ARTICLE

Effect of age and weight on physical activity

Rivan Virlando Suryadinata,1 Bambang Wirjatmadi,2 Merryana Adriani,2 Amelia Lorensia3

1Faculty of Medicine, Universitas Surabaya; 2Faculty of Public Health, Universitas Airlangga; 3Faculty of Pharmacy, Universitas Surabaya, Surabaya, Indonesia

Abstract

Background: Individuals tend to develop metabolic disorders and other chronic diseases, due to the poor conduction of physical activities. Meanwhile, a high level of physical activity positively affects the quality of life. However, irrespective of the numerous studies reported on the correlation between age, weight, and physical activity, there is limited study on the differences of physical activities in the geriatric and adult groups of obese and non-obese people. This study, therefore, aims to investigate the effect of age and weight on physical activity in geriatric and adult groups.

Design and methods: The purposive sampling technique was used to obtain data from 154 respondents from community-integrated health care in Surabaya, East Java, Indonesia. These respondents were equally divided into two groups of adult (21-60 years) and geriatric (>60 years) groups.

Results: The Chi-Square test showed that there were no significant differences between physical activity in the obese and non-obese people of the geriatric groups (P>0.05). Conversely, in the adult group, there were significant differences between physical activities and the age of obese and non-obese groups (P<0.05).

Conclusions: In conclusion, age affects physical activity in adult and geriatric groups.

Introduction

Physical activity gradually declines with age as people lose their muscle mass and strength. During the aging process, physical activity decreases by 40%-80%, thereby increasing the likelihood of individuals developing metabolic disorders and other chronic diseases, such as cancer, diabetes, cerebrovascular and cardiovascular diseases. Studies showed that an increase in physical activity tends to lower the risk of having cognitive disorders and improves the overall well-being of the human body.1-3 High level of physical activity is proven to have positive effects on the physical, social, emotional, and healthcare qualities of life.4,5

Age and weight are considered as two factors that influence physical activity. According to research, this activity tends to remain stable in middle age and reduces at old age. Studies demonstrated that moderate physical activity decreased in the elderly, although they still manage to carry out leisure and recreational activities during retirement. Age-related changes were associated with biological, psychological, and social aspects of human life. For instance, the older adults are bound to suffer from chronic diseases, such as diabetes, cognitive impairment, poor social interaction and obesity due to poor physical activities.5,7

A previous study found that high Body Mass Index (BMI) and low physical activity were related to the incidence of cardiac failure. Pandey et al stated that increasing leisure-time, and reducing BMI helps to improve circulation and cardiovascular health.8 People with a higher BMI are usually physically inactive, gain more weight, thereby leading to energy imbalance. Therefore, staying physically inactive in a long period of 10-12 years increases the risk of cardiovascular diseases and consequently of mortality. However, weight gains can be properly managed through healthy eating and engaging in physical exercises, thereby reducing mortality and morbidity rates.9,11

Obesity is not merely defined as an excessive gain in body weight against height, and it is also related to excessive adiposity, leading to metabolic consequences. It increases the risks of chronic diseases, such as diabetes, cardiovascular diseases, and cancer. This excess of body fat leads to disability and depression, as people have to face several health issues resulting from high BMI and low physical activity. In addition to this, economic and healthcare costs increase significantly, along with pressures from family members. Therefore, there is an increase in economic costs, a decrease in productivity and a greater psychosocial risk on obese people.12-15

Physical activity has been linked to various health benefits. Previous studies have shown that it was inversely correlated with metabolic and inflammatory biomarkers. Incorporating physical activity into the daily routine activities moderately or vigorously, such as going upstairs, walking, doing household chores, or cleaning up the yard, helps to keep the body fit and healthy. Structured activities, on the other hand, are carried out by walking or running on a treadmill, lifting weights, and other cardiac training programs. The amount of energy expenditure in moderate and vigorous physical activities is expected to be 3 – 5.9 and above 6 METs (Metabolic Equivalent Tasks), respectively. Higher physical activity contributed to a decrease in the occurrence of

Significance for public health

Age and weight are factors that influence physical activity levels. Low levels of physical activity have major impacts on the physical, social, emotional, and qualities of life. This study shows the different levels of physical activity between obese and non-obese in the geriatric and adult group.
metabolic diseases.\textsuperscript{16-18}

Despite the numerous studies analysing the correlation between age, weight, and physical activity, there is limited information on differences in physical activity levels in obese/non-obese geriatric and adults. This study, therefore, aims to investigate the effect of age and weight on the physical activity level in the geriatric and adult group.

