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Relationship of football kicking skill to lower limb measure and shoulder power

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Abstract

The purpose of the study was to analyse the relationship of kicking ability to limb measure and shoulder power of grassroots boys football players. In the study, one hundred and twenty-five boys were selected of age: 11 ± 1 ; height: 142.56 ± 9.29 cm and weight: 35.53 ± 7.13 kg from the northeast state of India. For the study kicking ability was the dependent variable and independent variables were thigh circumference, calf circumference and shoulder power. Kicking ability was measured by kicking for distance, thigh and calf circumference was measured by a steel tape and shoulder power was measured by a medicine ball put. Descriptive statistics and Pearson correlation were applied for analysis in SPSS 16. In the result, it was found that kicking ability was moderately related to shoulder power and with calf circumference relationship was low. Thigh circumference was negatively related to kicking ability. Thus, it was concluded that this variable could be a determining factor but the main focus might be given to skill development. For further study, it was suggested to include leg length, Range of motion of hip joints, knees and coordination.

Keywords: Grassroots, kicking ability, circumference and power

Introduction

Football is a keen interesting sport for all but researchers and coaches it's a dwell of knowledge fan spot of implementation to challenge the changing demand of football performance. The game of football has changed drastically over the year in terms of rule and regulation, media, social media, technique and skill, technology, style of play, the strategy of play and fitness level. In a web article of Nordic science, it was stated that in the last ten year the sprinting amount in the English Premier League was increased by 50%. Application of scientific training is an important cause of game-changing. Scientific training focuses on major and minor factors influencing football performance from the grassroots level till retirement. Football performance is influenced by various factors like anthropometrical, physical, physiological, motor skills and psychological factors. Kicking skill is one of the main skills in playing football and winning a match. Kicking ability at the right target and speed at the anticipated distance is the main point of success in football. In the study of Hart *et al.* (2016) [7] it was found that the velocity of the ball varies with the variation of limb characteristics. An accurate kicker has greater lean mass and less fat mass on their kicking limb (Urbin *et al.*, 2011) [14]. Bilateral development of relative muscle strength of lower limb and relative limb lean mass could be to enhance kicking accuracy (Hart *et al.*, 2014) [8]. Many studies have shown lower limb strength's effect on speed and other skills and performance of football players (Brooks *et al.*, 2013; Comfort *et al.*, 2014; Hoyo *et al.*, 2015; Morin *et al.*, 2015) [3, 5, 9, 11]. The leg is the main part of the body that generates force in kicking and the hip, torso and shoulder make the kick more powerful. Shoulder coordinate in kicking to maintain balance and transmit force in kicking. The non-kicking leg side arm plays the main role in kicking. The movement of the non-kicking side arm in kicking is abducted horizontally before kicking leg contact the ball then abduct horizontally to ball contact (Shan & Westerhoff, 2005) [13]. Optimal separation of supporting leg arm and kicking leg leads to twisting the torso to perform a maximum kick; this means optimum arm-hip separation denotes the higher value of a maximum kick (Lees *et al.*, 2010) [10]. Nowadays football is highly competitive, therefore instead of focusing on training and analysing the elite players, it also gives attention to grooming young football players, identifying the right players and study on their development.

Since, this study was conducted on football kicking ability and its relationship with thigh circumference, calf circumference and shoulder strength of grassroots football players. It was hypothesised that there would be a significant correlation between kicking ability for distance to thigh circumference, calf circumference and shoulder strength.

Method

Participant

One hundred twenty-five boy grassroots football player was selected for the study from different football clubs of Manipur and Mizoram of age: 11 ± 1 ; height: 142.56 ± 9.29 cm and weight: 35.53 ± 7.13 kg.

Procedure

For measuring lower limb, thigh and calf circumference were measured. Measurement was taken on the thigh and calf girth in a standing position. Shoulder power was measured by a medicine ball put. The subject sits on a chair with the spine erect and places the medicine ball under the chin in front of

the chest and pushes with maximum power. The best distance covered in feet out of three trials was measured as a score. The kicking skill of football was measured by kicking a rolling ball. The subject kicked a rolling ball serve 5m away from the restricted line before crossing the restricted line and measuring in the nearest meter. For analysing the relationship between limb measures and shoulder power to kicking ability Pearson correlation was applied in SPSS 2016. Data were normally distributed. Normality was tested Shapiro-Wilk test after transformation.

