

Comparative Lower Back and Hamstring Flexibility among Males and Females of Malaysian Colleges' Student

Tan Chee Hian¹., Sharunniza Sidik²

¹Faculty of Sport Science and Recreation Universiti Teknologi MARA Selangor

²Sekolah Menengah Kebangsaan Malaysia

Abstract

The study was to compare the lower back and hamstring flexibility among males and females Malaysia College students. Fifty students (25 males and 25 females) between 18 and 23 years old were assigned to 2 groups: males and females. The tests are traditional sit-and-reach flexibility test. There were pre-test and post-test. After pre-test, subjects trained 3 times a week for 6 weeks in 4 types of static stretching condition were Lying Back Curl, Lying Knee Hug, Supine Gluteal Stretch, and Sitting Hamstring Stretch (as treatment) before the post-test. The results were analyzed for a comparison of gender differences in sit-and reach test. An independent sample t-test was used. The t-test revealed a significant between 2 groups. Both group had significant ($p < 0.05$) improvements in the measures. The pre-test result (females 26.22 ± 6.04 cm, male 20.97 ± 4.89 cm). The post-test result (females 28.65 ± 6.24 cm, males 23.80 ± 5.07 cm). The result showed significant between 2 groups was $t = 3.372$, $p:0.001 < 0.05$ for pre-test and $t = 3.017$, $p:0.004 < 0.05$ for post, this mean the null hypothesis was rejected. The results of the pre-test and post-test of 2 groups males and females indicated that there was significant different in mean score of lower back and hamstring flexibility between males and females of college students. Female group had significantly greater score in pre-test and post-test, but the result showed that males college student could be improved their flexibility after treatment.. The result of this study supported to/ by the previous study that females more flexible compare with males (Schell & Leelarthae-pin, 1994) and (Warmbrodt & Rissman, 1999).

Keywords: Lower Back., Hamstring Flexibility, College Students

Background

Fitness and health are not the same. Those exercises that recommended by the American College of Sports Medicine (ACSM) and the American Heart Association for improving cardiovascular fitness had minimum intensity of exercise than their recommendation for improving cardiovascular health or longevity. Regardless of the differences between

fitness and health, five traditional fitness components were often classified as health related fitness components like: strength, muscular endurance, cardiorespiratory endurance, flexibility, and body composition. Indirectly, the fitness component of flexibility was responsible for the formation of the President's Council on Physical Fitness and Sports (PCPFS). President Eisenhower formed this organization in the mid 1950s after his disenchantment with the fitness of the youth.

Flexibility as referred to the range of movement that can be performed at the specific joint (Smith, 1994). It was an important component in athletic success and flexibility is also considered as an important component of physical health. However excessive flexibility, while being a requirement for success in some sports, can be disadvantage in sport requiring changing direction and the acceleration under load (Marshall, 1980 in Smith, 1994).

According to Smith, (1994) flexibility training was rapidly became an accepted part of any athlete's regime. Its increase in popularity stems from the awareness that, by increasing a joint to produce an effective movement pattern in sport performance is significantly enhanced. In addition, it was widely believed that by increasing joint's flexibility, the potential injury risk to that joint was decreased. With increased flexibility, the muscle, tendon and ligament around the joint were not put under as much strain in a given movement pattern. This is especially true when an individual was moving through a relative large range of movement, such as kicking a ball, or throwing an implement without considerable distance. Most people will suffer from low-back pain (Adamas, 2002). Although never documented by the Sit-and-Reach (SR) Test but the poor flexibility of the low-back extensors and hamstring had often been suggested to be associated with muscular low- back pain.

Poor hamstring flexibility may predispose injury to hamstring. Test for this muscle groups (lower back and hamstring muscle) had received the most attention since then because the Sit-and-reach Test had been incorporated as test in the health-related physical fitness. In succeeded flexibility training was mainly to know how much flexibility required for given sport, or simply in daily life, for those keen to be healthier (Ninos, 1997) was balanced flexibility, then it was considered to be long-term success in sport.

Problem Statement

Flexibility was referring to the range of movement that one's could perform at a specific joint. It was being one of the important components in athletic success, flexibility was also important for physical health. Poor flexibility might be responsible for one's bad posture, compression of peripheral nerves, dysmenorrhoea and other ailment (Burke 2000).

Most previous studies indicated that females had better flexible level rather than males at all ages. However, there were studies found that when 13 tests of joint looseness were administered to 124 adolescent, gender was not found to be an influencing factor of overall body looseness. 1980's researchers suggested that rather than being a general characteristic, flexibility appeared to be joint specific in nature.

