate⁸. Consistent physical exercise can help improve brain health, manage body weight, reduce the risk of diseases, strengthen muscles and bones, and improve the capacity of daily tasks⁹. Research by Buckinx et al. found that regular physical activity can prevent age-related changes in body composition¹⁰.

The researchers want to conduct this study due to the increased risks of obesity in the elderly. To prevent obesity in the elderly, one of the initial steps is to recognize it with appropriate methods, such as the body fat percentage method. Increasing physical activity in the elderly is also considered a factor in preventing obesity. Based on the issues outlined, the researchers are interested in studying the influence of physical activity on the occurrence of obesity in the elderly based on body fat percentage. The researchers hope that this study will help the elderly understand the dangers of obesity and encourage them to increase physical activity to avoid obesity

METHOD

The research design employs an observational analysis with a cross-sectional methodology. The study population comprises elderly individuals residing in the Griya Usia Lanjut St. Yosef Surabaya. The sample size was determined using the correlational research sample size formula, resulting in 32 samples. The sampling method employed is purposive sampling. Criteria for inclusion is (1) Elderly individuals (aged ≥ 60 years), (2) Willing to participate in the study and sign an informed consent, (3) Able to move independently (walk unassisted, walk with assistive devices, self-propel a wheelchair). Exclusion criteria are (1) Elderly individuals with illnesses requiring bed rest, (2) Those receiving meals from outside the facility more than once a week, and (3) Elderly individuals with dementia. The prevalence of obesity is the study's dependent variable, and physical activity is the independent variable. The research was conducted at Griya Usia Lanjut Santo Yosef Surabaya, located at Jalan Jelidro II No. 33A, Lontar, Sambikerep, Surabaya, East Java, from July 31 to August 28, 2023. The research procedure begins with obtaining informed consent, followed by the completion of the Physical Activity Scale for Elderly questionnaire for assessing physical

activity. Additionally, skinfold thickness measurements are taken using a skinfold caliper to gather body fat data. The research data is then processed and analyzed using the SPSS application with a contingency coefficient correlation test.

RESULT

Table 1. Distribution of Respondents Based on Age

Age	Frequency	Percentage
60-69	7	21,87%
70-79	12	37,5%
80-89	11	34,37%
≥ 90	2	6,25%
Total	32	100%

Based on the age categories in Table 1, the highest proportion of respondents falls within the 70-79 years age group.

Table 2. Distribution of Respondents Based on Gender

Gender	Frequency	Percentage
Female	22	68,75%
Male	10	31,25%
Total	32	100%

The result of the distribution of respondents in Table 2 indicates a higher percentage of females.

Table 3. Distribution of Physical Activity Based on Age

Variable	Age				Total
	60-69	70-79	80-89	≥90	
Phys. Act.	Rarely	4 (57,1)	7 (58,3)	5 (45,4)	2 (100) (56)
	Occasionally	1 (28,5)	4 (33,3)	6 (54,5)	0 (0%) (37)
	Frequently	1 (14,2)	1 (8,3)	0 (0%)	0 (0%) (6,2)
Total	7 (100)	12 (100)	11 (100)	2 (100)	32 (100)

Table 3 shows the distribution of physical activity by age. In the ≥ 90-year age group, the overall percentage of rarely performed physical activity is highest compared to other age groups. In the 80-89-year age group, the overall percentage of occasionally performed physical activity is highest compared to other age groups. In the 60-69-year age group, the overall percentage of frequently performed physical activity is highest compared to other age groups.

Table 4. Distribution of Physical Activity Based on Gender

Variable	Gender			
	Male	Female	Total	
Phys. Act.	Rarely	7(70%)	11(50%)	18(56,25%)
	Occasionally	2(20%)	10(45%)	12(37,5%)
	Frequently	1(10%)	1(4,5%)	2(6,25%)
Total	10(100)	22(100%)	32(100%)	

Table 4 shows the distribution of physical activity based on gender. In the male group, the majority of respondents have rarely

performed physical activity (70%). In the female group, the majority of respondents also have rarely performed physical activity (50%).

Table 5. Distribution of Obesity Occurrences Based on Age

Variable	Age				Total	
	60-69	70-79	80-89	≥90		
Obesity Occurrence	Non Obesity	3 (42,8)	6 (50)	8 (72,7)	2 (100)	19 (59,3)
	Obesity	4 (57,1)	6 (50)	3 (27,2)	0 (0%)	13 (40,6)
Total		7 (100)	12 (100)	11 (100)	2 (100)	32 (100)

Table 5 shows the distribution of obesity occurrences based on age. In the 60-69 age group, when viewed overall with other age groups, the percentage of obesity occurrences is found to be the highest in the 60-69 age group. In the ≥90 age group, when viewed overall with other age groups, the percentage of non-obesity occurrences is found to be the highest in the ≥90 age group.

