

# Role of Light Physical Activity Towards Stress in The Elderly in Nursing Home

Waynhena Sarawa Nesia<sup>1</sup>, Wahyuni Lukita Atmodjo<sup>1</sup>, Shirley Ivonne Moningkey<sup>2</sup>

<sup>1</sup> Department of Anatomy, Faculty of Medicine, Pelita Harapan University, Karawaci, Tangerang, Banten, Indonesia

<sup>2</sup> Department of Public Health and Family Medicine, Faculty of Medicine, Pelita Harapan University, Karawaci, Tangerang, Banten, Indonesia

## Abstract

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**Correspondance:** Waynhena Sarawa Nesia

E-mail: [waynhenanayna@gmail.com](mailto:waynhenanayna@gmail.com)

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**Introduction:** It was reported that one in five adults and four out of five adolescents around the world did not do enough physical activity, especially the elderly tend not to do physical activity that is classified as active. Less physical activity can inhibit the release of ACTH and decrease cortisol secretion so that it can cause stress. Although it has been reported about the relationship between physical activity and stress levels at the age of 23-54 years, there has not been much research on the relationship in the elderly. Many elderly people aged over 60 years, especially those living in nursing homes experience stress due to lack of physical activity. Thus, further research is needed regarding the relationship between light physical activity and stress levels in the elderly at the Nursing Home.

**Methods:** It was an unpaired categorical comparative analytic study. Elderly respondents at the Nursing Home aged 60-74 years will fill out the PASE questionnaire to assess physical activity and the PSS-10 to assess stress levels. The data obtained will be processed using Microsoft Excel and analyzed with the Pearson Chi-Square test using the SPSS-25 program.

**Result:** Of the 40 respondents, 30 did light physical activity and 10 did heavy physical activity. It was also found that 14 experienced mild stress and 26 experienced severe stress. The results from Pearson Chi-Square show p-value <0.001 and OR = 16.000.

**Conclusions:** The results of this study states that there is a significant relationship between light physical activity and stress levels in the elderly aged 60-74 years who live in nursing homes.

## Introduction

The "WHO Global action plan on physical activity and health 2018-2030: More active people for a healthier world" was launched in 2018 which said one in five adults and four out of five adolescents around the world do not do enough physical activity.<sup>1</sup> In Latin America and the Caribbean is a region that has a population with less physical activity. Meanwhile,

Uganda and Mozambique have residents with the highest physical activity. Only 6 percent of adults in this country are not physically active.<sup>2</sup>

Physical activity is a movements produced by skeletal muscles that result in an increase in energy expenditure that is more than at rest.<sup>3</sup> Physical activity is divided into 3 categories, that is mild, moderate and severe physical activity. Physical activity can be measured with the

Physical Activity Scale for Elderly (PASE) questionnaire which is specifically for the elderly with mild physical activity into 3 categories, namely mild with a score of 0-16, moderate with a score of 17-21 and severe with a score of 22-36.<sup>4</sup> Doing physical activity can affect stress levels, due to an increase in beta-endorphins produced in the hypothalamus pituitary adrenal (HPA) which will then be stimulated when the stressor induces the production of Corticotropin Releasing Hormone (CRH) causing the release of Adrenocorticotrophic (ACTH) and increasing the secretion of epinephrine. So when beta-endorphins increase it will reduce stress levels.<sup>5,6</sup>

