EFFECTS OF WAI KHRU MUAYTHAI TRAINING TO BALANCE ABILITY IN THE ELDERLY

Yanyong Phanpheng[1], Warayot Larha[2], Ashira Hirantrakul[3]

[1]*Sports and Exercise Science Program, Faculty of Science and Technology, Loei Rajabhat University, Thailand*
[2]*Physical Education Program, Faculty of Education, Loei Rajabhat University, Thailand*
[3]*Sports Science program, Faculty of Applied Science and Engineering, Khon Kaen University, Thailand*

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Abstract

The objectives of this quasi-experimental research were to study the effects of Wai Khru muaythai to balance ability in the elderly. The 56 elderly participants attending the health promotion project in a school for the old people in Loei province, Thailand, aged 60-75 years old, with similar physical conditions including age, weight, height and IBM. The samples were purposively selected based on the specific criteria. There were 2 experimental groups; 28 participants training for Wai Khru muaythai (WMT) and control group 28 subjects walking for exercise. The details of exercise activity were added as a part of health promotion activity for the school for the old people. The training took 12 weeks, 3 times a week, and 30 minutes for each training activity. Both groups were tested for the physical and balance ability with Functional reach test (FRT), dynamic balance with Timed Up and Go Test (TUG) and strength and endurance of muscular using 30 Second Chair Stand (CST) before and after training. The data was analyzed by Paired Sample t-test and Independent t-test at significant level at 0.05. The results of the study showed that both experimental groups had physiological statistical significance and balance ability which increase when testing by FRT and CST comparing the control group $p<0.05$. While testing TUG, the period of time reduced in both groups. It can be seen that Wai Khru muaythai, can increase strength of lower body which are the factors enhancing the balance ability which is the basic of movement.

Keywords: wai khru muaythai, training, balance ability, elderly

INTRODUCTION

Thailand has been turning to Ageing Society since 2005 when the ratio of the population aged older than 60 years old is 10% of the rest of the population. Increasing number of aged people continuously, it is predicted that Thailand will turn to aged society when the number people aged 60 or older become higher than 20 percent of the rest population in 2021 and in 2031 Thailand will be the Super-aged society when the number of people aged 60 or older become 28 percent of the rest of the rest of Thai population (Office of the National Economic and Social Development Board, 2013). From past to present, there are research studying the increase of aged people with risk of having different diseases such as diabetes, high cholesterol, high blood pressure and stroke (Maciaszek J. et al., 2007, Yuan Zhao, 2016). According to the study, it is found that another problem found with the aged people is accident. They get injured from falling down because they do not have ability to control their postural stability or balance due to weak muscles and Myasthenia Gravis (Dite W. et al., 2002). The study showed that people normally get physical balance problem when turning 40 years old (ACSM, 1998) and their balance ability decreased when they get older (Abrahamova D. et al, 2008). This condition may cause falls in elder people. Balance ability is a complex process that needs interior body functions including somatosensory, visual and vestibular (Du Pasquier R.A. et al, 2003). Therefore, stretching muscles and moving body in different directions especially standing position will stimulate mechanoreceptor function at feet, joints cervical vertebrae which are important parts to stimulate body balance reception (Lord S.R. et al, 2000, Baloh R. et al, 2003). Exercise is the way to help prevent dysfunctional organs when getting older. If the older people take good care of their physical health and perform activity appropriately, they can reduce these risk factors (Isaio, I. et al., 2019). Aerobic Exercise in the older people with different variables is beneficial for health. Nowadays, there is the promotion campaign to promote a variety of activities for the older people including the application of Arts, Calisthenics, Basic Movement and Dance Step to be a movement activity with music (Panitjaroennam S., 2003). The previous studies showed that slow-movement pattern provides positive effect in increasing body balance. At the same time, body movement in form of exercise mixed with body balance while moving or maintaining the balance ability of body including dancing in which all parts of body move and core muscles are used relatively and continuously will result in improving nerve system for body balance. Body balance is

consisted of three systems which are central nerve system, receptors and muscular systems. Cooperative functions of movement will stimulate muscles especially the core muscles which are very essential for body balance, the activities for this kind of movement are Tai Chi, Qigong, Yoga (Li J.X. et al, 2001, Komagata S. et al, 2003). Consequently, exercise pattern with slow movement will help stimulate core muscles effectively.

