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PREVALENCE OF HAMSTRING TIGHTNESS AND ITS RELATION WITH LOW BACK PAIN IN FAST BOWLERS OF PUNJAB

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ABSTRACT

In the game of cricket, job of fast bowler is most physically demanding and injury prone. Global Positioning System studies found that fast bowlers cover 22 kms in a single day of a test match, 13 kms in a one-day match and 5.5 kms in t20 match. Fast bowlers are most susceptible to injuries in the game of cricket. Low back injury is most common injury in fast bowlers. The study was done on 40 male fast bowlers from various districts of Punjab to find the prevalence of hamstring tightness and its relation with low back pain. Bowling workload of the fast bowlers was also calculated in the form of overs bowled in a week. Hamstring tightness was measured by Passive Straight Leg Raise (PSLR) and Passive Knee Extension Test (PKET). Hamstring flexibility was measured with Sit and Reach Test. Oswestry Disability Questionnaire (ODQ or ODI) was used to measure disability index in fast bowlers suffering from back pain. Unilateral tightness was found in 25% players. Spearman's correlation test was used to find out correlation between hamstring tightness and low back pain and a significant correlation was found ($p = 0.018$, $p<0.05$). 22.5% bowlers had hamstring tightness in their dominant leg or say rear leg. 75% of the bowlers who had bilateral tightness were suffering from low back pain. 60% of the bowlers with bilateral tightness suffered from a lower limb injury in past 12 months. The occurrence of low back pain was less in less experienced players. Most of the bowlers were found to be over bowling. 65% fast bowlers were bowling more than 24 overs in a week while 27.5% were bowling 40 or more overs in a week. So, it was concluded that there is relationship between hamstring tightness and low back pain.

KEY WORDS: *Cricket, Fast bowling, Hamstring Tightness, Low back pain.*

INTRODUCTION

Injuries to fast bowlers are one of the major challenges faced by the sport's medical specialists. Fast bowlers have the shortest careers as compared to batsmen and spinners and all credits go to injuries sustained by them. When talking about fast bowling injuries, back injuries are most prominent than others having ended the career of number of talented fast bowlers across the World. In professional cricket, most of the loss of playing time is due to the injuries to low back. Cricket is a low injury game but rate of injuries in fast bowlers is comparable to contact sports such as Football and Rugby (Orchard *et al.,* 2006). In all three formats players bat, bowl and field, therefore there are many different skills that are required for the game but the most physically demanding of these skills (pp) plus the skill that incurs the highest injury rate is fast

bowling (o and d). Fast bowlers in cricket are most susceptible to injuries in case of non-contact sports. A fast bowler has to absorb both vertical and horizontal components of the ground reaction force up to a half of a ton (Watson, 2005) during foot impact in the delivery stride. These forces are passed from lower body to your spine, where the more forces caused by rapid trunk hyperextension/flexion, lateral flexion and twisting are added as a result of the bowling action during delivery.

Stretch conducted a study which showed that bowlers are more prone to injuries (47.4%) as compared to batsman (29.8%) and fielders (22.8%). Common sites of injury were back and trunk (33.5%), upper limb (24.6%) and lower limbs (22.8%).

Most injuries were sustained by fast bowlers to lumbar spine (Mansingh *et al.,* 2006).

Fast bowler needs to be trained enough to withstand and reduce the substantial forces (mean peak vertical forces between 3.8-12 times body weight, mean peak horizontal forces of 2-4.9 times body weight) that they have to endure during bowling. The forces acting on spine are transmitted by legs especially through hamstrings. One of the suspected reasons behind LBP is lack of hamstring flexibility.

If hamstrings are less flexible, they pull on Ischial tuberosities which tilts your pelvic back. This causes the flattening of the spine by decreasing the curve in low back. This constant pull adds pressure to bones as well as strain to muscles. Therefore, the muscles in your lower back become weak and start to fatigue sooner.