There had many studies on flexibility test for comparing between males and females but they were normally used general test to test flexibility, for instant they measured all the body part to get one result. Those studies were normally used the athlete or sport person as their subjects, and with this study was that only measure the one's lower back and hamstring flexibility level and it was very limited previous researches.

As the result of that limited studied, this present experimental design study was used the Traditional Sit-and-Reach Test to measure lower back and hamstring flexibility of all subjects to get the confirmed result that there was different flexibility in parts mention between two genders per se.

Purposes of the Study

This study was to determine the level of lower back and hamstring flexibility among males and females college student . It could help up the college coaches or sports' department personnel to identify the weaknesses that concerned in the college or university's athletes as well. As the findings of this study, coaches and sports' department of college know better their students' lower back and hamstring flexibility level and might help in preparing training program in term of improving the level of flexibility of the athletes to make sure their athletes' performance would be the best in whatever sports as far as performance of flexibility is concerned.

Objectives of the Study

The main objective of this study was to know the different level of lower back and hamstring flexibility between males and females student in college. Beside the main objective, it would ventured into if any other factors that influenced the one's lower back and hamstring flexibility level among males and females of college with the Sit-and-Reach Test was concerned.

From the previous studied, there had other factors that influenced the flexibility liked gender, age, body type and activity level (Schell & Leelarthae-pin, 1994). So, demographically factors were underlying in this study.

Significant of the Study

The result of this study could be used to identify sports' talent according to student's flexibility level. Previous studied that had done, the flexibility was related with other fitness component such as strength. People who had good flexibility normally also good in strength (Overturf & Kravits, 2001). How far was that finding and through this study would get the reconfirm about strength and flexibility of one. At the same time, subjects that involved in this study also could get to know their own lower back and hamstring

flexibility level for the time being. This might motivate them to try themselves with coach concerned to improve their flexibility when they were not in a good condition. This finding also could help in term of reducing the percentage of low-back pain among college students as far as active in sports is concerned.

Hypothesis

This study is the comparison on lower back and hamstring flexibility level among males and females college students. Based on the problem raised, the following hypothesis is tested:

Ho: There is no significant different in mean of score on lower back and hamstring flexibility between males and females college students.

Limitations

In the testing procedures of this study, there were some limitations like:

Aged group: Students (males and females) between aged eighteen to twenty three years tested only

Type of test: This study purposively used the Traditional Sit-and Reach Test to test lower back and hamstring flexibility of subjects.

Measurements: Possibility in getting the most accurate data while taking the subjects' score.

Repetition of test: This study only took the average scores through out of four trials of each test.

Definition of Terms

Flexibility: The ability to move body joints through a maximal range of motion without undue strain.

Fitness: The ability to handle the task performed in everyday life with enough energy in reserve to enjoy leisure pursuit.

Range of motion: Movement allowed by the body's joints and body position in a particular exercise

Sit-and-Reach Test: Refer to the test that will be used in the study in order to determine level of flexibility.

Static Stretching :Consists of stretching muscle to its farthest point than holding that position for 20 to 30 seconds.

Dynamic Stretching: Involves moving parts of body and gradually increasing reach, speed of movement or both.

Proprioceptive Neuromuscular Facilitation (PNF): Allows for greater relaxation following each contraction and increases the ability to stretch a greater range of motion.

Isometric Stretching: Involves the resistance of muscle group through isometric contraction of the stretch muscle.

Methodology

Based on the purpose and hypothesis of the study, it was focused on the comparison of lower back and hamstring flexibility among males and females student of college. The following procedures were considered used to collect validity and reliable data. The research methodology was discussed as follow; research design, subjects, instrumentation, procedures of the data collection and analyzed.

Research Design

This study considered an quasi - experimental design. Subjects were asked to perform Traditional Sit-and-Reach Test to know their level of lower back and hamstring flexibility. This study was done in a classroom environment at college.

Subjects attended two session of test, there was pre-test and post-test. Within pre-test and post-test of the experiment, all subjects attained training program as the treatment in this study within six (6) weeks time.

In this treatment program, it mainly focused on static stretching (flexibility exercises) that involved lower back and hamstring flexibility. The two groups (males and females) worked with the same treatment, same time duration and same place (venue) to avoid any biases that affecting the validity and reliable score or result of this study.