Stress can be obtained from external factor, such as the environment, work, and other aspects, and can also be internal, that is self. Stress levels can be measured using the Perceived Stress Scale (PSS-10) questionnaire into 3 categories, namely mild with a score of 1-13, moderate with a score of 14-26 and severe.<sup>8</sup> Stress is a state where homeostasis feels threatened which is triggered by certain environmental conditions which are a source of problems (stressors) which are then countered by physiological responses to maintain body balance (eustasis). Hypothalamic pituitary adrenal (HPA) and Autonomic Nervous System (ANS) are components of the stress system that will mediate neuroendocrine responses.<sup>9</sup> Stress will be perceived differently by each individual, so the resulting response is also different. The process of perception is influenced by mental factors and individual experiences in living life, so that perceptions will be different at the age of children, adolescents, adults and the elderly.<sup>10</sup> According to the World Health Organization (WHO) elderly (elderly) are people aged 60 years or more, who are categorized into 4 categories, namely middle aged 45-59 years, elderly 60-74 years, old 75-90 years, and very old 90 over.<sup>11</sup> In this study, respondents with the criteria of elderly aged 60-74 years at the Nursing Home will be used. In addition, there is also an age division according to the Indonesian Ministry of Health, which is divided into 9 categories, starting from toddlers 0-5 years, children 6-11 years, early adolescents 12-

16 years, late adolescents 17-25 years, early adults 26-35 years, late adults 36-45 years, early elderly 46-55 years, late elderly 56-65 years and seniors over 65 years.<sup>12</sup> The Central Statistics Agency reported that last December 2021, there were 29.3 million elderly people, equivalent to 10.82% of the total population in Indonesia.<sup>13</sup> Some of the elderly population, especially those living in nursing homes only do light physical activity with a lifestyle that is not classified as active and spends a lot of time in bed.<sup>14,15</sup>

It was reported in 2019 by Hery Setiawan et al, that there was a significant relationship between the average physical activity and the level of stress carried out by hospital employees aged 23-54 years. The study used the International Physical Activity (IPAQ) questionnaire to measure the average physical activity of respondents without age restrictions<sup>16</sup>. Thus, it is still necessary to examine the relationship between light physical activity using a special questionnaire for the elderly, namely the Physical Activity Scale for Elderly (PASE) and stress levels in the elderly at nursing homes.

## Material And Methods

Materials needed for conducting this research were consent forms for respondents, a Physical Activity Scale for Elderly (PASE) questionnaire to assess physical activity, and a Perceived Stress Scale-10 (PSS-10) questionnaire to assess stress levels. The study design in this study was an unpaired categorical comparative analytic study. The sampling method used was purposive sampling technique, with the target population being the elderly aged 60-74, while the reachable population was the elderly aged 60-74 living in the Bina Bhakti Serpong Nursing Home. The research sample was 40 elderly people who met the inclusion criteria, namely aged 60-74 years, communicative, did not consume psychotropic drugs, had no history of stress illness and were willing to fill out an informed consent form.

Method of Research: Forty elderly people who met the inclusion criteria were given an Informed Consent sheet as a sign of their willingness to participate in the study. All samples were given a PASE questionnaire to measure their physical activity as light, moderate or heavy physical activity; and the PSS-10 questionnaire to obtain mild, moderate or severe stress levels. The independent variable in this study was physical activity which was measured using the Physical Activity Scale for Elderly (PASE), the dependent variable was stress level which was measured using the Perceived Stress Scale (PSS-10) while the confounding variables included family and genetic background. Data in the form of physical activity and stress levels will be processed using Microsoft Excel 365 and analyzed using the Pearson Chi-Square test on the Statistical Package for the Social Sciences -25 (SPSS-25) with an accuracy of 95% ( $p < 0.05$ ).

## Result

### Data on Elderly Characteristics in Nursing Homes

This research was conducted on the elderly who resided at the Bina Bhakti Werdha Nursing Home, totaling 67 people consisting of 27 men and 40 women with an age range of 56 - 84 years. However, according to the inclusion criteria, namely residents aged 60-74 there were only 40 people. Characteristic data of all residents in the Bina Bhakti Werdha Nursing Home can be seen in the table below:

**Table 1.** Baseline Characteristics

Characteristic	N=67	Percentage (%)
Age (years)	45-59	1,5%
	60-74	59,7%
	75-90	31,3%
	90 Over	7,5%
Gender	Male	40,3%
	Female	59,7%

