12. KINANTHROPOMETRY (1)

O-067 Changes in body compositions of elite level amateur and professional soccer players during the competitive season

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OBJECTIVE Body composition is one of the success factors in soccer. Some studies have evaluated the seasonal alterations in body compositions of different elite athletes. However, there is no adequate information regarding changes in body composition during the competition period in elite level amateur and professional soccer players. The purpose of this study was to analyze and compare the seasonal alterations in body composition variables (% Fat, FMM, BM, BMI and leg skin folds) among Turkish elite professional and amateur soccer players in competitive season.

METHODS 22 amateur and 25 professional soccer players participated in this study. BF and FFM, bioelectrical impedance technique (Tanita BC 418; Japan) was used to monitor body composition, and Harpenden skin fold calliper (Holtain, UK) was used to measure skin fold thickness. T-test was used to analyze pre and post-tests and the seasonal comparisons between groups.

RESULTS Results of BM, %Fat, FFM and leg skin folds and changes in season are shown in Table 1. Mean body mass of professionals was significantly decreased in the competitive period. Body fat changing during the season was significantly different between professionals (-0.4%) and amateurs (0.6%). Thigh skin fold thickness decreased 1 mm at the end of the season.

Table 1. Body composition values of amateur and professional soccer players and comparisons in competition period

	Weight(kg)		Percent Fat (%)				FFM(kg)		Calf(mm)			Thigh(mm)			
	pre	post	D †	pre	post	D †	pre	post	D	pre	post	D	pre	post	D
Amateurs	72.7 (6)	73.3 (5)	0.6 ±2	9.5 (3)	10.1 (3)	0.6 ±2	65.8 (5)	65.7 (5)	0.1 ± 2	6.4 (3)	6.1 (3)	0.3±1	11(5)	10 (4)	-1 ±2
Pro	70.5 (8)	69.6 (7)	0.9±2	10.2 (3)	10(3)	0.2±1	63.2 (6)	62.6 (6)	0.4 ± 2	8.1 (3)	8 (3)	0.1±2	12.4 (6)	11.6 (5)	-0.8±2
All Players	71.5 (7)	71.3 (7)	0.2±2	9.9 (3)	10 (39	0.1 ±2	64.3 (6)	64 (6)	0.3±2	7.3 (3)	7.1 (3)	0.2±1	12(5)	11(5)	-1 ±2

CONCLUSION Body composition is likely to change during the course of the competitive season as a result of soccer activities in amateurs and professionals. However, seasonal variation in body composition was not as much as expected, particularly in amateurs. Fat values in this study was similar to some of those in literature but was lower when compared to the other studies.

KEY WORDS Body composition, soccer, amateurs, professionals, competitive season.

O-068 Bone mineral density and body composition changes during a premier league association football season

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OBJECTIVE Body composition changes reflecting shifts in training throughout a season have been intensely studied in football players, yet little has been reported on the skeletal adaptations. It is possible that due to the bone remodelling cycle, the intense pre-season training period may have a negative impact on the players bone mineral density (BMD) during the early competitive season, before the positive gains are accrued later in the season and thereby increasing the risk of injury during this period.

METHODS The aim of this study was to assess skeletal training adaptations and seasonal changes in BMD and relate these changes in soft-tissue variables to seasonal variations in training and competition. Body composition was assessed using a dual-energy X-ray absorptiometry (DEXA) scanner (Hologic QDR series Discovery A, Bedford, Massachusetts).

