THE ANALYSIS OF SELECTED MOTOR ABILITIES IN SOCCER PLAYERS PRIOR TO WINTER PREP ARATORY MACROCYCLE

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- explosive strength,
- anaerobic endurance

Abstract:

The purpose of the study was to determine the level of selected motor abilities prior to the start of the winter preparatory period in the yearly training cycle. Among variables measured were: anaerobic endurance, coordination abilities – frequency ability, reaction speed, lower-body explosive power and body composition. The sample consisted of 33 U18 soccer players of 1. FC Tatran Prešov average aged 17.4 ±0.83 years. The soccer players are on the team playing the Slovak major soccer league in U18 category. The training age of players was 10 years. Players train seven times per week and play a league or preparatory match. The players attend 1st category Center of Talented Youth, which is the highest rank determined by the Slovak Soccer Federation. The data were collected using field and laboratory tests: Wingate test – anaerobic endurance and peak anaerobic power; Jumper – test of vertical jump height to assess lower-body explosive strength; body composition using INBODY 720. The collected data were processed using Microsoft Excel and data were characterized by basic mathematical and statistical parameters: arithmetic mean and standard deviation. The formulation of findings and drawing conclusions was based on subject analysis of collected data. The data collected throughout the testing assisted the coaches in making the winter preparatory period more effective via individualization of training load. This was meant to enhance sports performance in subjects participating in the study.

INTRODUCTION

The contemporary trend in elite sport requires systematic and long-term approach to athletes in order to increase the effectiveness of the controlling processes within training sessions, microcycles, mesocycles and under competition conditions. To regulate the training and game-related stimuli, one needs to know the organism's response to both external and internal load and to know the degree of disturbance in organism's homeostasis [4]. Every coach should make an effort to create optimal conditions for the enhancement of both athletic and player performance. Therefore, a coach should have sufficient amount og baseline information to plan the training process and to attain the maximal effectiveness of training via improvement in athletic performance of players. With regard to conditions under which the

soccer game skills are executed, we decided to assess the anaerobic alactacid capacity, which is indicative of short-term maximal performance, and body composition as one of the components of physical fitness [12]. The monitored parameters underlie the player performance in soccer games, during which a soccer player must undergo short exercise bouts when performing individual game skills.

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THE MATERIAL AND THE METHODOLOGY

The sample consisted of 33 U18 soccer players of 1. FC Tatran Prešov average aged 17.4 ±0.83 years. The soccer players are on the team playing the Slovak major soccer league in U18 category. The training age of players was 10 years. Players train seven times per week and play a league or preparatory match.

Anaerobic capacity was tested using 30-second cycle ergometer Wingate test performed on Monark 894E cycle ergometer. The parameters measured were peak anaerobic power (W/kg^{-1}), minimum peak power (W/kg^{-1}), and average peak power (W/kg^{-1}) [2].

Lower-body explosive strength was tested using jumping ergometer FITROJumper, which determines power in the eccentric phase of the jump per kilogram body mass, average power in the whole jump cycle per kilogram body mass and speed in the final phase of the jump [7].

The body composition of soccer players was assessed using the body composition analyzer INBODY 720. In addition to body composition, players were tested for body height, body mass, BMI index, percentage body fat and percentage muscle mass [1].

The data on the parameters measured were characterized by basic mathematical and statistical parameters: arithmetic mean (measure of central tendency) and standard deviation (measure of dispersion). The procession of data was also based on minimum and maximum values in order to determine the highest and the lowest values of parameters measured.

RESULTS

The study findings obtained using above methods are presented in this part of the paper. Field and laboratory testing was administered in three parameters: anaerobic endurance, lower-body explosive power and body composition.

Body composition analysis

To characterize soccer players and to determine the ideal body composition is impossible. When assessing body build in soccer players, several factors affecting somatotype have to be considered. With regard to ethnic specifics, playing positions and the level of athletic performance, it is impossible to specify the ideal body composition of a soccer player. The present paper includes information from previous studies conducted under similar conditions underlying the results analysis of the studied sample.

