PREDICTION OF SUCCESSFUL DEFENSE MOVEMENT OF FEMALE HANDBALL PLAYERS

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Abstract

This research aimed to verify and determine the predictive relationships of certain motor and morphological abilities with the execution of specific motor movements of a non-ball slalom and the movement in a triangle. The sample consisted of 20 female respondents, players from Bosnia and Herzegovina Premier League, aged 16-25 years. The predictor variables used were the years of the respondents, height, weight, BMI, fat content, sprint over 30m, SAMO reaction-agility test and Illinois test. The sample of criteria variables consisted of a non-ball slalom and a movement in a triangle. The general results of the regression analysis showed that on the basis of R2 = .876 it can be concluded that the predictor system explains 87.6% of the variability in prediction and shows the statistical significance of p = .000 with the results of the subjects in the motor slalom ball test. From the analysis of the prediction results of the system of predictor variables for the criterion variable of movement in the triangle (R2 = .704), it can be concluded that no statistically significant correlation (p = .133). The results of this study indicate a partially positive predictive value of this predictor set of variables, opening up the space for verification of some other systems of predictor and criterion variables. The second part of the conclusion is that the movements of players in defense can be enhanced by training that will target the development and refinement of speed, agility, and explosive power, taking into account genetic predisposition.
Keywords: Prediction, defense, handball.

NTRODUCTION

Sporting activities or sports can be divided into five groups, taking into account the character of motor activities (Malacko, 1991), with handball belonging to the first group of sports that have a significant influence on changing and shaping the anthropological characteristics of athletes. The same author classifies handball as a sports game in a series of polystructural complex sports characterized by the alternation of cyclic and acyclic complex movements, the result depending on the cooperation of all team members. Some of the movements of a cyclical nature are represented by shorter or longer runs and/or walking, while some of the acyclic movements are represented by movements without the ball and contact with the opponent, in addition to picking up and adding the ball, shooting at the goal. These last two examples characterize the movement of the players in defense. Effective and timely action of a single person or a group of players leads to a higher quality of defense and creates a result. The dynamics and type of movement of the defenders may depend on the used type of defense, in cases that deep defense is being more complex in its movements than line defense, which requires certain morphological characteristics and a higher level of motor skills of the players themselves in order to be at the peak of the assigned defense tasks (Demir and Stankovic 2007, Karisik and Goranovic, 2010; Grujic, 2016). On the other hand, the optimization of test protocols and variables for predicting the success of specific motor tasks is always a hot topic, which encourages researchers to find and test new systems of predictor variables. Accordingly, this research aims to test the system of some motor and morphological skills as predictors of the successful movement of handball players in defense.

METHODS

This research aims to verify and determine the predictive relationships of certain motor and morphological abilities in the execution of specific motor movements of a non-ball slalom and a movement in a triangle. The idea of the research is to contribute to the definition of the connection between these two spaces and to determine which systems of predictor variables cover their spaces and to provide a qualitative prediction of the execution of slalom and triangular movements representing specific movements of players in defense. The sample consisted of 20 female respondents from the player Premier League population of Bosnia and Herzegovina, aged between 16 and 25 years. The respondents were actively involved in the training process for at least two years without long breaks. When testing the predictor variables, the age of the respondents and some morphological characteristics were determined: height, weight, BMI and fat content. Tests used to measure the level of motor skills of movement speed and agility: sprint at 30m (measured times at 5m, 10m and 30m), SAMO agility test and Illinois test. The sample of criteria variables consisted of specific motor movements of a non-ball slalom and a movement in a triangle. The measurement of the respondents was performed before the start of the competition season.

Statistical analyses

In addition to the calculation of the basic descriptive parameters, a regression analysis with the corresponding parameters was performed in the statistical package SPPS 20. When preparing the analysis, based on the size of the multiple regression, the common variance and the individual coefficients were only explained-if they proved to be statistically significant.

RESULTS

The basic descriptive parameters for the predictor and criterion variables (Table 1), which observe the positions of the skjunis and curvature, indicate the normality of the distribution of the results obtained. The values of the arithmetic means for the variables height, weight and BMI are within the ranges obtained by some other authors who have carried out similar studies (Grujic, 2016).

