



Physical Activity Three-In-One Method Accompaniment as a form Elderly Empowerment to Prevent the Decline of Elderly Cognitive Function

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ABSTRACT

Objective: Degenerative disease is a health problem for the elderly, including the decline of cognitive function. The decline in cognitive function is closely related to physical activity, which can stimulate nerve growth and suppress cognitive decline. During physical activity, the brain is stimulated by Brain-Derived Neurotrophic Factors (BDNF). It plays a role in maintaining the health of nerve cells. This study aims to determine the impact of activities of the three-in-one method accompaniment as a form of elderly empowerment to prevent the decline of cognitive function. **Methods:** This study method uses a quasi-experimental pre-test and post-test design with a sample of 30 people. **Results:** The results of the study indicate the activity of the three-in-one method has an impact on the cognitive function of the elderly. **Conclusions:** Furthermore, it is recommended for the elderly to be encouraged to do activities or exercise individually or in a group based on the method of three-in-one. For further research, more detailed studies on other age groups are recommended.

Keywords: Three-in one method, Physical activities, Cognitive function, Elderly, Empowerment

INTRODUCTION

Successful development in the health sector impacts increasing life expectancy (UHH), 71.34 years in 2019, and an increasing number of elderlies grows almost in all countries [1]. An increasing number of elderlies in Indonesia will reach the highest level globally, around 414% [2]. Aging begins with the degeneration of cells. The number of cells is getting smaller, and the size is getting bigger, while the fluid in the body is getting less, so the mechanism of cell repair is disrupted [3].

The number of elderly people in Indonesia in the coming years will reach the highest level in the world, around 414% [2]. In addition to aging problems, the elderly often has physical limitations and are prone to disease.

Naturally, increasing age will bring changes or degeneration with the manifestation of several diseases. The decline in old age begins with the degeneration of body cells. The number of cells is decreasing, and the size is getting bigger, while the amount of fluid in the body is decreasing, so the mechanism of cell repair is disrupted. These cellular changes affect the function of tissues or organs of the body [3].

The increasing proportion of the elderly has caused several health problems in the elderly. In 2050 around 75% of the elderly will suffer from degenerative diseases and cannot move. One of the disorders due to degenerative processes in the elderly is a decrease in cognitive function. Cognitive function is a mental process in obtaining knowledge or abilities and intelligence, which includes ways of thinking, memory, understanding, planning, and implementation [4].

The decline in cognitive function can be inhibited by taking preventive measures. One of the preventive actions that can be taken by the elderly is to increase physical activity [5]. Physical activity is thought to stimulate nerve growth which may inhibit cognitive decline in the elderly [6]. When doing physical activity, the brain will be stimulated so that it can increase a protein in the brain called Brain-Derived Neurotrophic Factor [2]. This BDNF protein is essential in keeping nerve cells fit and healthy. If BDNF levels are low, it will cause senility. However, most of the elderly reduce their physical activity because they feel physical activity such as sports are not suitable for their lifestyle, even though some of them are aware of the benefits [7].

The decline in cognitive function can be suppressed by doing physical activity [8]. During physical activity, the brain increases the protein Brain-Derived Neurotrophic Factor, which functions to maintain neurological fitness. The three-in-one movement's method for the elderly are-

- Walking five times a week.
- Walking with heels three times a week.
- Pressing both hands against the wall two times a week.

Physical activity can stimulate nerve growth which may inhibit the decline in cognitive function of the elderly [9]. When doing physical activities, the brain will be stimulated; as a result, it can increase the protein in the brain in Brain-Derived Neurotrophic Factors [2]. This BDNF protein plays a crucial role in keeping nerve cells fit and healthy. If BDNF levels are low, it will lead to senility. However, most of the elderly reduce their physical activities because they feel that physical activities such as sports are not suitable for their lifestyle, although some are aware of the benefits [7].

Empowerment essentially aims to help clients gain power, strength, and ability to make decisions and actions to be taken and relate to the client self, including reducing personal and social obstacles in taking action. People who have achieved their goals are empowered through their independence. Even it is imperative to be more empowered through their efforts without depending on external help [10]. Associated with the changes that occur in the elderly, physiologically will experience various setbacks (degenerative), including cognitive function. However, the elderly must still be empowered through physical activity accompaniment, including through the three-in-one method of movement, to prevent pathological cognitive decline.

