COMPARISONS OF POSITIONAL GROUPS IN TERMS OF ANTHROPOMETRIC, RUGBY-SPECIFIC SKILLS, PHYSICAL AND MOTOR COMPONENTS AMONG U 13, U 16, U 18 AND U 19 ELITE RUGBY PLAYERS

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Abstract:

Rugby is a very popular sport and is played from primary school to senior level in more than a hundred countries worldwide. Certain anthropometric, physical, motor abilities and game-specific variables can distinguish between talented and less talented rugby players. However, a void still exists as to how these abilities change in growing and developing rugby players. At present the positional selection of players is left to the coaches and teachers, who do not necessarily possess the experience or knowledge for proper positional selections. The possibility to identify positional requirements by using a scientifically compiled test battery for rugby players will assist coaches and teachers in the correct positional selection of players at specific ages. The aim of this study was to compare playing groups in terms of anthropometric, rugby--specific skills, physical and motor components among U 13 (n=21), U 16 (n=22), U 18 (n=18) and U 19 (n=19) elite rugby players. These age groups were divided in four positional groups: tight forwards (props, hooker, locks), loose forwards (flankers, eight-man), halves (scrum- and fly half) and back-line (centres, wings and full back). Research on talent identification normally uses small groups because elite athletes represent only the talented or gifted players. An analysis of variance (ANOVA) was performed to establish any significant differences (d-value) between playing groups in terms of anthropometric, rugby-specific skills, physical and motor components. In conclusion it seems that forwards, and many coaches are of this opinion, develop much later in terms of anthropometric components. The back-line players reveal many more differences in terms of rugby-specific skills, physical and motor components. It is also interesting to note that the older the players, the fewer the differences that were apparent in terms of rugby-specific skills, physical and motor components. It thus seems that the positional requirements of adolescent rugby players differ among age groups, as well as among adult rugby players. Therefore it is necessary to compile scientific test batteries specifically for each age group. This might be due to better physical and motor conditioning as well as coaching of all players, irrelevant of positional groups.

Key words: *anthropometric characteristics, rugby-specific skills, physical and motor components, elite rugby players*

VERGLEICHE DER GRUPPEN DER SPIELER AUF BESTIMMTEN POSITIONEN IM HINBLICK AUF ANTHROPOMETRISCHE RUGBY-SPEZIFISCHE FERTIGKEITEN, KÖRPERLICHE UND MOTORISCHE KOMPONENTEN VON U/13-, U/16-, U/18- UND U/19 SPITZENRUGBYSPIELERN

Zusammenfassung:

Rugby ist eine sehr populäre Sportart, die in den Grundschulen, aber auch von Senioren in mehr als einhundert Ländern weltweit gespielt wird. Mittels bestimmter anthropometrischen, körperlichen, motorischen Fähigkeiten und spielspezifischen Variablen kann man zwischen talentierten und weniger talentierten Rugbyspielern unterscheiden. Es bleibt immer noch unklar, wie sich diese Fähigkeiten bei den sich entwickelnden Nachwuchsspielern ändern. Im Moment sind die Rugbytrainer und Sportlehrer für die Auswahl der Spieler auf eine bestimmte Position zuständig, obwohl sie nicht unbedingt über die Erfahrung oder Fachkenntnisse verfügen, um eine richtige Entscheidung zu treffen. Eine wissenschaftlich erstellte Testbatterie für Rugbyspieler wird den Rugby-Trainern und Sportlehrern helfen, eine richtige Positionsselektion für die

Spieler bestimmter Altersgruppen zu finden. Das Ziel dieser Forschungsstudie war, die Spielergruppen zu vergleichen im Hinblick auf anthropometrische, Rugby-spezifische Fertigkeiten, körperliche und motorische Komponenten von U/13- (n=21), U/16- (n=22), U/18- (n=18) und U/19 (n=19) Spitzenrugbyspielern. Diese Altersgruppen wurden in vier Positionsgruppen gegliedert: Stürmer der ersten Linie (Props, Hakler, Zweitereihestürmer), offene Stürmer (Außenstürmer, Drittereihemittestürmer), Halbspieler (Gedrängehalb und Verbinder) und Hinterliniespieler (Innendreiviertel, Außendreiviertel und Schlußspieler).

Eine Untersuchung der Talentsuch und -auswahl befasst sich normalerweise mit kleine Gruppen, weil Spitzensportler nur talentierte oder begabte Spieler sind. Eine Varianzanalyse (ANOVA) wurde vorgenommen, um signifikante Unterschiede (d-Wert) zwischen Spielergruppen im Hinblick auf anthropometrische, Rugby-spezifische Fertigkeiten, körperliche und motorische Komponenten zu bestimmen. Abschließend, scheint es, dass die Stürmer sich viel später im Hinblick auf anthropometrische Komponenten entwickeln. Viele Trainer sind auch dieser Meinung. Die auf der Hinterlinie spielenden Spieler zeigen weit mehr Unterschiede im Hinblick auf Rugby-spezifische Fertigkeiten, körperliche und motorische Komponenten. Es ist auch bemerkenswert, je älter die Spieler, desto weniger Unterschiede, die vorher offenkundig waren. Es scheint also, dass sich die Ansprüche einer bestimmten Position bei den jugendlichen Rugbyspielern je nach Altersgruppen unterscheiden, wie auch von den erwachsenen Rugbyspielern. Deshalb ist es notwendig eine wissenschaftliche Testbatterie für jede Altersgruppe zu erarbeiten. Die Ursache dessen liegt nicht nur in einer besserer körperlichen Kondition und motorischen Vorbereitung sondern auch wegen Trainiertheit aller Spieler, ohne Rücksicht auf die Positionen.

Schlüsselwörter: anthropometrische, Rugby-spezifische Fertigkeiten, körperliche und motorische Komponenten, beste/erfolgreichste Rugby players.

Introduction

Rugby consists of various activities that require certain anthropometric, physical, motor and rugby-specific components. These components are specific to the positional requirements in rugby (Craven, 1974, 1977; Joynson, 1978, Rutherford, 1983, Greenwood, 1985, Van der Merwe, 1989). A rugby team consists of eight forward players (2 props, 1 hooker, 2 flankers, 2 locks and 1 eight man) and seven back-line players (1 scrum half, 1 fly half, 2 centers, 2 wings and 1 full back). The eight forward players' main aim during a game is to gain possession of the ball while the back-line players utilize the possession gained (Craven, 1977). The game of rugby has, however, evolved and the loose forwards have become more mobile and play with progress possession. Even the halves have become more skilled and are responsible for decision--making as well as delegating the game. Seeing that the tasks of these positional groups have changed, so have the players' anthropometric, physical and motor characteristics. Studies by Hare (1997) and Pienaar and Spamer (1998) have all made a contribution to talent identification among rugby playing youths, although they were not conclusive in terms of positional requirements. Du Randt and Headley (1993) suggest that every talent identification and development programme should be specific to the positional requirements that exist in team sports. However, little research has been conducted in sport regarding positional requirements and even less regarding adolescents. Pretorius (1997) has, however, established that talented 10-year-old rugby players could be identified according to their playing position. It is also important to remember that anthro-pometric, physical, motor and sport-specific components, required by specific positions, will change because, as the players grow older, they attain physical maturity and gain more experience (Pienaar, Spamer, & Pretorius, 2000).

