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R E S E A R C H **Open Access**

Exercise Program: Tai Chi and Cognitive Stimulation to Improve Health Status of Elderly in Nursing Homes

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Abstract
The structure of the aging population reflects the higher average life expectancy, which possesses an impact on the emergence of degenerative non-communicable diseases. Promotive effort through an exercise program (tai-chi exercise and cognitive stimulation) is required for the elderly to enhance their physical and mental health. This study aims to determine an overview of the exercise program's effectiveness on the health status of the elderly in nursing homes. The research method administered Quasi experiment with a control group design. The sample was the elderly who live in nursing homes. This study employed simple random sampling with a total sample of 116 people in 2 provinces: DKI Jakarta and South Sumatra Province. The statistical test utilized a t-test and multiple linear regression test. The results revealed that there was a difference in the average value of the health status of the elderly before and after the exercise programs in the intervention group (p-value = 0.001), there was a difference in the average value of the health status of the elderly between the intervention group and the control group after the exercise intervention program (p-value = 0.001), there was a relationship between the length of stay in the orphanage on the health status of the elderly. Recommendation: the resulting exercise program can be employed as complementary therapies replicated more extensively in various health care settings.

Keywords: Tai Chi Exercise, Cognitive Stimulation, Health Status, Elderly.

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1. INTRODUCTION

The elderly population continues to increase globally. Recently, the population of 11 member countries of the WHO (World Health Organization) in the Southeast Asia region aged over 60 years and over amounted to 142 million. The two largest ASEAN countries are Singapore, 9%, and Thailand, 7%. Indonesia is estimated to possess an increasing elderly population higher than other countries in Asia and globally after 2050. The results of the 2010 population census explained that Indonesia is lately encompassed in the top 5 countries with the largest number of elderly in the world (Kementerian Kesehatan Republik Indonesia, 2019).

The aging population structure reflects an increasing average life expectancy of the population in Indonesia. The high life expectancy is one of the success indicators in achieving national development, particularly in the health sector (Kementerian Kesehatan Republik Indonesia, 2016). The increasing life expectancy is performed by improving health status through enhancing nutrition, sanitation, health services, education, and economic progress. However, with the growing age, physiological functions decrease due to the aging process or are affected by the illness suffered by the elderly such as heart disease, diabetes mellitus, stroke, rheumatism, and injury (Kementerian Kesehatan Republik Indonesia, 2018).

Government efforts to empower and improve the welfare of the elderly are conducted in an integrated manner across programs and sectors.These efforts are intended to maintain the healthy living, independency, and productivity of the elderly (Kementerian Kesehatan Republik Indonesia, 2014). Efforts developed to support these policies encompass promotive and preventive efforts, which are essential to reducing morbidity in the elderly. Health promotion is a health advocacy process to improve clients' support, professionals, and the public for positive health practices and to uphold the elderly change their lifestyle to move towards an optimal state of health (Allender, et al., 2014). Health promotion is performed to support the empowerment of the elderly in enhancing their healthy lifestyle. One form of health promotion is an exercise program for the elderly to improve physical fitness and mental health. Hence, tai chi and cognitive stimulation are exercise programs as complementary therapies in nursing which are suitable to be practiced by the elderly.

Complementary therapy is a treatment technique to improve healing through connectivity between the body-mind-spirit of each individual (Lindquist, et al., 2014). Complementary therapies in nursing are utilized as techniques/interventions assisting nurses in integrating the physical, mental, emotional, and spiritual dimensions of nursing. The optimal aging process involves a healthy mind, body, and spirit that can maintain the elderly′s independence, community involvement, and quality of life (Hallisy, 2019). Accordingly, Tai chi is a suitable exercise for the elderly as a mind-body exercise that affects physical, mental, and social health.

Tai chi exercise starts with meditation movements to calm the mind and then light movements to improve blood circulation. Then, a full concentration was performed on the abdominal area just below the navel, which is the center of gravity. After that, it was conducted the formation of Tai chi movements in which each movement with deep breathing (Sutanto, J., 2015). Tai chi can enhance the health status of the elderly, as illustrated by the research finding (Raman, et al., 2013), that tai-chi significantly enhances sleep quality in healthy adults and patients with chronic health problems,

improves health, including physical appearance, decreases pain, and produces psychological well-being. This study is also corroborated by research conducted by (Kong, et al., 2016) revealing that tai chi performed within five weeks could reduce chronic pain because of osteoarthritis. Research result by (Yogisutanti, et al., 2018) discovered that there was an effect of Tai chi exercise on the flexibility and muscle strength of the extremities in the elderly. Movement exercises through Tai chi gymnastics increase muscle strength and flexibility of the extremities in the elderly by training the muscles and movements. Thus, the elderly can be physically prepared, and daily activities can be performed productively. Tai chi can uphold the total score of the elderly's quality of life, including general health status, vitality, and mental health. (Pereira, et al., 2017).