Pincus, *et al.* (2002) explained the relationship between hamstring flexibility and back extensors endurance, as the hamstring muscle is attached to the ischial tuberosity, It is hypothesized that tightness of the muscle may induce posterior pelvic tilt, resulting in flat back and LBP. Mierau *et al.* (1989) reported a direct correlation between a history of LBP and lower extremity straight leg raising (SLR) measurements in adolescent males.

HYPOTHESIS

- NULL HYPOTHESIS –There is no relation of hamstring tightness with low back pain in fast bowlers.
- ALTERNATE HYPOTHESIS- There is relation of hamstring tightness with low back pain.

METHODOLOGY

The design of the study was observational and descriptive study.

The subjects were free for the choice of participation. They were told about the aim and procedure of the study. The subjects gave their informed consent before taking part in the study.

This study was carried out in various districts of Punjab which include Patiala, Sri Muktsar Sahib, Bathinda and Sangrur. The data was taken from the various cricket academies of these districts.

Participants of this research were male fast bowlers under 30 years who played cricket at certain level. (District, State, National, University, College). 40 male fast bowlers participated in the study.

Sampling is the method of selecting participants from the population. Snowball sampling technique was used.

The study was conducted on 40 male fast bowlers.

SELECTION CRITERIA

Inclusion Criteria

- Male
- Fast Bowler
- 15-25 years of age

Instruments Used

1. Universal Goniometer
2. Oswestry Disability Index (ODI)
3. Anthropometric Rod
4. Weighing Machine

Tests used for measuring hamstring tightness

1. Passive Knee Extension Test (PKET):

If the subjects had knee angle more than 30 degrees the hamstring muscle was considered to be tight (Apparao P. *et al.,* 2013).

2. Passive straight leg raise (PSLR):

Hamstring muscles were considered tight if they had PSLR of <70 degrees (Yildirim *et al.,* 1016). Tightness was considered if it was confirmed by both tests.

Results and Analysis

Table 4.1: Mean value of the tests used to measure hamstring tightness

	MEAN	S.D
PSLR Left	75.43	9.26
PSLR Right	73.00	10.79
PKET Left	35.07	10.7
PKET Right	37.95	11.62

Table 4.1 shows the mean values of different tests used to measure hamstring tightness. The mean value of Passive straight leg raise was found to be 75.43 in left leg and 73 in right leg. Mean values of Passive knee extension test was observed to be 35.07 in left leg and 37.95 in right leg.

Table 4.2: Comparison of the hamstring tightness with back pain and no back pain group

Hamstring Tightness ⇩	No Back Pain	Back Pain	Total
Left Leg	3	0	3
No Tightness	14	7	21
Right Leg	7	1	8
Both Legs	2	6	8
Total	26	14	40

Table 4.2 displays hamstring flexibility in low back pain and back pain free group at the time of study. There was hamstring tightness in left leg in 3 fast bowlers and none of them was suffering from back pain. 21 players had no hamstring tightness, out of which 7 players were suffering from back pain and 14 were in no back pain group. 8 players were suffering from hamstring tightness in right leg and only 1 of them was having back pain. Total 8 fast bowlers had hamstring tightness in both legs and 6 of them were suffering from low back pain. From total 40 fast bowlers 14 were suffering from back pain while 26 were in no back pain group.

Table 4.3: Comparison of Hamstring Flexibility with Disability Scores Measured from Oswestry Disability Index (ODI)

Hamstring Tightness ⬇	Minimal Disability (Odi Score Category)	Moderate Disability (Odi Score Category)	Na(Not Applicable In No Back Pain Players)	Total
Left Leg	0	0	3	3
No Tightness	4	3	14	21
Right Leg	0	1	7	8
Both Legs	3	3	2	8
Total	7	7	26	40

Table 4.3 displays hamstring flexibility in comparison with disability scores measured from Oswestry Disability Index (ODI).