At present the positional selection of players is left to the coaches and teachers, who do not necessarily possess the experience or knowledge for proper positional selections. The possibility to identify positional requirements by using a scientifically compiled test battery for rugby players will assist coaches and teachers in the correct positional selection of players at specific ages. Rugby will benefit from more competent players and the quality of the game will also improve. Elite players will also experience more satisfaction from their participation in sport.

Thus the aim of this study was to compare playing groups among U 13, U 16, U 18 and U 19 elite rugby players to establish positional requirements of adolescent rugby players in terms of anthropometric, physical and motor components and rugby-specific skills. The significant differences might indicate positional requirements which in turn might assist in compiling a scientific-founded test battery for positional selection in rugby among adolescents.

Methods

The study population consisted of U 13 (n=22), U 16 (n=21), U 18 (n=18) and U 19 (n=19) North West provincial rugby players. The age samples were small due to the fact that these players were elite (the best in their individual positional groups). They were classified into tight forwards

(props, hooker and locks), loose forwards (flankers and eight man), halves (scrum-halves and fly-halves) and back-line players (centres, wings and full back). The U 13 players represent the last year of primary school and he U 16 players the second year of secondary school. The U 18 players were players in their final year at school, whereas the U 19 players were players in their first year out of school and therefore eligible for selection for the national team. It should be kept in mind that this is the first study of its kind and that future studies with larger samples might provide more information, but that future studies of this kind should be focused on elite players.

For research purposes the fifteen positions were divided into four groups viz. tight and loose forwards and halfbacks and back-line players. These four groups are common to the game of rugby and are used by all coaches.

The teams were also selected according to the SARFU (South African Football Union) development policy, which states that 50% of selected players should be from previously disadvantaged communities. The participants were all tested and measured during their stay in the training camp, which was held in Potchefstroom, North West Province, South Africa.

The test protocol consisted of the following measurements and tests. The anthropometric measurements were: body mass (kg), stature (cm), fat percentage (%) (sum of triceps, supraspinal, subscapular, abdominal, thigh and calf skinfolds expressed in mm), breadths (cm) (humerus, femur and wrist), girths (cm) (flexed upper arm, forearm, ankle and wrist) (Norton, Olds, Olive, & Craig, 1996).

The rugby-specific skill tests were used to determine the following components: ground skills ability (n) (Australian Rugby Football Union, 1990), side-step ability (n) (Cooke, 1984), aerial and ground kick ability (n) (Australian Rugby Football Union, 1990), passing for distance ability (m) (AAHPER, 1966), passing-for-accuracy-over-4-m ability (n) (Pienaar & Spamer, 1998), passing-for-accuracy-over-7-m ability (n) (AAHPER, 1966), kicking ability (m) (AAHPER, 1966), kick-off ability (m) (AAHPER, 1966), catching ability while moving (n) (AAHPER, 1966).

The physical and motor tests were used to determine the following components: flexibility by adapted sit-and-reach test (cm) (Thomas & Nelson, 1985); power/explosive strength by vertical jump (cm) (Thomas & Nelson, 1985); speed endurance test (%) (Hazeldine & McNab, 1998); agility by Illinois and T-test (s) (Badenhorst, 1998); speed (s) by running over 10 metres and 30 metres (Hazeldine & McNab, 1998); strength by flexed upper arm hang (s), abdominal strength (n) and pull-ups (n) (Norton & Atherton, 1997; Ellis et al., 1998).

One-way analyses of variance (ANOVA) were done between the playing groups for each age group. Comparisons were made between tight and loose forwards and halves and back-line players. This was done to determine if the players presented any differences that could attribute to their specific skills in certain positional groups. Significant differences were determined using Cohen's method (Thomas & Nelson, 1985), but only the MS Error of the ANOVA was used instead of the standard deviation (sd), seeing that these subject were not randomly selected.

Results

U 13 rugby players

Table 1 presents the high significant differences between the tight and loose forwards in terms of fat percentage (d=1.44) and sum of skinfolds (d=1.45). The only high significant differences between the halves and back-line players were found in terms of body mass (d=1.07), stature (d=1.28). forearm girth (d=0.97), ankle girth (d=1.14) and wrist breadth (d=1.40). It was also interesting to note that the halves showed a higher value, than the loose forwards and back-line players, in terms of fat percentage ($\bar{x}$=14.32 and $\bar{x}$=12.59).

In terms of rugby-specific skill components, high significant differences were obtained between the tight and loose forwards in terms of aerial and ground kicks (d=0.90) and passing for accuracy over 7 metres (d=1.19) (Table 2). Back-line players and halves differed significantly in terms of ground skills (d=0.94), side-steps (d=1.21), aerial and ground kicks (d=1.01), passing for distance (d=0.80) and passing for accuracy over 7 metres (d=1.19) (Table 2).

Referring to the physical and motor components, the only high significant difference between the tight and loose forwards was in speed endurance (d=1.69) (Table 3). The halves and back-line players differed significantly in terms of adapted sit-and-reach (d=1.04), speed endurance (d=0.83) and the Illinois (d=0.91) agility test.

U 16 rugby players

Table 4 shows the high, significant difference between the halves and back-line players in terms of stature (d=0.81) and ankle girth (d=2.41). The back-line players also had higher values of ankle girth than the tight forwards ($\bar{x}$=25.40). The loose and tight forwards showed high significant differences in side-steps (d=1.45), passing for accuracy over 7 metres (d=2.01) and kicking for distance (d=1.60) (Table 5). Only the halves and back-line players presented high significant differences in terms of aerial and ground kicks (d=0.86), passing for distance (d=1.59) and kicking for distance (d=2.76).

