Physical performance tests and anthropometric data to predict selection in U19 rugby union players

LUIS VAZ[1,2], MARCO BATISTA[3,4,5],SAMUEL HONÓRIO[3,4,5], HELDER MIGUEL FERNANDES[1,2,3]

[1]*Universidade de Trás-os-Montes e Alto Douro, Portugal*
[2]*Research Centre in Sports, Health and Human Development (CIDESD-UTAD), Portugal*
[3]*Research in Education and Community Intervention, RECI- Instituto Piaget, Portugal*
[4]*Instituto Politécnico de Castelo Branco, Portugal*
[5]*Sport, Health & Exercise Research Unit (SHERU), Portugal*

ABSTRACT

Anthropometric and performance data were collected from 184 rugby players (mean age=17.9±0.5 years, body mass=84.2±13.5 kg; height =1.79±0.07 m) to explore: (i) the correlation among indicators; and (ii) compare profiles from the selected (n =39) and non-selected (n =145) players to represent the Portuguese under-19 national team. Anthropometry characteristics included body height and body mass. Physical performance variables included push up and pull-up test, squat, Sargent test, flexed arm hang test, sit-and-reach test, 20 m shuttle run test, handgrip strength test, 20-m and 50-m sprint and Illinois agility test. The results showed that the selected rugby athletes reported significantly higher levels of right (t = 2.77, p = 0.01, ES= -0.5 [-0.8 to -0.2]) and left handgrip strength scores (t = 2.81, p = 0.01, ES = -0.5 [-0.8 to -0.2]), and significantly better (i.e. lower) levels of agility scores (t = -2.28, p = 0.02, ES = 0.4 [0.1 to 0.7]) than the non-selected rugby athletes. Accordingly, prospective players need to be constantly monitored and evaluated across age-categories in order to allow them to achieve the anthropometrical and fitness requirements needed to play at the international level. **Keywords**: Rugby Union; Performance; Field-based tests; Selective factors; Predict selection.

Corresponding author. *Universidade de Trás-os-Montes e Alto Douro, Departamento de Ciências do Desporto, Exercício e Saúde, Quinta de Prados - Campus Desportivo, Apartado 1013, 5001-801 Vila Real - Portugal.*
E-mail: hmfernandes@gmail.com
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INTRODUCTION

Traditionally, the recruitment, selection and development of talented rugby union players has focused on training and game perception aspects of skills performance, with less emphasis placed on the physical testing performance characteristics. However, the differences between specific positions in anthropometrical measures also illustrate the heterogeneous nature of rugby players (Vaz, Morais, Rocha & James, 2014). Therefore, the purpose of this study was to explore how anthropometric and physical performance test indicators help to predict selection in U19 rugby union players.

MATERIAL AND METHODS

Participants

A total of 184 male U19 rugby union players from Portuguese national academies were part of this study (mean ± SD; age 17.9±0.5 years, body mass 84.2±13.5 kg, height 1.79±0.07 m). Players were divided into two groups based on selected (n=39) and non-selected (n=145) criteria to represent the Portugal national U19 rugby team. The study protocol followed the guidelines stated and conformed to the declaration of Helsinki and ethical approval was provided by the local University Ethics Committee.

Measures

Anthropometric measurement included body mass (kg) and body height (m). Physiological and performance assessment tests included: Push Up test, Pull-up test, Free standing squat, 1RM, Sargent Test, Flexed arm hang test, Sit-and-reach test, 20 m shuttle-run test and VO_{2max}. Handgrip strength test (right and left hand). Speed across 20m and 50m using dual beam electronic timing gates and Illinois agility test with 10 meters long and 5 meters wide. The validity and reliability of all tests selected for this study had been previously confirmed in literature (Moore & Murphy, 2003).

Procedures

The anthropometric and physical measurements were performed as follows: anthropometrics (morning), physical tests (afternoon), with an interval of ≈ 30-min interspersing consecutive tests. Due to the specific routines of these athletes' training and to their frequent physical assessments performed in Portuguese national academies, all athletes were highly familiarized with the experimental procedures of this study.