Table 6. Distribution of Obesity Occurrences Based on Gender

Variable	Gender			
	Male	Female	Total	
Obesity Occurrence	Non Obesity	7 (70%)	11 (50%)	18 (56,25%)
	Obesity	2 (20%)	10 (45%)	12 (37,5%)
Total		10 (100)	22 (100%)	32 (100%)

In Table 6, it shows the distribution of obesity occurrences based on gender. In the male group, most respondents experience obesity occurrences (70%). In the female group, most respondents experience non-obesity occurrences (72.7%)

Table 7. Results of Contingency Correlation Test of Physical Activity on Obesity Occurrence

Variable		Physical Activity			Total
		Rarely	Occas.	Freque.	
Obesity Occurrence	Obesity	12 (66,6)	1 (8,3%)	0 (0,0%)	13 (40,6)
	Non	6 (33,4)	11 (91,6)	2 (100%)	19 (59,3)
Total		18 (100)	12 (100)	2 (100%)	32 (100)

Based on the data in Table 7, in this study, there are 12 individuals with rarely performed physical activity who experience obesity occurrences, representing 66.6% of the total 18 respondents. Additionally, one individual with occasionally performed physical activity experiences obesity occurrences, accounting for 8.3% of the total 12 respondents. Six individuals with rarely performed physical activity do not experience obesity occurrences, representing 33.3% of the total 18 respondents. Furthermore, eleven individuals with occasionally performed physical activity do not experience obesity occurrences, constituting 91.6% of the total 12 respondents. Lastly, two respondents with frequently performed physical activity do not experience obesity occurrences, representing 100% of the total two respondents.

DISCUSSION

This study found that, among elderly males,

the highest percentage was observed in the category of obesity, reaching 70%, while in the elderly female group, the highest percentage was in the non-obesity category, at 72.7%. This finding differs from a previous study by Effendy et al. (2018), where the highest percentage of fat mass categorized as obese was found in elderly females, and in elderly males, the highest fat mass was associated with non-obesity occurrences¹¹. In this study, researchers identified a tendency for lower participation of elderly males in activities in the care home, such as exercise, which may lead to lower levels of physical activity, ultimately resulting in obesity.

The study found that an increase in fat mass did not correlate with advancing age. This finding contrasts with a previous study by Macek et al. (2020), where an increase in the percentage of fat mass was noted with advancing age¹². Researchers identified a trend in the 60 - 69 and 70 - 79 age groups with lower physical activity, especially in participating in care home activities like exercise, resulting in higher fat mass in these age groups. In the 80 - 89 age group, individuals tended to be more active in care home activities like exercise and assisting others, leading to a lower overall percentage of fat. In the ≥ 90 age group, the researchers did not find a percentage of fat falling into the

category of obesity occurrences. One possible factor could be genetic or hereditary factors causing obesity¹³.

In this study, among elderly males, the highest percentage was found in the rarely performed physical activity category at 70%. Among elderly females, the highest percentage was in the rarely performed physical activity category at 50%. This finding differs from previous studies by Nangoy et al. (2019) and Christy et al. (2019). Nangoy and Christy found that elderly males were more likely to have active or strenuous physical activity, while elderly females were more likely to have low or light physical activity^{14,15}. This could be attributed to factors influencing physical activity, such as the low participation of elderly males in care home activities, including exercise. Overall, in each age group, there was a tendency for a decrease in physical activity levels with increasing age. This finding aligns with a previous study by Bruton et al. (2020), which found a decline in physical activity after the age of 65 years¹⁶. Reduced physical activity in the elderly can be attributed to the aging process leading to a decline in muscle mass and strength, resulting in reduced physical activity capability¹⁷.

Through the analysis using the

Contingency Correlation test, a significant relationship was found between physical activity and obesity occurrences based on the percentage of body fat, with a p-value of 0.003 ($0.003 < 0.05$). In this study, a correlation value of 0.516 was obtained, indicating a moderate strength in the relationship between the two variables. Decreased physical activity can lead to the risk of excess energy accumulation, which can subsequently lead to obesity⁶. This finding is consistent with the results of a study by Nangoy et al. (2019), with a p-value of 0.003 ($0.003 < 0.05$), where elderly individuals with active to very active physical activity mostly had normal/low-fat mass¹⁴. Zou et al. (2020) also identified a significant correlation between high body fat percentage and low levels of physical activity¹⁸. Similar findings were also present in a study by Bradbury et al. (2017), where a strong correlation ($r= 0.79$ in males, $r= 0.85$ in females) was observed between body fat percentage and physical activity¹⁹.

CONCLUSION

This study found that the majority of the elderly residents at Griya Usia Lanjut St. Yosef Surabaya have infrequent levels of physical activity. Furthermore, the majority of elderly individuals at Griya Usia Lanjut St.

Yosef Surabaya are categorized as non-obese based on their body fat percentage. The statistical test results revealed a significant correlation, with a p-value of 0.003 ($0.003 < 0.05$), the relationship between physical activity and the incidence of obesity, as determined by body fat percentage among older inhabitants at Griya Usia Lanjut St. Yosef Surabaya, exhibits a moderate correlation strength of $r = 0.516$.

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