

# Effects of a combined stretching training on flexibility of students in sports science program, Silpakorn University

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## Effects of a combined stretching training on flexibility of students in sports science program, Silpakorn University

### Abstract

The research aimed to compare the effect of combined stretching training on flexibility and to compare the difference of the flexibility between male and female students in sports science program after 8 week of training. The subjects were 20 (10 male, 10 female) of the first year students in sports science program, Silpakorn University. The trainings were done in 30 minutes per day, 3 days per week, for 8 weeks. The flexibility tests were done every 2 weeks of training until 8 week. The data were analyzed by mean, standard deviation, One-way Analysis of Variance with repeated measures and compared in pair by using Bonferroni method with statistically significant at .05. The results showed the flexibility of male and female students in sports science program after the combined stretching training program was different with statistically significant at .05 and the difference in the flexibility of female students after 8 week of the combined stretching training program were increased higher than male students. In summary, the combined stretching training program can increase the flexibility both of the male and female students in sports science program and can increase flexibility in female more than male students.

**Keywords:** combined stretching, static stretching, dynamic stretching, flexibility.

## INTRODUCTION

Flexibility is the component of physical fitness. Flexibility is the ability to move a joint through its complete range of motion. If there is insufficient flexibility may reduce the movement of muscles or joints and increase the opportunity to accidents or injuries in sports and exercise. Consistent with the Department of Physical Education, 2013 that mentions the importance of flexibility is the ability to stretch muscles. The joints and tendons are at the end of the movement without feeling limited or painful. The development flexibility in athlete to increase the angle of body movement will increase physical fitness, techniques and sports skills. It can be done based on a variety of exercise and body management activities and the flexibility training. Meanwhile, the connective tissue and the muscles involved are around the joints. There is also a growing of flexibility.

The development of stretching is an effective way to increase the ability to work muscles and joints in full range of movement. The muscle fibers muscular ligaments and nervous systems that control body movements while the muscles are stretched quickly in a short time, the core of the muscles and the muscle ligaments are stretched. Sensory receptors inside the muscle fiber core send nerve signals to the spinal cord, and the other part sends it up to the brain. Nerve signals that the spinal cord will receive and transmit. Command to stretch out muscles. This results in a contraction, but if the muscles gradually stretch, such as a stagnant stretching technique, the muscle fibers core and muscle ligaments are stretched. Stimulating the sensation receptors we call Golgi Tendon sends nerve signals to the spinal cord and brain instead, inhibiting muscle function. As a result, the muscles loosen. This makes it possible to stretch even more muscles (Department of Physical Education, 2013)

At present, the development of flexibility has two main forms static stretching and dynamic stretching. Static Stretching mean slowly applied a stretch torque to a muscle and maintaining the muscle in a lengthened position (Chaouachi et al., 2017). Dynamic stretching would be expected

to movements through the active range of motion by contracting the muscle group antagonist to the target muscle group without bouncing (Samukawa et al., 2011). For decades, static stretching has been the standard modality used in training program, as it has been shown to be more or equally effective at increasing flexibility than other forms of stretching (Vasdeki, 2011). Dynamic stretching has been a popular choice to replace static stretching because the acute effects have been shown to improve others performance parameters such as agility, endurance, strength, power, and anaerobic capacity (Coons et al., 2017). To improve muscle flexibility and joints or adjust the length of the joints. The muscles must be exercised more stretching than usual, with physical exercises stretching muscles in postures associated with daily movements. A goal of flexibility program is to increase range of motion. Sport-scientists have started to use combined stretching, the combination between static stretching and dynamic stretching to increase flexibility but knowledge of the effects of combined stretching on flexibility is lacking.

Researcher interested in studying the effects of a combined stretching training on flexibility of students in sport science program, Silpakorn University. To compare the flexibility between before combined stretching training program and after 2nd, 4th, 6th, 8th week of the training program and to compare the flexibility between male and female students after 8th week of combined stretching training program.

## **METHODS**

### **Participants**

The Participants were 20 (10 male, 10 female) of the first year students in sports science program, Silpakorn University. All participants read an information sheet and gave written informed consent prior to participation and do not have previously back and leg injuries.

