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Differences in body composite and physical match performance in female soccer players according to team position

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ABSTRACT

Milanovic Z, Sporis G, Trajkovic N. Differences in Body Composite and Physical Match Performance in Female Soccer Players According to Team Position. *J. Hum. Sport Exerc.* Vol. 7, No. Proc1, pp. S67-S72, 2012. The aim of this research was to determine the differences between body composition and physical match performance among female soccer players according to the team's position. Twenty two elite female soccer players (aged 23.95 ± 4.52 , height 168.82 ± 7.19 cm, body mass index 21.5 ± 1.3 kg) from Serbian A-national team participated in this study. Players were tested for aerobic endurance, Yo-Yo intermittent recovery test level 1 (YYIRL1), body mass and body height. The percentage of body fat and body mass index (BMI) was determinate according to body height and body weight parameters. The average value of body weight among female soccer players has been 61.4 ± 6.0 kg. The biggest average value for body weight has been found among midfielders 62.7 ± 7.7 kg, while the smallest values have been found among goalkeepers 59.5 ± 10.6 kg. Opposite to the body weight, goalkeepers have been the tallest players with average body high of 172.5 ± 3.5 cm, than the defenders with 170.0 ± 7.2 cm, while the midfielders (168.7 ± 8.7 cm) and the attackers (164.7 ± 5.0 cm) have shown the smallest average values. The YYIRL1 test's results have shown that all positions have similar value within range of 880-930m, which indicates group homogeneity. The average values of the body fat was 25.9 ± 2.0 %. Significant difference between the tested variables according to the player's position in the team could not be established ($p < 0.05$). The selection process and the orientation towards specific team position represent an important aspect of the realization of the top athletic results, but it cannot be based merely on morphological and functional results. According to this research, differences cannot be precisely defined in both morphological and functional abilities of the women soccer players based on their position in the team. **Key words:** YO-YO TEST, BODY MASS, FEMALE, SOCCER.



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INTRODUCTION

Soccer is one of the most popular sport nowadays. This can be explained by the fact that more women have been interested in becoming the professional athletes in this kind of sport. For example, 40 000 female soccer players were register in Sweden, which was 20% of all register soccer players in that country (Sporis et al., 2007). In the last 10 years, the number of females participating in soccer has also risen among collegiate institutions in the United States (Krustrup et al., 2005).

Physical demands towards the female soccer players must be of specific physiological character since female differs from male in many parameters. It is necessary for female players to posses a high level of aerobic endurance because of the soccer characteristics and demands. The length of high intensity running during a soccer game in elite female players (0.71-1.71 km) is significantly different from that of male players (1.9-2.4 km) (Krustrup & Bangsbo, 2001; Krustrup et al., 2005). On top of this, gender differences can be seen in running performance or aerobic capacity (VO_{2max}). Female soccer players have lower VO_{2max} (43.4-56.8 ml/kg/min) than male players (55-67 ml/kg/min) (Krustrup & Bangsbo, 2001; Krustrup et al., 2005).

Stolen et al. (2005) concluded that physiological demands are similar, but competitive matches of women's soccer show less covered distance by players (almost 33%) at higher level of intensity (speed more than 15 kmh-1) than in the men's game (Krustrup et al., 2005). Krustrup et al. (2005) concluded that YYIRL1 (Yo-Yo intermittent recovery test level 1) is a good predictor of elite female soccer player's ability to perform high-intensity running throughout competitive matches and it can be used as an indicator of physical match performance.

Reilly and Secher (1990) addressed that body composition played an important role in fitness of a soccer player. It is important to emphasize that male soccer players tend to have a better ratio of lean body mass to body fat than female players (Matković et al., 2003), which eventually affects the endurance of female players. Overall female professional soccer players were more mesomorphic than endomorphic nonplayers, but less also less ectomorphic (Martens, 2004). The female soccer players had significantly different body fat percentages and lean body weights, but the differences in overall absolute fat were not significantly different from non-athletes (Can et al., 2004). Body weight and fat percentage are part of the physiological makeup of a soccer player, but this is less apparent in women than it is with men, specifically in regard to body fat.