RESULTS Negative BMD changes were observed only during the second more intense pre-season phase, BMD then increased during the competitive season. Percent body fat decreased during pre-season and during the competitive sea-

son, increasing only during the off-season. Fat-free soft tissue mass increased during the pre-season and was maintained during the competitive season and the off-season.

n	Time points	BMD changes	% Body fat	Fat-free soft tissue		
		(g.cm ²)	changes	mass changes (kg)		
4	T1 - T2	1.432 -1.423	11.50 - 11.53	70.44 - 72.09		
10	T3 - T4	1.499 - 1.528b	10.74 - 9.99a	69.42 - 69.64		
19	T4 - T5	1.496 - 1.487	10.33 - 11.62c	72.29 - 71.91		
12	T5 - T6	1.489 - 1.471a	12.91 - 11.92c	72.73 - 73.44a		
6	T1 - T3	1.486 - 1.486	12.7 - 11.25a	68.65 - 69.59		
11	T1 -T4	1.448 - 1.483c	12.47 - 10.70c	71.20 - 72.87c		
5	T2 - T4	1.420 - 1.464c	11.16 - 10.26	70.86 - 70.93		
10	T1 - T5	1.448 - 1.477b	12.55 - 12.09	70.82 - 72.32b		
2	T2 - T6	1.434 - 1.485	11.7 - 12.05	74.52 - 73.52		

Table 1. Seasonal changes in BMD and body composition

CONCLUSION The decrease of BMD due to intense training pre-season marked the start of bone remodelling with demineralisation. The following increase in BMD above initial values reflected the bone formation phase. It is concluded that the changes in both skeletal and soft-tissue variables reflected the seasonal variations in training and competition.

KEY WORDS Bone mineral density, football, seasonal changes, body composition.

O-069 Variations of total body water changes in football players during running

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OBJECTIVE Running is an aspect of many sport activities, which can be adversely affected by water loss of the body. Previous studies indicated that loss of water by sweating varies greatly across players who train even with the same intensity and environmental conditions. The purpose of this study was to reveal if body composition of sportsmen with similar experiences may relate to sweat loss during running in comfortable environment.

METHODS In this study total body water changes of 11 randomly selected football players were analyzed during a 20m shuttle run test (SRT). We assessed sportsmen's height, weight, body water content, body fat content, core body temperature and amount of calories burned during shuttle run test. By the end of each test body weight, body water content and temperature measurements were repeated.

RESULTS Analysis of body composition parameters showed higher values for body surface area (BSA, $1.76m^2$ vs $1.94m^2$), body mass index (BMI) and body water content (BWC) before tests in those, who lost <100ml of BWC(gr.B) in comparison with those who lost equal to or more than 100ml of BWC (gr.A, p<0.05). There was no significant difference for body fat percentage and core temperature parameters between groups.

CONCLUSION Higher BSA & BMI in gr.B in comparison with gr. A indicated on possibility of higher basal metabolic rate in former. Results allow to suggest, that higher basal metabolism in gr.B may require higher BWC to cool excessive sports-related heat. So, we can conclude that body composition is an important parameter in studies of body water changes in sportsmen.

KEY WORDS Body water, football player.

O-070 Physical and physiological status of champion American football players in Turkey

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OBJECTIVE Physical and physiological properties are not well documented particularly in some team sports, requesting aerobic as well as anaerobic pathways, such as American Football (AF). Besides, AF is one of the developing sports

in Turkey. The aim of this study was to determine physical and physiological parameters of champion American football players in Turkish league.

METHODS Totally 42 athletes' height, weight, body mass index (BMI: kg/m²), body fat ratio, flexibility (by sit and reach test), vertical jumping (by jump meter), left and right hand grip strength (by hand-grip dynamometer), leg and back strength (by back grip dynamometer) and anaerobic (by 10 yard and 40 yard running test) and aerobic (by Astrand Rhyming Test) performances were evaluated.

RESULTS Training year: 2.71 ± 2 , age:22.4(year), BMI: 29.15 kg/m^2 , waist/hip ratio: 0.86 ± 0.06 , body fat ratio: %18.81, flexibility: 8.06 cm, vertical jumping: 54.56cm, left and right hand grip strength: 47.72 ± 10.27 and 44.92 ± 9.48 N/kg, 10 yard and 40 yard running test: 1.71 ± 0.13 and 5.02 ± 0.77 sec and aerobic power: 38.01 ± 8.22 ml/kg/dk. No differences were observed between the offence and defence team in all parameters

CONCLUSION In conclusion, the specialized AF training allowed the participants to improve more of their fitness capacities compared with foreign players, and it is suggested that evaluations of fitness development should be continue systematically in order to gain success and to lower the injury risk.