### **Definition**

The definitions consisted of four keywords as follows: Combined stretching was defined as the combination between static stretching and dynamic stretching to increase flexibility starting with dynamic stretching

on target muscle 10 seconds and follow by static stretching same muscle group 10 seconds after 4th weeks of training increase time to 15 seconds per exercise. Static stretching was defined as slowly applied a stretch torque to a muscle and maintaining the muscle in a lengthened position for 10 to 15 seconds. Dynamic stretching was defined as a method of stretching the muscles with motion to movements through the active range of motion by contracting the muscle group agonist and antagonist to move the target muscle group without bouncing. Flexibility was defined as the ability to move a joint through its complete range of motion. In this research flexibility consisted by 3 muscle groups as follow back and lower back thigh muscles, torso muscles and shoulder muscles.

### **Research Instrument and Quality Assessment**

The instrument was used to collect the data as follows: Combined stretching training program was create by study and collect information from documents and research both domestically and internationally. This preliminary combined stretching training program was interviews with three experts of sport and exercise science. The results of the interview created a combined stretching training program by integrated dynamic stretching with static stretching and consists of frequency, intensity, and time of each practice. The training program take approximately 8 weeks and intensity adjusted every 2 weeks. The combined stretching training program had monitor quality and accurate monitoring of the training program by checked the index of objective congruence (IOC) from five experts. Determine the objectives, content requirements, and suitability of combined stretching training programs, then find an average of expert opinion scores. The results showed that the consistency index value of the contents of the combined stretching training program is between 0.80-1.00. Try out the combined stretching training program with 20 male sophomore students in sports science program, faculty of education, Silpakorn University for two weeks to determine the suitability of the training program before apply the combined stretching training program to all participants. The flexibility test consists with three tests as follows: (A

way of testing the physical fitness test of the Department of Physical Fitness, 2013) Sit and reach test measure the flexibility of back and lower back thigh muscles. Torso-flex trunk lift test measure the flexibility of torso muscles. Shoulder and wrist elevation test measure the flexibility of shoulder muscles.

#### **Data collection**

Explained the research objectives for all participants to understanding of the program before the training. Gave information sheet and ask for informed consent prior to participation. Explained how practices and data collection for all participants. Test the flexibility before the training, using all three flexibility tests. Provides the combined stretching training program for 30 minutes per day, 3 days per week for eight weeks. Test the flexibility after 2nd, 4th, 6th, and 8th week of training, using all three flexibility tests.

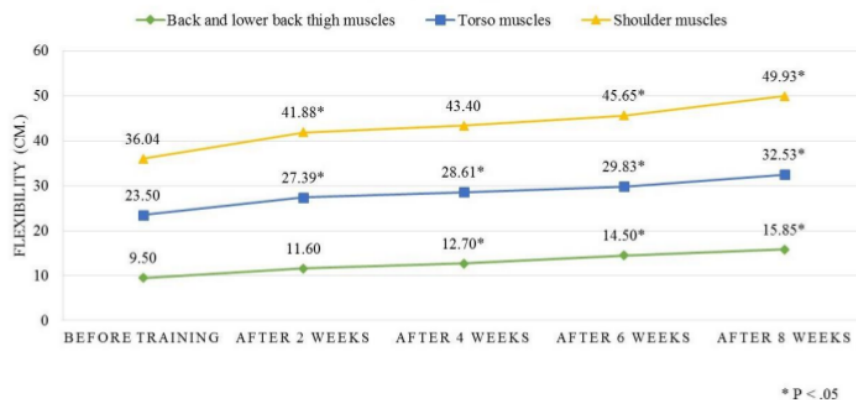
#### **Data analysis**

The data was analyzed using the Statistical Package for Social Science (SPSS). The flexibility of male and female students in sports science program before, after 2nd week, after 4th week, after 6th week, and after 8th week of practiced the combined stretching training program data were analyzed using mean, standard deviation, and One-way Analysis of Variance with repeated measures. If the flexibility were shown differences with statistically significant will be compared in pair by using Bonferroni method with statistically significant at .05.

