

# The effects of special fabric-based exercises on physical fitness among the elderly in Na O Subdistrict Administrative Organization, Muang District, Loei Province

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## ABSTRACT

The aim of this study was to examine the effects of a fabric-based exercise program on the physical fitness of the elderly individuals in the Na O Subdistrict Administrative Organization area. A total of 45 participants, aged 60-79 years, were assessed for physical fitness indicators, including body weight, body mass index (BMI), muscle strength, flexibility, and endurance of the cardiovascular and circulatory systems. The participants were selected by using purposive sampling technique and engaged in a fabric-based exercise program 3 days per week for 12 weeks. The results showed that before joining the program and 12 weeks after participating in the program, there was no difference in average mean of body weight, BMI, endurance, flexibility, and the 2-minute standing knee up and down test ( $p > 0.05$ ). However, the muscle strength statistically significant increased ( $p < 0.05$ ). An exercise program using fabric is a beneficial activity for increasing muscle strength in older adults, as the fabric is harmless in terms of weight on the joints, and it can be positioned in easy movements. Additionally, fabric is commonly available in daily life and can be used to promote health when correct training postures are applied according to natural movement patterns.

## KEYWORDS

Muscle Strength; Elderly; Fabric-Based Exercise Program

## **1. INTRODUCTION**

Advance in science, technology, and development in the medical field plays an important role in supporting and promoting the longevity of the population. Besides the fact that Thai society has changed into aging society, it directly impacts on the body and mind of the elderly (Yuan et al., 2016). Therefore, those involved need to make various arrangements according to the problem conditions and the needs of the elderly to have good health at the same time. The government has a social and quality of life policies to enhance the elderly to have a better quality of life by providing various public facilities for accommodating the elderly to have readiness to become an aging society. There are improved health services, education management, welfare provided including promoting careers and encouraging the elderly to participate in social driving under the concept that the elderly are highly experienced individuals and ready to participate in the development of the country.

Health and physical fitness problems are major problems among the elderly. These caused by changes in the body that affect functioning of various organs, such as the strength of the muscles, cardiovascular endurance, and flexibility. As the elderly age, the rate of physical impairment increases with increasing age (WHO, 2001). Several studies found that regular exercise can reduce the risk of diseases in the elderly and have a satisfactory improvement in physical fitness. Organizing exercises to increase the strength and flexibility of the hip, thigh, and ankle muscles to help in the development of balance and movement in daily life is essential. It can be seen that exercise is beneficial in all aspects for normal elderly and the elderly with physical illnesses (Hairi et al., 2010). The elderly who exercise at least 3 times a week, 30 minutes each time, for 12 weeks will increase better physical performance, and organs function. Moreover, Cardiovascular can also function more efficiently (Isaio et al., 2019).

According to the survey in the area of some municipalities in Na O Sub-district, Mueang Loei District, Loei Province, there is a school for the elderly that has activities to promote health such as drinking vegetable juice, exercising with folk dance, Krabong dance, and aerobics. However, the activities that promote the development of the cardiovascular system do not cover physical fitness, which is still lacking in strength training of specific muscles. Along with this, the use of fabric in exercise to increase the relationship between the use of muscles and the nervous system involves holding the cloth tense throughout the service period, causing the surrounding muscles of the shoulder joint and arm to form an isometric contraction. This exercise can be arranged in the correct posture by observing the grip on the fabric used in the exercise. In exerting the breathing during the exercise it was found that the exercise posture management does not cover the management of large

muscle groups that affect the movement. In addition, it is an alternative activity for the elderly to attend various activities. Furthermore, the fabric used is a device that is present in every home, which is the identity of the Thai people in the area. That can be easily found, cheap, using the principles of movement and the correct exertion of the joint muscles can help improve the quality of life of the local people and can also develop muscle strength as well. The researcher had the idea that there should be the development of exercise activities suitable for the elderly by applying fabric for exercising, as it is safe equipment in terms of joint load and can be positioned to allow easy movement. Thus, the purpose of this research is to study the effect of exercise program with fabric on physical fitness in the elderly in Na O Subdistrict Administrative Organization area.

## **2. METHODS**

### **2.1. Design and Participants**

This research was a quasi-experimental study, approved with a research ethics certificate for the research proposal, according to the announcement of Loei Rajabhat University No. HE 0299/2560. The participants in this research were elderly individuals aged between 60–79 years from the elderly club in the area of Na O Subdistrict Administrative Organization, Mueang Loei District, Loei Province. The sample group comprised 45 elderly acquired by purposive sampling technique through a pre-exercise readiness assessment to screen for risks, with good health, and free from the following diseases: heart disease, liver disease, kidney disease, lung disease, high blood pressure, chronic bone, and arthritis which hinder exercise and physical fitness testing. Those who had problems with illness and had diseases that affect body movement, such as osteoarthritis with joint pain, chest pain, fainting, or dizziness, or chest tightness during exercise, high blood pressure (not taking medication or uncontrollable blood pressure greater than 160/100 mm Hg), and inability to exercise continuously for more than 2 weeks were excluded from the research.

