E-ISSN: 2707-7020
P-ISSN: 2707-7012
JSSN 2022; 3(2): 69-71
Received: 08-05-2022
Accepted: 13-06-2022

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Hamstring flexibility between male and female cricketers with low back pain: A comparative study

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DOI: https://doi.org/10.33545/27077012.2022.v3.i2b.98

Abstract
Cricket is a global sport traditionally popular in the commonwealth nations. Low back pain is one of the common ailments in sports and one of the causative factors for the low back pain is reduced hamstring flexibility. Low back pain is highly prevalent in cricketers. Hamstring injuries have always been one of the highest frequency injuries in cricket. The aim of the study is to compare the hamstring muscle length of male and female cricket players associated with low back pain. A sample size of 50 cricketers among the age group of 19-25 were selected based on the inclusion and exclusion criteria. Group A include 25 male cricket players and Group B include 25 female cricket players. Hamstring flexibility is measured using (AKET) active knee extension test. The results obtained shows that there is significant difference in hamstring flexibility between male and female cricketers with low back pain.

Keywords: Active knee extension test, hamstring flexibility, low back pain, cricket

Introduction
Cricket is the world's second-most popular spectator sport after football and has capitated people of every age, sex, background, and ability for more than 400 years. It is now being played in 105 member countries of the International Cricket Council [1]. Sports personnel are the most afflicted towards various musculoskeletal disorders. One of the most common in both the sports as well as non-sports persons is Low Back Pain. Low back pain is the most common musculoskeletal complains experienced by 60% to 85% of athletic population at least once in a life time [2, 3]. Individuals with shortened hamstring muscles present gait limitations, increased risk of falls, and susceptibility to musculoskeletal injuries [3]. Hamstring muscle tightness leads to decreased range of motion of lumber flexion and pelvic tilt. This can alter the biomechanics of lumbar spine and may led to back [4]. The three muscles that constitute the hamstring muscle complex (HMC) are the Semitendinosus, the Semimembranosus and Biceps femoris muscles. They originate from the inferomedial impression on the upper part on the ischial tuberosity and insert on the upper part of the posterior surface of tibia [5]. Due to origin of hamstring that is located on the ischial tuberosities of the pelvis, hamstring flexibility may influence pelvic rotation [6]. Restricted pelvic rotation can lead to decreased lumbar motion and micro trauma which may be a factor in the development of low back pain [7]. Limitations in hamstring and quadriceps strengths have a connection with lower back injuries in highly active sportsmen [8] especially when they are young and playing a high-risk sport such as cricket fast bowling [9].

Materials
- Pen/pencil
- Velcro straps
- Goniometer
- (AKET) instrument

Methodology
A sample size of 50 cricketers from different Cricket clubs in Bangalore, among the age group of 19-25 were selected using convenient sampling based on the inclusion and exclusion criteria. Group A included 25 male cricket players and group B included 25 female cricket players. Hamstring flexibility is assessed and measured using (AKET) active knee extension test.

Inclusion criteria
- Male and female cricketers
- Age - 19 to 25 years
- Mechanical low back pain

Exclusion criteria
- Disc prolapses
- With radiating pain
- Any fractures
- Any Disease of spine
- Any surgeries

Procedure
Each player was positioned supine, with both hip and knee flexed to 90° on the examination couch. The thigh of measuring extremity was strapped with the instrument to maintain hip joint in 90 degree flexion. The opposite leg was placed flat on the couch with the knee fully extended and maintained in the position throughout the test. The lateral epicondyle of the femur was palpated, and the goniometer was centered over it. The lateral malleolus of the tibia and the greater trochanter of the femur were then marked the arms of the goniometer were aligned with the proximal and distal landmark. Then the player was instructed to actively extend the knee being tested until this was possible, with the hip was kept at 90° of flexion. The stationary arm of goniometer was aligned along the femur with reference point at the greater trochanter of the femur, the axis of movement was placed at the lateral femoral condyle at the knee joint and the moving arm was aligned with the lateral malleolus. Angle were measured to the nearest degree, on the sides representing active range of motion (AROM). A lag of 20 degrees is considered normal from full extension, anything less than 20 degrees is considered as hamstring tightness.

Results
Statistical Analysis
Statistical analysis of the data was done by using the software SPSS23.0. Descriptive statistics were calculated and summarized. Which includes frequency, percentage, Mean and standard deviation. Inferential statistics had been carried out in the present study. Comparison between the groups in hamstring length was done by un-paired t test. Level of significance was set at 5%.
Among male cricketers, a majority of 14(56%) are right side dominated and 11(44%) are left side dominated. In female cricketers, a majority of 18(72%) are right side dominated and 7(28%) are left dominated.