Table 1. Descriptive indicators of predictor and criterion variables

	Min.	Max.	AM	SE	Skjunis		Kurtosis	
					Stat.	SE	Stat.	SE
years	16	25	19.30	3.04	.26	.51	-1.25	.99
height	157.5	182.5	168.82	7.09	.19	.51	-.76	.99
weight	44.2	96.1	65.79	12.87	.47	.51	.64	.99
fat	9.4	31.5	24.35	5.43	-1.12	.51	1.64	.99
BMI	17.0	31.5	23.14	3.66	.45	.51	.30	.99
5m	1.09	1.30	1.19	.057	.03	.51	-.95	.99
10m	1.86	2.24	2.03	.095	.25	.51	-.26	.99
30m	4.60	5.67	5.02	.256	.58	.51	.94	.99
Semo	10.95	14.02	12.40	.682	.32	.51	1.17	.99
Ilinois	16.18	20.16	17.76	.870	.62	.51	2.08	.99
slalom	10.12	15.28	12.54	1.62	-.04	.51	-1.22	.99
triangle	17.01	25.64	20.85	2.58	.31	.51	-.92	.99

Min-minimum; Max- maximum; AM- arithmetic mean; SE- standard error; Stat- statistical value

From the values of the multiple correlation coefficients R2 = .876 (Table 2) it can be concluded that the tests of motor abilities as well as the morphological characteristics of the players,used as predictor system explains 87.6% of the variability in the prediction and show a statistical significance p = .000 with the results obtained by the players in the test of motorical variable slalom without ball. The rest of the variability of 12.4% consists of other motor skills or morphological dimensions that have not been considered as a subject of research.

Table 2. Results of the general regression analysis for the slalom variable

Model	R	R^2	Ad. R^2	SD	R^2 change	F	df1	df2	Sig. F
1	.970[a]	.941	.876	.572	.941	14.479	10	9	.000
a. Predictors: (Constant), Ilinois, years, BMI, height, 5m, mast, Semo, 30m, 10m, weight									

Further analyzes were carried out to determine the coefficients of the individual predictor variables (Table 3). The results of the partial regression coefficients and their statistical significance indicates that statistically significant relationships with the criterion variable is shown by the predictor variables Semo (.008) and Illinois (.006).

Table 3. Partial coefficient values for the slalom variable

Model		UC		SC		
		B	SE	Beta	t	Sig.
1	(Constant)	-14.99	25.39		-.59	.569
	years	-.06	.06	-.12	-.97	.354
	height	.02	.16	.11	.16	.873
	weight	-.05	.20	-.41	-.25	.805
	fat	.12	.05	.39	2.15	.060
	BMI	-.09	.52	-.21	-.18	.857
	5m	14.29	9.64	.50	1.48	.173
	10m	-13.90	8.35	-.81	-1.66	.130
	30m	2.51	2.58	.39	.97	.356
	Semo	-2.08	.61	-.87	-3.36	.008
	Ilinois	2.88	.81	1.54	3.52	.006
a. Dependent variable: slalom						

Model- predictor model; UC- unstandardized coefficients; SC- standardized coefficients; B- beta value; Sig.- statistical significance; SE- standardized error

From the values of the multiple correlation coefficients R2 = .704 (Table 4) it can be concluded that the tested motor skills used as a predictor system, although the explanation of 70.4% of the variability in the prediction did not show statistical significance p = .133 with the results obtained by the subjects in the situational motor test movement in a triangle.

Table 4. Results of the general regression analysis for the triangle variable

Model	R	R^2	Ad. R^2	SD	R^2 change	F	df1	df2	Sig. F
1	.839[a]	.704	.376	2.045	.704	2.142	10	9	.133
a. Predictors: (Constant), Ilinois, years, BMI, height, 5m, mast, Semo, 30m, 10m, weight									

The variables of longitudinal dimensionality and body mass as well as the variables of body composition showed no statistically significant correlation with the criterion variable slalom without the ball and showed that in this sample they did not have as much influence on the prediction of the results of the mentioned test.

DISCUSSION

Looking at the structure of the regression factors in Table 3, it can be said that the movement structure within the criterion variables is largely determined by the complex movements dominated by footwork, with the emphasis on changes in the direction and direction of movement. From many definitions of agility, it can be said that agility is a complex expression of motor skills that require efficient and rapid changes of direction and movement and the speed with which they are performed in a vertical and/or horizontal plane (Drabik, J. 1996; Plisk, SS 2000; Verstegen, M., Marcello, B., 2001). Accordingly, it can be confirmed that mobility is a motor characteristic that can predict a slalom movement.

