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BODY FAT CONTENT AND PHYSICAL WORK CAPACITY OF ADULT SOCCER PLAYERS

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Abstract: *In 64 League I and national team member soccer players' relative body fat content was estimated as suggested by Parizková (1961) while running time in a standard all-out spiroergometric exercise served to assess physical work capacity.*

The group could be regarded as homogeneous on the basis of stature, body mass and weight-related fat content, but variability in running time was nearly twice greater than those in the anthropometric variables.

When the parameters of the national team members were separately analyzed and compared to the remaining subjects, genuine differences only were found in running time (used as an indicator of physical work capacity) and oxygen uptake (used as one of the indicators of aerobic capacity).

Key words: *Body fat content; Soccer players; Oxygen uptake; Running time.*

Introduction

As observed earlier (Mészáros and Mohácsi 1982, Mohácsi and Mészáros 1986), the growth type of adult League I and national team member soccer players differs significantly from that of other Hungarian ball game players, and soccer players are slightly more pyknomorphic than non-athletic young adults (Mészáros and Mohácsi 1987). There is, further, a significant relationship in the soccer players between the indices (metric and plastic index) of the growth type and body-mass-related fat content (Mohácsi and Mészáros 1987).

In respect of physiological work capacity, however, the situation is less simple, because ball game players have been found to have a very similar relative aerobic power (Petrekanits 1986). Thus for instance, random differences only were found between soccer players of the various classes of the national championship (Mohácsi et al. 1990).

The frequency of anthropometric and spiroergometric studies performed in soccer players the last two years allowed us to subdivide our sample. The players that had taken part at least three times in the decisive games of the national team in this period could be separated from those who used to be fix members of the team at the matches of the national championship and Hungarian Cup, i.e. the ones beginning the game.

By comparing the anthropometric and physiological parameters, the aim was to disclose if any difference existed between the two subsamples grouped by so strict criteria.

Material and Methods

The players belonged to five teams of the first league. For the purpose of this study, data of 56 players were selected by the mentioned criteria from among more than 140. The saple consisted of 27 national team members and 29 players who belonged to the first ranking teams of the first league.

Growth types of the subjects were assessed as suggested by Conrad (1963). The metric and plastic indices of the growth type were calculated by using six body dimensions (stature, chest width and depth, biacromial distance and the girths of forearm and hand). In taking body measurements the recommendations of the International Biological Programme (Weiner and Lourie 1969) were observed. Weight-related fat content was estimated as suggested by Parizková (1961), then fat-free mass was calculated.

Physical and physiological work capacity was described by the treadmill running time (s) and during an all-out spiroergometric exercise by the aerobic power related to both total and fat-free body mass. Jaeger model gas analysors and treadmill were used. The subjects warmed up first individually, then after the arrangement of the measuring devices they continued warming up by running at 8 and 10 kmh on the level belt. The test exercise was begun at 12 kmh and 5 degree incline and continued by increasing the belt speed by 2 kmh and the incline by 2 degrees every second minute.

Differences between the respective variable means of thetwo subgroups were analyzed by *t*-tests for independent samples.

Results and Discussion

Means and standard deviations of the variables are shown in *Table 1*.

Stature was statistically not different between the subsamples but was slightly taller than in non-athletic young adults (Mohácsi and Mészáros 1987). First league players were significantly heavier (by nearly 3 kg) than national team members. It is noted that variability in stature was perceivably smalleer and in body mass markedly smaller than in non-athletic young adults (Főnyedi et al. 1988, Gyenis and Till 1981).

Table 1. **Anthropometric and physiological characteristics of the studied soccer players (means ± sd.)**

Variable	National team		League I players		
	x	s	x	s	t
HT	177.76	5.15	178.58	5.22	–
BM	71.15	4.92	74.03	4.76	2.23
F%	8.88	2.85	12.64	3.05	4.76
MIX	–1.09	0.28	–0.75	0.26	4.71
PLX	87.12	2.24	88.48	2.61	–
RT	381.00	35.74	345.52	38.56	3.56
RVO_2	59.06	4.67	52.84	4.33	5.17
LBM	64.83	4.27	64.67	3.78	–
VO_2/LBM	64.82	3.85	60.49	3.01	2.38
n	27		29		

Abbreviations: HT = height cm; BM = body mass kg; F% = relative body fat; MIX = metric index cm; PLX = plastic index cm; RT = running time seconds; RVO_2 = relative aerobic power ml . min^{-1} . kg^{-1}; VO_2/LBM = aerobic popwer related to lean body mass ml . min^{-1} . kg^{-1}; n = subject number

Also relative body fat was lower in the national team members. In view of body mass, first league players were likely to differ merely by having larger fat stores. When means only are analyzed, this amount of fat is unlikely to affect physical and physiological work capacity. By taking account of variability, however, some of the first league players might be even regarded as obese, particularly in view of their age, growth type linearity and quality of physical activity.

Thegrowth type indicees showed the first leaguer subgroup to be slightly pyknomorphic normoplastic individuals while national team members were normoplastic metromorphs.

The observed functional indicators showed national team members to be in a distinctly better shape. They ran 36 seconds longer and had 6 ml larger relative aerobic power. Since first leaguers were significantly heavier, the latter statement might seem trivial. Nevertheless, aerobic power in the national team members was also greater when related to fat-free mass.

Comparatively, mean relative aerobic power of even national team members could not be considered as excellent; other ball game players used to display a similar aerobic power (Petrekanits 1986), and soccer players of international calibre have usually better figures (Petrekanits 1986, Fekete et al. 1989).

Yet, realizing that relative aerobic power is but one aspect of physiological work capacity, further that connexion between relative aerobic power and event-specific performance is usually loose, even this result contained some intriguing aspects. What factor(s) enabled national team members to run longer? Was this a result of their higher aerobicv power orelse the latter was theresult of more intense exercise? These are difficult questions to answer since relative aerobic power in adult athletes can be but very moderately improved even by one or two years work (Mészáros et al. 1989, 1990).

In interpreting the observed differences we have thought selection effects are more likely to have worked than differences in physical fitness. It is also noted that soccer performance cannot be validly estimated by the indicators used so one has to accept the judgement of the coaches. It is emphasized further that not even athletic condition can be safely assessed by a single study. It was only a momentary state of fitness and a global idea of the players' cardio-respiratory endurance capacity that could be obtained. For the players' preparation, however, even this limited information is of advantage, the more so when one considers that the part training can play in improving the essential base, the athletes' physiological work capacity, is much more restricted than the one in, for instance, event-specific preparation.

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