### Physical Activity Data

The physical activity questionnaire was conducted through interviews with 67 elderly people, but only 53 respondents

could be interviewed. Of the 53 respondents, 13 were excluded due to certain medical conditions so that the number of respondents who could collect data was only 40 people. Of the 40 who met the inclusion criteria, there were 30 people with light physical activity, 7 people with moderate physical activity and 3 people with heavy physical activity, see the table below:

**Table 2.** Physical Activity Data

Physical Activity	Frequency (n)	Percentage (%)
Light	30	75%
Moderate	7	17,5%
Heavy	3	7,5%
Total	40	100%

### Stress Level Data

A total of 53 elderly people at the Bina Bhakti Serpong Nursing Home were interviewed to fill out the Perceived Stress Scale questionnaire (PSS-10) to see their level of stress, but only 40 met the inclusion criteria.<sup>25</sup> The stress level in this study was divided into 3 groups, that is mild stress with a score of 0-13, moderate stress with a score of 14-26 and severe stress with a score of 26-40. Of the 40 respondents, there were 14 respondents who experienced mild stress, 11 respondents experienced moderate stress and 26 respondents experienced severe stress. The results of the analysis of the respondent's stress level can be seen in the table below:

**Table 3.** Stress Level Data

Stress Level	Frequency (n)	Percentage (%)
Mild	14	35%
Moderate	11	27,5%
Severe	15	37,5%
Total	40	100%

### Analysis of the Relationship Between Physical Activity and Stress Levels

The 40 respondents who met the inclusion criteria were divided into 2 groups, namely group I which consisted of 30 respondents who had light physical activity and group II which consisted of 10 respondents who did heavy physical activities. From group I, there were 30 respondents who had light physical activity, there were 24 respondents who had moderate-severe levels of stress and 6 respondents who had mild stress. From group II, 10 respondents who did strenuous physical activity, there were 2 respondents with high levels of stress and 8 respondents with mild stress. The data were analyzed using the Pearson Chi-square test with a 95% degree of confidence which can be seen in the table below:

**Table 4. The Relationship Between Physical Activity And Stress Levels**

Variablel	Stress Level		Odd Ratio (95% CI)	P- value
	Yes	No		
Light Physical Activity	24	6	16.000 (2.674- 95.754)	<0.001
Heavy Physical Activity	2	8		

### Discussion

From **Table 1** regarding data on the characteristics of the elderly at the Nursing Home above, it is found that more than half of the elderly at the Bhina Bakti Nursing Home are aged 60-74 years, namely 40 respondents (59.7%) and there are more elderly women than men with a male ratio 32.5% (n=27) and women 67.5% (n=13). In another social institution, namely the Tresna Werdha Jombang Social Institution, there were 38 respondents (67.9%) aged 60-74 with a male ratio of 39.3% (n=22) and 60.7% female (n=34).<sup>17</sup> The characteristics of the elderly in these two institutions are the same where there are more women than men. The difference in the number of female and male residents is thought to be due to the higher life

expectancy for women than for men, where the life expectancy for women is 72 years and men is 69 years.<sup>18</sup> Life expectancy in women is high because women have two X chromosomes which provide redundancies to compensate for mutations, while men only have one X chromosome.<sup>19</sup> In addition, female hormones also provide more responsive immunity to maintain homeostasis and reduce stress more than men. In males, besides having only one X chromosome, there are other factors such as behavioral factors where males tend to carry out risky and dangerous behaviors compared to females.<sup>20</sup>

