

ASSESSMENT OF LOWER EXTREMITY FLEXIBILITY IN RECREATIONAL FOOTBALL PLAYERS

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ABSTRACT: As football is a sport that involves great physical strength, youngsters, who are under no professional guidance while playing recreationally are exposed to a wide array of musculoskeletal injuries due to lack of awareness of proper warming up, stretching and cool down techniques. For the players to function at an optimum level and for them to be less susceptible to injuries, it is important to maintain flexibility of especially the lower extremity muscles as these muscles are under greater usage while playing football. Our study involves assessment of flexibility of the lower extremity muscles in recreational football players and determining the incidence of muscular tightness. Ober's test, Ely's test, Thomas' test, and 90-90 SLR test for iliotibial band, rectus femoris, iliopsoas, and hamstrings muscles respectively. The results of the study show that, of the four muscles assessed in the study, the hamstrings were the most affected, with 84% of the participants testing positive for tightness, followed by iliopsoas with 43%, rectus femoris 33% and iliotibial band tightness with 26%. We also found that about 18 participants had two muscles tight at same time, while 10 had only one muscle tight, 6 had three muscles tight, 3 had no muscles affected and 3 participants had all four muscles tight at the same time. From this study we can conclude that the incidence of hamstring tightness was found to be the highest amongst the four muscles tested, followed by iliopsoas, rectus femoris, and iliotibial band muscle tightness.

Key Words: Lower extremity flexibility, recreational football players, Ober's test, Ely's test, Thomas' test, 90-90 SLR test

INTRODUCTION

Flexibility is the ability to rotate a single or series of joints smoothly and easily through an unrestricted pain-free range of motion. Muscle length, joint integrity, and periarticular soft tissue extensibility all interact to determine flexibility. Flexibility is maximized when the muscle-tendon units that cross a joint have adequate extensibility to deform and yield to a stretch force. The arthrokinematics of the moving joint (the ability of the joint surfaces to roll and slide) as well as the ability of periarticular connective tissues to deform also affect joint ROM and an individual's overall flexibility¹. Gleim and McHugh describe flexibility in two parts: static and dynamic. Static flexibility is related to the ROM available in one or more joints; dynamic flexibility is related to stiffness and ease of movement.²

Restricted motion can range from mild muscle shortening to irreversible contractures. Tightness is commonly used in the clinical and fitness settings to describe restricted motion due to adaptive shortening of soft tissue, in particular mild muscle shortening. Muscle tightness is also used to denote adaptive shortening of the contractile and non-contractile elements of the muscle.¹

The key physical attributes required in football include agility, balance and co-ordination; speed/speed endurance; flexibility; power; and strength. While body type may not matter so much in soccer, agility is paramount. In a sport that relies heavily on agility and its allied trait, speed, players make nearly a thousand changes of direction per game.⁶

The rapid rise of football in the past few years in India, has led to many youngsters taking up football as a recreational activity. As football is a sport that involves great physical strength, such youngsters, who are under no professional guidance are exposed to a wide array of musculoskeletal injuries due to lack of awareness of proper warming up, stretching and cool down techniques. For the players to function at an optimum level and for them to be less susceptible to injuries, it is important to maintain flexibility of especially the lower extremity muscles as these muscles are under greater usage while playing football.

The purpose of this study focuses on assessing four lower extremity muscles namely iliopsoas, iliotibial band, rectus femoris and hamstrings. It is important to maintain flexibility of these lower extremity muscles as these muscles are under greater usage while playing football. These are the postural or tonic

muscles, which are the muscles responsible for maintaining the upright and dynamic posture and have a tendency to become tight and hypertonic with pathology. Pathology to one of the force couple muscles or to one of the force couples acting about a joint can lead to muscle imbalance, instability, and loss of smooth coordinated movement. Certain lower extremity muscle groups face different demands during the different phases of the game like, the support limb muscles face different demands than the kicking limb. Different phases of kicking include preparation, backswing, leg cocking, acceleration and follow-through phase. Better definition of lower extremity function during kicking provides a basis for improved insight into soccer player performance, injury prevention, and rehabilitation. These muscles were assessed to determine any flexibility deficits in recreational football players using their respective outcome measures.²

Ober's test was used to assess iliotibial band tightness, Ely's test was used to assess rectus femoris tightness, Thomas test was used to assess iliopsoas muscle tightness, and lastly, 90-90 SLR test (Active knee extension test) was used to assess the hamstrings. The muscles were simply commented tight if positive and not tight for negative findings.

METHODS

Methods

- Study type: Cross sectional population-based
- Sample size: 40
- Study duration: 6 months
- Study set up: Football turf, Pune
- Target Population: Recreational Football Players

Inclusion Criteria

1. Recreational football players.
2. Age group of young adults (18-35 years)
3. Male and female football players

Exclusion criteria

1. Players not willing to participate
2. Players who play other sports as well

Materials

Constant: Demographic data sheet, consent forms, plinth.