### **2.2. Experimental Training**

The researcher implemented a fabric-based exercise program by first providing participants with basic knowledge about the exercises. This included instruction, demonstrations, and correction of exercise postures. Once the participants understood and were able to perform the exercises correctly, they began training under the supervision of sports scientists.

Participants completed a sequence of 15 exercise postures, which took approximately 45–50 minutes per session. To support continued practice, the participants were given instructional videos,

posters, and exercise fabric measuring 40 cm in width and 90 cm in length. The exercise program was conducted three times per week over a 12-week period.



**Figure 1.** Manual for demonstrating exercising postures with fabric

Before any workout, it is important to perform breathing and relaxation exercise for 10 minutes. Circuit training program exercise in a station of 3 exercise, 5 stations for a total of 15 exercises, by exercising the muscles in the following order. The subjects were trained to use resistance from their own body weight. In the practice of each posture as determined by the researcher, there is a leader every Wednesday and bring the manual to practice at home on every other day (Table 1).

**Table 1.** 12-week circuit training program using fabric resistance for the elderly

	<b>Exercise</b>	<b>Week 1-6 Reps*set</b>	<b>Week 7-12 Reps*set</b>	<b>Rest</b>
Station 1	1. Front raise with fabric	10*2	15*2	30 sec/ circuit
	2. Lateral raise with fabric	10*2	15*2	
	3. Height Knee with fabric	10*2	15*2	
Station 2	4. Horizontal row with fabric	10*2	15*2	30 sec/ circuit
	5. Twiss with fabric	10*2	15*2	
	6. Side lunge with fabric	10*2	15*2	
Station 3	7. Back down with fabric	10*2	15*2	30 sec/ circuit
	8. Deadlift with fabric	10*2	15*2	
	9. Single leg with fabric	10*2	15*2	
Station 4	10. Biceps curl with fabric	10*2	15*2	30 sec/ circuit
	11. Up right row with fabric	10*2	15*2	
	12. Squat with fabric	10*2	15*2	
Station 5	13. Shoulders press with fabric	10*2	15*2	30 sec/ circuit
	14. Shoulders back with fabric	10*2	15*2	
	15. Lunge with fabric	10*2	15*2	

*Note: Always hold the fabric taut.*

### 2.3. Physical Fitness Test

The researcher explained the steps of physical fitness testing by measuring blood pressure, height, weight with the TANITA model BC-587; testing the strength of the arm muscles with a Hand Grip Dynamometer, strength of the leg muscles by 30 Seconds Chair Stand; testing flexibility of the lower back and legs by Sit and Reach); and testing Cardio and circulatory system by 2 Minutes Step Test.

### 2.4. Statistical Analysis

Data on weight, body mass index (BMI), arm muscle strength, leg muscle strength, flexibility, and cardiovascular and circulatory endurance were analyzed using SPSS. Descriptive statistics, including percentage, mean, and standard deviation (SD), were calculated to compare physical fitness levels within the group before and after the 12-week training program. A paired t-test was conducted to assess whether there were statistically significant differences between pre- and post-test measurements, with a significance level set at  $p < 0.05$ .

## 3. RESULTS

Table 2 presents baseline and post-intervention characteristics of the elderly participants involved in the program.

**Table 2.** General information of the elderly before and after attending the program

General information	Pre-test (Mean±SD)	Post-test (Mean±SD)	p value
Age (years)	71.75±5.21	71.83±5.26	0.08
Weight (kg.)	57.73±10.74	57.97±10.76	0.07
Height (cm.)	156.98±8.19	156.98±8.19	-
Body Mass Index	23.44±3.74	23.51±3.68	0.07
Resting heart rate (beat/minute)	80.31±13.07	81.24±11.08	0.43
Systolic blood pressure (mm./Hg)	135.66±17.14	133.75±20.5	0.54
Diastolic blood pressure (mm./Hg)	76.01±9.56	75.19±10.6	0.34
Waist circumference(cm.)	86.63±9.86	86.06±9.81	0.17
Hip circumference (cm.)	96.41±8.02	95.56±7.88	0.00

According to the results of Table 2, there was no difference of the overall general data of the informants with statistical significance at the 0.05 level. In the following, Table 3 presents data showing how the physical fitness levels of participants changed due to the program.