It can be concluded that persons with a higher degree of motor mobility also achieve better movements in specific motor movements with changes in the direction and speed of the movement, but not for a successful prediction of more complex types of such movements, which is reflected in the results obtained for the criterion variable of movement in the triangle. In particular, the data in Table 4 showed that this model of the predictor variable could not be used to predict the success of the movement variable in the triangle. However, movements that are characteristic of defense movements with deeper exits and longer movements are caused by the stronger or additional influences of other motor skills that were not the subject of this study. In similar studies, some authors cited the lower explosive force of the lower extremities, the more complex forms of coordination and the speed of movement as motor skills from which a success prognosis for the same or similar specific motor tasks can be derived (Grujić, 2016; Pavlović et al., 2013; Karišik & Goranovic, 2010).

The prediction variables used (Semo and Illinois) belong to the motor ability agility, which highlights them as the most important part of the predictor system used and confirms the role of agility in predicting the success of movement in defense (Čavala, & Katic, 2010). These variables are subject to major changes over a shorter period of time for this age of respondents, and it would be desirable to verify the results obtained on a larger sample and a more detailed analysis of body status (Grujić, 2016).

In addition to driving to minimize technical errors, the outcome of handball games depends above all on the morphological characteristics of the players, the level of general motor skills, the level of specific situation motor skills (Tillaar, & Ettema, 2003) and their interrelation (Vuleta, Milanovic, Gruic, Jukic, & Pasic, 2006). The values obtained from the results of the regression analysis for the slalom variable indicate that this predictor system can be used as an estimator of the situation-motor performance of part of the players' movement in defense.

CONCLUSION

The general results of the regression analysis showed that, based on the values of multiple correlation coefficients (R2 = .876), it could be concluded that the motor and morphological abilities tested, which are used as a predictor system, are explaining 87.6% of the variability in prediction and show a statistical significance of p = .000 with the results of the subjects in the motor test slalom without the ball. The remaining variability of 12.4% consists of other motor skills that were not included as a research topic in this paper. From the analysis of the results of the prediction of the system of predictor variables on the criterion variable movement in the triangle (R2 = .704) it can be concluded that no statistically significant correlation was achieved (p = .133) and thers inability to predict the success of the movement in defense. Since the survey involved a relatively small number of respondents, there were certain limiting factors regarding the isolation of the relationship between the tests used and the quality of the defense movement that were not the subject of this research. When considering the specifics of movement structures in handball defense, it can be said that they also occur as a consequence of the visual reaction, anticipation and talent of the handball players themselves. The concept of used tests and length of the situation tests also tell us that the factor of endurance may have had an influence on both the performance and the prediction of the execution of defensive movements. Factors that are isolated and cannot be evaluated by testing are experiences and methods that work in a club and that can influence poor or better defensive performance. What is noticeable in the performance of the tests themselves and can certainly be linked to actual performance is the visibly poor movement mechanics of more complex performance structures such as these tests. We know that handball is a collective sport and that the defense performance does not always depend on an individual player, but that the quality of the defense depends more on teamwork. When it comes to morphological characteristics, it is certain that they can influence defense performance, but they can also be a decisive factor in the expression of some of the movement skills required in handball. Dealing with the problems of training control and its application in the training process and finding the optimal number of variables on the basis of which predictions can be made is always a current topic. Field work and testing require special conditions and time, especially when there is a large number of subjects, and efforts should be made to optimize them both in terms of the number of variables and the predictive validity of individual tests and systems as a whole. Koprivica, 1988 reminds us that it is necessary to study and observe the characteristics of players at all levels of athletic training, from beginners to top players, and not only to be satisfied with the master model. In this respect, the results of this study indicate a partially positive predictive value of this predictor set of variables, which opens the space to examine some other systems of predictive and criteria variables. Given the specificity of moving structures in defense, it is certain that explosiveness tests, reaction speed tests as factors of defense performance could be good predictors. This tells us that for some isolated tests or morphological characteristics it is difficult to determine success in defense, since, as we said, it depends on the talent, motivation, character traits of the players and the way they play. In order to be able to determine defense performance through testing, it is necessary to analyze in depth all the components that make up the defense phase and defense performance, and then to aim for the most specific tests that can cause high "situational" stress and isolate certain realistic situations. The second part of the conclusion is that the movements of players in defense can be improved by training aimed at developing and refining speed, agility and explosive power, taking genetic disposition into account (Milanovic, 2009).

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