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RESEARCH ARTICLE
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THE EFFECT OF DIFFERENT WARM-UP EXERCISES ON LEG STRENGTH IN MALE TAEKWONDO ATHLETES

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ABSTRACT

Background and Purpose: Physical strength, speed, agility, technical and tactical abilities, and neuromuscular processes all play a role in taekwondo performance. Slightly higher-intensity exercises may be followed by various static or dynamic stretching to boost neural transmission speed, prepare muscles for loads, and encourage joint mobility after the warm-up program. Several warm-up exercises assess the leg strength of male Taekwondo competitors.

Materials &Methods: There were 30 participants in the study. Those who didn't meet the inclusion or exclusion criteria were removed from consideration. Everyone who participated in the research had to sign a written consent form that explained the study's purpose, risks and benefits. As a pre-test, the subjects completed 1 rep max strength test. Post data was also collected using the 1 RM teams test after warm-up exercises. The warm-up exercises included walking Lunge, Lateral and forward leg swing, Kneeling thoracic twist, Brisk walk and Glute bridge abductors.

Results: The result of the study on Taekwondo males subjects has shown significant changes in the 1 RM scores as Pre score was 30.00±1.54 which after the session of warm-up workout changes in post results as 45.00±1. 722.The p-value of paired t-test was $P<0.05$ which shows that a significant difference was seen the subjects so the Alternative Hypothesis for the study is accepted.

Conclusion: According to the results of the study, we demonstrate that warmup exercise had substantial impacts on the individuals, which have significantly boosted their leg strength. More research has to be done on the subjects of various games in order to better understand their impact in various settings.

INTRODUCTION

When exercising or practising before a performance, warming up is an important element of the process of stretching and preparing for physical effort. Before exercising, athletes, singers, actors, and others warm up(1). Preparing the muscles for strenuous activity and preventing muscular cramps and overuse injuries are two commonly held beliefs. A steady rise in the intensity of physical activity (a "pulse raiser"), joint mobility exercises, and stretching are all common components of a warm-up before a workout. Athletes may warm up their muscles and raise their heart rate by jogging before a strenuous activity. Warm-ups should be tailored to the sport in order to engage the muscles that will

be utilised. There is some debate over the hazards and advantages of stretching and warming up at the same time, but it is widely accepted that warming up helps athletes emotionally and physically(2). Some warm-up exercises include stretching, but 2013 research found that doing so damages muscles. Static, dynamic, and ballistic stretches are all forms of stretches. Stretches involving bouncing or jerking are known as "ballistic." Flexibility and agility are said to be enhanced as a result of this practise(3). In order to do a static stretch, you must flex your muscles. This may assist avoid injury and allow for increased agility and flexibility. Static stretching for too long may weaken the muscles, so be careful not to overdo it. The goal of dynamic stretching is to increase performance by moving the body component in the appropriate manner until it reaches its full range of motion(4).
Exercise is any activity that involves moving your body in order to improve or maintain your physical fitness and well-being. It may be done for a variety of purposes, including to help in muscle and cardiovascular system development, refine athletic abilities, lose or maintain weight, improve health, or just for fun(5). Many people prefer to work out in the fresh air because it allows them to form social groups, which is beneficial to their overall well-being and mental health(6).
The quantity of recommended exercise for health benefits varies depending on the aim, the kind of activity, and the individual's age. Even a tiny quantity of physical activity is better than none at all(7).

