

## **SQUARE STEPPING EXERCISE IMPROVE SHORT-TERM MEMORY IN ELDERLY**

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### **ABSTRACT**

*Elderly is an advanced process that has a lot of decline in function, one of the decline that occurs is memory. Short-term memory is the most decreased in the elderly. The purpose of this study was to examine the effects of Square Stepping Exercise (SSE) on Short-term memory in the elderly. This was a pre-test post-test group design. Twentyseven elderly (60 years and older, 85% women) were recruited. Participants are asked to memorize the pattern of steps that have been given, then follow step patterns on a 4 by 10 square-patterned SSE mat without viewing printed pattern diagrams. Participants do exercise 30-45 minutes / day, 3 times a week for 4 weeks. Short term memory evaluated using mini COG. Improvement of short-term memory occurs by 28, 93% ( $p = 0.001$ ). The results of the study is that the provision of Square Stepping Exercise can improve short-term memory in the elderly*

**Keywords:** Elderly, Square Stepping Exercise, Short-term memory

### **INTRODUCTION**

The elderly is a process that has a lot of decreased function, one of the decreases that happened is memory. The normal ageing decreasing memory happened because of physiology to the neurologist system. The change of brain structure will be happened, including the decrease of brain heavy and volume. Brain will decrease active neuron from substansia nigra and substansia alba [1]. So that create cognitive function decreased, one of it is short term memory. Physically activity that well prepared can give the positive impact to physiology capacity of human brain, one of the functions is short terms memory. The elderly that has exercised regularly, having motivation, having big self-dependent, decreasing chronic disease and increasing fit physically. The research showed that active individual physically much longer getting decreasing memory. Aerobic exercise intervention is shown cognitive increase and memory to the seniors. An elder by doing aerobic exercise regularly can improve their memory increasing, that caused by increasing vascularity in hippocampus area. This is proven by giving aerobic exercise issues the brain plasticity to elder [4]. Dual task exercise there are motoric exercises combined with memory exercise based on several researches is proven to increase short term to the elderly. Dual task exercise can increase executive function to the brain wire [5] and can increase brain plasticity related to memory function [6]. The research by Gregory et al, 2017 stated that by giving dual task exercise has been shown to improve memory function to the healthy aged.

Square stepping exercise (SSE) is one of the dual task exercises that combined stepping exercise to memorize the pattern of stepping. SSE is an exercise that can be done by self-exercise and group with lower price and easy to apply. This exercise use box square pattern with size is 25 cm<sup>2</sup> estimated 40 boxes to a floor mat. This exercise should be elder doing the pattern of stepping to the front, the back and besides [8]. The exercise is given by the pattern of stepping that has been set without to see the pattern created. The elderly asked to remember the pattern of stepping first before doing this exercise. By this task stepping to memorize the pattern is proven to increase memory to the elder. Texeira et al, 2013 stated that SSE can increase cognitive function; one of them is the health of elderly memory [9]. Besides that, Túbero et al, 2014 has done of

this related research that proving the patient with cerebrovascular can increase cognitive function after doing SSE exercise. The aim of this research is to find out the effect of SSE to increase short term memory to elder.

## METHODS

### Design

This research is done in nursing home Sejahtera Denpasar in April – May 2018. The subject is given SSE exercise 3 times in a week and doing for 4 weeks. The design of research was pre-test and post-test.

### Population and Sample

The population of this research was the elder that lived in the nursing home Sejahtera, Denpasar. The total sample of this research is 27 people that have fulfilled the criteria's as follows: the elder with the age of 60–74 years, there is no distraction problem to the lower extremities. Clear to see without any assistance and to use eyeglasses, have active communication, and there is no heart and lung distraction.

### Collecting data

The collecting data is done before and after doing SSE treatment. To give mark short term memory is done by measurement used to Mini Cognitive Assessment.

### Treatment Protocol

SSE teratment is done in 4 weeks, 30-45 minutes, 3 times a week. This research needs small effort, none to warm-up and cool-down. SSE is done in the mat with pattern is 25 cm<sup>2</sup> estimated 40 boxes. The elder asked to step forward, backward and beside for each pattern. For the sequence of teratment is related to the rate of difficult pattern. In this teratment program is given 4 different patterns. The participant followed the instruction to stepping that has been set without to look pattern created. Each pattern is repeated 10 times. In the first week the participant asked to do stepping pattern 1 and 2, in the second week the participant followed stepping pattern 1, 2 and 3 and for the third week and fourth the elder followed stepping pattern 1, 2, 3 and 4.

