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Analyses of Some Performance Parameters and Determination of the Norm Values in Kosovo First League Goalkeepers

Abstract

The purpose of this study is to determine the correlations between anthropometric and power-related factors, make differences in power-related factors according to the anthropometric features, and determine the norm values of some motor abilities in Kosovo First League goalkeepers. The research was conducted on a sample of 15 volunteer goalkeepers, aged 21 years \pm 6 months old, who were active goalkeepers in the teams in the Kosovo First League. To measure the performance of the goalkeepers in the study, anthropometric parameters (length, weight, body mass index), acceleration (10 meters run), coordination (side step), agility/maneuverability (Ilion's Agility Test), reaction time (Nelson Hand Reaction Test, Plate Tapping Test), and success of the goalkeepers (conceded goals per season, success score evaluated by the coach) in the last Kosovo First League. To process the results of the study, analysis of the data was done with the IBM SPSS Statistics 24 software. The statistics obtained were provided by descriptive statistics, t-test, Pearson correlations and percentiles. The goalkeepers playing in Kosovo's First Football League showed significant correlations between length, plate tapping, Nelson hand reaction, and goals and goalkeeper performance in the last season ($p < 0.05$). Also, it was determined that taller goalkeepers' motor abilities were higher, and they were more successful according to the conceded goals per season and in the evaluation of the coaches compared to the shorter goalkeepers. The results of each test were given as the norm values for the Kosovo First Leagues' goalkeepers together with 20% groups. The ages of the goalkeepers in Kosovo First Leagues (average 20-22) were lower compared to the ages (average 26-28) of the goalkeepers of the major European leagues over the last decade. In the correlation analyses, it was determined that goalkeepers' performances were related to the length and reaction time.

Keyword: anthropometry, goalkeepers, Kosovo's first football league, power-related motor abilities.

INTRODUCTION

The goalkeeper is a unique position in football teams, and it is considered to be a determinant on the final match outcome, because one single mistake made by a goalkeeper can lead to a change on the scoreboard. Consequently, it is extremely important to evaluate a goalkeeper's match performance so that training programs can be designed and modified appropriately. However, additional studies should be undertaken in order to increase the knowledge of goalkeeper match performance (Gomez, 2015).

This research is made with senior goalkeepers who play for their teams in Kosovo First League. The goalkeeper in football is required to demonstrate a high level of different skills and actions related to both the defensive and offensive aspects of the game. Defensive acts, such as catching a shot, dealing with catching the ball down, half high, high or straight depending on the situation, deflection of the ball, positioning near the strike area, the exit of the goalkeeper in crosses catching the ball or hitting the ball with the fist and the goalkeeper coming out in situations 1 against 1, as well as offensive actions, such as passing the ball and hitting the ball at a distance which contributes to the construction of the action, where all these actions are performed in a repeated in games and exercises (Welsh, 1990).

In order to accurately execute the aforementioned defensive and offensive tasks and quickly, the goalkeeper has to take part in the exercises every time and has to train with his trainer which is specific only to the goalkeepers also to practice the exercises they do during the training session they have to play competitive character games where most the work of the coach and the change of the goalkeeper during the game are best noticed (Di Salvo, 2008).

Hardly any information regarding goalkeeper-specific skills can be found with the exception of a recent study of Knoop et al., (2013) designed to evaluate the reaction and action speed test (RAS) among thirty-four German goalkeepers of different age groups and competitive levels. Although the results of the RAS test have successfully differentiated the first goalkeepers and their substitutes, the instrumental apparatus used in this study is not easily accessible to coaches and trainers. Therefore, simpler protocols are needed to evaluate the particular technical skills involved in goalkeeping (Knoop et al., 2013).

The purpose of this study is to determine the correlations between anthropometric and power-related factors, make differences in power-related factors according to the anthropometric features, and determine the norm values of some motor abilities in Kosovo First League goalkeepers.

METHOD

Analyzing some performance parameters and determination of the norm values in Kosovo First League goalkeepers was used as an experimental approach to the research. The research was conducted on a sample of 15 male goalkeepers aged 21 years \pm 6 months old, who are goalkeepers of Kosovo First League goalkeepers. All participants reported being healthy, without any injury and normal sense of sight, hearing and touch. All of them were informed about the purpose and method of the experiment. The study was conducted based on the Helsinki declaration.

