Sport Mont 15 (2017) 1: 31–33
Original scientific paper
UDC 796.13:976.332

The Association of Sprint Performance with Anthropometric Parameters in Youth Soccer Players

Arjan Hyka, Edmond Bicoku and Ali Mysliu
University Aleksander Xhuvani, Elbasan, Albania
Agron Cuka
Sports University of Tirana, Tirana, Albania

A B S T R A C T

Several studies have investigated the association between strength and speed, showing that stronger athletes perform better during sprint performances (Baker & Nance, 1999). Moreover, the aim of this study was to evaluate the correlation between sprint performance and anthropometric parameters. Subjects were 32 youth soccer players. The age of participants was 15.1±0.3 years. Speed time (50 m sprint) was evaluated during sprint test, and anthropometric parameters were measured (weight, height, percent body fat). Correlation analysis (Pearson test) was performed to evaluate the correlation between speed and anthropometrics. Results showed correlation between body weight and speed (r=-0.041 Sig=0.834); BMI values and speed (r=0.231; Sig=0.236), body height and speed (r=-0.384; Sig=0.044); percent body fat and speed (r=0.440; Sig=0.019).In conclusion, the results of this study show no significance association between body weight and BMI with sprint performance and significance correlation between body height (negative correlation) and percent body fat (positive correlation) with speed.

Key words: *speed, correlation, sprint performance, soccer, player*

Introduction

In soccer players there are a lot of characteristic about physical preparation that affect the result of the match. So an athlete need a lot of physical preparation in order to achieve better result. Helsen, Hodges, Van Winckel and Starkes (2000) in their study showed that it takes 10 years of a soccer player to grow as a player in elite.

Studies by S.M. Gil, J. Gil, Ruiz, Irazusta and Irazusta (2007) and Gravina, S.M. Gil, Ruiz, Zubero, J. Gil and Irazusta (2008) revealed that for different playing positions there are specific physiological demands and anthropometrical prerequisites. This results showed in conclusion that this affect the selection of young players based on superior physiological performances and anthropometrical advantage. Results from different studies show that match intensity decreases with age (Capranica, Tessitore, Guidetti & Figura, 2001) and match level is indicated by distance coverage. Two studies by Di Salvo et al. (2007), Rampinini, Coutts, Castagna, Sassi and Impellizzeri (2007) revealed that the coverage is 11 km in professional senior while in youth U18 about 9 km (Helgerud, Engen, Wisloff & Hoff, 2001). Castagna et al., 2003 for athletes at U12 showed that distance coverage is 6.2 km (60-minute 11-a-side match).

Regarding heart rate response in professional senior a study by Stolen, Chamari, Castagna and Wisloff (2005) revelead that 93% of maximal heart rate—HRmax and U18: 82% of HRmax, and blood lactate concentration (professional senior: 10 mmol L21and U12: 5 mmol L 21 (Capranica et al 2001; Stolen et al., 2005). There are a few studies and a few literature review reporting the relationship between anthropometric and physiological performances among young soccer players. Several studies have investigated the association between strength and sprint performances, showing that stronger athletes perform better during sprint performances (Baker & Nance, 1999; Comform et al., 2012).

Moreover, the aim of this study was to evaluate the correlation between sprint performance and anthropometric parameters.

Methods

Subjects were 32 youth soccer players. The age of participants was 15.1±0.3 years. Speed time (50 m sprint) was evaluated during sprint test, and anthropometric parameters were measured (weight, height, percent body fat). Correlation analysis (Pearson test) was performed to evaluate the correlation between sprint and anthropometrics. Body height and body mass were measured using a Health O Meter 402 KL professional physician beam scale. Values were recorded to the nearest 0.1 cm and 100 g, respectively. Body Mass Index was calculated using the usual formula; BMI=body mass (kg)/body height (m^2). Skin fold thickness measurement were used for the estimation of children body fat percent. Triceps and sub scapular thickness were measured to the nearest 0.1 mm using a calliper on the right side of the body (Harpenden Skinfold Caliper; Baty International RH15 9LR. England). All skin folds were taken three times by the same examiner to ensure consistency in the results with the average of the three values used as a final value. To predict percent body fat the equation described by Slaughter et al. (1988) were used.