#### **RESULTS**

Figure 1. showed the results of the flexibility of male students in sports science program after practice the combined stretching training were as follows: when comparing differences flexibility of the back and lower back thigh muscles between before training, after 2nd week, after 4th week, after 6th week and after 8th week of training found that differences between before training with after 4th week, after 6th week and after 8th week training were significantly different at .05, when comparing differences flexibility of the torso muscles between before training, after

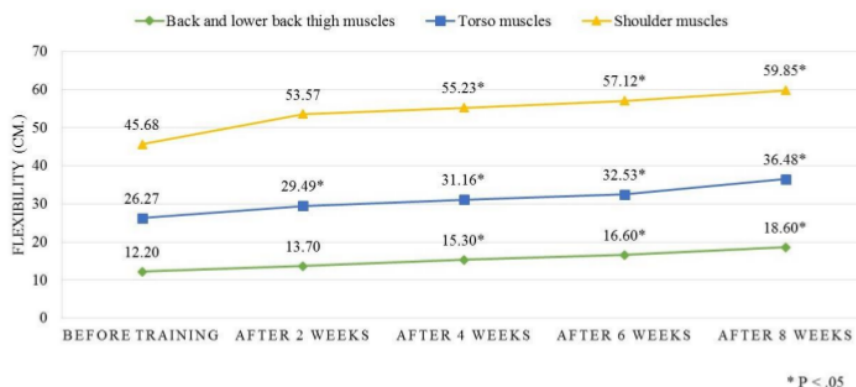
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2nd week, after 4th week, after 6th week and after 8th week of training found that differences between before training with after 4th week, after 6th week and after 8th week training were significantly different at .05, and when comparing differences flexibility of the shoulder muscles between before training, after 2nd week, after 4th week, after 6th week and after 8th week of training found that differences between before training with after 2nd week, after 6th week and after 8th week training were significantly different at .05. The combined stretching training program can increased the flexibility of back and lower back thigh muscles, torso muscles and shoulder muscles of male students in sports science program since after the 4th week of training.



**Figure 1.** Comparison differences flexibility of male students divided by muscle groups

Figure 2. showed the results of the flexibility of female students in sports science program after practice the combined stretching training were as follows: when comparing differences flexibility of the back and lower back thigh muscles between before training, after 2nd week, after 4th week, after 6th week and after 8th week of training found that differences between before training with after 4th week, after 6th week and after 8th week training were significantly different at .05, when comparing differences flexibility of the torso muscles between before training, after

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2nd week, after 4th week, after 6th week and after 8th week of training found that differences between before training with after 2nd week, after 4th week, after 6th week and after 8th week training were significantly different at .05, and when comparing differences flexibility of the shoulder muscles between before training, after 2nd week, after 4th week, after 6th week and after 8th week of training found that differences between before training with after 4th week, after 6th week and after 8th week training were significantly different at .05. The combined stretching training program can increased the flexibility of the back and lower back thigh muscles, torso muscles and shoulder muscles of female students in sports science program since after the 4th week of training.



**Figure 2.** Comparison differences flexibility of female students divided by muscle groups

Table 1. showed the comparison of the flexibility between male and female students in sports science program after practice the combined stretching training for 8th week were as follows: flexibility of back and lower back thigh muscles of female students after the 8th week of training were increased 6.40 centimeters when compared with the flexibility before the training (Before training  $12.20 \pm 5.22$ , After 8th week  $18.60 \pm 4.35$ ) and higher than male students. After the 8th week flexibility were increased 6.35 centimeters compared to before the training (Before training  $9.50 \pm 4.33$ , After 8th week  $15.85 \pm 3.06$ ), flexibility of torso muscles of female



students after the 8th week of training were increased 10.21 centimeters when compared with the flexibility before the training (Before training  $26.27 \pm 7.02$ , After 8th week  $36.48 \pm 6.12$ ) and higher than male students. After the 8th week flexibility were increased 9.03 centimeters compared to before the training (Before training  $23.50 \pm 3.24$ , After 8th week  $32.53 \pm 5.57$ ), and flexibility of shoulder muscles of female students after the 8th week of training were increased 14.17 centimeters when compared with the flexibility before the training (Before training  $45.68 \pm 11.95$ , After 8th week  $59.85 \pm 5.01$ ) and higher than male students. After the 8th week flexibility were increased 13.89 centimeters compared to before the training (Before training  $36.04 \pm 12.04$ , After 8th week  $49.93 \pm 10.52$ ). The flexibility after 8 week practiced the combined stretching training program can increased flexibility in female students more than male students.