The elderly require a regular exercise program to improve their physical and mental health to remain healthy, independent, and productive. The study aims to identify an overview of the effect of the tai chi exercise program and cognitive stimulation on improving the health status of the elderly.

2. RESEARCH METHOD

This study employed a quasi-experimental pre-posttest design with a control group design. The population was elderly living in nursing homes. Meanwhile, the sample was elderly with inclusion criteria: aged 60 years and over, living in nursing homes, not resting, not experiencing visual and hearing impairments, willing to be respondents, and able to read and write. The sampling strategy used simple random sampling. The sample size was 120 people (60 intervention groups and 60 control groups). In the implementation of the study, the sample excluded four people due to their declining health conditions, so that the number of samples became 116 people. This research was conducted in DKI Jakarta in 2 nursing homes (1 nursing home for the intervention group and one nursing home for the control group) and in South Sumatra Province, which utilized two nursing homes. The nursing home was chosen to understand that it would be used as a practice site for the students. All respondents have explained the study and given their informed agreement to participate by signing the informed consent form. Univariate, bivariate, and multivariate analyses were utilized to analyze the data. The dependent and independent t-tests and the Multiple Linear Regression Test were utilized in the statistical analysis. The researcher acquired authorization to research the Province Health Office DKI Jakarta and ethical clearance from the Ethics Committee of Health Polytechnic Jakarta II of the Ministry of Health No. LB.02.01/KE/L/167/2016 before beginning the study.

The exercise program (Tai Chi Gymnastics and Cognitive Stimulation) were performed for the elderly through the following stages: 1) Performing tai chi exercises beginning with meditation to calm the mind through breathing regulation, then warming up with light movements and continuing with various movements of the hands and feet at a slow speed, which is completed in groups by the elderly; and 2) Applying cognitive stimulation through reality orientation therapy, memory therapy, and puzzle games. The exercise program, which is a combination of tai chi exercise and cognitive stimulation, was applied through the following activities: 1) Conducting training for nurses in nursing homes by the researcher on the exercise programs for the elderly (training is conducted in 1 day); 2) Training the elderly to involve in tai chi exercises and cognitive stimulation two times a week for eight weeks in which the activities were performed eight times with guidance and eight times independently by utilizing a monitoring book;

The frequency of exercise which was two times a week is based on the results of previous research and follows the schedule of gymnastics activities at nursing homes. Thus, it is easier to integrate the exercise program into routine gymnastics activities at the nursing homes:3) Evaluating the exercise program by assessing the health status and cognitive function of the elderly before and after the intervention (Zhang, et al., 2012).

The instrument used to assess the health of the elderly was a modified version of the Short-Form Health Survey (SF-12) developed by researchers. Researchers have utilized this device in past studies (Riasmini, et.al., 2019). The SF-12 is a 12-item questionnaire with a Likert scale of 1 to 5. The physical component summary (PCS) and mental component summary (MCS) values were utilized to calculate the SF-12 scale of 1-60. A higher score meant the client's physical and mental health was in better shape. The support of health workers was examined using a modified questionnaire from the MOS social support survey, which consisted of 20 items with a 0-3 Likert scale and measured changed emotional, reward, informational, and instrumental support.

3. RESULTS AND DISCUSSION

Table 1. Respondents characteristic scores based on age, length of stay in nursing homes and support from health workers.

Variable	Group	N	Mean	Median	SD	Min-Max
Age	Intervention	57	70,70	70	9,805	60-88
	Control	59	69,51	68	6,678	60-78
Length of stay in the nursing homes	Intervention	57	44,80	36	55,367	1-319
	Control	59	36,17	28	28,534	2-120
Health Worker Support	Intervention	57	33,72	30	12,588	0-73
	Control	59	30,56	31	9,511	3-46

Results of the The analysis revealed the average age of the elderly in the two groups was almost the same (around 70 years), while the youngest age was 60 years and the oldest was 88 years. The length of stay in the nursing home between the intervention and control groups was almost similar: between 3-4 years. The support of health workers was almost the same in both groups: around 30. After being categorized, it was discovered that the support of health workers for the elderly was half adequate, and the other half was inadequate.

Table 2. Distribution Characteristics of Respondents by Sex, Marital Status, and Education.