**Design and methods**

This research utilized a case-control study design to investigate the effect of age and weight on physical activity in adults and the geriatric group. A purposive sampling technique was used to obtain data from 154 respondents from community-integrated health care in Surabaya, East Java, Indonesia. These respondents were equally divided into two groups: adults (21-60 years) and geriatric (>60 years). Those suffering from cardiovascular, cerebrovascular, respiration, and liver diseases were excluded. The Body Mass Index (BMI) and the International Physical Activity Questionnaire (IPAQ) were also used to assess the healthy weight of obese and non-obese respondents. This study has been approved by the ethics committee of Universitas Surabaya, and the data were processed and analysed by using SPSS 22. In addition, the Chi-Square tests were also used to analyze the effect of age and weight on physical activity.

**Results and Discussion**

Table 1 shows the demographic characteristics of respondents according to age, sex, and BMI. It shows that in the adult age group, obesity values were the same regardless of gender. Almost three-quarters of women had the highest percentage of non-obesity (72.7\%) compared to men, however, as they aged, their chances of being obsessed increased (84.4\%). The rate of geriatric obesity, also known as type 1, is 80\% compared to type 2 at 27.3\%.

Studies showed that more than 60\% of middle-aged women in

| Characteristics | Obesity (n=77) | Non-obesity (n=77) |
|-----------------|--------------|-------------------|
|                 | Frequency    | Percentage (%)    | Frequency | Percentage (%) |
| **Adult age**   |              |                   |           |               |
| Gender          |              |                   |           |               |
| Man             | 38           | 49.3              | 21        | 27.3          |
| Woman           | 39           | 50.7              | 56        | 72.7          |
| BMI (Body Mass Index) | Underweight | < 18.5            | 13        | 16.9          |
|                 | Normal       | 18.5 – 22.9       | 42        | 54.5          |
|                 | Overweight   | 23 – 24.9         | 22        | 28.6          |
|                 | Obesity 1    | 25 – 29           | 45        | 58.4          |
|                 | Obesity 2    | ≥ 30              | 32        | 41.6          |
| **Geriatric age group** |              |                   |           |               |
| Gender          |              |                   |           |               |
| Man             | 12           | 15.6              | 33        | 42.8          |
| Woman           | 65           | 84.4              | 44        | 57.2          |
| BMI (Body Mass Index) | Underweight | < 18.5            | 5         | 6.5           |
|                 | Normal       | 18.5 – 22.9       | 38        | 49.3          |
|                 | Overweight   | 23 – 24.9         | 34        | 44.2          |
|                 | Obesity 1    | 25 – 29           | 56        | 72.7          |
|                 | Obesity 2    | ≥ 30              | 21        | 27.3          |

| Physical activity | Obesity (n=77) | Non-obesity (n=77) |
|-------------------|---------------|-------------------|
|                   | Frequency     | Percentage (%)    | Frequency | Percentage (%) |
| **Geriatric age group** |              |                   |           |               |
| Low               | 69            | 89.6              | 67        | 87            | 0.858 |
| Moderate          | 6             | 7.8               | 7         | 9             |
| High              | 2             | 2.6               | 3         | 4             |
| **Adult age group** |              |                   |           |               |
| Low               | 32            | 41.5              | 47        | 61            | 0.047 |
| Moderate          | 42            | 54.5              | 27        | 35            |
| High              | 3             | 4                 | 3         | 4             |
low socio-economic status were obese or overweight. This condition was influenced by factors such as employment status, high blood pressure, arthritis, and other issues related to activities of bending, moving at a regular pace, sitting, and getting up from chairs. A multi-sector partnership program was recommended to achieve better results in obesity treatment in low-income areas. In addition, health care professionals also need to recognize that psychosocial and other nutritional problems affected obesity in the elderly. Therefore, a low-budget physical activity is essential for people to carry out the adequate exercise with maximum benefits. A number of different measurement methods need to be applied to measure the relationship between physical activity and quality of life. According to previous studies, physical activity needs to be objectively measured using an accelerometer. In addition, subjective measurement needs to be conducted by asking questions on the different types of daily physical activities. This study used the International Physical Activity Questionnaire (IPAQ) as a valid and reliable instrument to measure the physical activity of adult and geriatric respondents.