There are three main categories of physical activities, based on their total impact on the human body. Exercise that engages vast muscle groups and increases the body's consumption of oxygen over rest is considered aerobic. Increasing cardiovascular endurance is the primary purpose of aerobic exercise. Running, cycling, swimming, skipping rope, rowing, hiking, dance, tennis, and long-distance running are all forms of aerobic exercise(8). If you're looking to build lean muscle and bone density, you'll benefit from an anaerobic workout, which includes resistance training like weightlifting. Push-ups, pull-ups, lunges, squats, and the bench press are all examples of strength training(9). Weight training, functional training, eccentric training, interval training, sprinting, and high-intensity interval training are all examples of anaerobic exercise, which increases muscular strength in the short term(10). Flexibility exercises lengthen and stretch muscles. Stretching exercises, for example, serve to keep joints and muscles flexible. The objective is to increase range of motion in order to decrease the risk of injury.Accuracy, agility, power, and speed training are all examples of physical activity. Static vs. dynamic exercise is another way to categorise different kinds of workouts. As a result of increased blood flow, 'dynamic' workouts like jogging tend to reduce diastolic blood pressure. Static activity, on the other hand (like as weightlifting), might temporarily raise the systolic pressure while the exercise is being performed(11,12).
One of the most widely practised martial arts in India is Taekwondo. With a concentration on head-height kicks, leaping spinning kicks and quick kicking skills; it is also known for its use of punching and kicking methods. Tae kwon do may be translated as "kicking," "punching," and "the art or method of" in the literal sense(13). Master Puran After returning from Hong Kong, Andrew Gurung brought taekwondo to India. From 1969 until 1974, he learned taekwondo under Korean Grand Master Lee Pyung Pal. It was in 1974 that he received his 2nd Dan in Taekwondo from Great Grand Master Lee Pyung Pal. He began teaching taekwondo in Kalimpong, Darjeeling, and Sikkim at the beginning of his career. Later, he extended his trainings to Kolkata, as well as the southern, northeastern, and northern portions of the country. " Until 1984, he made regular trips to all corners of India. "Father of Taekwondo in India" is a distinction that he has received from the United States' official taekwondo hall of fame(14).
When taekwondo was first brought to India in 1975, Jimmy R. Jagtiani was one of the country's early taekwondo teachers, an 8th Dan Black Belt in Taekwondo. On August 2, 1976, the Taekwondo Federation of India (TFI) was created as a National Taekwondo Organization in India(15).
All four of these organisations were affiliated with the World Taekwondo Federation (WTF) at some point between 1978 and 1994: Taekwondo Federation of India; Asian Taekwondo Union; Indian Olympic Association; South Asian Taekwondo Federation. TFI was recognized in 1988 as an independent, supreme court-recognized national governing organization for the Korean martial art, by the Indian Ministry of Youth Affairs and Sports(16).

Four muscles work together to bend knees: semimembranosus, semitendinosus, the long and short heads on the posterior thigh of the biceps femoris, and the semimembranosus. When the hip and knee joints are in their flexion and extension positions, three "real" hamstrings are responsible. The short head of the Biceps femoris isn't activated by hip extension since it only covers the one joint (the knee). It is occasionally categorized as anything other than a "hamstring" because of the wide range of its origins and innervations.(17).

All hamstring muscles have the following characteristics: Muscles should begin at the Ischial tuberosity. Muscles should be inserted over the knee joint, either in the tibia or the fibula. It is the sciatic nerve's tibial branch that supplies nerve impulses to the muscles of the knee and hip joints(18). True hamstrings are those muscles that meet all four of the following requirements. This ligament, which is part of the adductor magnus tendon, covers solely the adductor tubercle on bone, despite the fact that this tendon is structurally deteriorated. The adductor tubercle is two millimetres apart from where the ligament joins to the knee's medial epicondyle(19). Place a low stool in front of you and squat down on it with your hips and feet. Return to starting position by leaning forward from your hips until you feel a stretch in the back of one of your thighs. Taking a pre-run hamstring stretch might protect you from injury. The phrase "Stagnant Stretching" is used to describe a stretch that does not move. For a certain period of time, the participant holds a stretch position. Static stretching, which has a low risk of damage, is a safe and effective method of stretching(20). Static stretching may be used as part of a regular stretching regimen as well as a preventative measure against injury. Statical stretches, on the other hand, may have a detrimental effect on your athletic ability. Static stretching may make it difficult for you to respond swiftly. For vertical leaps, brief sprints, balance, and response times, it may take up to two hours. For the objective of increasing the muscle's perceived flexibility and producing an untense muscular tone, stretching may include bending or stretching one or more muscles (or tendons)(21). Improved muscular control and flexibility will follow from the training. Stretching is used for more than only relieving muscular pain and spasms; it also aids in mobility and comfort(22).

