

NORMATIVE VALUE OF ADDUCTOR SQUEEZE TEST IN NEPALI MALE PROFESSIONAL FOOTBALL PLAYERS: A CROSS-SECTIONAL STUDY

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ABSTRACT

Introduction

Groin pain is a common problem. Adductor squeeze test are used to diagnosed, monitor and prophylactically determine the risk of developing groin pain.

Objectives

The aim of study was to establish normative adductor squeeze test values in Nepali male professional football players.

Methodology

One hundred and sixty-one healthy players from top football clubs attended the study. Hip adductor muscle strength was assessed using sphygmomanometer at 0°, 45° and 90° hip flexion.

Result

The mean value of adductor squeeze test score at 0° of hip flexion position was 152.03 ± 33.18 , for 45° of hip flexion position was 152.38 ± 27.52 and for 90° of hip flexion position was 120.57 ± 21.88 . 45° of hip flexion has the highest value of the adductor squeeze test.

Conclusion

This study established reference ranges for adductor squeeze tests for normative pre-season data in Nepali male A-division professional football players.

KEY WORDS

Adductor muscle; Groin; Muscle; Soccer; Strength

INTRODUCTION

Groin pain is one of the common overuse injuries in a soccer game and accounts for 10-18% of all soccer injuries.^{1,2} The evaluation and treatment of groin pain in the athletes are challenging, and these injuries are prone to recurrence that can lead to chronic disability.^{3,4} The adductor muscle group has a poor blood supply and a rich nerve supply, making it slow to heal and very sensitive to any intervention.⁵

Football is one of the most popular sports with the greatest participation globally.¹ There are 204 million people from 203 nations are members of the Federation of International Football Associations (FIFA).⁶ Regular participation and training have several benefits related to physical and mental health, cardiovascular and musculoskeletal variables.⁷

Various methods of assessing adductor muscle strength have been purported including hand-held dynamometer,⁸⁻¹⁰ manual muscle testing devices and isokinetic dynamometry.¹¹⁻¹³ The adductor squeeze test is an important objective outcome for both rehabilitation and prevention of groin injuries as it has been shown that decreased hip adductor strength precedes groin injuries in some populations.⁸

The objectives of this study were to establish normative value for adductor strength in Nepali professional football players and from different playing position. These values may assist the sports medicine clinician and physiotherapist in the determination of the physical status of a player and facilitate the design of groin injury prevention and management programs in a clinical setting.

In Nepal, so far there are no any studies done to establish normative adductor strength in soccer players.

METHODOLOGY

Ethical approval was granted by Institutional Review Committee (IRC). Written permission was taken from five different clubs and players had their consent forms signed before conducting the study.

Convenient sampling method was used and Subjects were recruited from five top clubs of A-division. They were Army football club, Nepal police football club, Armed police force football club, Friends football club and Jawalakhel youth football club. The total number of players who had participated in the current study was 161.

Potential subjects based on the inclusion criteria were t-s with no history of surgery, no self-reported history of groin or pelvic pain in either limb, no other lower limb injury and no pain reported during the testing procedure (Figure No. 1,2,3). Players were categorized into position units (i.e., goalkeeper, defender, winger, midfielder and striker)

Outcome Measure

The adductor squeeze test (AST) protocol undertaken was the same as that previously described. All participants wore shorts and were barefooted. The test was performed in three submaximal efforts in each of the test position that is 0°, 45° and 90° of hip flexion. For the testing session, participants were again informed of the test procedure.

They were then positioned supine with their head flat on the bed and arms across the chest. Each participant was required to perform 3 maximal squeezes in 0°, 45°, and 90° of hip flexion. The sphygmomanometer was used for all subjects. It was pre-inflated to 10 mmHg and placed between the player's knees such that the middle third of the cuff was located at the most prominent point of the medial femoral condyles. For formal testing the player was instructed to squeeze the cuff as hard as he could. The highest-pressure value displayed on the sphygmomanometer dial was recorded during each maximal adductor squeeze test. Trials were considered invalid and repeated if any of the following occurred: the participants head lifted off the bed, hands were removed from chest, the pressure cuff slipped, or the participant pushed through heels/feet. Participants were allowed a 15-second rest between maximal squeeze and 45-second rest between each test position.¹⁴ Participants were unable to see the sphygmomanometer and were unaware of test scores for the duration of the testing session.