Table 1. Means (x̄) and significant differences (d-value) between the positional groups in terms of anthropometric components for U 13 players

Variables	TF	LF	H	BL	MS Error	TF vs LF	H vs BL
	x̄	x̄	x̄	x̄		d	d
Body mass (kg)	66.19	60.00	48.00	56.33	61.19	0.79	**1.07*****
Stature (cm)	173.13	170.00	160.50	170.00	55.05	0.42	**1.28*****
Tricep skinfold (mm)	10.63	7.20	9.50	7.75	6.75	**1.32*****	0.67
Supraspinale skinfold (mm)	11.19	5.67	5.25	5.33	16.51	**1.36*****	0.02
Subscapular skinfold (mm)	10.00	6.83	6.75	6.50	7.20	**1.18*****	0.09
Pectoral skinfold (mm)	6.81	3.33	5.50	3.67	8.26	**1.21*****	0.64
Abdominal skinfold (mm)	17.88	7.17	9.13	7.83	45.39	**1.59*****	0.19
Thigh skinfold (mm)	13.81	10.33	13.75	11.75	12.96	**0.97*****	0.56
Calf skinfold (mm)	11.19	8.67	8.88	8.58	10.68	0.77	0.09
Sum of skinfolds (mm)	74.69	45.87	53.25	47.75	394.69	**1.45*****	0.28
Fat percentage (%)	17.75	12.59	14.32	12.76	12.91	**1.44*****	0.44
Flexed upper arm girth (cm)	29.26	28.37	26.55	27.90	3.81	0.46	0.69
Forearm girth (cm)	26.41	25.87	23.38	24.90	2.45	0.35	**0.97*****
Ankle girth (cm)	23.35	22.70	20.90	22.37	1.65	0.51	**1.14*****
Calf girth (cm)	33.66	34.00	31.43	33.45	10.78	0.10	0.62
Humerus breadth (cm)	7.66	7.13	6.33	6.88	0.63	0.67	0.70
Femur breadth (cm)	9.36	9.63	9.08	9.40	0.42	0.42	0.50
Wrist breadth (cm)	5.76	5.77	5.23	5.58	0.07	0.01	**1.40*****

High significance: $d \geq 0.8$***; medium significance: $d \geq 0.5$; low significant difference: ≥0.2
TF = tight forward; H = half-back; LF = loose forward; BL = back-line

Table 2. Means (x̄) and significant differences (d-value) between the positional groups in terms of rugby-specific components for U 13 players

Variables	TF	LF	H	BL	MS Error	TF vs LF	H vs BL
	x̄	x̄	x̄	x̄		d	d
Ground skills (s)	4.01	4.02	3.74	4.27	0.32	0.02	**0.94*****
Side steps (n)	4.13	4.00	6.00	4.33	1.89	0.09	**1.21*****
Aerial and ground kicks (n)	4.38	3.33	5.50	4.33	1.35	**0.90*****	**1.01*****
Passing for distance (m)	17.10	17.63	19.28	16.76	9.99	0.17	**0.80*****
Passing for accuracy (4m) (n)	2.88	2.33	5.50	4.50	2.94	0.32	0.58
Passing for accuracy (7m) (n)	22.75	25.33	27.25	24.67	4.72	**1.19*****	**1.19*****
Kicking for distance (m)	31.07	34.35	38.59	33.96	46.68	0.48	0.68
Kick-off for distance (m)	27.35	29.96	36.13	29.87	133.87	0.23	0.54
Catching while running (n)	18.38	17.67	19.25	17.67	4.74	0.33	0.73

High significance: $d \geq 0.8$***
TF = tight forward; H = half-back; LF = loose forward; BL = back-line

In Table 6 the results of the physical and motor components are indicated and the high significance difference between the tight forwards and loose forwards was found in terms of abdominal strength (d=1.49). The halves and back-line players showed high significant differences in the modified sit-and--reach (d=1.67), vertical jump (d=3.51), speed en-durance (d=2.62), pull-ups (d=0.97), abdominal strength (d=1.56) and flexed arm hang (d=0.96). The halves (x̄=46.00) performed much better than the back-line players (x̄=34.38) in terms of vertical jump, although it would be expected that these positions require the same amount of power.

Table 3. Means ($\bar{x}$) and significant differences (d-value) between the positional groups in terms of physical and motor components for U 13 players

Variables	TF	LF	H	BL	MS Error	TF vs LF	H vs BL
	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$		d	d
Adapted sit and reach (cm)	2.88	3.33	2.43	6.00	11.92	0.13	1.04***
Vertical jump (cm)	28.38	30.67	30.00	32.50	10.94	0.69	0.76
Speed endurance (%)	5.07	7.78	3.55	4.88	2.58	**1.69***	**0.83***
Illinois agility test (s)	19.90	18.32	18.39	20.30	4.45	0.75	**0.91***
T-test agility (s)	13.85	12.94	13.28	13.86	2.15	0.62	0.40
Speed 10m (s)	2.17	2.19	2.21	2.14	0.04	0.10	0.34
Speed 30m (s)	5.27	5.03	5.00	4.90	0.26	0.46	0.18
Pull ups (n)	8.88	7.00	10.50	12.17	22.51	0.40	0.35
Abdominal strength (n)	3.50	2.67	4.50	3.33	3.12	0.47	0.66
Flexed arm hang (s)	9.19	15.02	24.67	23.30	96.85	0.59	0.14

High significance: $d \geq 0.8$***
TF = tight forward; H = half-back; LF = loose forward; BL = back-line

Table 4. Means ($\bar{x}$) and significant differences (d-value) between the positional groups in terms of anthropometric components for U 16 players

Variables	TF	LF	H	BL	MS Error	TF vs LF	H vs BL
	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$		d	d
Body mass (kg)	82.75	77.50	68.00	72.25	61.19	0.67	0.54
Stature (cm)	183.88	183.75	172.50	178.50	55.05	0.02	**0.81***
Tricep skinfold (mm)	9.19	9.00	6.00	6.88	6.75	0.07	0.34
Supraspinale skinfold (mm)	10.75	9.25	5.50	7.50	16.51	0.37	0.49
Subscapular skinfold (mm)	12.25	10.25	7.50	9.13	7.20	0.75	0.61
Pectoral skinfold (mm)	6.31	5.50	4.00	5.69	8.26	0.28	0.59
Abdominal skinfold (mm)	16.75	11.75	8.00	10.13	45.39	0.74	0.32
Thigh skinfold (mm)	12.63	10.75	7.00	9.88	12.96	0.52	0.80
Calf skinfold (mm)	8.19	7.75	4.50	6.38	10.68	0.13	0.57
Sum of skinfolds (mm)	69.75	58.75	38.50	49.88	394.69	0.55	0.57
Fat percentage (%)	18.39	16.67	12.17	14.13	12.91	0.48	0.54
Flexed upper arm girth (cm)	33.60	32.95	31.21	31.70	3.81	0.33	0.25
Forearm girth (cm)	28.50	27.40	27.55	27.73	2.45	0.70	0.11
Ankle girth (cm)	23.50	23.83	22.30	25.40	1.65	0.25	**2.41***
Calf girth (cm)	37.80	38.28	35.95	35.20	10.78	0.14	0.23
Humerus breadth (cm)	7.413	7.20	7.00	6.88	0.5058	0.47	0.16
Femur breadth (cm)	10.175	9.70	9.35	9.61	0.9372	0.73	0.15
Wrist breadth (cm)	6.19	6.00	5.65	5.79	0.07	0.73	0.54

High significance: $d \geq 0.8$***
TF = tight forward; H = half-back; LF = loose forward; BL = back-line

U 18 rugby players

Table 7 presents the tight forwards and loose forwards with high significant differences in terms of body mass (d=1.67), fat percentage (d=1.92), sum of skinfolds (d=0.83) and calf girth (d=0.85). The back-line and halves revealed high significant differences in terms of body mass (d=1.13), stature (d=1.45), ankle girth (d=1.74) and humerus (d=0.97) breadth.