From **Table 2**, data on elderly people at the Bhina Bhakti Werdha Nursing Home above found that 30 elderly people with an age range of 69-74 years did light physical activity and 10 elderly people aged 60-68 years did heavy physical activity. The results of this study showed that out of 40 respondents, 75% did light physical activity and only 25% did heavy physical activity. This supports previous research, which reported that there were more people who did light physical activity than those who did heavy physical activity where there were 39 people who did light physical activity (69.9%) and 17 people who did heavy physical activity (30.4%).<sup>17,21</sup> So there are similarities from the two studies above. Inactivity for not doing physical activity is thought to be due to the age factor, where there is a decrease in muscle mass, a decrease in muscle pH and muscles become stiffer so that as you get older the decrease in physical activity also decreases.<sup>22</sup> The elderly also experience problems with balance due to decreased peripheral vision, decreased ability to detect information about their surroundings (spatial) so that this condition can be a risk of falling in the elderly.<sup>23</sup> In addition to the age factor, the decrease in physical activity in the elderly is also thought to be due to a lack of support from the social environment.<sup>24</sup>

From **Table 3** regarding the stress level data above, the elderly who live in the Bhina Bakti Nursing Home starting from the age of 70 experience levels of severe

stress with a total of 15 respondents, then the elderly aged 65-70 experience moderate stress with a total of 11 respondents and the elderly aged 60 -65 experienced mild stress levels with a total of 14 respondents. This supports previous research at the Tresna Werdha Social Service Center, which reported that respondents who experienced high levels of stress were more than respondents who experienced mild levels of stress where there were 20 respondents (55.6%) who experienced high stress and 16 respondents (44,4%) who experienced mild stress.<sup>26</sup> So there are similarities from the two studies above. This is presumably because a decrease in physical activity can cause physiological changes such as cardiovascular, neurological, reproductive and endocrine disorders, so that when there are physiological changes the sympathetic nervous system will inhibit hypothalamic activation resulting in inhibition of ACTH which increases cortisol secretion and causes stress.<sup>5</sup>

In **Table 4**, it was found that respondents who did not carry out light physical activity showed a higher level of stress. Meanwhile, respondents who did strenuous physical activity showed lower levels of stress. Using the Pearson Chi-Square test, the relationship between light physical activity and stress level was significant with a p-value <0.001, and odds ratio (OR) = 16.000. These results indicate that respondents who did not carry out strenuous physical activity had a 16 times greater chance of severe stress.

In a previous report conducted on Alam Sutera hospital employees aged 23-54 years, it showed a significant relationship between physical activity and stress levels.<sup>16</sup> In another study conducted on Surabaya State University students aged 17-23 years, there was no significant relationship between physical activity and stress levels.<sup>27</sup> In research conducted on previous research at the Budi Luhur Yogyakarta PSTW Center, it was found that 75% of people who had high levels of stress were due to a lack of support from their families. From the research report, it

was found that there is an equation for risk factors for family problems that can cause stress in the elderly.<sup>28</sup>

Research on elderly aged 60-74 years shows the significance of the relationship between physical activity and stress levels. This difference is thought to be due to the difference in age of the respondents. Where as the age of the respondents increases, physical activity becomes the main factor for maintaining mental, psychological and social productivity.<sup>29</sup> Physical activity will activate the sympathetic nervous system and then inhibit the hypothalamus, so that adenocorticotrophic (ACTH) is inhibited and causes a decrease in cortisol secretion which results in stress. Physical activity can also improve cognitive function in the elderly by increasing blood flow to the brain to form brain neurotransmitters, thereby reducing setbacks in dealing with stressors that lead to stress such as loss of physical abilities.<sup>30</sup> The age range for the elderly at the Bina Bhakti Werdha Nursing Home is 56-84 years and over, who are vulnerable to psychological and neurological disorders that can affect stress levels.<sup>22</sup>

## Conclusion

The results of this study are in accordance with the hypothesis which states that there is a significant relationship between physical activity and stress levels in the elderly aged 60-74 years living at the Bina Bhakti Werdha Nursing Home. The odds ratio of 16,000 shows that elderly people aged 60-74 who do not do physical activity have a 16-fold risk of experiencing stress.

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