The values of the body height (H), body weight (W) and body mass index (BMI) were determined for samples. Body height was measured by the "Martinanthropometer" and the data was read with an accuracy of 0.1 cm. The body weight and body mass index were measured with medical scales (Tanita BC 545 N Innerscan Segmental Personal Body

Analysis) and the data was read with an accuracy of 0.1 kg. 10-meter sprint test measurements were performed according to Bjelica and Fratrić's protocol (the result is given with an accuracy of 0.1 sec) (Bjelica & Fratrić, 2011). The Illinois Agility Test (IAT) was administrated a standard version from previous literature (Roozen, 2008; Cureton, 1942; Cureton, 1951; Wilkinson, 2009; Caldwell, 2009), the length of IAT was 10 m and was marked by cones, with four cones in the center spaced 3.3 m apart and four corner cones positioned 2.5 m from the center of cones. On the "go" command the sample starts the IAT and at the finish line each trial was recorded in seconds. Plate tapping (PLT) was used to measure movement speed individually and measured according to the standard procedure used in the euro fit test battery (Badrić, 2011).

Analysis of Data

Analysis of the data made by using the IBM SPSS Statistics 24 software. To determine the differences between motor abilities in according to the anthropometric characteristics were used t-test, correlation between goalkeepers performance and motor abilities were determined by using Pearson correlation, and determination of the norm values for each motor abilities were used percentiles statistics.

FINDINGS

Table 1. Descriptive Statistics and Determination of the Norm Values for the Anthropometric and Power-Related Factor of The Kosovo's First Football League Goalkeepers

		L	W	BMI	10mR	SS	IA	PLT	NHR	CG	SScore
N		15	15	15	15	15	15	15	15	15	15
Mean		184.7	72.7	21.3	2.18	8.37	16.98	9.45	11.73	22.2	2.9
Std. Dev.		5.20	8.96	2.34	.23	.61	.92	2.14	1.98	8.38	1.38
Skewness		-.65	-.03	.01	.21	1.77	-.15	.82	.29	.97	-.05
Kurtosis		-.09	-1.28	-1.05	-.22	5.58	-.00	-.58	-.92	-.19	-1.22
Range		18	27.0	7.3	.87	2.69	3.53	6.57	6.00	27	4
Minimum		174	59.0	17.9	1.80	7.51	15.14	7.07	9.00	13	1
Maximum		192	86.0	25.2	2.67	10.20	18.67	13.64	15.00	40	5
Percentiles	20th	179.0	62.6	18.6	1.95	8.10	16.09	7.58	10.00	Norm values	
	40th	184.0	68.7	20.7	2.10	8.29	16.84	8.36	11.00		
	50th*	185.0	74.3	21.6	2.17	8.30	16.94	8.50	12.00		
	60th	186.2	76.1	21.9	2.26	8.31	17.09	9.27	12.00		
	80th	189.8	83.1	23.9	2.39	8.64	17.89	11.50	13.80		

Middle fifty*, L: Length (cm), W: Weight (kg), BMI: Body mass index (kg/m²), 10mR:10 meters run (secs), IA: Illinois agility test (secs), SS: Side steps (secs), PLT: Plate tapping (secs), NHR: Nelson hand reaction (secs), CG: Conceded goals (per season), SScore: Success score (evaluated by coach 1-5)

Table 1 as it can be seen beside the descriptive statistics which has shown the normal distribution of the included tests, also was determined the norm values of the anthropometric and anthropometric features of Kosovo's First Football League goalkeepers.