The back-line players also showed a higher value than the tight forwards in terms of ankle girth ($\bar{x}$=25.30) and calf girth ($\bar{x}$=39.18). It seems

Table 5. Means (x̄) and significant differences (d-value) between the positional groups in terms of rugby-specific components for U 16 players

Variables	TF	LF	H	BL	MS Error	TF vs LF	H vs BL
	x̄	x̄	x̄	x̄		d	d
Ground skills (s)	3.72	3.66	3.44	3.54	0.32	0.11	0.18
Side steps (n)	3.50	5.50	5.50	6.13	1.89	**1.45*****	0.45
Aerial and ground kicks (n)	4.13	4.75	6.50	5.50	1.35	0.54	**0.86*****
Passing for distance (m)	20.03	21.38	25.95	20.93	9.99	0.43	**1.59*****
Passing for accuracy (4m) (n)	4.25	4.50	5.00	4.63	2.94	0.15	0.22
Passing for accuracy (7m) (n)	21.13	25.50	25.50	24.50	4.72	**2.01*****	0.46
Kicking for distance (m)	39.10	28.18	59.50	40.65	46.68	**1.60*****	**2.76*****
Kick-off for distance (m)	31.06	24.33	41.50	34.61	133.87	0.58	0.60
Catching while running (n)	19.13	19.25	19.50	19.38	4.74	0.06	0.06

High significance: *d* ≥ 0.8***
TF = tight forward; H = half-back; LF = loose forward; BL = back-line

Table 6. Means (x̄) and significant differences (d-value) between the positional groups in terms of physical and motor components for U 16 players

Variables	TF	LF	H	BL	MS Error	TF vs LF	H vs BL
	x̄	x̄	x̄	x̄		d	d
Adapted sit and reach (cm)	6.75	5.50	10.00	4.25	11.92	0.36	1.67***
Vertical jump (cm)	37.63	35.75	46.00	34.38	10.94	0.57	**3.51*****
Speed endurance (%)	4.44	5.44	3.42	7.62	2.58	0.62	**2.62*****
Illinois agility test (s)	18.91	18.24	17.60	17.09	4.45	0.32	0.24
T-test agility (s)	12.01	13.08	12.76	13.08	2.15	0.73	0.22
Speed 10m (s)	1.98	1.84	1.75	1.86	0.04	0.71	0.56
Speed 30m (s)	4.75	4.51	4.26	4.47	0.26	0.46	0.40
Pull ups (n)	5.13	4.50	12.50	7.88	22.51	0.13	**0.97*****
Abdominal strength (n)	3.13	5.75	6.00	3.25	3.12	**1.49*****	**1.56*****
Flexed arm hang (s)	19.46	14.48	40.83	31.42	96.85	0.51	**0.96*****

High significance: *d* ≥ 0.8***
TF = tight forward; H = half-back; LF = loose forward; BL = back-line

from these results that the back-line players were more muscular than the tight forwards. The significant differences between the tight and loose forwards in terms of ground skills (*d*=1.07), side-steps (*d*=0.99), passing for accuracy over 4 metres (*d*=1.35) and catching while running (*d*=3.90) are shown in Table 8.

There was also just one skill of high significant difference between the halves and back-line players, which was the side step (*d*=0.91). The only high significant difference between the tight and loose players was in terms of flexed-arm hang (*d*=1.74) (Table 9). The only outstanding significant difference between the halves and back-line players was the modified sit-and-reach (*d*=1.88).

U 19 rugby players

In Table 10, high significant differences were found in all the anthropometric measurements between the tight and loose forwards, with the exception of stature (*d*=0.22) and all the breadths. The back-line players and halves presented high significant differences in terms of forearm girth (*d*=0.98), ankle girth (*d*=1.43) and wrist breadth (*d*=1.10). In Table 11, the only high significant differences between the tight and loose forwards were obtained in the aerial and ground kick (*d*=0.92) and passing distance (*d*=1.55). The halves achieved the poorest result in terms of passing for accuracy over 7 metres (x̄=18.00), and therefore the high significant difference in terms of passing for accuracy over

Table 7. Means ($\bar{x}$) and significant differences (d-value) between the positional groups in terms of anthropometric components for U 18 players

Variables	TF	LF	H	BL	MS Error	TF vs LF	H vs BL
	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$		d	d
Body mass (kg)	96.57	83.50	68.67	77.50	61.19	**1.67*****	**1.13*****
Stature (cm)	187.86	188.00	172.00	182.75	55.05	0.02	**1.45*****
Tricep skinfold (mm)	12.71	8.25	8.00	7.63	6.75	**1.72*****	0.14
Supraspinale skinfold (mm)	13.50	11.00	7.33	8.00	16.51	0.62	0.16
Subscapular skinfold (mm)	15.36	11.03	9.50	8.25	7.20	**1.61*****	0.47
Pectoral skinfold (mm)	7.21	5.50	3.67	5.25	8.26	0.60	0.55
Abdominal skinfold (mm)	19.93	16.00	8.83	10.00	45.39	0.58	0.17
Thigh skinfold (mm)	11.71	11.25	7.33	9.70	12.96	0.13	0.66
Calf skinfold (mm)	8.86	8.00	5.00	7.25	10.68	0.26	0.69
Sum of skinfolds (mm)	82.07	65.53	46.00	50.83	394.69	**0.83*****	0.24
Fat percentage (%)	23.58	16.69	15.30	14.03	12.91	**1.92*****	0.35
Flexed upper arm girth (cm)	34.81	34.25	33.50	34.50	3.81	0.29	0.51
Forearm girth (cm)	30.13	30.00	28.77	28.63	2.45	0.08	0.09
Ankle girth (cm)	25.00	24.70	23.07	25.30	1.65	0.23	**1.74*****
Calf girth (cm)	37.09	39.88	37.10	39.18	10.78	**0.85*****	0.63
Humerus breadth (cm)	7.41	7.58	6.63	7.40	0.63	0.20	**0.97*****
Femur breadth (cm)	10.11	10.25	9.47	9.93	0.42	0.21	0.71
Wrist breadth (cm)	6.13	6.00	5.57	5.73	0.07	0.50	0.62

