Correlations Between Speed, Agility and Strength in U15 Rugby Players - Pilot Study

Florentina-Petruța MARTINAȘa*, Adrian COJOCARIUa

a" Alexandru Ioan Cuza" University of Iași, Str. Toma Cozma nr.3, Iași, 700554, Romania

Abstract

The aim of this paper was to highlight the relationships between speed, agility and strength in U15 rugby players. In this regard, 22 male rugby players from the U15 category (67.77 ± 13.8 kg, 169.95 ± 6.99 cm), registered at the CSS Bârlad club, were evaluated. The sprint was determined over the distance of 10 m ($2.06\pm 0.16s$), 20 m (3.53 ± 0.30 s), 40 m (6.43 ± 0.65 s) and 60 m (9.37 ± 1.03 s), to evaluate the explosive strength of the lower limbs, we used 3 tests, Squat Jump (1376 ± 2.27 cm), Countermovement Jump (15.11 ± 2.61 cm) and Free Jump (17.20 ± 2.9 cm) and to evaluate agility we used the 505 test ($2,82\pm 0.16$ s). The statistical analysis (using IBM SPSS Statistics 2- Pearson correlation) reveals a strong link between speed, agility and strength (p=0.00 and r is between 6.87 and 9.97).

Keywords: rugby, speed, agility, strength.

1. Introduction

Sports studies have focused on identifying the most appropriate training methods that can influence the physical ability of performance athletes (Loturco et al., 2015; Loturco et al., 2013). Numerous specialized works try to identify the most important biomotor indicators that influence the level of play and that are associated with performance (Da Cruz-Ferreira

^{*} Corresponding author. Tel.: 0751851970.

E-mail address: petruta.martinas@uaic.ro

& Ribiero, 2013; Lombard et al., 2015; Bradley et al., 2015; Green et al., 2011; Gabbett & Seibold, 2013; Gabbett et al., 2011; Smart et al., 2014; Till et al., 2016).

The game of rugby is considered a sport of individual attributions and skills, due to the demands of each field position, but team unity is essential in achieving goals (Oprean, 2012). Due to the nature of its complexity, this sport makes intense demands on the athletes' energy resources, their optimization representing a conditioning factor of sports performance (Oprean et al., 2017).

Rugby players need a large motor package, and its assessment must provide us with objective data on the adaptation of the players to the demands of the game and the adaptation of the body to the training programs, but also data to provide information on the monitoring of the development of the athletes, to predict talent identification and player selection.

In team sports, the essential factors in achieving sports performance are represented by speed and agility, expressed at maximum intensity (Nichifor et al., 2021). The improvement of the force-speed couple can be considered an essential factor in achieving high performance in sports games due to the fact that the current game requirements are based on its evolution and are characterized by complex qualities of the players such as speed, reaction, execution, agility, quick thinking and others (Argus et al., 2012; Barnes et al., 2014).

Speed and acceleration capacity are frequently assessed qualities among rugby players (Till et al., 2017), being considered essential components in player performance.

At the same time, changes of direction are considered decisive efforts in the game of rugby due to the fact that the rapid change of the direction of travel can lead to a finality that will influence the outcome of the match (Nimphius et al., 2018).

In this regard, some studies have shown that there are positive correlations between the forms of manifestation of speed and changes of direction or agility of athletes (Condello et al., 2013; Freitas et al., 2019; Loturco et al., 2019; Pereira et al., 2018), and other studies have shown no links between maximal force and changes in direction (Loturco et al., 2018).

The choice of the most suitable tests and measurements that can be used both in the selection and in the verification of the level of rugby players is a current issue and is debated more and more often in the specialized literature (Chiwaridzo et al., 2017, Chiwaridzo et al., 2018, Oorschot et al., 2017, Chiwaridzo et al., 2021, Dobbin et al., 2018, Dobbin et al., 2019).

Therefore, the aim of this paper was to highlight the relationships between speed, agility and strength in U15 rugby players.

2. Methods

In carrying out this research, we started from the premise that there are certain associations between speed, strength and agility, among rugby players, associations demonstrated in the specialized literature. Thus, we assume that there are certain associations between speed, strength and agility in U15 rugby players.

In this regard, 22 male rugby players from the U15 category ($67.77\pm$ 13.8 kg, 169.95 ± 6.99 cm), registered at the CSS Bârlad club, were evaluated.