Table 2. Differences in the Motor Abilities of the Goalkeepers Categorized by Anthropometric Features

	Length groups	N	X±SD	p	Weight groups	N	X±SD	p	BMI groups	N	X±SD	p
10mR	174.0 – 184.9cm	7	2.33±1.18	0.01*	59.0-72.7kg	7	2.20±.23	0.73	17.9-21.3(kg/m ²)	6	2.21±.25	.71
	185.0 – 192.0cm	8	2.04±.18		72.8-86.0kg	8	2.16±.25		21.4-25.2(kg/m ²)	9	2.16±.23	
SS	174.0 – 184.9cm	7	8.53±.81	0.37	59.0-72.7kg	7	8.62±.80	0.14	17.9-21.3(kg/m ²)	6	8.66±.88	.14
	185.0 – 192.0cm	8	8.23±.38		72.8-86.0kg	8	8.15±.27		21.4-25.2(kg/m ²)	9	8.18±.27	
IA	174.0 – 184.9cm	7	17.30±.73	0.22	59.0-72.7kg	7	17.10±.85	0.67	17.9-21.3(kg/m ²)	6	17.13±.93	.64
	185.0 – 192.0cm	8	16.70±1.03		72.8-86.0kg	8	16.88±1.03		21.4-25.2(kg/m ²)	9	16.89±.96	
PLT	174.0 – 184.9cm	7	11.20±1.89	0.00*	59.0-72.7kg	7	9.81±2.25	0.56	17.9-21.3(kg/m ²)	6	9.57±2.37	.86
	185.0 – 192.0cm	8	7.92±.62		72.8-86.0kg	8	9.14±2.13		21.4-25.2(kg/m ²)	9	9.37±2.12	
NHR	174.0 – 184.9cm	7	12.85±1.77	0.03*	59.0-72.7kg	7	12.14±1.57	0.47	17.9-21.3(kg/m ²)	6	12.00±1.67	.68
	185.0 – 192.0cm	8	10.75±1.66		72.8-86.0kg	8	11.37±2.32		21.4-25.2(kg/m ²)	9	11.55±2.24	
CG	174.0 – 184.9cm	7	28.2±8.4	0.00*	59.0-72.7kg	7	23.4±6.8	0.61	17.9-21.3(kg/m ²)	6	23.1±7.4	.73
	185.0 – 192.0cm	8	16.8±3.1		72.8-86.0kg	8	21.1±9.8		21.4-25.2(kg/m ²)	9	21.5±9.3	
SScore	174.0 – 184.9cm	7	2.1±1.3	0.03*	59.0-72.7kg	7	2.4±0.9	0.19	17.9-21.3(kg/m ²)	6	2.5±1.0	.34
	185.0 – 192.0cm	8	3.6±1.0		72.8-86.0kg	8	3.3±1.5		21.4-25.2(kg/m ²)	9	3.2±1.5	

Significant differences: $p < 0.00^*$, 10mR:10 meters run (secs), IA: Ilions agility test (secs), SS: Side steeps (secs), PLT: Plate tapping (secs), NHR: Nelson hand reaction (secs), CG: Conceded goals (per season), SScore: Success score (evaluated by coach 1-5)

Analyses showed in table 2 determined that the goalkeepers who have higher body length were more successful in motor abilities (10mR, PLT, NHR) and play performance (CG, SScore) $p < 0.00$. Analyses have shown that it was not any significant difference in the motor abilities or in the goalkeeper's success performance according to the anthropometric features such as a bodyweight and body mass index $p > 0.00$.

Table 3. Relationships Between the Goalkeeper's Success Scores, Conceded Goals and Motor Abilities

Variables	L	W	BMI	10mR	IA	SS	PLT	NHR	CG	
W	R	.499								
	P	.058								
BMI	R	.046	.886**							
	P	.871	.000							
10mR	R	-.704**	-.349	-.059						
	P	.003	.203	.835						
IA	R	-.522*	-.210	.019	.542*					
	P	.046	.452	.945	.037					
SS	R	-.481	-.511	-.338	.442	.234				
	P	.070	.052	.219	.099	.401				
PLT	R	-.841**	-.287	.125	.557*	.229	.492			
	P	.000	.300	.658	.031	.413	.062			
NHR	R	-.597*	-.210	.094	.213	.035	.109	.605*		
	P	.019	.453	.739	.445	.901	.698	.017		
CG	R	-.788**	-.323	.048	.493	.297	.341	.843**	.704**	
	P	.000	.240	.865	.062	.282	.213	.000	.003	
AScore	R	.740**	.491	.173	-.460	-.366	-.389	-.663**	-.683**	-.914**
	P	.002	.063	.538	.084	.180	.152	.007	.005	.000

L: Length (cm), W: Weight (kg), BMI: Body mass index (kg/m²), 10mR:10 meters run (secs), IA: Ilions agility test (secs), SS: Side steeps (secs), PLT: Plate tapping (secs), NHR: Nelson hand reaction (secs), CG: Conceded goals (per season), SScore: Success score (evaluated by coach 1-5)

Table 3 has shown that it was a significant correlation between goalkeeper's success performance and L, PLT, NHR $p < 0.05$.