High significance: $d \geq 0.8$***
TF = tight forward; H = half-back; LF = loose forward; BL = back-line

Table 8. Means ($\bar{x}$) and significant differences (d-value) between the positional groups in terms of rugby-specific components for U 18 players

Variables	TF	LF	H	BL	MS Error	TF vs LF	H vs BL
	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$		d	d
Ground skills (s)	4.05	3.45	3.20	3.22	0.32	1.07***	0.05
Side steps (n)	5.14	6.50	8.00	6.75	1.89	**0.99*****	**0.91*****
Aerial and ground kicks (n)	4.43	5.25	6.67	6.00	1.35	0.71	0.57
Passing for distance (m)	22.36	24.80	25.42	24.96	9.99	0.77	0.14
Passing for accuracy (4m) (n)	4.43	6.75	6.67	5.75	2.94	**1.35*****	0.53
Passing for accuracy (7m) (n)	24.29	24.75	27.67	28.25	4.72	0.21	0.27
Kicking for distance (m)	36.44	35.98	39.20	41.15	46.68	0.07	0.29
Kick-off for distance (m)	34.83	40.73	45.17	44.93	133.87	0.51	0.02
Catching while running (n)	16.00	24.50	20.00	20.00	4.74	**3.90*****	0.00

High significance: $d \geq 0.8$***
TF = tight forward; H = half-back; LF = loose forward; BL = back-line

7 metres (d=3.13) between the halves and back-line players was expected. The high significant differences between the tight forwards and loose forwards were obtained in terms of vertical jump (d=2.62), speed endurance (d=1.28), speed over 10 metres (d=0.96), pull-ups (d=0.93) and abdominal strength (d=1.13) in Table 12. The halves and back-line players showed high significant differences in terms of vertical jump (d=1.83) and flexed-arm hang (d=1.07).

Table 9. Means ($\bar{x}$) and significant differences (d-value) between the positional groups in terms of physical and motor components for U 18 players

Variables	TF	LF	H	BL	MS Error	TF vs LF	H vs BL
	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$		d	d
Adapted sit and reach (cm)	0.57	1.75	1.00	7.50	11.92	0.34	**1.88*****
Vertical jump (cm)	45.14	44.75	50.67	50.00	10.94	0.12	0.20
Speed endurance (%)	5.01	5.92	6.75	6.36	2.58	0.57	0.24
Illinois agility test (s)	17.57	17.46	16.39	16.68	4.45	0.06	0.13
T-Test agility (s)	11.93	11.39	10.90	11.23	2.15	0.37	0.23
Speed 10m (s)	2.14	2.10	1.84	1.86	0.04	0.18	0.11
Speed 30m (s)	4.79	4.49	4.25	4.32	0.26	0.57	0.15
Pull ups (n)	1.71	5.50	9.00	6.00	22.51	**0.80*****	0.63
Abdominal strength (n)	3.43	3.75	4.67	4.25	3.12	0.18	0.24
Flexed arm hang (s)	13.89	30.99	35.65	28.43	96.85	**1.74*****	0.73

High significance: $d \geq 0.8$***
TF = tight forward; H = half-back; LF = loose forward; BL = back-line

Table 10. Means ($\bar{x}$) and significant differences (d-value) between the positional groups in terms of anthropometric components for U 19 players

Variables	TF	LF	H	BL	MS Error	TF vs LF	H vs BL
	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$		d	d
Body mass (kg)	101.14	86.38	77	82.8	61.19	**1.89*****	0.74
Stature (cm)	185.86	184.25	179.33	183	55.05	0.22	0.49
Tricep skinfold (mm)	13.36	9	9.83	7.7	6.75	**1.68*****	**0.82*****
Supraspinale skinfold (mm)	14	9.75	9.67	7.5	16.51	**1.05*****	0.53
Subscapular skinfold (mm)	17.71	10.63	9.17	9.1	7.2	**2.64*****	0.02
Pectoral skinfold (mm)	6.79	5.75	7	6.2	8.26	0.36	0.28
Abdominal skinfold (mm)	22	14.38	13	12.6	45.39	**1.13*****	0.06
Thigh skinfold (mm)	16.29	13.63	11.17	9.36	12.96	0.74	0.50
Calf skinfold (mm)	11.86	8.88	8	6.6	10.68	**0.91*****	0.43
Sum of skinfolds (mm)	95.21	66.25	60.83	52.86	394.69	**1.46*****	0.40
Fat percentage (%)	25.93	16.97	16.48	14.75	12.91	**2.49*****	0.48
Flexed upper arm girth (cm)	39.46	37.05	36	37.24	3.81	**1.23*****	0.63
Forearm girth (cm)	32.06	30.6	29.4	30.94	2.45	**0.93*****	**0.98*****
Ankle girth (cm)	25.44	28.2	23.17	25	1.65	2.14***	1.43***
Calf girth (cm)	41.26	40.55	37.77	39.1	10.78	0.22	0.41
Humerus breadth (cm)	7.76	7.48	7.5	7.1	0.63	0.36	0.5
Femur breadth (cm)	10.33	10.18	9.4	9.42	0.42	0.24	0.03
Wrist breadth (cm)	6.06	6	5.9	6.18	0.07	0.22	**1.1*****

High significance: $d \geq 0.8$***
TF = tight forward; H = half-back; LF = loose forward; BL = back-line

Table 11. Means (x̄) and significant differences (d-value) between the positional groups in terms of rugby-specific components for U 19 players

Variables	TF	LF	H	BL	MS Error	TF vs LF	H vs BL
	x̄	x̄	x̄	x̄		d	d
Ground skills (s)	3.81	3.42	3.24	3.43	0.32	0.68	0.34
Side steps (n)	6.29	7.00	7.33	7.40	1.89	0.52	0.05
Aerial and ground kicks (n)	6.43	7.50	7.33	6.80	1.35	**0.92***	0.46
Passing for distance (m)	21.41	26.33	27.40	27.20	9.99	**1.55***	0.06
Passing for accuracy (4m) (n)	4.71	5.25	6.00	6.40	2.94	0.31	0.23
Passing for accuracy (7m) (n)	25.14	24.50	18.00	24.80	4.72	0.30	**3.13***
Kicking for distance (m)	49.21	48.75	51.33	53.08	46.68	0.07	0.26
Kick-off for distance (m)	46.86	49.50	52.83	52.32	133.87	0.23	0.04
Catching while running (n)	19.71	20.00	20.00	20.00	4.74	0.13	0.00

High significance: $d \geq 0.8$***
TF = tight forward; H = half-back; LF = loose forward; BL = back-line

Table 12. Means (x̄) and significant differences (d-value) between the positional groups in terms of physical and motor components for U 19 players

