

The Effectiveness of Balance Exercise for Older People in Posyandu Wreda Pratama Padukuhan Kalirandu, Bangunjiwo, Kasihan, Bantul Yogyakarta

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Abstract— Aging is a natural process characterized by the decrease in the function of various organs of the body. This process is causing older people to have the risk of various health problems. One of the health problems this experienced by older people is body balance disorders. Body balance is influenced by complex and coordinated interactions of sensory components (visual, vestibular, and proprioceptive input) and motor or musculoskeletal responses. This research aims to provide an overview of the implementation of community nursing intervention and service in balance exercise to older people that have balance disorders in Padukahan Kalirandu, Bangunjiwo, Kasihan, Bantul, Yogyakarta. This study used A quasi-experiment method, which aims to determine the effectiveness of giving balance exercise interventions to older people. The sample in this study was 46 respondents. The location of this research was Posyandu Wreda Pratama Padukahan Kalirandu, Bangunjiwo, Kasihan, Bantul, Yogyakarta. The results of this study show A decrease in the average results of the body balance before and after the intervention was given. The results before the intervention are 13.93 seconds, and after the intervention, it was decreased to 12.13 seconds.

Keywords—older people, balance exercise

I. INTRODUCTION

According to the Indonesian Central Bureau of Statistics [1], the older people population in Indonesia has increased. In 2014, the population of the older people was 20.24 million, and in 2017 it was 23.4 million. Older people who are placed in rural areas are 50.36%, and those who live in urban areas are 49.64%. The highest population of older people from each region in Indonesia, as stated by the National Older people Day Activities (HALUN), are found in Special Region of Yogyakarta (DIY) which ranked first with a percentage of 13.9%. The second was Central Java as much as 12.46% and the lowest percentage was in Papua with a percentage of 2.8% [2].

Aging is a natural process characterized by the decrease in the function of various organs of the body. This biological process is slowly causing older people to face the

risk of experiencing various health problems. One of the health problems experienced by older people is a body balance disorder. Body balance is dependent on complex and coordinated interactions of sensory components (visual, vestibular, and proprioceptive input) and motor or musculoskeletal responses. Both are controlled through various central nervous systems or central mechanisms [3][4].

Musculoskeletal changes that occur in the older people are degradation of bone, muscle joints, and connective tissues strength. There is a decrease in the absorption of calcium which causes bones to become porous. The joint experiences a decreased of synovial fluid viscosity and degenerative changes in the joints. These changes is the cause of a decrease in flexibility, limited flexion, and extension of the joints. Other changes that greatly affect the body's balance are changes in the nervous system [5]. Allah SWT has explained about His power towards His servants whom He been created. In which the Creation of Allah SWT who is an adult with a strong condition, then the older people who experience a weaker state. The word of Allah SWT is stated in QS. Ar - Rum (refers to Shahih International) verse 54 [6]:

﴿اللَّهُ الَّذِي خَلَقَكُمْ مِنْ ضَعْفٍ ثُمَّ جَعَلَ مِنْ بَعْدِ ضَعْفٍ قُوَّةً ثُمَّ جَعَلَ مِنْ بَعْدِ قُوَّةٍ ضَعْفًا وَشَيْبَةً يَخْلُقُ مَا يَشَاءُ وَهُوَ الْعَلِيمُ الْقَدِيرُ﴾

Meaning: (Sahih International) “Allah is the one who created you from weakness, then made after weakness strength, then made after strength weakness and white hair. He creates what He wills, and He is the Knowing, the Competent”.

A result of the interview with the caregiver of the older people in Posyandu Wreda Pratama found that there was no program designed to prevent body balance disorders, falls, and injuries for the elderly. Program of Puskesmas Kasihan 1 itself does not include balance disorders prevention or intervention for older people. Community health nurses as health professional who are close to the community including the older people have a

substantial role in preventing balance disorders, falls, and injuries. Community health nurses used the nursing care approach and nursing services in these promotive-preventive efforts.