Descriptive statistics (mean and standard deviation) were calculated for the variables assessed in this study. It was creating a specific data base in excel file (pre and post intervention

Received for publication January 4, 2017

test results) and then converted in SPSS database. All variables assessed in this study were tested for normality. P-values of≤0.05 were considered statistically significant. Pearson product moment correlation coefficient was used to assess the relationship between selected parameters (anthopometric parameters and sprint performance). All analysis was performed using the statistics system SPSS 17.0.

Results

Data on table 1 show the results for anthropometric parameters of youth soccer players. The mean values for weight mass are 48.2 kg (sd 8.8 kg), for body height 160.4 cm (sd 9.0 cm), for BMI 18.6 kg/m^2 (sd 2.5 kg/m^2) while for percent body fat 10.6% (sd 6.0%). Also the table shows the results for speed using 50 m sprint test (mean 7.85 seconds; sd 0.6).

Table 1. Descriptive statistics for anthropometric parameters and speed

	Minimum	Maximum	Mean	Std. Deviation
Weight	32.5	71.3	48.2	8.8
Height	138.0	175.0	160.4	9.0
BMI	15.3	26.4	18.6	2.5
Percent Body fat	5.0	31.7	10.6	6.0
Speed (50m sprint)	6.85	9.36	7.85	0.56

Results on table 2 show correlation between speed and body weight (r=-0.041; Sig=0.834); speed and BMI values (r=0.231; Sig=0.236), speed and body height (r=-0.384; Sig=0.044); speed and percent body fat (r=0.440; Sig= 0.019).

Table 2. Correlation coefficient between speed and anthropometric parameters

		Weight	Height	BMI	Percent Body fat
Speed (50m sprint)	Pearson Correlation	-0.041	-0.384*	0.231	0.440*
	Sig. (2-tailed)	0.834	0.044	0.236	0.019

Legend: ** Correlation is significant at the 0.01 level (2-tailed) ; * Correlation is significant at the 0.05 level (2-tailed)

Results on table 3 show correlation between speed with body height and percent body fat splited by speed category. In the first category (lowest speed score) data show that speed and body height are negatively correlated (r=-0.471; Sig=0.425); speed and percent body fat values are positively correlated (r=0.208; Sig=0.736) while in the second category data show that speed and body height are negatively correlated (r=-0.348; Sig=0.359); speed and percent body fat values are positively correlated (r=0.597; Sig=0.09) while in the third category data show that speed and body height are negatively correlated (r=-0.467; Sig=0.174); speed and percent body fat values are positively correlated (r=0.427; Sig=0.218) and fourth category (highest score) data show that speed and body height are negatively correlated (r=-0.986; Sig=0.014); speed and percent body fat values are positively correlated (r=0.944; Sig=0.051).

Table 3. Correlation coefficient between speed with body height and percent body fat splited by speed category

Speed category			Height	Percent Body fat
1	Speed (50m sprint)	Pearson Correlation	-0.471	0.208
		Sig. (2-tailed)	0.425	0.736
2	Speed (50m sprint)	Pearson Correlation	-0.348	0.597
		Sig. (2-tailed)	0.359	0.09
3	Speed (50m sprint)	Pearson Correlation	-0.467	0.427
		Sig. (2-tailed)	0.174	0.218
4	Speed (50m sprint)	Pearson Correlation	-0.986*	0.944*
		Sig. (2-tailed)	0.014	0.051

Legend: * Correlation is significant at the 0.05 level (2-tailed); Speed category- increases with 0.5 seconds per category (1 lowest score- 4 highest score)

Discussion

In conclusion, the results of this study show no significance association between weight and BMI with sprint performance and significance correlation between height (negative correlation) and percent body fat (positive correlation) with sprint. This data show that in youth soccer players the height and percent body fat plays a crucial role in the performance of sprint during the game or the training course. The significance between height and sprint performance is negative, meaning that increasing the height the performance of sprint decreases meaning better results. In contrary with decreasing height. This mean having higher values in sprint test so not having better results.