Table 2 showed that obese adults have moderate (54.5%) to low (41.5%) physical activity level, with the lowest at 61%, found in non-obese adults. On the other hand, both geriatric obese and non-obese group tends to have poor physical activity level. Chi-square test results show that there are no significant differences between the physical activity level of geriatric obese and non-obese groups (P>0.05). Conversely, in the adult group, it is found that there are significant differences between the physical activity level of obese and non-obese groups.

Insignificant results of physical activity indicate other confounding factors, such as dietary habits, psychosocial issues, and physical weakness. Weight loss therapy targeting obesity in geriatrics has been considered controversial because it leads to a loss in lean muscle mass of 25%. Additionally, bone mineral density tends to decrease as weight loss occurs, and geriatrics suffering from obesity experienced metabolic and functional problems.

Table 3 shows the differences between physical activity levels in the adult and geriatric group, with significant differences in the obese and non-obese groups at P<0.05. Physical activity is a non-pharmacological treatment available to most people, and it plays an essential role in preventing various metabolic diseases in overweight and obese adults. A clinically significant weight loss (≥ 5% of initial weight) has been identified as predictors of metabolic disorders such as metabolic syndrome, insulin resistance, type-2 diabetes mellitus (T2DM), dyslipidemia, hypertension, lung diseases, cardiovascular diseases, and inflammation.

Conclusions

In conclusion, age affects physical activity in adult and geriatric groups, but only obese adults have shown these changes.

Correspondence: Rivan Virlando Suryadinata, Faculty of Medicine, Universitas Surabaya (UBAYA), Surabaya, Jl. Tenggilis Mejoyo, Kali Rungkut, Kec. Rungkut, Kota SBY, Jawa Timur 60293, Indonesia. Tel: +6231.298 1000. E-mail: rivan.virlando.s@staff.ubaya.ac.id

Key words: Age, Weight, Physical Activity.

Contributions: The authors contributed equally.

Conflict of interest: The authors declare no potential conflict of interest.

Funding: This study was financially supported by Faculty of Medicine, Universitas Surabaya (UBAYA), Surabaya.

Acknowledgements: The author are grateful to Faculty of Medicine, Universitas Surabaya, Surabaya for their kind support

Clinical Trials: This study has been approved by ethics committee of Universitas Surabaya (UBAYA), Surabaya.

Conference presentation: Part of this paper was presented at the 4th International Symposium of Public Health, 2019 October 29-31, Griffith University, Gold Coast, Australia.

Received for publication: 6 March 2020. Accepted for publication: 13 June 2020.

©Copyright: the Author(s), 2020 Licensee PAGEPress, Italy Journal of Public Health Research 2020;9:1840 doi:10.4081/jphr.2020.1840 This work is licensed under a Creative Commons Attribution NonCommercial 4.0 License (CC BY-NC 4.0).

References

1. Gopinath B, Kifley A, Flood VM, et al. Physical Activity as a Determinant of Successful Aging over Ten Years. Sci Rep...
Notthoff N, Reisch P, Gerstorf D. Individual Characteristics and Physical Activity in Older Adults: A Systematic Review. Gerontol 2017;63:443–59.

Taylor D. Physical activity is medicine for older adults: Table 1. Postgrad Med J 2013;90:26–32.

Gill DL, Hammond CC, Reifsteck EJ, et al. Physical activity and quality of life. J Prev Med Public Health 2013;46:S28-34.

Anokye NK, Trueeman P, Green C, et al. Physical activity and health related quality of life. BMC Public Health 2012;12:624.

Takagi D, Nishida Y, Fujita D. Age-associated changes in the level of physical activity in elderly adults. J Phys Ther Sci. 2015;27:3685-7.