MATERIALS AND METHOD

This study uses a quasi-experimental method pre-test-post-test design. The elderly in this study were 30 people aged 60 years-70 years, divided into two groups (treatment group and control group), able to communicate and have normal general conditions. Data collection was carried out by measuring cognitive function before carrying out physical activities with the three-in-one method using the Mini-Mental State Examination/MMSE instrument.

Furthermore, empowerment is carried out through mentoring the elderly in carrying out physical activities with the three-in-one method for one month, namely:

- Walking five times per week as a light intensity exercise.
- Walking with heels three times per week as a balance exercise.
- Pressing both hands against a wall twice per week as a strength or endurance exercise.

Furthermore, the measurement of cognitive function was carried out again with the same instrument, data from the measurement results. Then the data was processed and analyzed by univariate (mean) and bivariate (T-test). This research has obtained ethical clearance with No. 25/KEPK/EC/V/2020 at Poltekkes Kemenkes Bandung.

RESULTS

In general, the results showed that the movement of the three-in-one method affected the cognitive function of the elderly. The cognitive function score increased by 1.86. In particular, the score before carrying out the three-in-one method was 24.67, and after that, it became 26.53 (Figure 1).

Table 1 Cognitive function of the elderly before carrying out the three-in-one physical activity method

Cognitive function of the elderly before carrying out the three in one physical activity method	Mean	SD	Skor Min	Skor Maks
	24.67	2.35	22	28

The table above shows the average cognitive function score of the elderly before carrying out physical activities using the three-in-one method of 24.67 (Table 1).

Table 2 Cognitive function of the elderly after carrying out the three-in-one physical activity method

Cognitive function of the elderly after carrying out the three in one physical activity method	Mean	SD	Skor Min	Skor Maks
	26.53	2.386	26	30

The table above shows the average cognitive function score of the elderly after carrying out physical activities using the three-in-one method of 26.53 (Table 2).

Table 3 The Impact of the three-in-one method of physical activity on the cognitive function of the elderly

Elderly Cognitive Functions	Mean	SD	Skor Min	Skor Maks	p-Value
before carrying out the three in one physical activity method	24.67	2.35	22	28	0
after carrying out the three in one physical activity method	26.53	2.386	26	30	

The table above shows the p-value in the intervention group of 0.000, which means that the three-in-one physical activity method impacts the cognitive function of the elderly (Table 3).

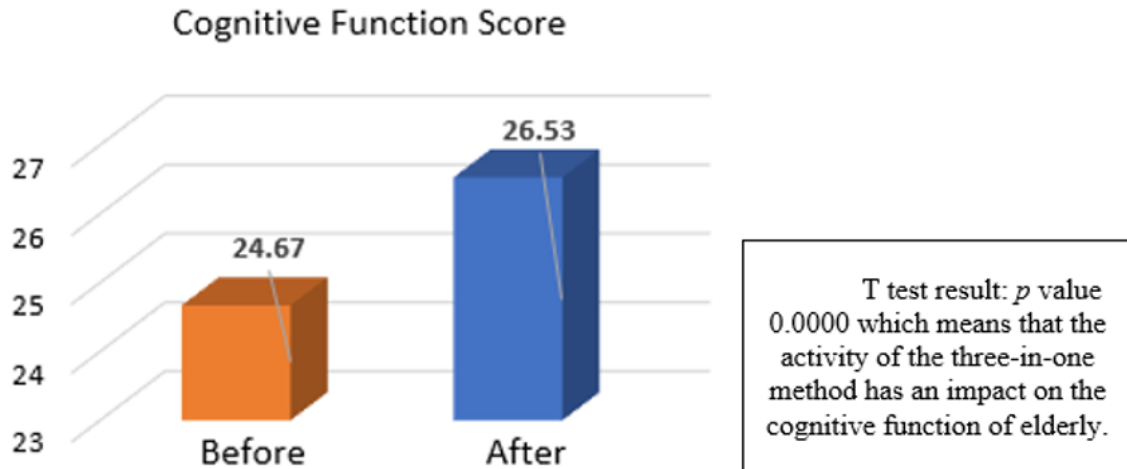


Figure 1 The Average cognitive function before and after the intervention of three-in-one physical activity