Variable	Intervention Group		Control Group		Total	
	N	%	N	%	N	%
Sex						
Men	28	49,1	28	47,5	56	47,83
Women	29	50,9	31	52,5	60	52,17
Marital status						
Married	7	12,3	1	1,7	8	6,95
Widowed/Separated	44	77,2	51	86,4	95	82,60
Single	6	10,5	7	7	13	10,45
Education						
Primary School	49	86	51	86,4	100	86,20
Secondary School	8	14	8	13,6	16	13,8

The results analysis of the characteristics presented that most respondents were women, with widowed/separated, marital status, and primary school of education.

Table 3. Analysis of Elderly Health Status Before and After Intervention Exercise Program.

Variable	Group	Mean	SD	95% CI	t	*p-value**
Health Status	Intervention Group					
	Before	40,28	6,155	(-5,050) – (-1,933)	-4,487	0,001
	After	43,77	5,477			
	Difference	3,49	0,678			
	Control Group					
	Before	39,08	4,790	(-0,401) – (1,181)	0,987	0,328
	After	38,69	4,352			
	Difference	0,39	0,438			

**Dependent t-test*

The analysis results presented a significant difference in the health status of the elderly in the intervention group before and after the exercise program intervention (p-value = 0.001), with an average difference of 3.49. Meanwhile, in the control group, there was no significant difference in the cognitive function of the elderly (p-value = 0.328)(Table 3).

The study results illustrate that the average health status of the elderly was still good because the elderly were still able to perform activities. However, nearly all of the senior people in this study had health issues such as knee pain, sleep problems, high blood pressure, and urine problems. The reduction of body cells causes health difficulties in the elderly, resulting in a decrease in body function and endurance and a rise in disease risk factors. Malnutrition, balance issues, and abrupt bewilderment are common health problems in the elderly. In addition, hypertension, hearing and vision issues, dementia, osteoporosis, hypertension, and other degenerative disorders are all common in the elderly. This is in conformity with the study's findings Bestari & Wati, 2016, which found that there was a relationship between the number of chronic diseases they had on the anxiety of the elderly with chronic diseases, (p = 0.004). The elderly who possess more than one chronic disease have a three times greater risk of feeling anxious. Multiple chronic diseases can affect the ability of the elderly to function independently so that it possesses an impact on the low quality of life of the elderly.

Promotive and preventive efforts are essential factors that must be performed to reduce morbidity in the elderly. Furthermore, there must be effective coordination between the associated programs within the Ministry of Health and professional organizations to improve the health of the elderly. Promotive efforts through exercise programs, combining tai chi and cognitive stimulation, are expected to overcome various problems experienced by the elderly due to the aging process. Hallisy, 2019, stated that the optimal aging process involves a healthy mind, body, and spirit. Mobility is a key to maintaining independence, community involvement, and quality of life. Tai chi is a mind-body exercise that affects physical, mental, and social health.

The results of this study indicate a significant difference in the health status of the elderly in the intervention group before and after being provided the exercise program intervention of 3.49 points. Meanwhile, in the control group, there was no significant difference. There was even a decrease in the average value.

There was no significant change in the health status of the elderly in the control group. It is possible that this is due to the elderly's previous health issues, such as joint pain, hypertension, and other issues. Despite taking part in sporting activities that were consistently carried out in nursing homes, the elderly were unable to enhance their health. Even the average value of the elderly's health status dropped by 0.39 points. This demonstrated that tai chi exercise plays a significant effect on improving the health of the elderly. As a result, it is hoped that health staff in nursing homes will be able to continue tai chi exercise programs that are already part of the orphanage's regular sports activities. The involvement of health workers in the nursing home during the intervention and the assistance of tai chi exercise videos helped them implement these activities as a promotive effort for the elderly. The support of health workers and families needs to be increased to help the elderly perform regular exercise programs, thereby increasing the motivation of the elderly to conduct activities and reduce loneliness. It was in accordance with the results of the study (Kang, et al., 2018) which presented a significant effect between social support with physical activity and quality of life and that can reduce loneliness. Supported by research results (Keswara, 2017), it was found that there was a relationship between social interaction and loneliness. Good social interaction reduces loneliness experienced by the elderly. Exercise programs performed with fellow elderly with the support of health workers can increase interaction and provide feelings of pleasure because they can communicate with each other and share experiences.

Table 4. Analysis of the Health Status of the Elderly After Exercise Program Intervention.