II. METHODS

The methodology of this study was quasi-experimental, which aims to determine the effectiveness of balance exercise interventions to older people [7]. The criteria of inclusion and exclusion of samples in this study are:

Inclusion criteria:

- A) Willing to be a research respondent
- B) There was no movement disorder

Exclusion criteria:

- A. Older people who were absent during the intervention 4 time
- B. Using motion aid

III. RESULT

Characteristics distribution of the respondents in this study consists of age, gender, education, job, and disease history presented in table 4.1. The total respondents in this study were 46 people. Based on research conducted in October 2018, the results are as follows:

Table 4.1 Demographic Data Frequency Distribution Respondents consists of Age, Gender, Education, Job and Older people History in the Wreda Pratama (n = 46)

No	Characteristic	Frequent	Percentage %
1	Gender		
	Male	15	32,6
	Female	31	67,4
2	Age		
	60-74 years old	24	52,2
	75-90 years old	22	47,8
3	Education	5	10,9
	Not educated	4	8,7
	Did not complete elementary school	12	26,1
	Elementary School	6	13
	Junior High School	11	23,9
	Senior High School College	8	17,4
4	Job		
	Pensionary	9	19,6
	Housewife	22	47,8
	Laborer	6	13
	Entrepreneur	9	19,6
5	History of Disease		
	Hypertension		
	Diabetes Mellitus	11	23,9
	Hearth Disease	5	10,9
	Asthma	4	8,7
	Hypotension	2	4,3
No History Disease	1	2,2	
		23	50

Source: Primary Data (2018)

Table 4.1 shows that the characteristics of female respondents in Posyandu Wreda Pratama were 31 respondents (67.4%), in the age range of 60-74 years were 24 respondents (52.2%), had a history of elementary school education (SD) were 12 respondents (26.1%), the majority worked as housewives were 22 respondents (47.8%), and did not have a history of disease were 23 respondents (50%).

Table 4.2 Description of body balance (risk of fall) in the community of older people in Wreda Pratama (n = 46)

	Mean	SD
Body balance	13,93	1,88

Source: Primary Data (2018)

Table 4.2 shows that the average body balance score of the respondents are 13,93 with a standard deviation of 1.88 . It can be concluded that the older people’s body balance is impaired since the normal mean which is 12 based on CDC score [8].

IV. DISCUSSION

1. Characteristics of Respondents Age, Gender, Education, Job, and Disease History

A. Age

The majority of the age characteristics in this study are in the age range of 60-74 years (52.2%) which have fall risk. As the older people get older, the body will have more massive change in muscle strength, gait, walking strength, body function in general [9]. The condition of the body which has decreased is in accordance to the word of Allah in QS Ar-Rum verse 54 [6]: Sahih International “Allah is the one who created you from weakness, then made after weakness strength, then made after strength weakness and white hair. He creates what He wills, and He is the Knowing, the Competent”.

As the older people getting old, they will go through a change in psychological function resulting in degenerative disorders. One of degenerative disorder that often occurs is a musculoskeletal disorder that can increase the risk of falls in older people [10]. The increase of age in older people can increase the risk of fall and is caused by several factors which consist of age, pathological conditions, environmental factors, physical, psychological, financial, cognitive and religiosity changes [11][12].

The result of research by Susilo, Limyat & Gunawan [12] explained that age influence risk falls significantly (value of p = 0.019; OR = 9), which can be interpreted that the more a person ages, the person have 9 times higher risk of fall. Age is one of the factors that cause most the older people to fall. This is caused by morphological changes in muscles that can cause functional changes in the muscles strength and contraction of muscle, elasticity, and flexibility of muscle and speed of movement. Decreasing muscle function and strength will cause a decrease in the ability of the older people to maintaining body balance [13][14].

The disruption in the balance of the body are the effects of aging, accidents, and disease factors, but out of all of them, aging is the main factor that causes most the occurrence of body balance disorders in the older people [13][15]. As people age, the body will go through degeneration and decrease in their ability to carry out daily life activities. Also the flexibility will decrease and cause greater risk of fall. According to the results of research conducted by Gupta, Yadav, & Malhotra [16], from 265 patients of older people, there are 23.4% experiencing decreased ability to carry out daily activities, 70% of them were aged at 60-69 years, and aged >80 years had a decreased ability to carry out daily activities – even more significantly.

B. Gender

This study explained that there are significantly more female respondents than men, that are 31 respondents (67.4%). Women's life expectancy is higher than that of men. In accordance to the Indonesian Ministry of Health [17] it is explained that the women's life expectancy is higher (9.53) than men (8.54). It is seen from the fact that the number of female older people is more than the male one. This study is also in line with Deniro research [13] which explained that women have a life expectancy of 2.1% higher than men aged 60 years and 1.3% higher at 70 years of age. Clinically, women have a greater risk of fall than men. It occurs after female older people experienced menopause which causes a decrease in bone mass by 7% while in men is only around 1%. Reduced bone mass is caused by the decrease in the amount of the estrogen hormone, which causes osteoclastogenesis to reduce. Osteoclasts are bone cells that influence the degenerative process of the bone. If a degenerative disorder is characterized by a decrease in bone mass, this will result in an imbalance between resorption of calcium and bone formation. The imbalance is due to several factors which consists of aging factor and reduced gonadal (genital) gland function. Based on the explanation above, it can be concluded that gender of female has a higher fall risk than men [5][12].