Subjects been informed about the study procedures before started the pre-test, and demographical data been collected such as age, weight, height, sex and to know whether subjects are in active or not active mode in any physical activities.

After that subjects been explained clearly about test (Traditional Sit-and-Reach Test). Researcher demonstrated how to do the test accurately. Before the subjects been tested, they had done the warm up and stretching sections for several time (in minutes) to avoid any unnecessarily injuries when perform the test.

Earlier than the performing the Test, subjects had been divided into two groups whereby each group consisted of 25 students. First group with 25 male students and another group of 25 female students. The post-test was done in the same conditions.

Observation on- going by the researchers to make sure that the subjects were doing the test with proper technique to get the valid data.

The Sit-and-Reach box should be braced against an object example the wall to prevent it from sliding away from the subject. The other procedures were: subjects remove shoes, sit on the floor, fully extended their legs, and slowly bended forward along the measuring scale.

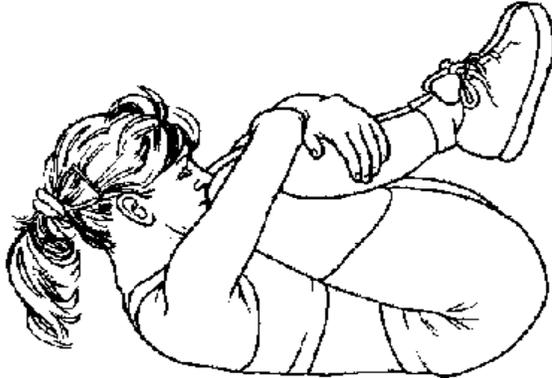
The subjects performed four trials. All the four trials were recorded in a specific designed data form.

After the pre-test, all subjects must attended the treatment programme. The treatment was attended by all subjects for three days per week, which was on every

Monday, Wednesday and Friday and from 6.00 pm to 6.30 pm for six weeks continuously.

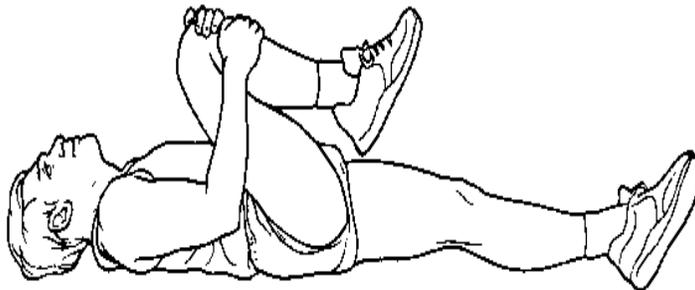
Every session of treatment, subjects must completed 20 minutes of static stretching, the same type of exercises that was conducted by researchers. All subjects were given treatment with four types of static stretching exercises like:

a. Lying Back Curl



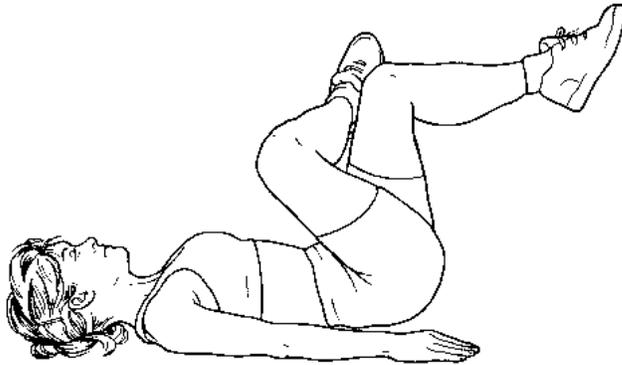
Protocol : Lie with the shoulders flat against the floor and bring both knees up towards the chest. Wrap both hands around the legs and hug the knees tightly whilst lifting the lower back off the floor slightly. Hold the stretch for between 20 to 30 seconds before relaxing then stretch again. *Caution*: If have back problems, do not hold this stretch. Instead, move into the lifted-back position then slowly return to the starting position with head and lower back on the floor.

b. Lying Knee Hug



Protocol: Lie with the shoulders flat against the floor and bring the left knee up towards the chest, using both hands to pull the knee as close as is comfortable to the chest. For the stretch to be effective, it is important that the right leg remains straight with the toes pointing towards the ceiling. Hold the stretch for between 20 to 30 seconds before relaxing then stretch again. Repeat this stretch for the right leg.