Table 1: Showing Left and Right dominant knee of male and female cricketers

	Left dominant	Right dominant
Male	11(44%)	14(56%)
Female	7(28%)	18(72%)

Table 2: Showing mean and standard deviation of hamstring muscle length in dominant knee of male and female cricketers.

Hamstring muscle length		N	Mean	Std. Deviation	t value	Result
Dominant	Female	25	9.40	6.563		
	Male	25	16.32	4.110	4.468	p<0.001

The above table shows in Dominant knee average hamstring tightness in female cricketers is 9.4±6.563 ° and in male cricketers it is 16.32±4.110 °.The analysis shows dominant knee hamstring tightness is significantly more in male cricketers as compared to female with p<0.001.

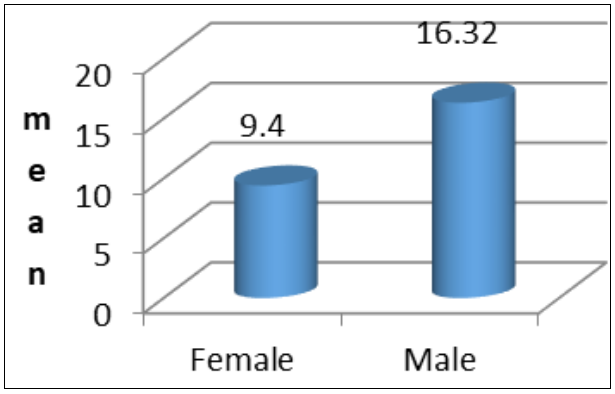

Fig 1: Showing mean hamstring muscle strength in dominant knee of male and female cricketers.

Table 3: Showing mean and standard deviation of hamstring muscle tightness in non-dominant knee of male and female cricketers.

Hamstring muscle length		N	Mean	Std. Deviation	t value	Result
Dominant	Female	25	11.20	6.994		
	Male	25	17.60	4.804	3.771	p<0.001

The above table shows in non-Dominant Knee average hamstring tightness in female cricketers is 11.2±6.994 ° and in male cricketers it is 17.6±4.804 °. The analysis shows non dominant knee hamstring tightness is significantly more in male cricketers as compared to female with p<0.001.

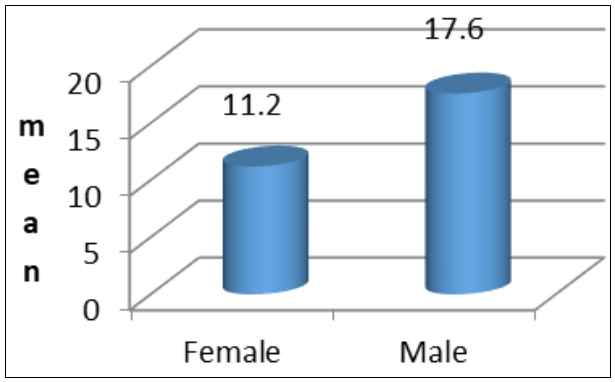

Fig 2: Showing mean hamstring muscle tightness in non-dominant knee of male and female cricketers.

Discussion
This study describes comparative study on hamstring flexibility between male and female cricketers with low back pain. The findings of the present study shows that female cricket players with low back pain have greater hamstring flexibility as to male cricketers with low back pain. The average hamstring flexibility for male in dominant knee was 16.32 ± 4.110°. The average hamstring flexibility for male in Non dominant knee was 17.6±4.804°. The analysis shows that dominant and non-dominant knee hamstring tightness is significantly more in male as compared to female with p<0.001.
The average hamstring flexibility for female in dominant knee was 9.4±6.563. The average hamstring flexibility Non dominant knee was 11.2±6.994°. The analysis shows that dominant and non-dominant knee hamstring tightness is

significantly more in male as compare to female with $p<0.001$.

Athletes with good hamstring flexibility may have lower maximal hamstring muscle strains and they imply that athletes with good hamstring flexibility may have lower risk for hamstring injury compared to athletes with poor hamstring flexibility [10].

Conclusion

The study concludes that there is significant difference in hamstring flexibility between male and female cricketers with low back pain. The female cricketers have greater hamstring flexibility as compare to male cricketers with low back pain.

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