MuayThai is one of world famous sports and popular martial; sport. The uniqueness of muaythai is Wai Khru which is the form of paying respect to teachers or parents. Wai Khru muaythai is performed before the fighting. It is also warm-up session as well. It begins with using simple movement skill and concentrating to control different body movement which is interesting for implementing with the older people for promoting their moving ability or balance ability. In addition, it also helps promote Thai martial art which has been presented in fine postures of Wai Khru muaythai with certain steps. The rhythm of body movement is slow which reduces impacts with joints and harmless for the older people. In addition, the previous studies still provided insufficient scientific information in promoting balance ability which is the basic body movement in daily life.

Consequently, the researchers were interested in applying the Wai Khru muaythai to be an alternative exercise model for the older people. The objectives of this research were to study the effects of Wai Khru muaythai to the balance ability in the elderly. This also helps promote beautiful cultural arts as well as physical, mental and social development as well as helps improve the quality of life of the older people in the future.

METHODS

This research is a Quai-experimental research design with two group pretest-posttest design which is certified and proved by The Research Ethics Review Committee for Research Involving Human Research Participants, on 16th March 2019, project no. HE 014/2562. The participants understood the details of practice during the experiment and sign consent letter to participate in the research.

Participants

56 participants are the older people residing in Loei Province, males and females aged 60-75 years old, doing normal routines and not having regular exercise. The simple random sampling technique was applied for selecting the samples that were divided into two groups; the first group consisted of 28 participants performing Wai Khru muaythai and the second group consisted of 28 participants performing walking exercise. The participants were signed the consent document to participate in the research. All participants need to pass the questionnaires for examining their general health history and physical activity readiness questionnaire (PAR–Q) specifying that the do not have any diseases involving with muscles and nerve systems. In addition, they were all able to walk. On the other hand, the participants who could not participate throughout the research project will be removed from the experiment.

Procedure

In this study, the researchers designed both patterns of exercise as parts of health promotion activity for the elderly in the school for the older people. Both group exercised 30 minutes period, 3 times a week, totally 12 weeks. For the details and instruction of exercise, the experimental group performed Wai Khru muaythai postures including warm-up and concentrating for 5 minutes, then began practicing 8 sets of Wai Khru muaythai postures for 20 minutes and practiced static stretching for 5 minutes. For the control group, the participants performed walking exercise beginning with warm-up, static stretching for 5 minutes and then walking with normal speed for 20 minutes and then doing static stretching for 5 minutes. There were sport scientists observing and suggesting the participants for correct positions and posturers as well as breathing methods during the time of training.

Instruments

Physiological; The data collection was conducted to test the variables regarding health at Sport Science and Exercise Laboratory in the faculty of Science and Technology, Loei Rajabhat University from 08.30 – 12.00 am. The samples performed rest sitting for 5 minutes and were measured with Omron HEM – 7320 to examine their Heart Rate, Systolic blood pressure and Diastolic blood pressure. Then, the samples were examined for their physical components using Bioelectrical Impedance Analysis (BIA), in body 220 model, including body weight (Kilogram) and IBM (kg/m^2).

Balance ability assessment; The researcher evaluated the reliability within the measure (research Assistant) to measure all two balance abilities before the actual assessment. The measurement reliability is excellent (ICC=0.964, 0.986 respectively). The next step was to test the balance. Method 1 In a standing position, arms

were stretched at shoulder width, reaching forward (Functional reach test, FRT) for as far as possible. Method 2: Test the fluency and balance while moving (agility and dynamic balance) by sitting, standing, walking (Timed Up and Go Test, TUG). Upon hearing the "start" signal, samples stood up from the chair, walked at as fast a distance as 8 feet, turned back, walked back and sat in the same chair. The researchers measured the timer (seconds) from getting up from the chair and until returning to the chair. And the final test was conducted to test the strength and endurance of muscular. The samples sat down on the chair and stood up (Chair stand test, CST) for 30 seconds, then counted the number of times in a fully practiced posture.