Varma VR, Dey D, Leroux A, et al. Re-evaluating the effect of age on physical activity over the lifespan. Prev Med 2017;101:102–8.

Pandey A, LaMonte M, Klein L, et al. Relationship Between Physical Activity, Body Mass Index, and Risk of Heart Failure. J Am Coll Cardiol 2017;69:1129–42.

Nordstoga AL, Zotcheva E, Svedahl ER. et al. Long-term changes in body weight and physical activity in relation to all-cause and cardiovascular mortality: the HUNT study. Int J Behav Nutr Phys Act 2019;16:45.

Drenowatz C, Hill J, Peters J, et al. The association of change in physical activity and body weight in the regulation of total energy expenditure. Eur J Clin Nutr 2017;71:377–82.

Preiss D, Thomas LE, Wojdyla DM, et al. Prospective relationships between body weight and physical activity: an observational analysis from the NAVIGATOR study. BMJ Open 2015;5:e007901.

Segula D. Complications of obesity in adults: a short review of the literature. Malawi Med J 2014;26:20-4.

Suryadinata RV, Lorensia A, Sari RK. Differences in Nutrition Food Intake and Body Mass Index between Smoker and Non-smoker in Adult. Indones J Clin Pharm. 2017;6:171–80.

Wiklund P. The role of physical activity and exercise in obesity and weight management: Time for critical appraisal. J Sport Heal Sci. 2016;5:151-4.

Hu F. Obesity epidemiology. New York: Oxford University Press;2008.

Strasser B. Physical activity in obesity and metabolic syndrome. Ann N Y Acad Sci. 2013;1281:141–59.

Kaleth AS, Saha CK, Jensen MP, et al. Effect of Moderate to Vigorous Physical Activity on Long-Term Clinical Outcomes and Pain Severity in Fibromyalgia. Arthritis Care Res (Hoboken). 2013;65:1211–8.

Gebel K, Ding D, Chey T, et al. Effect of Moderate to Vigorous Physical Activity on All-Cause Mortality in Middle-aged and Older Australians. JAMA Intern Med. 2015;175:970.

Nagarkar AM, Kulkarni SS. Obesity and its effects on health in middle-aged women from slums of Pune. J Mid-life Health 2018;9:79-84.

Batsis JA, Zagaria AB. Addressing Obesity in Aging Patients. Med Clin North Am 2018;102:65-85.

Tenet E, Maietti E, Chiaranda G, et al. Physical activity intervention for elderly patients with reduced physical performance after acute coronary syndrome (HULK study): rationale and design of a randomized clinical trial. BMC Cardiovasc Disord 2018;18:98.

Porter Starr KN, McDonald SR, Bales CW. Obesity and Physical Frailty in Older Adults: A Scoping Review of Lifestyle Intervention Trials. J Am Med Dir Assoc 2014;15; 240–50.

Waters DL, Ward AL, Villareal DT. Weight loss in obese adults 65years and older: A review of the controversy. Exp Gerontol 2013;48:1054–61.

Anton S, Manini T, Milsom V, et al. Effects of a weight loss plus exercise program on physical function in overweight, older women: a randomized controlled trial. Clin Interv Aging 2011;6:141-9.

Kelley GA, Kelley KS. Effects of Exercise in the Treatment of Overweight and Obese Children and Adolescents: A Systematic Review of Meta-Analyses. J Obes 2013;2013:1-10.

Swift DL, Johannsen NM, Lavie CJ, et al. The Role of Exercise and Physical Activity in Weight Loss and Maintenance. Prog Cardiovasc Dis 2014;56:441–7.

Wing RR, Lang W, Wadden TA, et al. Benefits of Modest Weight Loss in Improving Cardiovascular Risk Factors in Overweight and Obese Individuals With Type 2 Diabetes. Diabetes Care 2011;34:1481-6.

Suryadinata RV, Wirjatmadi B, Adriani M. Efektivitas Penurunan Malondialdehyde dengan Kombinasi Suplemen Antioksidan Superoxide Dismutase Melon dan Gliadin Akibat Paparan Rokok. Glob Med Heal Commun 2017;5:79-83.