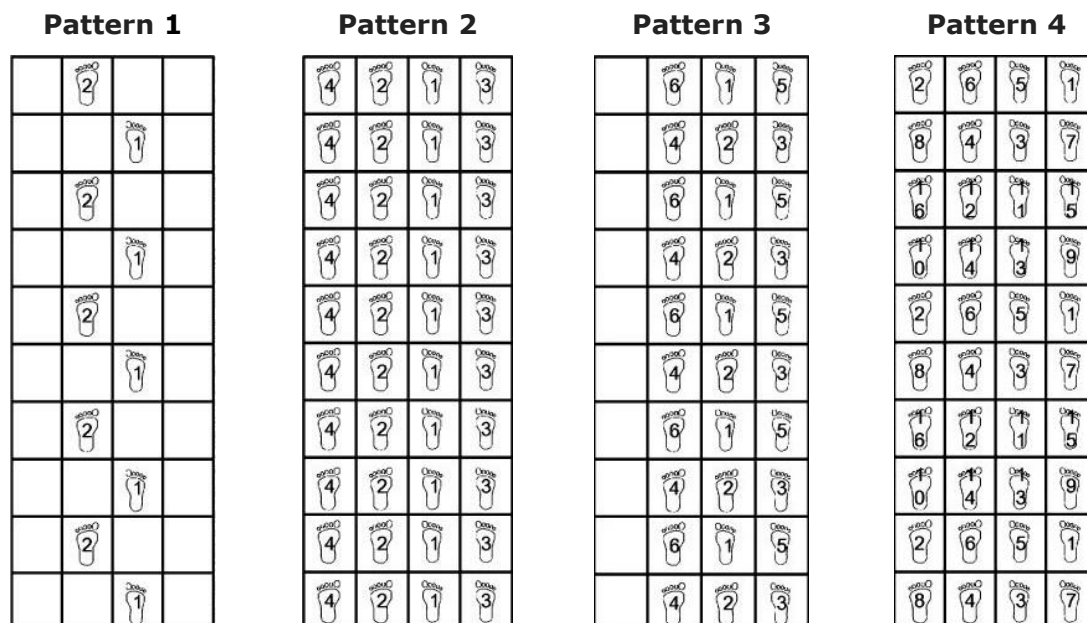


Figure 1. Pattern SSE

## Data Analysis

Data Analysis is done as follows:

1. Descriptive Statistic
2. Data Normality Test uses Shapiro-wilk test
3. Analysis of treatment effects uses Wilcoxon rank test

## FINDINGS AND DISCUSSIONS

This research is participated 27 elders with the age more than 60 years old divided into 4 men and 23 women. Participant took the exercise 4 weeks started from April until May 2018. Table 1 summarizes the demographic characteristics of the sample.

**Table 1. Demographic Characteristics of the Sample**

Characteristics		Group (n=27)	
		n	%
Age	60-64	5	25.9
	65 -69	10	37
	70-74	12	37.1
Sex	men	4	14.8
	women	23	85.2

According to table 1, it can be seen from the characteristic of age and gender. The age of 65-69 years was 10 people (37%) and the age 70-74 year was 12 people (37.1%). For men were 4 people (14.8%) and women were 23 people (85.2%).

## Data Analysis Of Descriptive Value Mini Cog to Elder

As indicated by Table 2, it can be seen the rate before taking the exercise was 3.55 and for the rate after taking the exercise was 4.59. The rate of memory increasing before and after taking the exercise was 28.93%.

**Table 2. Descriptive Mini Cog Test Scores Before and After Training**

Mini Cog	Group (n=27)		
	pre	post	improvement
Min	0	1	
Max	5	5	
Mean	3.55	4.59	28.93%
SD	1.52	0.93	

## Data of Normality Test

According to Table 3 there a point p before was 0.001 and point p after was 0.0001 the data can be stated abnormal distributed.

**Table 3. Mini Cog Normality Test**

Mini Cog Value	<i>Saphiro Wilk test (p)</i>
Pre test	0.001
Post test	0.0001

## Value Test Mini Cog Test Before and After Treatment

Table 4 indicates that value of Mini Cog Test before and after treatment with analysis test using Wilcoxon rank test showed the value  $p = 0.0003$ . The result of value stated significant giving Square Stepping Exercise can improve short term to elder.

Giving Square Stepping Exercise to elder has been shown to improve cognitive function, one of the exercise was short term memory [9]. SSE treatment required participant visualized and memorize stepping pattern then follow the pattern on the mat. This exercise need good concern, memory and plan to taking the best exercise. The

ability of elder memory and concern is decreased [11]. There was an effort to memorize pattern it caused improving short term memory to elder.

**Table 4. Hypothesis Testing Mini Cog Test Before and After Training**

Group	N	<i>Wilcoxon rank test</i>	
		<i>z</i>	<i>p</i>
Pre test	27	-3.573	0.0003
Post test	27		

In SSE application asked to stepping 10 times every pattern, in stepping activity includes aerobic activity. By doing the aerobic activity regularly, it can be improved short term memory to elder. Improving memory is related with blood vascularisation better in the area of hippocampus in the brain [7]. Whereas the role of hippocampus is control of emotion, and memorize to the person. If vascularisation in the hippocampus have increased, it can be produced neuroplasticity in the brain that can improve to memory of someone [6].

## CONCLUSION

Based on the result of the research, it can be concluded square stepping exercise treatment reacted to improving dynamic balance to elder.

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