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Somatotype Differences in Young Croatian Rowers and Soccer Players

Kinesiology

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ABSTRACT

The aim of this research was to analyse the somatotype differences in young Croatian rowers and soccer players. The research was conducted on the sample of 19 soccer players and 14 rowers aged 16 years. The average somatotype value in rowers was 4.64-4.54-2.84±2.11-1.14-1.02 (mezomorph-endomorph), while in soccer players it was 2.43-4.39-3.28±0.96-1.13-1.21 (ectomorph-mezomorph). The independent samples T-test showed that the endomorph component was significantly more expressed in rowers than in soccer players. Eight somatotype categories for rowers and six for soccer players were created based on the category diagram. The highest percentage of rowers belonged to the mesomorphic endomorph category (29%), while in soccer players the most represented was the ectomorphic mezomorph (28%) category. 50 % of rowers belonged to the somatotype categories dominated by the endomorphic component, while 62% of soccer players belonged to the somatotype categories dominated by the mesomorphic component.

INTRODUCTION

Rowing is defined as boat movement, with or without the steersman, by muscle power of one or several rowers, using oars as simple levers of second order, while sitting with their backs turned in the direction of the boat movement. It belongs to the group of cyclic, monostructural activities, and by the domination of the certain energetic sources in the energy consumption it belongs to the group of predominately aerobic activities. The energy requirements for the overall competition are in average 80% aerobic and 20% anaerobic (Marinović, 2009).

Unlike rowing, soccer belongs to the group of polystructural complex sports. Regarding the duration and intensity of the match, most energy in soccer is gained from aerobic activities (Jastrebzski et al., 2013). Tactically, soccer is an invasive sports game. Team scores by moving a ball into another team's territory and shooting into a goal. To prevent scoring, one team must stop the other from bringing the ball in its own territory and attempting to score (Mitchell, Oslin and Griffin, 2006).

The assumption is that those obvious differences between rowing and soccer condition the different body stature necessary for success in the sports. Somatotyping is one of the most frequently used techniques for analyzing the body build. Very often somatotype is used in identifying talented young athletes for particular sports (Carter et al., 2005). However, most research that analysed body stature in rowing (Ackland et al., 2001; Bourgois et al., 2000; Mikulić et al., 2005) and soccer (Martirosov et al., 1987; Reilly, Bangsbo and Franks, 2000), was conducted on the sample of elite junior and senior athletes.

In Croatia there was no research that analysed somatotype difference of youth rowers and soccer players.

METHODS

This research represents a cross-sectional study in which Croatian young soccer players (N=19; average chronological age 16.00 years) and rowers (N=14; average chronological age 15.29 years) were measured by using ten anthropometric measures, representing independent variables. These variables were: Body height (cm) and Body mass (kg); Triceps, Subscapular, Supraspinale and Calf skinfolds (cm); Flexed arm and Calf girth (cm); Humerus and Femur breadth (cm). The dependant variable in this research was the sport practiced by the examinee (soccer or rowing). Based on the anthropometric characteristics, body mass index was calculated, as well as three somatotype components by using the Heath-Carter method. Two to three measurements were taken at each site with the average value used in any further calculation if two measurements were taken, and the median value used if three measurements were taken. The independent samples T-test determined difference significance in certain somatotype components between soccer players and rowers. Analysis of differences in proportions was used to establish whether there were significant differences in frequency of each somatotype category between the soccer players and rowers. *Somatotype* Ver. 1.2.5.and *StatisticaVer 10.00* softwares were used in data processing.

RESULTS AND DISCUSSION

Table 1 Descriptive indicators and Kolmogorov-Smirnov distribution normality test

Variables	Soccer players (N=19)			Rowers (N=14)		
	Mean	SD	K-S	Mean	SD	K-S
Body height	179.18	8.82	0.15	180.79	5.83	0.13
Body weight	70.41	10.38	0.13	75.34	9.90	0.13
Supraspinale skinfold	7.36	3.19	0.23	20.40	11.61	0.14
Subscapular skinfold	9.02	2.23	0.22	15.99	9.21	0.16
Triceps skinfold	9.40	3.57	0.24	15.68	7.99	0.15
Calf skinfold	11.29	3.25	0.11	15.79	7.07	0.18
Calf girth	37.93	2.21	0.16	37.97	2.60	0.20
Flexed arm girth	30.81	2.70	0.23	32.89	2.87	0.13
Femur breadth	9.77	0.47	0.18	10.01	0.47	0.15
Humerus breadth	6.94	0.61	0.18	7.04	0.37	0.18
			Test=0.31			Test=0.36

Table legend: N – number of examinees; Mean – arithmetic mean; Med – medium value; Min – minimum value; Max – maximum value; SD – standard deviation; K-S – Kolmogorov-Smirnov test; Test – limit value of K-S test

The values of K-S test (Table 1) are lower for all the variables than critical values of the subsamples of soccer players and rowers. This confirms that distributions of all the variables do not significantly deviate from the normal distribution, and that in further data processing parametric methods of data processing can be applied. The height of youth rowers and soccer players is approximately equal. Rowers are heavier and have more subcutaneous fat tissue than soccer players.