Results also showed that the association between percent body fat and sprint performance is positive. This mean that with the increase in body fat percentage, the soccer player will have higher values in sprint performance and in contrary. In conclusion in this study the author suggest for the trainers or coaches to pay attention in the anthropometric parameter like percent body fat. Body height plays a crucial role but this parameter defer in the position at the field court. This data are in line this the results from a study by Wong, Chamari, Dellal and Wisløff (2009).

Wong et al. (2009) in their study showed that body mass was significantly correlated with ball shooting speed (r=0.58; p=0.001) and 30 m sprint time (r=-0.54; p=0.001) while body height was significantly correlated with vertical jump height (r=0.36; p=0.01), 10m (r=-0.32; p=0.01) and 30m (r=-0.64; p=0.001) sprint times and BMI was significantly correlated with ball shooting speed (r=0.31; p=0.01), 30 m sprint time (r=-0.24; p=0.05).

To conclude we must emphasize the role of anthropometric parameters in the selection of youth soccer players as suggested by Reilly, Williams, Nevill and Franks (2000), other than absolute anthropometry advantage, psychological and soccer-specific skills should be also considered in the selection of young soccer players for developing future high-class players.

REFERENCES

Baker, D., & Nance, S. (1999). The relationship between running speed and measures of strength and power in professional rugby league players. *J Strength Cond Res, 13*, 230–235.

Comfort, P., Bullock, N., & Pearson, S.J. (2012). A comparison of maximal squat strength and 5-, 10-, and 20-meter sprint times, in athletes and recreationally trained men. *J Strength Cond Res, 26*, 937–940.

Capranica, L., Tessitore, A., Guidetti, L., & Figura, F. Heart rate and match analysis in pre-pubescent soccer players. *J Sports Sci, 19*, 379–384.

Castagna, C, D'Ottavio, S, and Abt, G. Activity profile of young soccer players during actual match play. J Strength Cond Res 17: 775–780, 2003.

Di Salvo, V., Baron, R., Tschan, H., Calderon Montero, F.J., Bachl, N., & Pigozzi, F. (2007). Performance characteristics according to playing position in elite soccer. *Int J Sports Med, 28*, 222–227.

Helsen, W.F., Hodges, N.J., Van Winckel, J., & Starkes, J.L. (2000). The roles of talent, physical precocity and practice in the development of soccer expertise. *J Sports Sci, 18*, 727–736.

Helgerud, J, .Engen, L.C., Wisloff, U., & Hoff, J. (2001). Aerobic endurance training improves soccer performance. *Med Sci Sports Exerc, 33*, 1925–1931.

Gil, S.M., Gil, J., Ruiz, F., Irazusta, A., & Irazusta, J. (2007). Physiological and anthropometric characteristics of young soccer players according to their playing position: relevance for the selection process. *J Strength Cond Res, 21*, 438–445.

Gravina, L., Gil, S.M., Ruiz, F., Zubero, J., Gil, J., & Irazusta, J. (2008). Anthropometric and physiological differences between first team and reserve soccer players aged 10-14 years at the beginning and end of the season. *J Strength Cond Res, 22*, 1308–1314.

Rampinini, E., Coutts, A.J., Castagna, C., Sassi, R., & Impellizzeri, F.M. (2007). Variation in top level soccer match performance. *Int J Sports Med, 28*, 1018–1024.

Reilly, T., Williams, A.M., Nevill, A., & Franks, A. (2000). A multidisciplinary approach to talent identification in soccer. *J Sports Sci, 18*, 695–702.

Stolen, T., Chamari, K., Castagna, C., & Wisloff, U. (2005). Physiology of soccer: An update. *Sports Med, 35,* 501–536.

Slaughter, M.H., Lohman, T.G., Boileau, R.A., Horswill, C.A., Stillman, R.J., Van Loan, M.D., & Bemben, D.A. (1988). Skinfold equations for estimation of body fatness in children and youth. *Hum Biol, 60*(5), 709–723.

Wong, P.L., Chamari, K., Dellal, A., & Wisløff, U. (2009). Relationship between anthropometric and physiological characteristics in youth soccer players. *The Journal of Strength & Conditioning Research*, *23*(4), 1204-1210.

A. Hyka
University Aleksander Xhuvani, Rruga Rinia, Elbasan, Albania
e-mail: arohyka@ymail.com