Both groups control intensity 65-75% of maximum heart rate throughout the duration of each exercise. Intensity and energy expenditure while training with Wai Khru muaythai and walking exercise group. All participants put on heart rate monitor (Polar Team Pro) in which the signal was connected to the receiver (Apple Ipad). The results were displayed on the screen while training including Heart Rate (bpm.), Percent of Average Heart Rate (%AVG HR), Percent of Maximum Heart Rate (%AVGHR^{max}) and Energy Expenditure of Exercise in Kilocalories (Kcal).

Statistical Analysis

Descriptive statistics was used to describe the characteristics of the sample. Changes within the group were analysed before and after the training with the Paired t-test and the differences between the groups were analysed with Independent t-test statistics at the significant level α=0.05 and with SPSS17.0 (SPSS Inc. Released 2008. SPSS Statistics for Windows, Version 17.0 Chicago: SPSS Inc.).

Table 1. Wai Khru muaythai training program

Day	Unit of training	Wai Khru MuayThai position	Duration of training
Monday Wednesday Friday	Warm up	Static stretching of major muscle groups	5 minutes
	Work out	Promnang (Sitting post) 1. Grab (Sitting) Tawaibangkom + Hanuman wakmek 2. Tawaibangkom (Sitting) + Sodsoi Mala+ Berkfha 3. Tawaibangkom (Sitting) + Sawnoi Prapang 4. Tawaibangkom (Sitting) + Labhokmokasak	20 minutes - 8 positions, 2 rounds
		Promyuen (Standing post) 1. Wai (Standing) Tawaibangkom + Sodsoi Mala+ Hanuman songdao 2. Wai (Standing) Tawaibangkom + Sodsoi Mala+ Chang sabadnguang 3. Wai (Standing) Tawaibangkom + Sodsoi Mala+ Hong hern 4. Wai (Standing) Tawaibangkom + Sodsoi Mala+ Praram plangsorn	
	Cool down and stretching	Static stretching.	5 minutes

RESULTS

There were 56 volunteers in this study divided into two groups but there two volunteers disappeared during the experiment, in which each group did not complete the program as specified. Initially, the basic data analysis results of the volunteers in both groups were of average age. Most of the female groups in both groups are overweight by referring to the BMI. The general data of the volunteers before exercise showed that there was no significant difference.

Table 2. shows the general information of samples.

	General information of samples		*p*
	Experimental group (n = 28) Wai Khru muaythai	Control group (n = 28) Walking exercise group	
Gender (male : female)	6 : 22	5 : 23	-
Age (year)	64.5±2.7	65.1±2.6	.641
Height(cm)	164.8±7.2	163.1±6.7	.882
Weight (kg)	67.8±5.3	55.4±10.5	.526
Body mass index (kg/m^2)	25.6±1.4	25.5±4.4	.721

Table 3. represents the comparison of the mean values and standard deviations of the variables in Physiological and Balance ability between before and after 12-week experiment and control group.

Variable	Experimental group (n = 28) Wai Khru muaythai		Control group (n = 28) Walking exercise group		*p*
	Pretest	12 weeks	Pretest	12 weeks	
Physiological					
Weight (kg)	67.8±5.3	66.7±4.4	67.3±5.9	66.7±4.5	.524
Body mass index (kg/m^2)	25.6±2.4	25.2±2.1	25.4±2.6	25.2±2.1	.277
Heart rate (bpm)	82.1± 9.5	79.2±7.5*	81.2 ± 9.9	78.4±7.2*	.161
Systolic blood pressure (mm Hg)	132.0 ± 15.3	128.1±13.5*	132.4 ± 15.9	128.0±13.3*	.207
Diastolic blood pressure (mm Hg)	74.6 ± 5.8	74.2±4.0	74.5 ± 6.3	74.3±5.2	.535
Balance ability					
Functional reach test (cm.)	13.7±1.3	16.6±1.9* [b]	12.8±1.2	14.2±1.9*	.001
Timed Up and Go Test (second)	7.2±0.7	6.7±0.8	7.0±0.6	6.9±0.7	.328
Chair stand test 30 second (reps)	14.8±1.2	19.7±1.9* [b]	15.5±0.8	18.2±1. 6*	.001

** Means there was a significant difference from before the experiment at the 0.05.*
[b] Means differences from the experimental group were statistically significant at the 0.05.