Drawing on the recommendation of several experts in body composition of athletes, the mean body height of the study participants fell within the average range of the athletic population. The mean body mass of the participants 70.5 kg was under the mean body mass for athletic population [3]. The recommended body mass is between 73.3 and 77.4 kgs. [5] report that one of the relevant parameters when assessing somatic dimensions is the ratio of body height to body mass. Among other characteristics illustrated in Table 1 are BMI, percentage body fat and percentage muscle mass. These characteristics supplement the information about the soccer players [10].

The data on body height, body mass, percentage muscle mass and percentage body fat of soccer players were compared to data of ice and ball hockey players reported by. Compared to the results reported by the authors, the soccer players compared to ice hockey players and ball hockey players were on average 1 cm and 4.2 cm taller, respectively. However, mean body mass in soccer players was lower compared to both samples of hockey players, which may be attributed to the character of sporting activity and sport-specific requirements. The comparison of percentage body fat and muscle mass between soccer players and hockey players revealed that soccer players compared to their hockey counterparts demonstrate lower body mass and lower muscle mass percentage.

Table 1. Body composision, lower-body explosive strength and analysis of anaerobic endurance

Variables	Average	(± s)
Hieght (cm)	178,8	(6,4)
Weight (kg)	70,8	(7,4)
BMI	22,1	(1,6)
% fat	10,3	(2,5)
% muscle	36,1	(3,7)
Jumper:		
P (W/kg)	55,6	(66,7)
P´(W/kg)	6,1	(0,3)
v (m/s)	2,5	(0,1)
h (cm)	31,2	(3,3)
Wingate:		
P´max (W/kg)	10,2	(0,7)
P´min (W/kg)	6,6	(0,6)
P´average (W/kg)	8,7	(0,7)

Legend: **cm –** centimeter, **kg –** kilogram, **BMI –** body mass index, **JUMPER: P(W/Kg) –** power in the active phase, **P´(W/Kg) –** mean power in total cycle, **v(m/s) –** speed in last phase of rebound, **h(cm) –** height of rebound, **WINGATE: P´max (W/Kg) –** maximum power of player during the test, **P´avg(W/Kg) –** mean power of player during the test, **P´min(W/Kg) –** minimum power of player during the test

Analysis of lower-body explosive strength

The first parameter of lower-body explosive strength tested using jumping ergometry was power in the concentric phase of the take-off (Pact), which is indicative of the capacity of the lower-body muscles to contract as fast and as effectively as possible. This capacity is to a large extent determined by the contribution of the fast-twitch and slow-twitch muscle fibers [9]. According to generally accepted norms for the age-matched groups, the results showed that soccer players that mean power in the concentric phase of the take-off 55.6 W/kg falls in the above-average range. When compared to other sports, compared to ice hockey and ball hockey players, the mean values were 44.4 W/kg, or 39.2 W/kg, respectively. These values were found to be higher than those reported for hockey players. This is a surprising finding due to the specificity of both sports.

In the jump height, the mean value of jump height in soccer players was 31.2 cm, which is comparable with other athletes of the same age category. The mean values fell in the average range.

Analysis of anaerobic endurance

In anaerobic endurance (Pavg – W/kg), the assumption is that the higher the value, the better preconditions for speed and strength endurance (see Table 1). The mean value of average anaerobic power in soccer players was 8.7 W/kg, which according to norms was elite

performance [11]. The minimum and maximum values in the investigated parameters ranged from 6.6 to 10.2 W/kg.

CONCLUSIONS

The baseline testing of selected parameters in soccer players prior to the start of the winter preparatory season aided in analyzing body composition, lower-body explosive strength and anaerobic endurance and making the planning of training more organized and the training itself more effective. The study findings have shown that training should be targeted at increasing the ratio of muscle mass to body mass [6], at improving strength endurance and speed endurance and last but not least at increasing the level of special endurance [8] and lower-body explosive strength.

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