METHODOLOGY

- Study Design: An observational study
- Research setting- The study was performed in Greater Noida.
- Study Location: People living in Greater Noida, India.
- Duration - The duration of the study was 4 weeks.
- Consent and Ethical Consideration-Ethical approval had been taken from the institute to conduct the research, and informed consent had been taken from each participant to be included in the study
- Population- 30 subjects.
- Sample Size: 30 individuals were selected by random sampling.
- Sampling method- Random sampling was done based on inclusion and exclusion criteria.
- A sample side -30 subjects had been included based on the inclusion and exclusion criteria.

Inclusion Criteria:

- age of 17 years old to 27 years old,
- height of 155 cm to 180 cm,
- weight of 45 kg to 75 kg
- athlete who trained 3-4 h/day six times a week.

Exclusion Criteria:

- any post injury athlete,
- recreational athletes

Tools used

- Stopwatch
- Consent form
- Assessment form

● Pen & paper

PROCEDURE

A total of 30 subjects were included in the study. The subjects were screened according to the Inclusion or Exclusion criteria. Before the study, the written consent form was taken from all subjects through a sufficient explanation of the procedure, purpose, and risks/benefits provided to all subjects. The subject's pretest was done using 1 RM squads test. Post data was also collated using 1 RM squads' test after warm-up exercise. The warm-up exercises were included as walking Lunge, Lateral and forward leg swing, kneeling thoracic twist, Brisk walk, and Glute bridge abductors.

DATA ANALYSIS

The data analysis was carried out using the Social Science Packaging Software (SPSS) 26.0 edition of the software. Readings were analy99zed using a paired t-test. This is a graphical depiction created using Microsoft Word 2021.

RESULTS

The result of the study on Taekwondo male subjects has shown significant changes in the 1 RM scores as Pre score was 30.00±1.54 which after the session of warm up workout changes in post results as 45.00±1.722.The p value of paired t test was P<0.05, which shows that a significant difference was seen the subjects so the Alternative Hypothesis for the study is accepted.

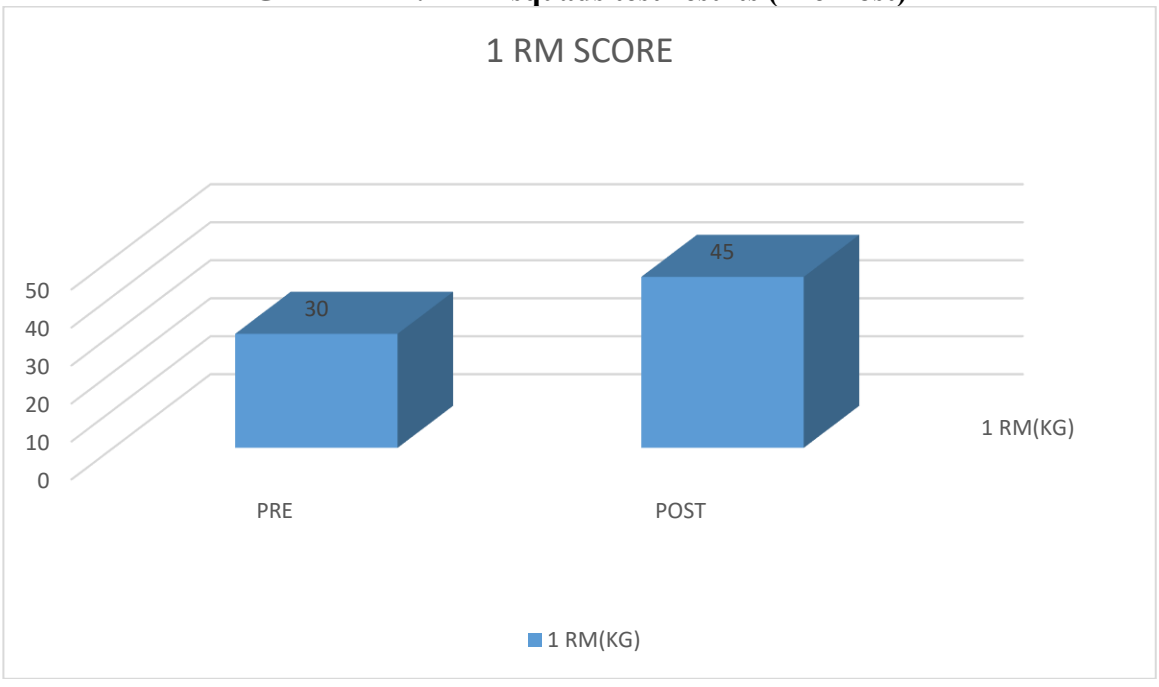
TABLE NO 1: Demographic Descriptive Statistics.