The analysis with pair t-test revealed that heart rate and systolic blood pressure of both groups decreased significantly. When comparing between before and after exercise ($p<0.05$). However, when analyzing between groups using Independent t-test statistics, using the mean values of change in physiological, there were no significant differences between the experimental groups. In addition, both groups were able to stabilize from the functional reach test and the strength of the lower body with the 30 second Chair stand test which was statistically improved within the group when comparing between before and after exercise ($p<0.05$) and when analyzing between groups using Independent t-test statistics, using the mean of the change in balance ability, and the strength of the lower body. It was found that the experimental group exercising with respect to Wai Khru muaythai had a statistically significant increase in their balance ability ($p<0.001$). While, the Timed Up and Go Test decreased the mean time of testing in both groups but there was no statistically significant difference between the experimental groups.

DISCUSSION

This research has integrated the knowledge of the art of paying respect to Wai Khru muaythai to create aerobic forms of exercise that are novel, safe, fun, challenging, suitable for health promotion activities of the elderly. The exercise style emphasizes various movement skills, combining the traditional Wai Khru muaythai style which is a national sporting heritage of Thailand. And the researcher has studied the effect of exercise training on balancing ability in the elderly by comparing with exercise styles by walking which is the introduction of both forms

of exercise activities as part of promoting physical activities in the elderly school Loei, Thailand. The research findings can be discussed as follows.

The physical fitness data report of the two experimental groups after 12 weeks showed that physiological in relation to the body composition, consisting of body weight and body mass index compared to before the experiment has a tendency to decrease there was not found to be significantly different after exercise. The change of variables that are related to body composition shows that both forms of exercise have the activation of large muscles for continuous movement, and the circulation of all muscle groups. It can be said that this form of exercise is aerobic exercise, which is a process that uses the energy system of the body at a time level. And the right weight to use energy from fat for combustion as energy, which is related to weight loss. (Otten L. et al, 2017, Stephen D.R. et al, 2017). In addition, the side variable physiological that is related to the heart system, circulatory system, and the ability to work better. In this study, we found that after exercise, the heart rate and systolic blood pressure decreased when comparing to before exercise. According to the change, it can be explained that exercise that can maintain the level of heart rate and control the proportion of respiration will have a good effect on the heart, circulatory system and respiration. In this study, it was found that both subjects had a reduced heart rate and systolic blood pressure. The method of exercising with Wai Khru muaythai is using the rhythm of the music which has the relationship of the rhythm of body movement continuously. The participants were advised for how to breathe and manage fatigue while exercising. This is consistent with the recommendations of Emiliano A.P. et al (2005) which described that the benefits of breathing exercises while exercising can affect the efficiency of the breathing and the heart muscles that help with compression. This is related to the function of controlling the baroreceptor system. Exercise will stimulate the vagal tone, resulting in slower heart rate. Lower peripheral vascular resistance helps promote the function of the artery wall which is an important reason for the decrease in blood pressure values (Marsh S.A. et al, 2005, Carnelissen V.A. et al, 2005)