Variables	TF	LF	H	BL	MS Error	TF vs LF	H vs BL
	x̄	x̄	x̄	x̄		d	d
Adapted sit and reach (cm)	4.57	4.25	3.00	5.00	11.92	0.09	0.58
Vertical jump (cm)	45.57	54.25	52.33	58.40	10.94	**2.62***	**1.83***
Speed endurance (%)	5.43	3.38	5.73	5.24	2.58	**1.28***	0.30
Illinois agility test (s)	17.19	16.29	15.94	15.71	4.45	0.43	0.11
T-test agility (s)	11.66	11.05	10.44	10.73	2.15	0.41	0.20
Speed 10m (s)	2.20	2.00	1.87	1.94	0.04	**0.96***	0.36
Speed 30m (s)	4.87	4.47	4.18	4.14	0.26	0.78	0.08
Pull ups (n)	5.86	10.25	9.33	10.20	22.51	**0.93***	0.18
Abdominal strength (n)	4.00	6.00	5.00	5.60	3.12	**1.13***	0.34
Flexed arm hang (s)	18.51	25.55	18.87	29.41	96.85	0.71	**1.07***

High significance: $d \geq 0.8$***
TF = tight forward; H = half-back; LF = loose forward; BL = back-line

Discussion and conclusions

U 13 players

In conclusion, the U 13 forwards (tight and loose) showed more differences than the back-line players (halves and back-line) in terms of anthropometric components. Quarrie, Handcock, Toomey, and Waller (1996), found adult loose forwards to be taller than front row forwards, but shorter than locks. However, this was not the case with the U 13 players in this study. The only exception in literature (Rigg & Reilly, 1988) was the fat percentage and body mass of the halves and back-line players, where the halves did not present the smallest values of all the players.

It seems that the halves were the most skilled players in terms of rugby-specific skills components. Most literature supports the fact that the back-line players (which include halves) are more skilled in terms of rugby-specific components than the forward players (Craven, 1974; Quarrie, Handcock, Toomey, & Waller, 1996; Joubert & Groenewalt, 1998). This is because the back-line players play with the possession, and the halves are responsible for most of the decision-making in the team.

The back-line players performed best in the most physical and motor components of all the playing positions, whereas the tight forwards performed poorest. These findings support the find-

ings represented in the literature concerning adult players (Babić, Mišigoj-Duraković, Matasić, & Jančić, 2001).

U 16 players

Among U 16 forward and back-line players few differences were found in terms of anthropometric components, which means that at this age all the players seemed relatively similar, irrelevant of positions. It also proved that at this age the coach can still change a forward to a backline player and vice versa. The fact that the tight forwards had the highest mean values in most of the anthropometric measurements is also supported by the literature of adult players (Carlson et al. 1994); Quarrie et al., 1996). The back-line players measured taller than the halves. This is in accordance with the findings of De Ridder (1993), Maud and Shultz (1984), and Rigg and Reilly (1988).

The rugby-specific skill components showed many more differences between the U 16 back-line players than the forward players. This is still in contrast with the literature about positional differences of adult rugby players in terms of rugby-specific skill components among back-line players (Joubert & Groenewalt, 1998).

It seems from these results that there were not many differences between the tight and loose forwards in terms of physical and motor components. As the tight forwards achieved the best results in the T-test for agility, it suggests that tight forwards are agile, which is in accordance with the literature concerning adult players (Joubert & Groenewalt, 1998). The back-line and halves showed significant differences in more components, which suggests that these groups need specific physical and motor components training.

U 18 players

The U 18 forwards showed more differences in terms of anthropometric components than the back-line players. The tight and loose forwards also seemed to show more differences in terms of anthropometric components at this age than their younger counterparts (Craven, 1974; Hazeldine & McNab, 1998). It is evident that with mature age the anthropometric characteristics become more important for tight forwards. The halves are smaller and lighter than the back-line players, which is in accordance with literature (De Ridder, 1993). The differences suggest that at this age there are a few anthropometric components that distinguish between halves and back-line players.

The few differences between the halves and back-line players suggest that they do not differ much in terms rugby-specific skills components. It also seems that few differences exist between playing positions in terms of physical and motor components. This could be attributed to the fact that even at this young age players are well conditioned, and therefore show few differences among playing groups in terms of physical and motor components, a finding which is in contrast with the literature for adult players (Quarrie et al., 1996; Babić et al., 2001).

U 19 players

The U 19 forwards presented more differences in terms of anthropometric components than the back-line players. This suggests that forwards (tight and loose) develop more in terms of anthropometric components with advancing age than halves and back-line players do.

It seems that at this age there are few differences between tight and loose forwards and halves and back-line players in terms of rugby-specific components. This might be due to the fact that players at this age are all well developed, irrelevant of positional group, in terms of rugby-specific components. This is in contrast with literature on positional differences of adult rugby players (Joubert & Groenewalt, 1998; Quarrie et al., 1996; Babić et al., 2001).

It seems at this age that the tight and loose forwards present more differences than do the halves and back-line players in terms of physical and motor components. This indicates that tight and loose forwards need specific components for their positional responsibilities. This is in accordance with the literature on adult players (Quarrie et al., 1996). The few differences between the halves and back-line players suggest that at this age in terms of physical and motor components they require more or less the same components.

Finally, it seems that forwards, and many coaches are of this opinion, develop much later in terms of anthropometric components. The back-line players present many more differences in terms of rugby-specific skills and physical and motor components. It is also interesting to note that the older the players, the fewer the differences that were apparent in terms of rugby-specific skills and physical and motor components. This might be due to better physical and motor conditioning as well as the coaching of all players, irrelevant of positional group.

It thus seems that the positional requirements of adolescent rugby players differ among age groups and from adult rugby players. Therefore, it is necessary to compile scientifically based test batteries specifically for each age group according to the anthropometric, rugby-specific skills and physical and motor components. This will assist coaches and teachers in selecting the best players for each position, which in turn will result in more competent players and more satisfaction from participation. The aim in this study was also to assist coaches and teachers in establishing norms which could be

used to evaluate players at different ages. Full details of the test battery for positional selection for each age groups can be found in Van Gent (2003). It is also strongly recommended that more research on more similar elite groups should be conducted.

The present study is the first research of this type and should be seen as a pilot study. Therefore, the norms that were compiled can be used by coaches as an indication till more research results are available.

References

American Alliance for Health, Physical Education and Recreation (AAHPER) (1966). *AAHPER skills test manual for football.* Washington, D.C.: AAHPER.

Australian Rugby Football Union. (1990). *Australian rugby skills test.* Sydney: Australian Rugby Football Union.