	AGE	HEIGHT	WEIGHT
Mean	23.82	5.91	61.98
N	30	30	30
Std. Deviation	1.829	1.003	2.752

TABLE NO 2: 1 RM squads test results (Pre-Post)

	PRE(kg)	POST (kg)	P VALUE
GROUP A	30.00±1.54	45.00±1.722	P<0.05

GRAPHA 1:1 RM squads test results (Pre-Post)



DISCUSSION

The study was conducted to check the effects of warmup exercise as on Taekwondo Athletes which has shown that result of the study on Taekwondo males subjects has shown significant changes in the 1 RM scores as Pre score was 30.00±1.54 which after the session of warm up workout changes in post results as 45.00±1.722.The p value of paired t test was $P<0.05$ which shows that significant difference was seen the subjects so that Alternative Hypothesis for the study is accepted. A study done by Jonatas Ferreira da Silva Santos et al 2016shows Studying the effects of post activation training on counter-movement leaps and rapid kick repetition will be done. There were nine taekwondo practitioners in attendance. In one of the four experimental circumstances, there was just one control. After the warm-up and conditioning activities, the Frequency Speed of Kick Test is incorporated in this workout plan. When comparing the two groups, we used Bonferroni post-hoc testing. Alpha levels were set at 5%. In each set, the quantity of kicks varied substantially. The measures were not affected by volume or intensity (maximum countermovement jump, mean countermovement jump, kick decrement, impact and rating of perceived exertion). According to the research, no matter how many conditioning workouts taekwondo competitors complete, they do not improve their performance. Ani AGOPYAN et al 2020 shows in there study that young taekwondo competitors may benefit from foam rolling in the short term, according to the study. A variety of FR exercises conducted on taekwondo athletes were shown to affect joint ROM and vertical jump height. Methods: This study included 19 black-belt taekwondo practitioners. On the first day, the anthropometric measurements were also taken. On the second day, three-minute FR exercises were performed at five different locations. Next, everyone underwent exchange inspection, which took place on the third day. ANOVA Repeated Measures tests were conducted in two and three dimensions. Three variables were unaffected by the strength of either the dominant or non-dominant leg. FR exercise improved vertical leap height and jumping force significantly. The PSLR-ROM of taekwondo athletes showed little effect despite several FR sessions. With FR training, a person's vertical jump may be significantly improved.

Future scope of study

- More study can be done with higher sample size in the study which more protocoled to be done.

Conflict of interest: -None

CONCLUSION

According to the results of the study, we demonstrate that there were substantial impacts of warmup exercise on the individuals, which significantly boosted their leg strength. More research has to be done on the subjects of various games in order to better understand their impact in various settings.

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