Table 4.4: Spearman's correlation test between hamstring tightness and low back pain

Spearman's rho		Hamstring tightness	Low back pain
Hamstring tightness	correlation coeff. Sig.(2-tailed)	1.000	0.378 0.18
Low Back pain	correlation coeff. Sig.(2-tailed)	0.378 0.018	1.000

Table 4.4 shows the Spearman's correlation test between hamstring tightness and low back pain. Significant correlation is found between the two ($p<0.05$) with moderate strength of relationship. Since the result is positive, it shows that low back pain increasse with increase in hamstring tightness.

DISCUSSION

Unilateral tightness was found in 25% players. 22.5% bowlers had hamstring tightness in their dominant leg or say rear leg at the time of delivery of the ball. Bilateral tightness was found in 20% bowlers. 75% of the bowlers who had bilateral tightness were suffering from low back pain. Significant correlation was found between hamstring tightness and low back pain using Spearman's correlation ($p=0.018$, $p<0.05$). So null hypothesis was rejected and alternate hypothesis was accepted. Hamstring flexibility didn't show significant relationship with low back pain ($p=0.069$, $p>0.05$).

Unilateral hamstring tightness was found in 10 players. Unilateral hamstring tightness in left leg was found in 3(7.5%) fast bowlers whereas in case of right leg, it was found in 8(20%) bowlers. 95%of the bowlers were right arm bowlers one of the bowlers with unilateral tightness in left leg was left arm bowler. Therefore. it was found that the rear leg of the bowler in delivery stride was less flexible. Front leg was found to be more flexible. It is also evident from the mean values of the tests used to measure hamstring tightness. Mean value of left leg was found higher than right leg. From the mean values of PSLR and PKET, it was found that that the left leg of the fast bowlers was more flexible than right leg. 92.5% of the bowlers were right arm bowlers. Therefore, it was noticed that their dominant side hamstring was less flexible as compared to non-dominant one. In the present study evaluation of intra-subject difference in hamstring flexibility in patients with low back pain was done. Right hamstrings were found to be more flexible than left ones, also dominant lower extremities were found to be more flexible than non-dominant ones. Fast bowlers continuously bend forward after delivering the ball, tight hamstrings increase the risk of low back injuries. Fast bowling is an activity in which we rely on one side of body more than other. If we are right hander there are chances that our right side is stronger but less flexible then left. The hamstring tightness

found in the rear leg or dominant leg of the fast bowler may be due to the biomechanics. The non-dominant leg is flexed and extended in delivery stride every time you bowl and a tension is built up in hamstrings of your dominant leg in follow through, when braking effect occurs due to the crossing of your bowling arm across your body, So these may be the reasons behind hamstring tightness found in the non-dominant leg.
Bilateral hamstring tightness was found in 8 (20%) bowlers. Significant correlation was found between hamstring tightness and low back pain using Spearman's correlation ($p=0.018$, $p<0.05$).

It was found that 75% of the bowlers who had bilateral tightness were suffering from back pain. Mackay *et al.* (1988) found that tightness in muscle surrounding the pelvis can increase lumbar lordosis. Elliot *et al.* (1992) found bowlers with low back injuries had significantly less hamstring flexibility than the uninjured players. He was not sure that it is a consequence of injury or its cause.

CONCLUSION

Null hypothesis was rejected and alternate hypothesis was accepted as significant correlation was found between hamstring tightness and low back pain using Spearman's correlation ($p=0.018$, $p<0.05$).

Unilateral tightness was found in 25% players. 22.5% bowlers had hamstring tightness in their dominant leg or say rear leg at the time of delivery of the ball.

Bilateral tightness was found in 20% bowlers. 75% of the bowlers, who had bilateral tightness were suffering from low back pain.

Most of the bowlers were found to be over bowling. 65% fast bowlers were bowling more than 24 overs in a week while 27.5% were bowling 40 or more overs in a week.

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