DISCUSSION

The average cognitive function before the method of three-in-one physical activity was 24.67, and one month after running the method of three-in-one physical activity, the average cognitive function was 26.53, quantitatively the cognitive function value increased to 1.86, with a p value of 0.00. The method of three-in-one physical activity affects cognitive function. Vance et al. propose activities regulating metabolism energy and synaptic plasticity and there is a relationship between the levels of physical activity with cognitive function in the elderly [11,12]. Brain-Derived Neurotrophic Factor (BDNF) interacts with Adenosine Monophosphate-Activated Protein Kinase (AMPK) and Mitochondrial Detachment Protein 2 (UCP2) in metabolism energy. In addition, motion increases blood flow to the brain and supports the growth of nerve cells [13].

Other studies support this, which state that there is a relationship between physical activity levels and cognitive function in the elderly [12]. Physical activity will also affect blood flow to the brain and reduce the activity of the inflammatory system. Cognitive function is conscious mental activity such as thinking, remembering, learning, and using language. Cognitive functions include attention, memory, judgment, problem-solving, and executive abilities such as planning, evaluating, monitoring, and evaluating [13].

The decline in cognitive function can be suppressed by movements [14]. Physical activity stimulates nerve growth and can reduce cognitive decline in the elderly [7]. During taking three-in-one movement, the brain is stimulated to increase BDNF. It plays a role in maintaining healthy nerve cells. On the other hand, the elderly tends to reduce their movements because they consider them incompatible with their lifestyle, although some of them are aware of their benefits [3].

Physical activity or exercise affects cognitive function by regulating energy metabolism and synaptic plasticity. The molecular system that plays a role in this is the Brain-Derived Neurotrophic Factor (BDNF). Exercise increases the volume of brain structures, including the hippocampus, and affects the production of BDNF. BDNF will interact with other molecular systems in the brain involved in energy metabolisms, such as 5'-Adenosine Monophosphate-Activated Protein Kinase (AMPK) and Mitochondrial Detachment Protein 2 (UCP2) [3]. This molecular system will provide signals to the brain related to energy homeostasis, which leads to the regulation of synaptic plasticity and cognitive function. BDNF as a Neurotrophic factor will interact with other Neurotrophic factors, namely Insulin Growth Factor 1 (IGF1) and Vascular Endothelial Growth Factor (VEGF). Exercise increases the production of BDNF. In addition, exercise increases blood flow to the brain, which supports nerve cell growth and function [14].

The decline in cognitive function ranges from mild cognitive impairment to the onset of dementia. Mild cognitive impairment is a disease in which cognitive function declines with age. In general, the elderly is claimed to have cognitive impairment or dementia if there has been atrophy of the central nervous system, with disturbance progressive without consciousness clinical manifestations [1]. Dementia has an impact on dysfunction in the fulfilment of daily activities. Physical activity can stimulate nerve growth, inhibiting the decline in cognitive function in the elderly [15]. During physical activity, the brain will be stimulated to increase the production of a protein in the brain called Brain Derived Neurotropic Factor (BDNF) [3]. This BDNF protein plays an essential role in maintaining the health of nerve cells. If BDNF levels are low, it leads to senility. However, most of the elderly reduce their physical activity because they feel physical activity such as sports are not under their lifestyle, although some are aware of the benefits [3].

CONCLUSION

- Physical activity with the three-in-one method of movement can prevent cognitive decline in the elderly.
- Accompaniment/Mentoring physical activity with the three-in-one method for the elderly can be a form of empowerment to prevent cognitive decline in the elderly.

RECOMMENDATIONS

Elderly Group Manager

- Physical activity through the three-in-one method of movement is carried out routinely.
- Implementations of physical activity three-in-one method can be carried out individually or collectively.

Intended for Further Research

- Research various physical activities in more detail and a broader sample.
- Develop a more in-depth study of the impact of three-in-one physical activity on cognitive function at a young age, considering that cognitive function disorders are currently common in pre-elderly accompanied by improvements in other healthy lifestyles.

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DECLARATIONS

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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