DISCUSSION

Results of the study have shown that the goalkeepers who have higher body length were more successful in the motor abilities such as 10 meters run, plate tapping and Nelson hand reaction tests. It can be connected to body extremities, longer legs and arms helped goalkeepers to achieve higher performance in an acceleration and movement speed of the upper extremities.

Goalkeepers have to compete with other players for the ball in the air, so goalkeepers with more length and weight have an advantage. This fact makes it easier to cover the entire goal area (Arneson et al., 2004).

In another way, body weight and body mass index have not shown any significant effect on the motor abilities or in the goalkeeper's successful performance. As it was shown in the correlation analyses, the goalkeeper's performance depends on power-related (explosive force) factors such as acceleration, speed and reaction time.

Regarding running performance and match outcome, the author finds that the goalkeepers of the teams that lost covered significantly greater distances in sprinting compared to the goalkeepers of the teams which won or drew, could be explained by the fact that they may push forward when losing, thus reaching their maximal physical capacity in the hope of potentially drawing or winning the game (Castellano et al., 2011).

As mentioned above, the correlation analyses have shown that the goalkeeper's performance (conceded goals per session and success score given by coach) affected by the motor abilities which are related to the explosive actions as a reaction time or acceleration.

Results showed that there were differences in most of the match performance indicators for goalkeepers. Goalkeepers of high level teams achieved less ball touches (BT), Passes, Passes to forward half (PtFH), Interceptions, Clearances, yellow card (YC), Ball Recoverise (BR), Saves, Catches and lost balls(LB), but higher pass accuracy (PA) and accuracy of passes forward half (AoPtFH). This is possibly due to the fact that high level teams were subjected to less attacking play from the opponents, whereas the opposite happened to goalkeepers of low level teams. Similar findings were found by Szwarc et al., (2010). Meanwhile, Seaton and Campos, (2011) suggested that there were differences between goalkeepers from different levels in terms of ball distribution and success of performance indicators. The first team goalkeepers showed better performance on successful rolled and thrown distributions, while the third team's goalkeeper was the most successful at kicked distributions.

As another result, in the study were determined norm values for each anthropometric and motor abilities included in the study for the Kosovo's First Football League goalkeepers. In comparison to another country and leagues goalkeepers norm values of the anthropometric and motor abilities, Kosovo's First Football League goalkeepers have shown lower performance in abilities such a Running Speed when the average score was 2.10 and the result standard deviation was 0.23, compared to Guru Nanak Dev University, Amritsar football goalkeepers whose average score was 4.31 and the standard deviation score was 0.27 (Singh et al., 2017).

CONCLUSION

It can be concluded that the goalkeepers who have higher body length were more successful in the acceleration (10 meters run), action speed of the upper extremities (plate

tapping, and Nelson hand reaction) tests. Bodyweight and body mass index has not shown any significant effect on the motor abilities or in the goalkeeper's successful performance. As it was shown in the correlation analyses, the goalkeeper's performance depends on the power-related (explosive force) factors such as acceleration, speed, and reaction time.

The study results have shown that conceded goals per session and success score given by coach affected by the motor abilities which are related to the explosive actions as reaction time or acceleration. Based on the above conclusions we suggest that the goalkeeper's training program should be focused more on motor abilities such as reaction time, acceleration, explosive movements, etc.

Besides these findings in the study also, were determined norm values for each anthropometric and motor abilities included in the study for Kosovo's First Football League goalkeepers. Norm values of the goalkeeper's motor abilities can be used to prepare a more appropriate personal training program for goal keeper's, comparing values with another country or another league's goalkeepers and shaping training program according to the country or leagues which has shown better results than Kosovo's First Football League goalkeepers. In light of the above information, we can suggest norming all motor abilities related to the goalkeeper's performance according to age and league when they belong.

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