Babić, Z., Mišigoj-Duraković, M., Matasić, H., & Jančić, J. (2001). Croatian rugby project, pt. 1. *Journal of Sport Medicine and Phyiscal Fitness, 41*, 250-255.

Badenhorst, E. (1998). *'n Keuringsmodel vir talentidentifisering by 16-jarige sokkerspelers.* [A selection model for talent identification for 16-year-old soccer players. South Africa.] (Master's thesis, North West University).

Carlson, B.R., Carter, J.E.L., Patterson, P., Petti, K., Orfanos, S.M., & Noffal, G.J. (1994). Physique and motor performance characteristics of US national rugby players. *Journal of Sport Medicine, 12*, 403-412.

Cooke, G., (1984). *Rugby union.* London: Black.

Craven, D.H. (1974). *Patroon vir rugby: 'n praktiese handleiding oor grondbeginsels, vaardighede, spelsette en oefenmetodes.* [Pattern for rugby: a practical guide of fundamentals, setpieces and training methods. In South Africa.] Cape Town: Tafelberg.

Craven, D.H. (1977). *Rugby handbook.* [Rugby guide. In South Africa] Cape Town: Tafelberg.

De Ridder, J.H. (1993). *'n Morfologiese profiel van junior en senior Cravenweek rugbyspelers.* [A morphological profile of junior and senior Craven week rugby players. In South Africa.] (Doctoral's thesis, North West University).

Du Randt, R., & Headley, N. (1993). Guidelines and recommendations. In R.N. Singer, M. Murphey & L.K. Tennant (Eds.), *Handbook of research on sport psychology, sponsored by the International Society of Sport Psychology* (pp. 315-321). New York: Maxwell Macmillan International.

Ellis, L., Gastin, P., Lawrens, S., Savage, B., Sheaches, A., Staaff, A., Tumily, D., Quinn, A., Woodford, S., & Young, W. (1998). Testing protocols for the physiological assessment of team sports players. In C.J. Gore (Ed.), *Testing methods manual: sport specific guidelines for the physiological assessment of the elite athletes* (pp. 132-144.). Belconnen: Australian Sport Commission.

Greenwood, J. (1985). *Total rugby: fifteen-man rugby for coach and player.* 2nd ed. London : Black.

Hare, E. (1997). *Die identifisering van rugbytalent by seuns in die senior sekondêre skoolfase.* [The identification of rugby talent among secondary schoolboys. In South Africa.] (Doctoral's thesis, North West University).

Hazeldine R., & McNab, T. (1998). *Fit for rugby.* London: Kingswood Press.

Joubert, R., & Groenewalt, B. (1998). *Principles of successful coaching.* Cape Town: SARFU Publication.

Joynson, D.C. (1978). *Better rugby for boys.* 3rd ed. London: Kaye & Ward.

Maud, P.J., & Shultz, B.B. (1984). The US national rugby team: a physiological and anthropometric assessment. *Physician and Sport Medicine, 12*(9), 86-99.

Nicholas, C.W. (1997). Anthropometric and physiological characteristics of rugby union football players. *Sports Medicine, 23*(6), 375-396.

Norton, K., & Atherton, M. (1997). Hi-fit manual: Health & Fitness software, 1-4. Retrieved 25 February, 2003 from http://www.itech.net.au/hfs/hy_fit_manual.htm#muscstandend.

Norton, K.I., Olds, T.S., Olive, S.C. & Craig, N.P. (1996). Anthropometry and sport performance. In K.I. Norton & T.S Olds (Eds.), *Anthropometrica: a textbook of body measurements for sports and health courses* (pp. 287-364). Sydney, Australia: UNSW Press.

Pienaar, A.E., & Spamer, E.J., (1998). A scientific approach towards the identifying of rugby talent among ten- and eleven-year-old boys. *Kinesiology, 2*(1), 48-53.

Pienaar, A.E., Spamer, E.J., & Pretorius, J.H. (2000). Veranderlikes wat onderskei tussen suksesvolle en minder suksesvolle tienjarige rugbyspelers in geselekteerde spelspesifieke posisies. [Variables which distinguish between successful and less successful ten year old rugy players, specific to playing positions. In South Africa.] *South African Journal for Research in Sport, Physical Education and Recreation, 22*(2), 23-35.

Pretorius, J.H. (1997). *Talent identifisering in geselekteerde spelspesifieke posisie by 10-jarige rugbyspelers.* [Talent identification of sport specific positions among 10-year-old rugby players. In South Africa.] (Master's thesis, North West University).

Quarrie, K.L, Handcock, P., Toomey, M.J., & Waller, A.E. (1996). The New Zealand rugby injury and performance project, IV: Anthropometric and physical performance comparisons between positional categories of senior A rugby players. *British Journal of Sports Medicine, 30,* 53-56.

Rigg, P.E., & Reilly, T. (1988). A fitness profile and anthropometric analysis of first and second class rugby union players. In T. Reilly, A. Lees, K. Davids & W.J. Murphy (Eds.), *Science and football: Proceedings of the First World Congress of Science and Football,* Liverpool, 13-17th April, 1987 (pp. 194-200). London: E & F.N. Spon.

Rutherford, D. (1983). *International rugby: for players, coaches and spectators.* London: Heinenmann.

Thomas, J.R., & Nelson, J.R. (1985*). Introduction to research in health, physical, education, recreation and dance.* Champaign, IL: Human Kinetics.

Van der Merwe, C.A. (1989). *'n Ontleding van die bewegingsverloop in rugby op senior klubvlak.* [A time analysis of rugby games at senior club level. In South Africa.] (Master's thesis, North West University).

Van Gent, M.M. (2003). *A test battery for positional selection in adolescent rugby players.* (Doctoral's thesis, North West University, South Africa).

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USPOREDBE MEĐU SKUPINAMA ELITNIH RAGBIJAŠA U 13, U 16, U 18 I U 19 RAZLIČITIH IGRAČKIH POZICIJA PREMA ANTROPOMETRIJSKIM I MOTORIČKIM KARAKTERISTIKAMA, TE ZNANJIMA I VJEŠTINAMA SPECIFIČNIMA ZA RAGBI

Sažetak

Uvod

Ragbi je vrlo popularan sport koji se u više od stotinu zemalja širom svijeta igra od osnovne škole do seniorske dobi. Raznolike aktivnosti te sportske igre zahtijevaju određene antropometrijske, i motoričke komponente, kao i komponente specifične za sam ragbi, svojstvene zahtjevima pojedinih pozicija u igri. Uvidom u te komponente moguće je razlikovati talentirane i manje talentirane igrače ragbija. No, još uvijek je nedovoljno poznato kako se te sposobnosti mijenjaju tijekom rasta i razvoja mladih igrača. Dosadašnja istraživanja doprinijela su identifikaciji talenata među mladim igračima ragbija, no nisu u obzir uzimala specifične zahtjeve pojedinih pozicija. Trenutno je selekcija igrača za pojedine pozicije u igri prepuštena trenerima i učiteljima, koji često nemaju ni iskustva ni znanja za pravilan odabir. Identificiranje pozicijskih zahtjeva znanstveno utemeljenom baterijom testova pomogla bi u pravilnoj selekciji ragbijaša specifičnih dobnih skupina za pojedina igračka mjesta.

