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Relationship of anthropometric characteristics with physical fitness performance among soccer players

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Abstract

Physical fitness makes foundation for higher sports performance. The aim of present study was ascertain the association of anthropometric characteristics with physical fitness among soccer players. For the purpose of this study, total 50 inter-collegiate football players of various positions were selected from Guru Nanak Dev University Amritsar, Punjab, India. The age of soccer players were between 19 to 25 years. Pearson correlation of coefficient was utilized to ascertain association of anthropometric with physical fitness performance. Level of significance was set at 0.05.

Keywords: Anthropometric, physical fitness, soccer

Introduction

Soccer is very popular game in the world especially in European countries. It involves techniques of running, passing, kicking, tackling, blocking, heading, juggling and dribbling. Often all these activities have to be performed at great speed. The game of football contains physical challenges. Though two players may be equal in their skills but because of different physical and mental response, there can be much difference in their performance. A player must be quick in assessing a situation and in his response. Keogh (1999) ^[1] suggested that a physical conditioning and anthropometric measurements selection plays an important role in determining the football teams Elite junior Australian rules. The popularity of the game is reflected in the millions who participate in Soccer in lower level of play. Soccer is now being played in more than 210 countries throughout the world. Soccer is popular because of the fact it is a simple game requiring very minimum infrastructure and equipments Stepnicka (1974) ^[10]. There will be significant difference of Anthropometric variables between Defender and Midfielder players playing positions in Football Singh, A., & Singh, B. (2015) ^[5]. The Subject's body weights accounted for much front squat performance variance only at the heaviest load. Overall, body mass index and the weight/torso length ratio served as the best predictors of front squat performance variance. The results suggest anthropometry serves as an accurate predictor of front squat performance in college football players Shepherd (2010) ^[4]. The performance abilities between positions in young soccer players appear to be different. Anthropometry can discriminate physical capacities and soccer skills providing a scientific rational behind the coaches' practice of selecting young soccer players Brahim (2013) ^[6]. Hailu (2016) ^[9] suggested that within-position variation was quite large in some cases, which could indicate that a team that does not have the opportunity to hand-pick players, based on anthropometric characteristics, may be at a disadvantage therefore the respective soccer coaches, sport science professionals should take into account the principle of morphological optimization in talent detection, identification and selecting soccer players. Leão (2019) ^[3] observed apposition specificity of anthropometric characteristics across different age categories. Additionally, the same data supported different validated equations which resulted in large differences in the final outcome estimations. Veale (2010) find differences in body composition of the elite junior athletes, development in a linear fashion is noted, providing useful information for the creation of age appropriate expectations and training programs. There is paucity of studies related to association of anthropometric characteristics with physical fitness performance.

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Material and Methods

Fifty soccer players selected from inter-collegiate football tournament held at Guru Nanak Dev University Amritsar, Punjab, India, and age between 19-25 yrs. The aim and methodology of the study informed to all the subjects and they voluntarily to participate in this study.

Hypothesis

There will be no significant relationship exist between anthropometric characteristics and physical fitness performance.

Anthropometric Variables Measurements

Gross Body Measurements

- Standing Height (cm)
- Body Weight (kg)

Length of Body Parts (cm)

- Upper Leg Length
- Lower Leg Length
- Upper Arm Length
- Lower arm Length

Diameters of Body Parts (cm)

- Bicondylar Humerus Diameter
- Biacromial Diameter
- Hip Diameter
- Bicondylar Femur Diameter

Girth of Body Parts (cm)

- Biceps Muscle Girth
- Calf Muscle Girth

Physical Fitness Measurements

AAHPER youth fitness testing, is considered as a test of items included, the measured all the component physical fitness.

1. Pull the Ups
2. Bent knee sit ups (sixty-seconds)
3. 4 X 10 m the shuttle run
4. Standing broad jump
5. 50 yard dash
6. 600 Yd run/ walk

Procedure

The detail protocol of the study intimated to all the subjects and signed written consent form. The measurements of the subjects were taken within two days. On first day all anthropometric measurements was taken and AAHPER youth fitness testing was done on second day.

Measurements

Anthropometric assessment was taken as per instruction issued by International Society for the Advancement of Kinanthropometry (ISAK). The total scores achieved by the players in the AAHPER youth fitness test regarded as performance.

Results

Table 1: The correlation of anthropometric characteristic with physical fitness performance among Inter-collegiate soccer players.

Variables	Mean	Standard Deviation	Correlation
Weight	63.06	4.1177	-0.069
Height	169.9	2.67	0.22
Biacromial Diameter	39.62	2.2847	-0.124
Bicondylar Femur Diameter	8.128	0.462	0.109
Bicondylar Humerus Diameter	5.54	0.2	-0.03
Hip Diameter	30.94	2.0244	-0.322
Upper Arm Length	30.46	1.7404	-0.249
Lower Arm Length	24.88	1.409	0.141
Upper Leg Length	48.42	3.592	0.309
Lower Leg Length	48.42	3.592	0.195
Biceps Muscle Girth	23.78	1.5817	0.0645
Calf Muscle Girth	31	2.49	0.03

The table-1 shows a positive relationship between height, bicondylar femur diameter, lower arm length, lower arm length, upper leg length, lower leg length, biceps muscle girth, calf muscle girth with physical fitness performance thus, our hypothesis has been rejected. On other side table -1 shows a negative relationship between weight, biacromial diameter, bicondylar humerus diameter, hip diameter, upper arm length with physical fitness performance, in that case our hypothesis has been accepted. Certain anthropometric characteristics have biomechanical advantage in sports performance. Longer limbs lengths have advantage in jumping and running events. Greater muscular girth signifies greater cross sectional area of muscles, as muscular force is directly proportional to cross sectional area of muscle. Thus greater biceps muscle girth provides the greater muscle power for lifting the body upward while performing the pull ups and provides greater momentum while performing the 50 m dash and standing broad jump yards.

Discussion and conclusion

This is confirming the fact that competitive sport demands events specific physical structure. A top level performance demands a particular type of body size shape and proportion. Numerous researchers had observed high correlation between the body profile of athletes and performance in specific tasks. Hirata (1966) had suggested that nation with people whose general physique is limited to the characteristics of champions in certain events must concentrate their training program on those events only. Carter (1982) had also suggested that the athletes who wish to achieve success in sports at high level must compare their physique with Olympic athletes. Anthropometric characteristics and physiological parameters are important in sports performance. Coaches and physical education teachers must take in account these variables while talent identification and formulation of training schedule in any sports. Reilly (2000) [2] also concluded that anthropometric and physiological criteria do have a role as part of a holistic monitoring of talented young players

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