Wai Khru MuayThai training is a new alternative exercise that can be added physical fitness for the elderly The basic parameters of the structure of the body that promotes good physical performance are 2 components, which are the strength and endurance of the muscles which has a positive effect on the structure of the body. In this study, the researcher realized the training posture with the basic movement skills in daily life of the elderly. From the 30 second chair stand test, it was found that both experimental groups had an increased average when compared with before the experiment with statistical significance at the level of 0.05. In addition, the average post-exercise mean shows that Wai Khru muaythai experimental groups have better ability to test the chair stand test for 30 seconds than walking exercise groups when compared after 12 weeks of exercise. This is due to the use of Wai Khru muaythai gestures, using gestures that use the power of the muscles of various parts of the body in rhythm, with the use of muscles in relation to the rhythm of the music that controls the movement. This helps control the muscles in various movements, postures and concentrate during practice. It is consistent with the study of Chabairam B. (2019), the study of exercise using ancient muaythai postures on the physical fitness of the elderly. It was found that, after practicing Thai boxing, there was a positive effect on the strength of the muscles in lifting tests in the arms folded position for 30 seconds and standing posture for 30 seconds which is a fundamental factor that is related to the ability to maintain a balanced body while in motion and to move effectively. This study, the focus is on the study of variables related to balance in the elderly by the Functional reach test, which found that the sample has the ability to test the functional reach test in increasing range after exercise with statistical significance at the level of 0.05. However, it was found that Wai Khru muaythai exercise groups were able to stand and touch the front more distance compared to the exercise group by walking. There is also a test of agility and dynamic balance with Timed Up and Go Test, which are basic skills in daily physical movements. From the test results, it was found that both groups were able to improve their balance while moving the body according to the conditions of the test with shorter duration. Although this study does not study mechanisms that increase the ability to balance directly but it can discuss the strengths from the designed posture training of Wai Khru muaythai with rhythm. This pattern requires the principle of transferring weight during movement in rhythm with various gestures together with weighting on the heel and toes which will stimulate the senses and maintain a more balanced weight on the feet Nicole K et al, 2014). Wai Khru muaythai was applied by the researcher using rhythm to control body movement together with contracting the abdominal muscles to help increase the stability of the core muscle while moving rhythmically at all times while performing the strength of the core muscles that are responsible for controlling

body movement. This causes the motion recognition mechanism to work harmoniously (Coordination movement) both the arms and legs, resulting in the control of the coordination of muscles (neuromuscular control) awareness of joints (proprioceptive sense) according to the rhythm repeatedly throughout the training period. That is to say, exercise in a muscle group that is primarily responsible for controlling the movement of the arms, legs, or core muscle groups, including abdominal muscles, back, pelvic floor and diaphragm, resulting better balance of the participants. (Springer B.A. et al, 2007, Kwon Y.K., 2015). In this research, 8 sets of dance techniques were performed and repeatedly practiced with simple rhythm. Therefore, according to the above principles, it can be explained that the form of exercise by paying respect to Wai Khru muaythai is to promote the mechanism of the relationship in the movement and develop the ability to maintain the balance of the body while in static (static balance) and the movement of the body (dynamic balance) as well as to practice learning and remembering. It also has a positive effect on various aspects of physiology. In the case of the elderly who are unable to comply, basic movements should be used. By starting from the easy posture to the difficult posture or begin by using a slow tempo and increase the tempo faster when the participant can follow may choose to use local, regional music for familiarity and rhythm. Have fun, enjoy, or use rhythmic instruments instead of music, with rhythms that can be easily remembered.

In addition, Wai Khru MuayThai is an alternative aerobic exercise with rhyming slow movement which can reduce physical impact well. This exercise is appropriate to be applied for exercise activity in the school for the old people in order to promote basic physical fitness in physiology.

CONCLUSION AND PRACTICAL ASPECTS

The results of the research revealed that Wai Khru muaythai positively resulted in strength and endurance of lower body and improve core stablity which are main factors for balance and effectiveness of responsive muscular structures. Controlling body movement is a basic skill for doing daily life among the older people with confidence. It can help reduce accidents from falls and it indicates the good quality of life of the older people in the future.

Wai Khru Muaythai can be an alternative to low-impact exercise. Physical education and occupational therapists can be used to promote physical activities for the elderly.

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Corresponding Author:
Yanyong Phanpheng
Sports and Exercise Science Program,
Faculty of Science and Technology,
Loei Rajabhat University, Thailand
e-mail: yanyong_spsc@hotmail.com