The sprint was determined over the distance of 10 m, 20 m, 40 m and 60 m and to evaluate agility we used the 505 test, all applied using the automatic timing system. To evaluate the explosive strength of the lower limbs, we used 3 tests, Squat Jump, Countermovement Jump and Free Jump, applied using the Just Jump Platform.

Statistical analysis was performed using the IBM SPSS Statistics V20 program, applying the Pearson correlation.

3. Results and discussions

Table 1 shows the average (± standard deviation) results obtained by the players in the evaluation tests of speed over the 4 distances, of agility and explosive force of the lower limbs evaluated through the 3 tests.

	Mean	-	Std. Deviation
Squat Jump (cm)	13,76	±	2,27
Countermovement Jump (cm)	15,11	±	2,61
Free Jump (cm)	17,20	±	2,98
Speed 10 m (s)	2,06	±	0,16
Speed 20 m (s)	3,53	±	0,30
Speed 40 m (s)	6,43	±	0,65
Speed 60 m (s)	9,37	±	1,03
Agility (s)	2,82	±	0,16

Table 1. The average results of the subjects

Table 2 highlights the values of the correlation coefficient and the significance threshold obtained after applying the Pearson Correlation statistical test. We thus observe that there are good (r>0.5) and high (r>0.75) associations between the investigated variables, in all cases the significance threshold having a value equal to 0.000.

r value											
	SJ	CMJ	FJ	10 M	20 M	40 M	60 M	505			
SJ	-	0,886**	0,878**	-0,824**	-0,903**	-0,921**	-0,935**	-0,871**			
CMJ	0,886**	-	0,918**	-0,795**	-0,863**	-0,855**	-0,870**	-0,796**			
FJ	0,878**	0,918**	-	-0,687**	-0,789**	-0,784**	-0,799**	-0,730**			
10 M	-0,824**	-0,795**	-0,687**	-	0,970**	0,913**	0,912**	0,765**			
20 M	-0,903**	-0,863**	-0,789**	0,970**	-	0,976**	0,975**	0,833**			
40 M	-0,921**	-0,855**	-0,784**	0,913**	0,976**	-	0,997**	0,860**			
60 M	-0,935**	-0,870**	-0,799**	0,912**	0,975**	0,997**	-	0,864**			
505	-0,871**	-0,796**	-0,730**	0,765**	0,833**	0,860**	0,864**	-			

Table 2. Corelations

**p=0,000

SJ= Squat Jump, CMJ= Countermovement Jump, FJ= Free Jump, 10 M= Speed 10 m, 20 M= Speed 20 m, 40 M= Speed 40 m, 60 M= Speed 60 m, 505= agility

At the same time, we notice that there are certain links between the speed evaluated on the 4 distances and the agility of the athletes, but also associations between the speed and the explosive force of the lower limbs evaluated through the 3 tests. Also, the statistical results reveal high associations between agility and the explosive strength of the lower limbs of the athletes.

These associations can be explained by the fact that in performing speed running, the explosive force has an essential role both in the impulse of the running step and in making changes of direction, thus, we can deduce from here that the training programs to which the athletes are subjected have an influence on both muscle strength, speed and agility of athletes. In rugby these qualities are highlighted in most phases of the game, especially in attacking phases, accelerations, kicking or conversions, or even taking the touchline. At the same time, the strength of the lower limbs also plays an essential role in maintaining the stability of the body in motion.

Regarding the correlation of speed tests with the results of the agility test, it is obvious that the latter involves the speed, and this can be highlighted in the game of rugby in the changes of direction.

Specialists in the field have identified in their research that in relation to rugby players, there are certain associations between speed and agility (Nichifor et al., 2021; Freitas et al., 2021; Freitas et al., 2019), but also between lower limb explosive strength, speed and agility (Loturco et al., 2017). Thus, we note that the results obtained in the present study are in agreement with the specialized literature, but, at the same time, we must specify the fact that there are also studies that do not agree with the results obtained by us.

4. Conclusions

The statistical analysis reveals a strong link between speed, agility and strength in U15 rugby players. The results obtained by us are in agreement with the specialized literature in the sports field, but these obtained associations may also exist as a result of certain factors that can influence these skills of the players, aspects that should be discussed in further research by specialists in the field.

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