Result

Table 1: Correlation of kicking ability to leg measure and shoulder power

Item	Coefficient of correlation
Thigh Circumference	-.357**
Calf Circumference	.332**
Shoulder power	.666**

** Correlation is significant at the 0.01 level (2-tailed).

Table 2: Description of Thigh Circumference

Class	Class Mean	Frequency	Cumulative Percentage	Mean (cm)	Stander deviation
30-34	32.5	16	12.8	39.7	4.8
35-39	37.5	55	56.8		
40-44	42.5	32	82.4		
45-50	47.5	18	96.8		
>50	55	4	100		
Total		125			

Comparing the thigh circumference mean, the sample in the mean class was 55 (44%) as the result shown in the table-2, below the mean was 16 (12.8%) and above class was 54 (43.2%). The analysis between table-2 and the thigh circumference range of 38.1 ± 4.6 cm for 10 years and 39.95 ± 4 cm for 12 years old boys according to Diwaka (1995)

[6] indicates that maximum boys have good thigh circumference. From table 1 thigh circumference is significantly related but low (.35) and negative. It may be due to the component of the thigh including bone, muscle and fat, but strength is related to the lean mass (Reed *et al.*, 1991)^[12] and the players are a beginner.

Table 3: Description of Calf Circumference

Class	Class Mean	Frequency	Cumulative Percentage	Mean (cm)	Stander deviation
11-14	13.0	1	.8	28.6	4.1
15-19	17.5	2	2.4		
20-24	22.5	11	11.2		
25-29	27.5	74	70.4		
30-34	32.5	30	94.4		
35-39	37.5	6	99.2		
>40	42.5	1	100.0		
Total		125			

Table 4: Description of Shoulder Power

Class	Mean Class	Frequency	Cumulative Percentage	Mean (feet)	Stander deviation
5 - 7	6.0	37	29.6	8.7	2.3
8 - 10	9.0	70	85.6		
11- 13	12.0	11	94.4		
>14	15.0	7	100.0		
Total		125			

Based on table 3 Comparing the mean, the sample in the mean class was 74 (56%), below the mean was 14 (14.4%) and above class was 37 (12%). The analysis between table-3 and the calf circumference range of normal BMI boy's 28.9 ± 2.2 ; overweight boy's 33.1 ± 2.0 ; obese boys 37.7 ± 3.3 and total range were 30.3 ± 3.6 according to Cicchella *et al.*, (2014)^[4] indicate that calf muscle development in the boys of northeast India was good. The correlation between calf circumference and kicking ability was significant and low (.33) as shown in

table-1. This low correlation indicates calf mass is related to kicking ability but kicking performance also depends on other parameters like coordination and technique (Anthrakidis *et al.*, 2008)^[1].

Based on table 4 Comparing the mean, the sample in the mean class was 70 (56%), below the mean was 37 (29.6%) and above class was 18 (14.4%). The analysis between table-4 and according to (Biggar *et al.*, 2021)^[2] the medicine ball push power was 4.3 ± 0.7 m for 12 years indicating that shoulder

power was poor. From table-1, the correlation between shoulder power and kicking ability was significantly related. The correlation coefficient of relation (0.66) shows it was related moderately. It shows shoulder power was an important component in kicking (Lees *et al.*, 2010)^[10].

Conclusion

The development of basic components for specific game and sport affect performance. Long-term development from an early age is the most successful way. So, the study was conducted on grassroots football players to find the relationship between kicking ability to lower lean and shoulder power. Based on data analysis results found that kicking ability was significantly related to calf measure and shoulder power. Thigh measures relate significantly but negatively related. Thus, while selecting players calf circumference could be a factor; while training less focus should be given to strength as maximum strength development was not attained at this age so the focus could be on skill development. Further research can be done as there is other influencing factor such as leg length, range of motion of the hip joint, knee flexion and extension and leg swing speed and coordination.

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