c. Supine Gluteal Stretch



Protocol: Lie with the shoulders flat against the floor with both knees bent and feet around hip width apart. Tilt the pelvis slightly so that the small of the back is in contact with the floor. Place the right foot over the left knee and move the knee away from the body. Lift the left foot up from the floor; bring the knee as close to the chest as is comfortable. Hold the stretch for between 20 to 30 seconds, relax and stretch again. Repeat the stretch for the left leg. *Caution:* It is essential that the back remains flat throughout this stretch in order to minimize the chance of injury.

d. Sitting Hamstring Stretch



Protocol: Sit on the floor with the back upright and both legs extended. Keeping the right leg straight with the toes pointing towards the ceiling, bring the heel of the left foot close in towards the groin. Take care to ensure that the back remains flat, lean forward from the base of the spine/hips. Hold the stretch for 10 to 15 seconds, relax and stretch again. Repeat for the left leg.

Whatever, before performing the static stretching exercises, there are guidelines that must be followed by subjects to avoid any injuries.

- a) Warm-up to increase the tissue temperature and blood flow.
- b) Isolate the muscle to be stretched in a relaxed, non-weight bearing position.
- c) Make the stretch slow and smooth to avoid a reflex contraction.
- d) A slight tension should be developed and this tension should subside during the stretch.
- e) Hold each stretch (20 to 30 seconds).
- f) Increase the length of the stretch when the tension resides.

- g) Breathe regularly during the stretch to ensure relaxation.
 - h) When the stretch is over, come out of the position with a slow and smooth movement.
 - i) Stretch consistently, especially if it is part of a rehabilitation program.
- (All protocols cited from Thomas J.R 2001)

After completed six weeks of treatment, all the subjects were attended the post-test. This is to determine either the treatment gave any effects on lower back and hamstring flexibility level and to find out which groups have higher increment after the treatment.

Researchers used the same condition as pre-test in doing the post-test to control the validity of this study. For the post-test researchers also used the same method of traditional sit-and-reach flexibility test. Every subject was given four trials. All the post-test scored data recorded in the same form.

Condition of the Test

Equipment: This study used the traditional sit-and-reach box for pre and post test.

Day of test: All subjects attended the test on the same day and 6.00pm to 6.30pm.

Place of test: All subjects used the same place for the test and treatment time as well.

Treatment program: Subjects took part in the same static stretching activities (refer the diagram of a , b , c and d in the protocol and table 1 for 6 weeks time).

Duration of treatment: All subjects attended 20- 30 minutes per day and 3 times a week. (table 2)

Table 1: Static Stretching Training Program (Treatment)

Pre-test	Within six (6) weeks	Post-test
Traditional sit-and-Reach Test	Static Stretching a. Lying Back Curl b. Lying Knee Hug c. Supine Gluteal Stretch d. Sitting Hamstring Stretch	Traditional Sit-and-Reach Test

Table 2: The Treatment Program Schedule

Week 1 until 6 during Static Stretching Program	
Venue	Class room of College of Malaysia
Time	6.00 pm to 6.30 pm
Day	Monday, Wednesday, and Friday
Training	Two groups (male and female)
Duration	20- 30 minutes per session

Subjects of the Study

Randomly selected 50 subjects. 25 males and 25 females student from KUIM who aged between 18 to 23 years old. Students was divided according to their gender and subjects were asked to fill up permission form to participate in this study.

Data Collection

The data was collected by students result in doing a Sit-and-Reach Test. All the data was analyzed with the help of Statistic Package for Social Science (SPSS) and it involved the used of independent sample t- test because this study was to compare mean score between 2 groups of subject.

Analysis and Interpretation Data

The purpose of this study was to compare the lower back and hamstring flexibility level between males and females of college students. The first part was the descriptive characteristic such as mean of age, height and weight of subjects.

The second part was to compare the flexibility test between the two groups (males and females). An inferential statistical analysis to test the study's hypothesis. The level of significant was set at $p < 0.05$ as far as social science is concerned.

Table 3: Demographic data of males and females student

Gender		N	Minimum	Maximum
male	Age	25	18.00	22.00
	Weight (kg)	25	39.40	83.50
	Height (cm)	25	156.00	175.00
female	Age	25	19.00	23.00
	Weight (kg)	25	34.50	68.00
	Height (cm)	25	146.00	167.00

Table 3 showed that demographic data of males and females college student who participated in the study. The minimum age of males student were 18 years old and females were 19 years old and maximum age for males were 22 and females 23 years old respectively and this means that the subject consisted females older than males subjects.