Outcome measures

1. Ober's test¹⁵
2. Ely's test¹²
3. Thomas test¹⁶
4. 90-90 SLR test¹³

PROCEDURE

Permission was taken from the institutional ethical committee. The purpose of the study was explained and informed consent was taken from the subjects. A total of 40 subjects were evaluated for tightness of the following muscles- iliotibial band, rectus femoris, iliopsoas, and hamstrings using Ober's test, Ely's test, Thomas' test, and 90-90 SLR test respectively. Data was collected and subjected to statistical analysis.

Results:

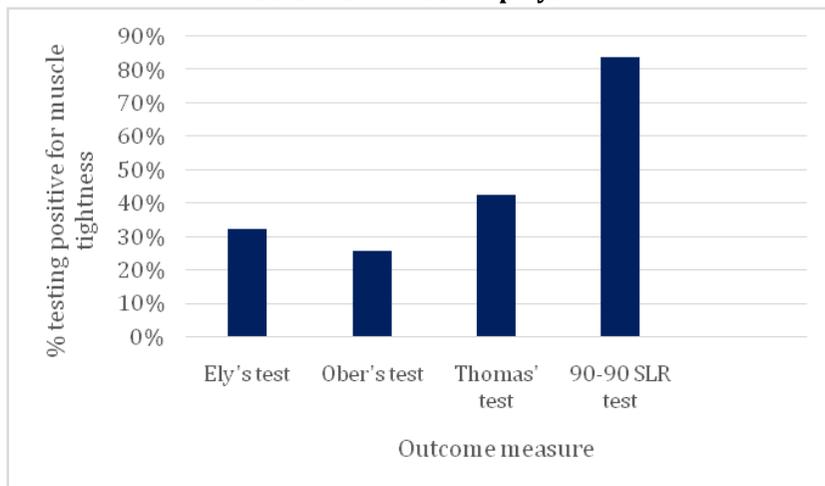
Table 1: Descriptive statistics of age and BMI

	N	MEAN±SD	MIN	MAX
AGE (years)	40	21.62 ±1.53	19	24
BMI(kg/m ²)	40	21.13±13.58	17.05	35.92

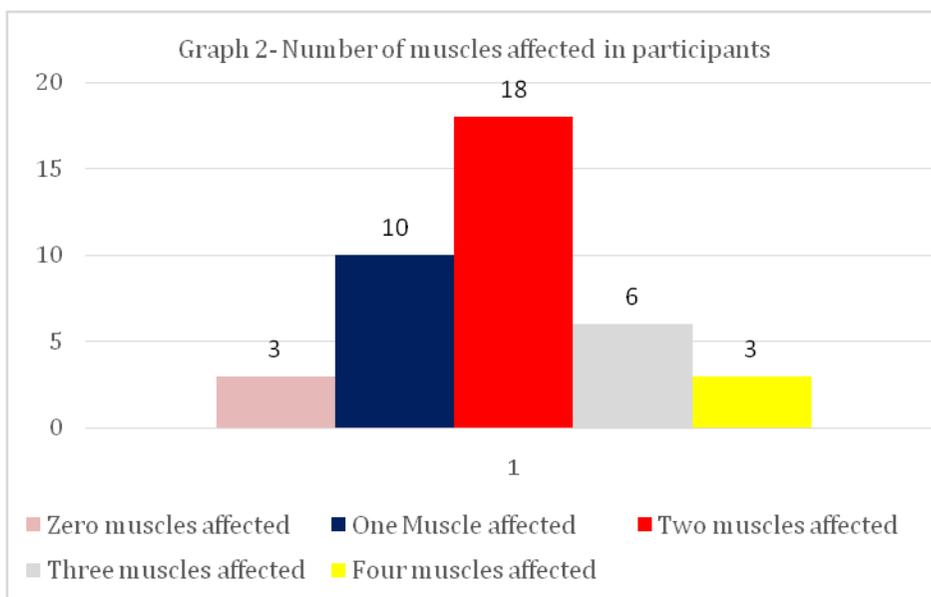
Table 2: Frequency Distribution of lower extremity muscle tightness in recreational football players.

Muscle (Test)	Frequency	Percent (%)
Hamstrings (90-90 SLR)	33	84
Iliopsoas (Thomas')	17	43
Rectus femoris(Ely's)	13	33
Iliotibial band(Ober's)	10	26

Graph 1- Number of participants testing positive for lower extremity muscle tightness in recreational football players.



Graph 2- Number of muscle affected together at the same time in participants.



DISCUSSION

The rapid growth in popularity of football in India has prompted many youngsters taking up football as a recreational activity. Evidently there are flexibility deficits among football players when compared with the non-playing population. This raises the question whether recreational football players have proper awareness of injury prevention as there is no professional guidance for such players. Our study focuses on assessing flexibility of lower extremity muscles and to determine which muscle groups have more or less flexibility deficits.

The aim of this study was to assess lower extremity muscle flexibility in recreational football players. A cross-sectional population based study was carried out in which there were 40 participants. Table 1 shows descriptive statistics of age and BMI.