Variable	Group	N	Mean	SD	95% CI	F	*p- value*
Health Status	Intervention	57	43,77	5,477	3,252 – 6,902	2,846	0,001
	Control	59	38,69	4,352			

**Independent t-test*

The analysis results presented a difference in the health status of the elderly between the intervention group and the control group after the exercise program intervention with a p-value = 0.001 (Table 4)**.**

The study results also discovered the differences in the health status of the elderly between the intervention group and the control group after the exercise program intervention. It proved that the health status of the elderly was better because they followed the exercise program regularly, which was twice a week for eight weeks. These differences presented that tai chi exercises and cognitive stimulation were periodically beneficial for the elderly. Supported by research results Djawa et al., 2017, it was revealed that there was a relationship between the activities of the elderly and the health status of the elderly. The elderly who are independent, able to meet their daily needs, are not dependent on their family members. Similar to the results of qualitative research Baga, et al., 2017, it is illustrated that physical activity performed by the elderly has a relationship with physical well-being in which they were still able to perform activities independently without assistive devices. Moreover, the elderly are motivated to stay healthy and feel fit and excited frequently.

Based on interviews with the elderly, information was obtained that the pain in the knees was reduced. The elderly were more able to hold back urination because, in tai chi, there was also a Kegel exercise. The elderly also stated that they slept more soundly. Research results corroborate these results (Raman, et al., 2013), that tai-chi

significantly improves sleep quality for healthy adults and patients with chronic health problems and enhances physical appearance, pain reduction, and psychological well-being. In accordance with the research results Hall, et al., 2017, it is discovered that tai chi effectively reduces pain and disability in patients with musculoskeletal disorders. Accordingly, research results by Yan et al., 2013, unveiled that Tai chi conducted for 12 weeks could reduce pain and improve physical function in the elderly with arthritis.

The results of the blood pressure examination discovered that the average blood pressure of the elderly who possessed hypertension decreased after regular tai chi exercises. Corroborated by research results (Guan, et al., 2020), it is stated that tai chi performed routinely for 12 weeks could lower systolic and diastolic blood pressure. Tai chi is a healthy physical activity that can help avoid essential hypertension and other chronic disorders. In addition, the elderly who practiced tai chi regularly felt more excited about engaging in events at the orphanage and felt healthier and more vital to move and satisfy their daily demands, according to the results of interviews. This conforms with the study's findings (Yogisutanti, et al., 2018). Tai Chi was proven to affect the elderly's flexibility and muscle strength in the extremities. By exercising the muscles and movement in the elderly, movement activities such as Tai Chi gymnastics can develop muscle strength and flexibility of the extremities, allowing the elderly to be physically trained. This allows the elderly to be more productive in their regular duties. Hosseini, et al., 2018, described that Tai chi effectively improves balance and the fear of falling risk and is considered a practical and valuable method for fall prevention in the elderly in the community.

Table 5. Effect of Elderly Characteristics on Health Status.

Variable	B	St. Error	Beta	t	*p-value**
Health Status					
Length of stay in the nursing home	0.044	0.022	0.263	1.982	0.053 0.000
Constant	33.092	2.971		11.140	

**Uji Regresi Linier Ganda*

Based on the multivariate multiple linear regression test results, it was revealed that only one independent variable (length of stay in the orphanage) possessed an effect on the dependent variable of the elderly health status with p-value = 0.053(Table 5). It indicates that in addition to the exercise program, there was a variable length of stay in the orphanage that contributes to the health status of the elderly.

The findings revealed that, in addition to the influence of the exercise program, the length of stay in the nursing home impacted the elderly's health. In both the intervention and control groups, the average length of stay in a nursing home was roughly 3-4 years, with the longest staying up to 26 years. According to the findings of interviews with orphanage nurses, the elderly who had lived at the orphanage and were self-sufficient at the time of entrance increasingly developed health difficulties as they grew older. There were senior adults whose health had deteriorated due to chronic conditions, including one of the respondents who dropped out due to their deteriorating condition and was hospitalized, preventing them from continuing the study. It was by the results of the study Kelly, et al., 2010, which stated discovered that length of stay was significantly associated with sex, marital status, and chronic disease conditions experienced by the elderly. The elderly who have lived in the nursing home experienced worthless blamed themselves, and felt abandoned by their family members (Moniung, et

al., 2015). The elderly also frequently experience loneliness due to the lack of interaction from family members. It is similar to the results of the study (Keswara, 2017). It was uncovered that around 58.1% of the elderly experienced loneliness in the nursing home, and it was discovered that there was a significant relationship between social interaction and loneliness. Therefore, tai chi exercise program and cognitive stimulation performed in groups were expected to increase interaction between the elderly so that the physical and mental health status of the elderly increases.

4. CONCLUSION

The exercise program (Tai Chi Gymnastics and Cognitive Stimulation) has been proven to improve the health status of the elderly effectively. As a result, it is envisaged that this training program can be used as one of the modalities and complementary therapies in nursing that can be developed for the elderly in the community and the post-care recovery phase, rather than just in nursing facilities. Nurses can use this training program as a guide to constructing various interventions for empowering the elderly in their communities.

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