C. Education

Based on the results, the highest educational level were 12 respondents who have the background of elementary school (12.1%). People with satisfactory level of education is expected to be able to improve knowledge and understanding in this case in terms of health and self-care however. The results of the study showed that the level of education is quite low. The results of this study showed that the level of formal education level is still relatively low which was caused by the economic conditions of respondents who have low income so that they prioritize to work rather than to continue to take higher education. The low level of education of a person will influence the level of knowledge in the prevention to fall [18].

D. Job

The job characteristics of the respondents are housewives with 22 respondents (47.8%). The number of jobs as housewives/ not working is caused by the majority

of the respondents are women. Job related to daily activities can affect strength, flexibility, and balance in motion functions and tissue resistance. The majority of respondents in this study have a job as housewives. Housewife has a more active level of activity which requires greater muscle flexibility and endurance. A person who is active in carrying out physical activity has a positive effect on muscle strength and prevents the progress of muscle weakening when they get older. The high risk of falls in the older people who are not active is caused by the decrease in muscle strength which cause changes in muscle performance, and it affects the balance when the older people do physical activity [16][19][20].

Bad balance during physical activity can cause a risk of fall. The older people who are active while carrying out physical activities will have many movements. It will cause contraction of muscle. The contractile of protein synthesis will be faster. It will increase the actin filaments and myosin in myofibrils which will increase muscle mass. Increased muscle mass will affect the increase in components of muscle metabolism, that is ATP, which has an impact on increasing muscle strength. Optimal muscle strength will help older people to keep their body balance [13][15].

E. Disease History

Based on the results of the study, the majority of respondents had no disease history of 23 respondents (50%). A history of chronic diseases is one of the factors that influence the psychosocial changes of older people in dealing with health problems. Older people health problems will affect the older people in socializing with the environment so that the older people will have a higher risk to fall [21]. The prevalence of chronic older people disease in South Jakarta showed that 61.4% of the older people that experienced joint disease have a higher risk of falls. One of the chronic diseases experienced by older people who often cause the risk of collapsing is osteoarthritis. Osteoarthritis is an illness of the joints that move. The joints most often affected by osteoarthritis are joints that work as bearers of the body. It consists of the knee, pelvis, lumbar vertebra, cervix, and joints of the fingers. The disease can be the cause of the musculoskeletal system disorders. Someone who is exposed to this disease will experience pain and stiffness in the joints. This disease will cause restricted movement caused by decreased function of the bone and joints to support the body. These conditions might worsen the productivity of the older people and allow for changes in gait to be abnormal, and increase older people's risk of falls [22][23].

2. Body Balance (Falls Risk)

The risk of falls also decreased in the community of older people in Wreda Pratama after undergoing exercise four times in a month every Sunday in 30-45 minutes. The results of the study showed that an increase in body balance in older people with body balance disorders. The TUGT value decreased from 13.93 to 12.13 (a decrease of 1.8 seconds) ($p = 0,000$). Increasing body balance through a decrease in TUGT value proves that balance exercise is part

of the effective nursing intervention models to overcome balance disorders to prevent falls prevent falls.

These results are confirmed by research by Miko, Szerb, Szerb, and Poor [24] in Hungary. Twelve months of balance exercise with a duration of 3 times a week for 30 minutes improves older people body balance ($p = 0.005$; TUGT value from 8.89 seconds to 6.74 seconds). Older people who became a respondent as many as 100 people in which the age more than 65 years old. The average decrease in TUGT is 0.18 seconds a month. The results differ from those obtained by researchers. It caused some older people are still vigorous in carrying out daily activities independently.

Another study supporting the results of the study was Hirase, Inokuchi, Matsusaka, and Okita [25] who conducted research in Japan on 45 older people with an average age of 83.1 years old. His results showed that balance exercises performed once a week for 6 months with a duration of 1 hour per session significantly improved body balance (p -value = 0.009). Further results of the analysis showed that the value of TUGT decreased from 15.9 to 13.9. While in the control group it increased from 14.3 to 15.0.

The older people who join balance exercise will have a good balance the body. A good balance of the body will minimize the risk of fall. Nurses and posyandu volunteer can collaborate to always monitor balance exercise programs. This exercise is important in order to improve balance, muscle strength, and flexibility in maintaining aging body functions.

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