Statistical analysis

Mean strength for all test positions were calculated to determine the reference range. Mean and standard deviation was calculated from each testing position and also a number of variables, namely, height (m), weight (kg), age (categorized as 5 years intervals i.e., 18-22; 23-27; 28-32; 33-37) and playing position (goalkeeper, defense, mid fielder, winger and striker)

Statistical analysis was undertaken using SPSS statistics version 21.



Figure 1: 0 degree test position



Figure 2: 45 degree test position



Figure 3: 90 degree test position

RESULTS

One hundred and sixty one Nepali male professional players from five football clubs were invited to participate in this study. All invited players agreed to participate (100%). Analysis was done to find the mean values and standard

deviation for age, BMI, Adductor squeeze test values for 0°, 45° and 90° of hip flexion position was calculated.

The mean (SD) weight was 61.96, 6.33, height 1.69 (0.054), and BMI 21.59.(202) kg/m² (as shown in table no.1). There was a fairly even split across the five age categories: 39.13% aged between 18-22 years (n=63), 39.13% aged between 23-27 years (n=63), 16.77% aged between 28-32 years (n=27) and 4.96% aged between 33-37 years (n=8) and their mean score is shown in table no.2. The standard assumptions of a power of 80% and statistical significance of 5% were used. This study has sufficient power to determine a difference in all three squeeze test scores.

Squeeze test scores:

Mean value of adductor squeeze test score at 0° of hip flexion position is 152.03 ± 33.18, for 45° of hip flexion position as 152.38 ± 27.52 and for 90° of hip flexion position as 120.57 ± 21.88. 45° of hip flexion had the highest value of the Adductor squeeze test (Table 1).

Table 1: Descriptive Analysis

No. of Observation N=161	Range	Minimum	Maximum	Mean	±SD	Variance
Age	19.00	18.0	37.0	23.6	4.6	21.6
Height	.43	1.52	1.9	1.6	.05	.003
Weight	44.00	46.0	90.0	61.9	6.3	40.1
BMI	11.02	16.9	27.9	21.5	2.0	4.0
ASTV0	190.0	60.0	250.0	152.0	33.1	1101.0
ASTV45	160.0	70.0	230.0	152.3	27.5	757.6
ASTV90	130.0	60.0	190.0	120.5	21.8	479.14

Table 2: Descriptive Analysis for player's categorization and age interval (5 years)

	Goal keeper (n=16)	Defense (n=52)	Mid fielder (n=31)	Winger (n=27)	Striker/F orward (n=35)	Age Categories (5 years interval)			
						18-22 (n=63)	23-27 (n=63)	28-32 (n=27)	33-37 (n=8)
ASTV 0	158.7±30.35	147.6±35.7	152.0±32.6	154.4±27.5	153.5±35.7	151.8±33.2	153.7±34.4	156.1±25.7	126.2±39.2
ASTV 45	158±23.4	153.0±32.5	147.0±22.8	153.1±22.3	15±29.5	149.2±25.1	150.6±29.4	166.5±21.3	143.1±36.1
ASTV 90	127.1±17.6	120.1±26.2	118.2±20.3	120.3±17.7	120.4±21.2	122.2±22.2	117.7±21.8	126.5±20.7	109.3±18.7

DISCUSSION

This study assessed the adductor strength of Nepali male professional football players. We established normative ranges of strength for hip muscle groups in testing position that is commonly used in the assessment of adductor related groin pain. The value of AST in three testing position has not so many differences. However, the mean value of AST at 45° found higher. This is the first study to report this value in professional football players. We also observed test values in different playing position. The results of this study may assist the sports physiotherapist in making key decision

regarding the management and rehabilitation of both symptomatic and asymptomatic players. This information can be used to assess the degree of player's weakness at presentation relative to predictive normal. Hence, this study also suggests that for groin injury prevention, identification of risk of injury and for better rehabilitation, the groin has to assess properly and functionally keeping all the aspects of groin injury including the other causative factors and associated injuries such as iliopsoas-related groin injury and pain, especially more focused adductor muscle for any group of athletes.