Analysis

Mean (M) and standard deviation (SD) were calculated for all dependent variables. Correlation between variables was computed using Pearson (r) correlation coefficient. Independent sample t-tests were used in order to identify significant differences between the two groups (selected vs. non-selected athletes). The effect sizes (ES) of obtained differences were expressed in standardized Cohen's differences and respecting intervals (Hopkins, Schabort, & Hawley, 2001). All statistical analyses were performed using SPSS Version (IBM Corporation, USA) and statistical significance was set at < 0.05.

RESULTS

The descriptive statistics and the correlation coefficients for the anthropometric and physical fitness variables in total sample were calculated. Moderate to high negative correlations were observed between the pull up and the Illinois agility scores, between the left handgrip strength and the Sargent test scores, and between the squat and the Sargent test scores. The anthropometric and physical performance levels for the selected and non-selected groups of athletes are presented in Table 1.

Table 1. The anthropometric and physical performance levels for selected and non-selected groups of athletes

Variables	Total sample (n = 184) *M ± SD*	Selected (*n* = 39) *M ± SD*	Non selected (*n* = 145) *M ± SD*	*t*	*p*	Cohen'd [90% CI]
Anthropometric characteristics						
Body mass (kg)	84.28±13.53	86.72 ± 12.76	83.63 ± 13.70	1.27	0.20	
Body height (m)	1.79±0.07	1.80 ± 0.09	1.79 ± 0.06	0.72	0.46	
Physical fitness						
Push Up test	43.25±11.10	42.64 ± 12.48	43.41±10.73	- 0.38	0.70	
Pull up test	11.83±4.29	12.36 ± 4.57	11.68 ± 4.21	0.87	0.38	
Flexed arm hang test	40.42±13.63	38.82 ± 10.34	40.85 ± 14.38	- 0.82	0.41	
Handgrip strength (left)	48.00±4.88	49.89 ± 6.54	47.49 ± 4.22	2.81	0.01*	-0.5 [-0.8 to -0.2]
Handgrip strength (right)	46.03±4.65	47.86 ± 5.98	45.54 ± 4.11	2.77	0.01*	-0.5 [-0.8 to -0.2]
Free standing squat	140.77±31.09	142.31 ± 31.22	140.37 ± 31.15	0.34	0.73	
Sargent test	44.95±5.06	44.82 ± 5.20	44.99 ± 5.04	- 0.18	0.85	
20 m sprint (*s*)	2.99±0.18	2.97 ± 0.16	3.01 ± 0.18	- 1.16	0.24	
50 m sprint (*s*)	6.85±0.27	6.84 ± 0.26	6.86 ± 0.18	- 0.29	0.76	
Illinois agility test	15.15±0.96	14.84 ± 1.09	15.24 ± 0.91	- 2.28	0.02*	0.4 [0.1 to 0.7]
Sit-and-reach test	32.93±4.88	33.05 ± 4.71	32.89 ± 4.95	0.18	0.85	
VO_{2max} (ml • kg^{-1} • min^{-1})	49.69±3.96	49.62 ± 4.31	49.71 ± 3.87	-0.12	0.90	

**p< 0.05*

Between-groups comparisons indicated that selected rugby athletes reported significantly higher levels of right (ES= -0.5 [-0.8 to -0.2]) and left handgrip strength scores (ES = -0.5 [-0.8 to -0.2]), and significantly better levels of agility scores (ES = 0.4 [0.1 to 0.7]) than the non-selected rugby athletes.

DISCUSSION

Findings highlight the importance and relationship between handgrip strength test and agility ability to team selection in Portuguese U19 rugby national team. Results regarding the left and right handgrip strength may provide additional insights. A combination of three variables, body mass, handgrip strength and agility, differentiated significantly between the selected and non-selected rugby players.

CONCLUSIONS

The main findings have several implications for the effective selection process design, particularly by helping to identify and to improve the accuracy of elite rugby talent identification programs.

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