Table 2 and graph 1 shows frequency distribution of lower extremity muscle tightness in recreational football players. Of the four muscles assessed in the study, the hamstrings was the most affected, with 84% of the participants testing positive for tightness. It can be observed that internal forces in the Biceps Femoris depends on the length and the shortening-lengthening velocity of muscle fibers. The muscle is a viscoelastic system, that is, the tension opposing deformation increases when the velocity of muscles elongation also increases. The amount of force produced by a muscle is also related to the length at which the muscle is held (Tension-Length relationship). The Tension/length ratio defines the material's

stiffness. When the stiffness increases, the slope of the curve Tension-Length become steeper and greater tensions with smaller deformations are produced. That is, the failure tension is reached at shorter deformations of the muscle fiber. As stiffness of tendon is bigger than that of the muscle, the fiber tear occurs normally near the proximal muscle-tendon union especially in the Biceps Femoris. Therefore, elevated levels of the muscle stiffness associated with a lack of flexibility, increases the risk of hamstring injury.²⁸

Among various attributes required in a player for playing football and performing at a high level, flexibility is a key component. In a study done by F. Garcia- Pinillos, et al, 2012, concluded that hamstring flexibility is a key factor for performing football-specific skills, such as sprinting, jumping, agility, and kicking in young football players. These results support the rationale that muscle flexibility must be specifically trained in football players beginning at early ages.¹⁸

The iliopsoas muscle tightness was found in about 43% of the participants, while, the rectus femoris tightness was found to be 33% and lastly, iliotibial band tightness was found to be about 26% in all participants. Postural muscles contract slowly and have great endurance. They're also prone to over activity and finally tend to tighten when they're overactive.² Muscular tightness is frequently postulated as an intrinsic risk factor for a muscle injury in soccer. Further, hamstring, iliopsoas and quadriceps flexibility measurements are of clinical relevance for monitoring recovery after such injury. In a study done by N Bittencourt and colleagues on 182 elite male soccer players measuring flexibility of the hamstring, iliopsoas and quadriceps concluded that the flexibility assessment should be performed in preseason to guide preventive interventions and provide baseline values to rehabilitation parameters after a muscle strain.¹⁴

There are various studies done that evidently show the high incidence of musculoskeletal injuries among recreational football players.

In a study done by Ozgur Kilic et al in 2018, found that incidence of musculoskeletal injuries among recreational football players were chiefly located in the ankle, knee, groin, and hamstring, being associated with previous injury and match exposure and concluded that musculoskeletal injuries are common among recreational football players, while effective preventive programmes are available.¹⁹

In a study done, by Donmez G et al 2018, the incidence patterns of football injuries and associated consequences in daily life and labour loss, among public employees was established and concluded that the risk of injury in recreational football players is relatively high causing significant labour loss¹⁷.

It was also found that about 18 participants had two muscles tight at the same time, while 10 had only one muscle tight, 6 had three muscles tight, 3 had no muscles affected and 3 participants had all four muscles tight as shown in graph 2. The findings also suggested that among the participants that had at least two muscles tight, 16 of them had hamstrings and iliopsoas tightness at the same time. Also a total of 8 participants showed asymmetrical tightness, of which 3 participants had only the dominant side tight, while 5 had the non-dominant side tight. Our study supports the fact that asymmetrical patterns exist in football players. Kicking and cutting skills in soccer are clearly unilateral, require asymmetrical motor patterns and lead to the development of, asymmetrical adaptations in the musculoskeletal function of the lower limbs.⁷

Being under no professional guidance, the awareness of proper stretching, warm up and cool down techniques among recreational football players is called to question, which in turn increases the risk of injury and could affect the levels of their performances. In a study done, by Christos Papadopoulos et al 2006, the strength and speed characteristics of elite, sub-elite and recreational young soccer players were examined in which they concluded that elite young soccer players can be distinguished from sub-elite and recreational young soccer players in strength and speed characteristics.⁸

With proper awareness of injury prevention programmes that keep the flexibility in check the risk of injuries can be lowered. Muscle strains and overuse injuries are most likely to be prevented by improved flexibility, especially when the athlete has adequate strength to control the flexibility. In a study done by Lisa S. Krivkkas, MD et al 1996, 201 athletes were tested, and of them 71 sustained 115 injuries. They concluded that tight ligaments and muscles are related to injury in men, but not women, college athletes. A preseason flexibility program may decrease injuries in college men athletes.¹⁰

There is a need for awareness among recreational players for proper injury prevention as football is on the rise in India. Amit Mantri et al 2013, reported in his study that football has been seen as one of the most vibrant sports in India and is #2 sport after cricket which is the result of many factors including strategic dialogue, investment and planning around the promotion of the game.³

In order to reduce the risk of injuries in the susceptible population of recreational footballers, it is important to create awareness among them about proper injury prevention protocols that include proper techniques of warming up, stretching and cool-down. More study is needed to determine proper protocols

in order to ensure prevention of the most common injuries among recreational football players. Awareness camps may be set up at the playing grounds, where proper information can be conveyed to the players explaining the importance of injury prevention protocols.

CONCLUSION:

The recreational football players show high incidence of hamstring tightness followed by iliopsoas, rectus femoris, and iliotibial band muscle tightness.

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Conflict of interest: None

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