Table 2 Comparasion of somatotype components in soccer players (N=19) and rowers (N=14)

Somatotype components	Soccer players			Rowers		
	Mean	SD	Range	Mean	SD	Range
Endomorphic*	2.43	0.96	1.1-4.7	4.64	2.11	1.6-9
Mesomorphic	4.39	1.13	1.1-5.9	4.54	1.14	2.4-6.5
Ectomorphic	3.28	1.21	1.2-5.4	2.84	1.02	1-5.1

Table legend: Mean – arithmetic mean; SD – standard deviation; Range – minimum and maximum value span; * - significant differences in certain somatotype component gained by the independent samples t-test

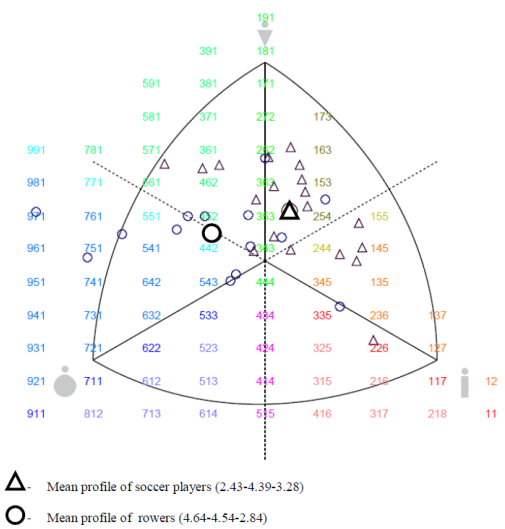

Figure 1 Somatoplot of soccer players and rowers

Young soccer players in average belong to the ecto-mesomorph while young rowers belong to the mesomorph-endomorph somatotype category (Table 2 and Figure 1). The independent samples t-test showed that rowers had significantly higher values in the endomorph somatotype component compared to soccer players.

Comparison of the obtained results and the results of other research leads to a conclusion that values of mezomorph somatotype component in young Croatian soccer players were equal to those of their peers from Spain (2.6-4.4-2.6, Gill et al., 2010) and Greece (3.6-4.4-2.8, Nikolaidis et al., 2011), with somewhat more expressed ectomorph somatotype component. Greek soccer players had somewhat higher values of endomorph component than the Spanish and Croatian young soccer players. In elite junior (1.7-5.6-2.6, Martirosov et al., 1987) and senior (2.0-5.3-2.2, Reilly et al., 2000) soccer players there was a growth trend in the mezomorph and decrease trend in the endomorph somatotype component. Such body stature enables soccer players a display of strength, speed and endurance, necessary for the highest quality level play.

Young rowers participating in this research had equal values of mezomorph and ectomorph, and significantly higher values of endomorph somatotype component in comparison to the Greek rowers of the same age (2.5-4.5-3.0, Kaloupsis et al., 2008). In high quality Greek senior rowers (lightweight rowers 1.6-4.6-3.2; heavyweight rowers 2.1-5.2-2.5; Kaloupsis et al., 2008), and especially in rowers who participated at 2000 Sydney Olympic Games (lightweight rowers 1.4-4.4-3.4; heavyweight rowers 1.9-5.0-2.5; Ackland et al., 2001) even lower values of endomorph somatotype component are noticed, meaning that an excess of subcutaneous fat tissue had a negative impact on the rowing success. It is interesting that the endomorph component was more expressed in Croatian senior rowers (3.3-5.0-2.4 Mikulić et al., 2005) than in Greek rowers and participants of Sydney Olympic games.

Table 3 Frequency and percentage of each somatotype category and significance of differences in proportions between rowers and soccer players

Somatotype category	Rowers (N=14)		Soccer players (N=19)		
	N	%	N	%	p
Balanced endomorph	1	7	0	0	0.12
Mesomorphic endomorph	4	29	0	0	0.01
Mesomorph-endomorph	2	14	0	0	0.27
Endomorphic mesomorph	1	7	3	17	0.19
Balanced mesomorph	1	7	3	17	0.19
Ectomorphic mesomorph	1	7	5	28	0.06
Mesomorph-ectomorph	0	0	1	6	0.17
Mesomorphic ectomorph	0	0	3	17	0.05
Balanced ectomorph	1	7	0	0	0.12
Central	3	21	3	17	0.39

Table legend: N – frequency of subjects, % – relative values; p-statistical significance

A classification of the examinees into somatotype categories had been executed (Table 3), with the aim of gaining more detailed insight into somatotype specificities of individual players . Of the possible 13, eight somatotype categories were gained on the subsample of rowers, and six on the subsample of soccer players. By analysis of differences in proportions between young soccer players and rowers, a significantly higher proportion of the mesomorphic endomorph somatotype category was established in rowers, and a significantly higher proportion of the mesomorphic ectomorph somatotype category was found in soccer players.

The highest percentage of rowers belonged to the mesomorph-endomorph category (29%), while in soccer players the ectomorph-mesomorph category was the most represented (28%). 50 % of rowers belonged to the somatotype categories dominated by the endomorph component, while 62% of soccer players belonged to the somatotype categories dominated by the mesomorph component.

CONCLUSION

- Based on the findings of this study, the following conclusions have been drawn:
- Endomorph somatotype component was significantly more

expressed in young rowers than in young soccer players
- Somatotype of young Croatian rowers in this research differed from the somatotype of elite rowers, by much higher expression of endomorph component
- Somatotype of young Croatian soccer players in this research was similar to the somatotype of high quality junior and senior soccer players.
- 50 % of rowers belonged to the somatotype categories dominated by the endomorph component, while 62% of soccer players belonged to the somatotype categories dominated by the mesomorph component.
- Quality training and convenient nutrition should influence the reduction of subcutaneous fat tissue in young rowers.

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