Stoga je cilj ovog istraživanja bio usporediti skupine elitnih ragbijaša, načinjene prema igračkim pozicijama, u dobi od U 13, U 16, U 18 i U 19 radi utvrđivanja pozicijskih zahtjeva na mlade igrače u smislu antropometrijskih, tjelesnih i motoričkih komponenata, kao i komponenata vještina specifičnih za ragbi. Postavljena je hipoteza da će utvrđene statistički značajne razlike ukazati na različite igračke zahtjeve pojedinih pozicija koje bi se mogle koristiti u znanstveno utemeljenim baterijama testova za pozicijsku selekciju mladih ragbijaša.

Metode

Uzorak ispitanika činili su elitni igrači ragbija dobnih skupina U 13 (n=22), U 16 (n=21), U 18 (n=18) and U 19 (n=19). Svaka dobna skupina podijeljena je dalje na četiri skupine prema pozicijama u igri: napadači 1. i 2. linije skupa (stupići, sidraš, 2. linja), napadači 3. linije (igrači treće linije, zatvarač), vezni igrači (spojka i otvarač) i igrači stražnje linije (centri, krila, branič). Mjerene su sljedeće karakteristike i sposobnosti igrača: *antropometrijske variable* - tjelesna masa, tjelesna visina, postotak masnog tkiva, promjeri (humerus, femur i zapešće) te opsezi (flektirana nadlaktica, podlaktica, gležanj i zapešće); specifična motorička znanja i vještine - spretnost (vještina) na tlu, vještina udaranja lopte po tlu i u zraku, bacanje lopte u daljinu, preciznost dodavanja na udaljenosti većoj od 4m te većoj od 7 m, sposobnost udaranja lopte te izvođenje počet-

nih udaraca, vještina hvatanja u pokretu; tjelesne i motoričke komponente - fleksibilnost (adaptirani test dohvata u sjedu); snaga / eksplozivna jakost (skok uvis); brzinska izdržljivost; agilnost (test Illinois i T-test); brzina (sprint na 10m i 30 m); jakost (izdržaj u zgibu, podizanje trupa iz ležanja na leđima, broj zgibova).

Jednosmjerna analiza varijance (ANOVA) koristila se za utvrđivanje značajnosti razlika (d-vrijednost) između različitih igračkih skupina u pogledu antropometrijskih komponenata, specifičnih motoričkih znanja te motoričkih skupina za svaku dobnu skupinu igrača. Za utvrđivanje značajnosti razlika primijenjena je Cohenova metoda, no, s obzirom da ispitanici nisu slučajno odabrani, korišten je samo MS Error analize varijance umjesto standardne devijacije (SD).

Rezultati

U 13 igrači

U skupini U13 napadači (1., 2. i 3. linije skupa te zatvarač) pokazali su više razlika u antropometrijskim komponentama od ragbijaša stražnje linije (veznih igrača i igrača linije). Vezni igrači su postigli najbolje rezultate u testovima specifičnog motoričkog znanja i vještina. Igrači linije pokazali su se najboljima među svim pozicijskim skupinama u većini tjelesnih i motoričkih komponenata, dok su napadači 1. i 2. linije skupa u tim testovima postigli najlošije rezultate (tablice 1, 2 i 3).

U 16 igrači

Između napadača i igrača stražnje linije u dobi od U 16 pronađeno je malo razlika u antropometrijskim komponentama. Napadači 1. i 2. linije skupa imali su najviše prosječne vrijednosti u većini antropometrijskih mjerenja. Igrači stražnje linije bili su viši od veznih igrača. Igrači stražnje linije U 16 pokazali su puno više razlika u specifičnim motoričkim znanjima i vještinama od napadača (tablice 4, 5 i 6).

U 18 igrači

Napadači U 18 pokazali su više razlika u antropometrijskim komponentama od igrača stražnje linije. Napadači 1. i 2. linije i napadači 3. linije sa zatvaračem ove dobne skupine više su se međusobno razlikovali u antropometrijskim komponentama od svojih mlađih kolega. Vezni igrači su bili niži i la-

kši od igrača stražnje linije. Između veznih igrača i igrača stražnje linije nisu pronađene značajne razlike u specifičnim motoričkim znanjima i vještinama. Rezultati su pokazali nepostojanje značajnih razlika u tjelesnim i motoričkim komponentama među pozicijskim skupinama (tablice 7, 8 i 9).

U 19 igrači

Napadači U 19 pokazali su više razlika u antropometrijskim komponentama od igrača stražnje linije. Rezultati su ukazali na to da među napadačima (1., 2. i 3. linija skupa te zatvarač), veznim igračima i igračima stražnje linije nema značajnih razlika u komponentama specifičnima za ragbi. Napadači 1. i 2. linije te napadači 3. linije i zatvarač pokazali su više razlika u tjelesnim i motoričkim komponentama od veznih igrača i igrača stražnje linije (tablice 10, 11 i 12).

Rasprava i zaključak

Rezultati ukazuju na to da se napadači razvijaju puno kasnije od ostalih ragbijaša u smislu antropometrijskih komponenata. Igrači stražnje linije pokazuju puno više razlika u specifičnim motoričkim znanjima i vještinama, kao i u motoričkim komponentama. Također treba naglasiti da, što su igrači stariji, to je među njima manje vidljivih razlika u specifičnim motoričkim znanjima i vještinama te motoričkim komponentama. Moguće je da je razlog tomu bolja fizička i motorička kondicijska priprema, kao i jednoobrazna sportska priprema svih igrača, neovisno o poziciji koju igraju.

Može se zaključiti da se zahtjevi pojedinih pozicija na adolescentne ragbijaše razlikuju s obzirom na dobnu skupinu. Stoga je nužno sastaviti znanstveno utemeljene baterije testova koje bi bile specifične za svaku dobnu skupinu i kojima bi se mjerile antropometrijske osobine, specifična motorička znanja te motoričke komponente, a što bi omogućilo bolju selekciju igrača za svaku igračku poziciju. Rezultati ovog istraživanja mogu poslužiti za stvaranje normi koje se mogu koristiti u evaluaciji igrača različitih dobnih skupina. Ovo je prvo istraživanje te vrste te ga treba smatrati pilot istraživanjem. Ovdje predstavljene norme mogu poslužiti kao pokazatelji dok ne budu dostupni rezultati daljnjih istraživanja.