The adductor muscles play an important role in motor control and stability of lower kinematic chain during the gait cycle. The main function of adductor group muscle is to bring foot together and cross leg activities such as kicking which is frequently used in football game. Ancillary to their action as hip adductors in the frontal plane, they also act as an accessory hip flexor up to 90° of hip flexion and an accessory hip extensor at angle greater than in the sagittal plane.^{15,16} Lovell et al suggest that the clinician should assess strength of the gracilis, adductor longus, and adductor magnus muscle in 45 degree hip flexion.¹⁷

Studies in other sports have reported higher squeeze test values than those recorded in this study as shown in fig no.1, although they included both symptomatic and asymptomatic participations.^{18,19} whereas we included only asymptomatic individuals who experienced no pain during the test procedure. The values were observed lower due to various other factors such as lack of proper physical training, discontinuation of seasonal game, lack of proper rehabilitation and also due to lack physiotherapist in every football club. We observed lower adductor squeeze value in both the 0 and 90 degree of hip flexion in this study. The 0 degree of hip flexion position corresponds closely with maximal hip extension at the terminal stance phase of the gait cycle, and the 90 degree of hip flexion position is similar to the range of motion achieved by sprinters towards terminal swing phase of the gait cycle.²⁰

Varying physical capacities and anthropometric profiles are required for different playing position in football. We observed no statistically significant difference between the position units and categorization in squeeze test values; however, further data with a larger sample size may lead to significant findings. This suggest that players size in this A division football players does not influence these values. The higher squeeze values were observed among goalkeepers (n=16) in 45° of hip flexion (158.75±23.43 mm of Hg) and in 90° of hip flexion (127.18±17.60 mm of Hg). Whereas, other players in different playing position had low test values. This may result in overuse of the adductor muscle group and therefore potentially result in higher risk of injury in this group.

The potential weakness is that these data related to the start of the season (pre-season screening program) and do not provide information on how these scores may vary during the season. However, it was important to take all the values at the same time point to enable a normative range for that time to be determined, than to try and amalgamate a range of season time points, and as such the start of the season, when the players are being assessed for their training needs going forward, seemed logical and most useful for players, coaches and team physiotherapist. Another weakness of this study is that the data were recorded only from five A division clubs. The result of the study will be more relevant if more clubs were included.

CONCLUSION

With the increasing demand of football as a professional game, prevention of injuries and rehabilitation for player performance and to maximize player training are important. The adductor squeeze test values can be helpful in the reduction of injuries by early detection and management of injuries, giving attention to the techniques and monitoring the efforts of intervention over time.

Though the players were healthy, the test values were lower than other studies; it might be due to various other. So, to get higher squeeze value, the players should train regularly, continue their game and should get proper rehabilitation after injury. The results in this study represent the normative strength values for professional football players only and cannot be considered to be normative values for other athletic populations.

Further recommendation from this study shows, the research can be done to find out the association between BMI.

RECOMMENDATIONS

The current study findings, normative value of adductor muscle strength can be used as a baseline finding for prognostic as well as rehabilitation phase of an athlete. The study shows difference in strength of hip adductor muscle among different player's position. Hence, the reference value can be useful for different playing position of the players.

Groin pain among the football players should be taken into consideration pre-season as well as post season as it is beneficial for the football players to perform better during the main event.

Furthermore, Pre and post season measurement of adductor strength should be taken and can be compared with the players with groin injuries.

LIMITATIONS OF THE STUDY

The football players for the current study were assessed only pre-season. Post season evaluation of the adductor strength was not done due to player's engagement. The current study didn't consider the players with the groin injuries or groin pain. The players adductor strength can be also be measured with groin pain and injuries. Hence, players adductor strength pre-season and post season was not compared and also players with groin injuries strength were not compared.

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CONFLICT OF INTEREST

No conflict of interest

FINANCIAL DISCLOSURE

None declared

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