**Table 1.** Comparison of the flexibility between male and female students in sports science program after practice the combined stretching training for 8th week

Muscle groups	Gender (n = 10)	Flexibility				Difference
		Before the training		After the 8 <sup>th</sup> week		
		$\bar{X}$	S.D.	$\bar{X}$	S.D.	
1. Back and lower back thigh muscles	Male	9.50	4.33	15.85	3.06	6.35
	Female	12.20	5.22	18.60	4.35	6.40
2. Torso muscles	Male	23.50	3.24	32.53	5.57	9.03
	Female	26.27	7.02	36.48	6.12	10.21
3. Shoulder muscles	Male	36.04	12.04	49.93	10.52	13.89
	Female	45.68	11.95	59.85	5.01	14.17

## DISCUSSION

The comparison of differences in pairs found that the flexibility in all 3 muscle groups, namely the back and lower back thigh muscles, torso muscles and shoulder muscles after the 8 week training better than before

the training. With statistical significance at the .05 in both male and female students. Maybe because Stretching is an important technique used to develop flexibility (Charles et al., 2011). When developed into a program of combined stretching exercises by using static stretching techniques, which are ways to increase muscle flexibility from external forces. This is to stretch the muscles to the point that feels tense but not painful. The force that remains at that point for 15-30 seconds to increase flexibility or increase movement range. With the Dynamic Stretching is a method of stretching the muscles that are caused by active muscle contractions, causing the movement of limbs by contracting the muscles of the front (Agonist) and the back (Antagonist) of the limbs. In the momentum style without using centrifugal force for movement. There is no static stretching or no bouncing during the end of the movement is a good method to increase muscle flexibility and joints (Department of Physical Education, 2013). Resulting in stretching exercises to improve flexibility which is in accordance with the concept of Charoen, 2014 mentioned active stretching is an exercise by the athlete to control the movement of the exercise. Until the end of the phase of movement. This technique can also be divided into steps which are Step 1: Active static exercise stretching this type of stretching athletes must gradually moving until reaching a distance or angle of movement that makes the muscles feel so tight that they can no longer move and stand still for at least that position for 10-15 seconds and step 2: Active dynamic stretching exercise is a sequence of actions that stretches the muscles in a stationary or still position. So that the joints and muscles that have been stretched can work more perfectly including a combination of stretching training programs has been programmed based on the principle of "FITT-VP" It consists of F: Frequency of training. I: Intensity of training. T: Time is the amount of time spent in each training. T: Type is the method used in training. V: Volume is the number of times repeat in each position. And P: Progression is to increase training intensity (American College of Sports Medicine, 2014). So the program combined stretching muscles able to develop flexibility

effectively which is consistent with the concept of Charoen, n.d. states that stretching If you want it to happen correctly meet the desired goal or objective must be caused by learning methods or procedures. And understand the rules or principles of exercise and in accordance with the findings of Natthaphon and Kittikon, 2008 studied the study of static stretching and dynamic stretching on flexibility. The subjects were volunteers of first year students at the Department of Sport Science. Srinakharinwirot Ongarak University, 10 people, found that the flexibility of body flexion stretching and tilting of the forms with stretching, stationary and moving muscles. In the post-stretching tests, it was significantly higher than the pre-stretching tests at the statistic level of .05 and was consistent with the results of the Dale and the faculty (Del et al., 2011). Studying the short-term effects of static stretching and dynamic stretching found that stretching with a stationary motion and active movement a 60-second freeze pattern followed by 90-second motion, and a 90-second freeze pattern followed by 90-second motion results were increased flexibility 36.3% and 85.6%.

The difference in the flexibility in female students after 8th week of practiced combined stretching training program were increased higher than male students. Which is according to the research hypothesis maybe because flexibility has many influential factors. Gender is one of the factors that affects one's flexibility and ability to move joints. Mostly female will be more flexibility than males (Chareon, 2009 and Tavorn, 2017), which is in line with the concept of American College of Sports Medicine, 2014, which states that gender is one factor that has Influence on flexibility in which females are more flexibilities than males. Because it is a result of differences in bone and joint structure. Women will have a lower body torso than men after adolescence. It is because women have a lower center of gravity and shorter legs than men. And in accordance with the concepts of Charles and others (Charles et al., 2011), which states that gender differences are one of the factors that influence flexibility. Girls will tend to be more flexibilities than boys in childhood but when entering

adulthood there will be less differences. Women are flexibility than men due to the influence of anatomy and hormones. Women have hips that are wider than men or maybe because women have activities or sports that are associated with good physical fitness. Such as dancing, gymnastics, or swimming (Charles et al., 2008).

### **CONCLUSION**

The combined stretching training program can increase the flexibility all muscles groups as follow back and lower back thigh muscles, torso muscles and shoulder muscles in both of the male and female students in sports science program and can increase flexibility in female more than male students.

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