**Table 3.** The comparison of physical fitness before and after attending the program

	Number	$\bar{x}$	SD	p value
Hand grip (kg.)				
Before the program	45	17.81	5.31	0.02*
After the program	45	19.10	5.46	
30-second Chair stand (times)				
Before the program	45	15.93	2.86	0.01*
After the program	45	18.27	2.86	
Sit and reach (cm.)				
Before the program	45	-13.74	10.03	0.55
After the program	45	-14.00	10.85	
2-minute Step (times)				
Before the program	45	159.31	40.34	0.40
After the program	45	162.26	33.98	

Note. \*  $p < 0.05$

According to the results of Table 3, it was found that the hand grip and 30-minute chair stand before joining the program and after joining the program were significantly different at 0.05 level. However, there was no difference found in the sit and reach and 2-minute step with a statistical significance of 0.05.

#### **4. DISCUSSION**

The study on exercise with fabric in the elderly showed that there was no difference in average body weight and body mass index, which is possibly because exercising with fabric is moderate to low intensity exercise. The training pattern is defined as a number of repetitions in a set where the continuity may not be enough for the body to use the aerobic energy system. Consequently, it does not affect body weight and BMI. For the elderly energy expenditure in daily-life activities and rate of new tissue formation and metabolic rate decrease with increasing age resulting in overweight in the elderly. This is the condition in which the body accumulates fat more than the body needs that results in being overweight (Otten et al., 2017; Bouaziz et al., 2017) Physiological changes and decreased functions of the body resulted in the reducing physical activity of the elderly together with a 10% reduction in metabolism per year. This resulted in reduced muscle strength, reduced muscle mass, and increases fat accumulation (WHO, 2001).

Strength of the arm muscles of the elderly before joining and after joining the program for the elderly averagely increased. The muscle strength increased with a statistically significant difference at the 0.05 level since the exercise program with fabric and the postures used in training strengthened the muscles while performing exercises. Pulling fabric is an exercise that enhances isometric contraction (Danny et al., 2019), where there is no movement or movement of the body such as pressing object, or pushing a pole or a wall that result improving muscles strength. This is consistent with research by Frontera et al. (2002) that isometric contraction and isotonic contraction (including isokinetic) strength training are resistance exercises that affect the development of muscle strength in the elderly and at all ages. It is also consistent with Mohammad et al. (2019) who investigated the effect of lower body resistance training on improving mobility in the elderly and found that after training the muscles to exert a steady movement always encourages more mobility abilities. The elderly has confidence in moving in different directions and also improve their static and dynamic balance abilities.

The exercise in which the muscle contracts to cause the length of the muscle to change while the tension in the muscle changes slightly is a suitable exercise for the elderly that does not emphasize on fast movement (Kwak et al., 2016; Phanpheng et al., 2020; Buransri et al., 2021).

The current study showed that the averages times of 30-chair stand increased because the exercise pattern improved strength of the large muscles, including hip muscles, thighs, and upper body muscles using body weight and fabric as resistance. As a result, the ability of the muscles used to exercise increases. However, there was no significant difference in the flexibility before and after participating in the program among the elderly at the .05 level. It is possibly because the exercise program with fabric is an exercise for muscle strength training. The contraction did not affect in the elderly's flexibility.

There should be more muscular stretching postures added during the warm-up and exercises for body stretching in different directions as well as muscles stretching. In addition, it is necessary to have regular training to prevent injuries caused by rapid movement (Gavin et al., 2019).

Regular exercise can reduce the risk of disease in the elderly and result in improved physical performance. Exercise activities to increase the strength and flexibility of the leg and ankle muscles. Helps to develop balance body movement system as well as reducing falls of the elderly. The researcher has an idea that activities should be developed that are suitable for the elderly. At this stage of life, it is important to consider the quality of life among the elderly. Therefore, the researcher is interested in studying and developing effective exercise patterns for older adults. The goal is to use physical activity to address common health problems in the elderly and to promote exercise routines that can benefit both individuals and society. This involves the development of an innovative exercise model specifically designed for the elderly.

## **5. CONCLUSIONS**

Exercise with fabric has an effect on the physical fitness of the muscles strength in which normal fabrics can be applied for the exercise. The fabric used in the program is a common household item and a symbol of local Thai identity. It is inexpensive, easily accessible, and widely used by people in the area. By applying principles of proper movement and targeted joint and muscle exertion, this fabric-based exercise can help improve the quality of life for local residents. Additionally, it contributes to the development of muscle strength.

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### **AUTHOR CONTRIBUTIONS**

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

### **CONFLICTS OF INTEREST**

The authors declare no conflict of interest.

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