Juric et al. (2007) suggested that the morphological characteristics of female soccer players did not differ significantly according to their team positions. Also, the average height and body mass values of the female soccer players were within the normal range just like other elite European female soccer players. Goalkeepers and defenders are taller and have greater body mass compared to midfielders and attackers (Franks et al., 1999; Reilly et al., 2000). There are several factors that could influence the female level of fitness. The nature of the annual soccer calendar and the fact that most female soccer players mainly train and play on a part-time basis could be one of the factors according to Polman et al. (2004). In order to effectively use this small amount of time it is essential to know more about the performance of female soccer players.

The aim of this research was to determine the differences between body composition and physical match performance among female soccer players according to their team's position.

MATERIAL AND METHODS

Subjects

Research was performed on a sample of 22 elite female soccer players from Serbian A-national team, (aged 23.95 ± 4.52 , height 168.82 ± 7.19 cm, body mass index 21.5 ± 1.3 kg). The subjects were the following: 2 goalkeepers, 4 attackers, 8 midfielders and 8 defenders. All the participants provided written consent after being informed of the test protocol. The protocol of the study was approved by the Ethical Committee of the Faculty of sport and physical education, University of Nis and according to the revised Declaration of Helsinki. Each player had at least 4 years of training experience, corresponding to 2 hour training sessions, and at least 1 competition per week.

Testing was performed during the preparation of national team, in February 2009. The study protocol was held for every subject. Beside the results, the basic anthropometric parameters (body height-TV and body weight-MT) and the age of the players were registered in the study protocol. Speed and endurance tests were held at the same day.

Testing procedure

Each athlete performed a standardized 15 minute warm-up consisting of general movements and dynamic and static stretching. After the general warm-up, players performed assessments of morphological parameters, speed and endurance in random order. During the test air temperature ranged from 22°C to 25°C. It began at 10 am and finished by 1 pm. Players were instructed not to be involved in strenuous exercise for at least 48 hours before the fitness testing session and consume their normal pre-training diet before the testing session. None of the subjects were injured 6 months before the testing.

Body height and body weight were measured according to the instructions of the International Biological Program-IBP (Weiner & Lourie, 1969). The body height was measured with a GPM anthropometer (Siber & Hegner, Zurich, Switzerland) to the nearest 0.1 cm. Body weight was obtained by TANITA BC 540 (TANITA Corp., Arlington Heights, IL) to the nearest 0.1kg. Body mass index was calculated by formula: $BMI = \text{masa tela (kg)} / (\text{visina tela (m)})^2$. Percentage of body fat (Bfat%) was calculated by formula: Adult body fat % = $(1.20 \times BMI) + (0.23 \times \text{Age}) - (10.8 \times \text{gender}) - 5.4$ (Deurenberg et al., 1991).

Yo-Yo intermittent recovery test level 1 (YYIRL1) was used for measuring the physical match performance (Bangsbo et al., 2008).

Statistical analysis

The statistical Package for Social Studies SPSS (v17.0., SPSS Inc., Chicago, IL) was used for statistical analysis. Descriptive statistics were reported as mean \pm SD for all measures with special analysis for positions in team. A one-way ANOVA was used to examine if differences exist between four positions: attackers, midfielders, defenders and goalkeepers. The statistical significance was set at $p < 0.05$.

RESULTS

Descriptive statistics showed no significant deviation in body height and weight among tested players depending on the team positions, while the values of the body fat percentage are much higher due to the fact that the study was performed on elite female soccer players, members of the national selection (Table 1). The average body fat of the female players was 61.4 ± 6.0 kg. The greatest average value for body weight has been found among midfielders 62.7 ± 7.7 kg. Contrary to the Body fat, the greatest average

value of body height has been found in goalkeepers (172.5 ± 3.5), then the defense players (170.0 ± 7.2 cm), while the smallest values have been found among the midfield players (168.7 ± 8.7 cm) and the attackers (164.7 ± 5.0 cm). The YYIRL1 test's results have shown that all positions have similar values within range of 880-930 m, which indicates group homogeneity. The deviation is noticed within the goalkeepers whose average value was 780.0 ± 84.8 m (Table 1). By using one-way ANOVA the significant difference between the tested variables according to the player's position in the team could not be established ($p < 0.05$).

Table 1. Differences among the position in the team.