The minimum weight of males students were 39.17 Kg and maximum were 85.50 Kg where else, the females student minimum weight were 34.50 Kg and maximum only 68 Kg. Means the males student were much heavier than females.

The minimum height of males student were 156cm and females student were 146 cm. The males student taller than females student in this study and this was commonly showed in previous studied as well.

Table 4: Pre-test and Post-test of males and females student.

Gender		N	Minimum	Maximum	Mean	Std. Deviation
Male	Pre-post (cm)	25	11.88	32.00	20.9764	4.89004
	Post-test (cm)	25	12.20	34.48	23.8008	5.06793
female	Pre-post (cm)	25	11.25	33.78	26.2180	6.04103
	Post-test (cm)	25	12.23	36.43	28.6484	6.23534

Table 4 showed the pre-test and post-test flexibility level test between males and females student. The mean score for pre-test of males student were 20.98 ± 4.89 cm and females student were 26.22 ± 6.04 cm so this showed females student had higher mean score flexibility than males student even before the treatment on them.

The mean score level of flexibility for post-test of males students were 23.80 ± 5.07 cm and females student were 28.65 ± 6.24 cm and this means that the females student still showed the higher mean score of flexibility than males student.

As the conclusion, the males students had showed improvement in their flexibility level after treatment from mean score of 20.976cm before and to 23.800cm after the treatment and this mean at the average of 2.843 cm improved but the females mean score even face content valid showed improvement too (26.218cm to 28.648cm), it means that there was only 2.43cm improved after the treatment, however in the ratio of mean score comparatively showed that males students improved slightly more or higher in their the level of flexibility after treatment program concerned when compared with the females students improvement in ratio.

Table 5: The independent sample test of pre-test and post-test between males and females student

Independent Samples Test			
	t	df	Sig. (2-tailed)
Pre-post (cm)	3.372	48	.001
Post-test (cm)	3.017	48	.004

Table 5 showed the independent sample test of pre-test and post-test flexibility level between males and females student. The level of significant was set at $p < 0.05$.

For the pre-test the $t = 3.372$, $p = 0.001 < 0.05$ and fell in the rejection of the null hypothesis and hence H_0 are rejected, that mean the H_a was accepted.

The result of the post-test for two groups of males and females indicated that there was significant different too in mean score of lower back and hamstring flexibility level between males and females of college student. The result showed $t = -3.017$, $p = 0.004 < 0.05$ and fell in the rejection of the null too.

As the conclusion, from right the pre or the post test result and even after or before treatment were showed that the females KUIM students were had significant better flexibility level of lower back and hamstring than their males counterparts as long as the gender factor was the main concerned.

The result of this study reconfirmed the indication of that there was significant different in mean score of lower back and hamstring flexibility level between males and females college student.

Conclusion and Recommendation

Result of this study indicated that was significant different of lower back and hamstring flexibility level among males and females KUIM student. Most study indicated that

females are better flexibility than male at all age (Schell & Leelarthae-pin, 1994). Anyway, from the ratio in centimeter on the flexibility level which was experimental tested in this study showed that after the treatment, the males students could improved higher ratio or better ratio in their flexibility and it means that the males student could gained better result in flexibility level when the coach was concerned in whatever so sports must emphasized their training programs specifically on the flexibility activities like the protocol (treatment) that practiced in this study to the males athletes.

This study result supported to the previous studies result that the gender and types of activities were factors affecting one's flexibility level (Bandy, Irion & Briggler, 1997), (Schell & Leelarthae-pin, 1994) and (Warmbrodt & Rissman, 1999).

Recommendations

This study was the result of 50 students as subjects only. The result might more valid if the number of subjects used is larger. Subjects were age between 18 to 23 years old only. The result of this study only informs the level of flexibility around this age groups. For the future study, it might considered others age groups in the population.

The treatment for the future study could be improvised not only static stretching exercise but add in those Proprioceptive Neuromuscular Facilitation (PNF) activities Isometric Stretching or Active Stretching as well.

This study showed that there was different on lower back and hamstring flexibility level among males and females students of Malaysian college. For the next study might venture into compare the difference flexibility level more the two parts as this study concerned but other parts like: shoulder flexibility, hip flexibility and trunk flexibility.

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Corresponding Author

Dr. Tan Chee Hian
Pan Asian Sport Society and Physical Education (PASSPE- SEA-FSR-UiTM)
tanchee@salam.uitm.edu.my