	Sum of Squares	Mean Square	F	Sig.
Age (years)	88.58	29.527	1.561	0.233
Body weight (kg)	32.69	10.898	0.265	0.850
Body height (cm)	104.52	34.841	0.638	0.600
Body mass index	8.42	2.808	1.681	0.207
Percentage body fat (%)	26.75	8.920	2.944	0.061
YYIRL1 (m)	38036.36	12678.788	0.292	0.831

YYIRL1- Yo-Yo intermittent recovery test level 1.

DISCUSSION

The effects of this research are slightly different from the results of the previous researches that involved female soccer players (Verheijen, 1997; Sporiš et al., 2007). The most noticeable difference amid goalkeepers. In this research female goalkeepers have the smallest body mass index and body fat percentage, which is contrary to the research done by Sporiš et al. (2007) and Verheijen (1997), where they have found totally opposite values in comparing goalkeepers to the rest of the team players. Furthermore, as far as the age was concerned the goalkeepers were the second youngest players, coming right after the defense players.

The goalkeepers have expectedly obtained lower values in the results of the crossed distance during the YYIRL1 test, which was anticipated owing to the fact that the goalkeepers manage to cross approximately 4000 m during the game (Krustrup et al., 2005) contrary to the field players who manage to cross in average approximately 10 000 m (Krustrup et al., 2005). One of the most important things in choosing the goalkeepers in the selection process is the height (Sporis et al., 2007), since it directly influences the possibility of the more successful goalkeeping. The average goalkeeper height values in this research satisfy the highest selection criteria and basically are identical to the values of the elite female players both in Croatia (Sporis et al., 2007) and Denmark (Krustrup et al., 2005).

Body mass percentage is absolutely essential for the entire female soccer players abilities since if there is a growth in the body mass then appears the proportional loss in muscular mass. As a final product there appears a deficit in the development of the explosive strength which is necessary for quite a number of the movement direction changes, jumps and sprint abilities. A high negative correlation exists between percentage of body fat and performance in those activities where the body mass must be moved through space, either vertically as in jumping or horizontally as in running (Can et al., 2004). Regarding the fact that we are dealing with the elite female players, members of the national team, there have been notified immensely higher values of the body fat percentage among all the players no matter which position they occupy in the team. The average values of the body fat was 25.9% contrary to the values of the top soccer players, which is 13.7-19% (Misigoj-Durakovic et al., 1996; Can et al., 2004; Krstrup et al., 2005; Sporis et al., 2007). The midfield female players had the highest body percentage, contrary to the research of Sporis et al. (2007) where the midfield players had the lowest body mass percentage.

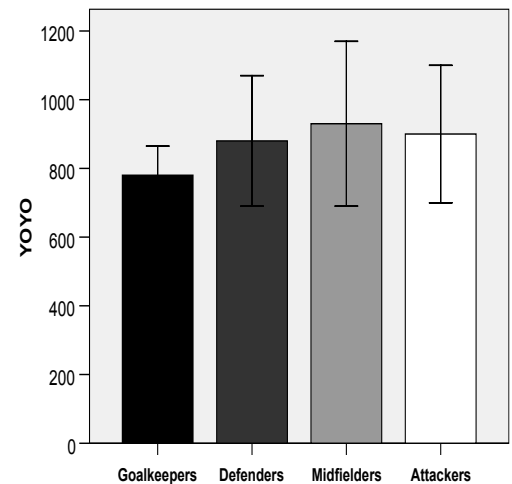


Figure 1. Comparison between team positions

Even though the midfield players have shown the best results in YYIRL1 test in this research, the difference was not significantly higher from the difference among the players in the rest of the positions. There is a considerable need for the quality aerobic endurance among the midfield players due to the fact that they have been actively involved both in the difference phase and attacking phase and practically connect the whole team (Bangsbo et al., 1991; Da Silva et al., 1999). Regarding the fact that the midfield players in this research have a significantly higher values of the body fat percentage and lesser aerobic abilities than the needed values for this level of the competition (Krstrup et al., 2005), leads us to the reasonable doubt in the existence of their abilities for the high level performance.

CONCLUSIONS

The selection process and the orientation towards specific team position represent an important aspect of the realization of the top athletic results, but it cannot be based merely on morphological and functional results. Even though some researches have dealt with the profiling of the soccer players depending on the team position (Bangsbo et al., 1991; Da Silva et al., 1999; Gil et al., 2007), according to this research there cannot be precisely defined differences in both morphological and functional abilities of the female soccer players based on their position in the team.

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