KEY WORDS Aerobic, anaerobic, strength, body fat ratio, BMI, male, American footballer.

O-071 Cross-validation of non-invasive lactate threshold by bioelectrical impedance in football players

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OBJECTIVE The most accurate method of determining lactate threshold (LT) is the direct measurement of blood lactate concentration (BLC). A noninvasive method has been proposed to estimate LT, as critical power and heart rate deflection. A simple method for predicting the LT using bioelectrical impedance spectroscopy (BIS) during incremental test on a cycle ergometre was proposed by Alvarenga and Souza (2005). The aim of the present study was to estimate in cross-validation group (CVG) of football players the intensity of the LT from BIS variation (at rest and end of exercise) and to compare with LT using the BLC.

METHODS The CVG of football players(male, n=10) performed a cycle ergometre test started with initial power of 30 W and increased by 30 W every 3 minutes until 150 W (end of exercise). LT was determined as the intensity corresponding to 3.5 mm of the BLC. The BIS was measurement at rest and at end of the test from the method based on the response to the voltage step

RESULTS The mean of the LT using the invasive method was 94.27 ± 11.90 W and the LT using BIS was 95.46 ± 12.09 W. The comparison of the two methods showed r = 0.987 and SEE = 2.16 W. The LT intensity expressed in watts was not significantly different (p>0.05) across protocols.

DISCUSSION Recently (Stahn et al., 2006) used a non-exercise model based on bio impedance analyses for prediction of maximal oxygen. In this study, a progressive exercise model based in BIS was used for estimation LT and obtained high correlation. It was concluded that the proposed non-invasive technique could potentially be applied for prescribing an aerobic exercise.

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KEY WORDS Lactate threshold, blood lactate, bioelectrical impedance spectroscopy.

O-072 Body size and composition of Turkish National American Football League players

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OBJECTIVE American Football has been started to be played in Turkey since 1993, and has developed significantly. Despite its development, there has been limited data about American football players' attributes in Turkey. The purpose of this study was to present a profile of body size and composition of Turkish National American Football League (NAFL) players prior to the start of regular season. Forty-three members of a NAFL team were measured for height, body mass, body mass index(BMI), percent body fat(PBF), body type using bio impedance system during preseason training period of 2006-2007 football season.

METHODS For descriptive purposes, players were divided into the following groups: defensive line (DL), line backers (LB), corner back (CB), offensive line (OL), running backs (RB), wide receivers (WR), quarterbacks (QB). These data were analyzed by player position for comparison with previous studies of other countries NAFL football players. One-Way ANOVA was used for analysing the findings.

RESULTS Descriptive results of the study were presented in Table 1. Significant relationships observed were as follows (= represents not significant; > represents P < 0.05): Height: DL=LB=CB=OL=RB=WR=QB, weight: OL=DL>LB=RB=QB=WR=CB, mean body fat: OL=DL>LB=RB=WR=QB=CB, percent body fat: OL=DL=RB=LB=WR=CB=QB, Body Mass Index: OL>DL>LB=RB=WR=QB=CB.

Table 1. Descriptive statistics of the study. Data are means (SD).

	Defensive Line (DL)	Line Backer (LB)	Corner Back (CB)	Offensive Line (OL)	Running Backs (RB)	Receivers (WR)	Quarter Backs (QB)
N	7	13	9	7	5	9	3
HEIGHT (cm)	181.1 (5.2)	177.7 (5.4)	176.2 (6.9)	181.1 (4.7)	176.0 (8.8)	176.5 (4.1)	183.3 (2.9)
WEIGHT(kg)	105.8 (11.9)	88.3 (9.4)	72.5 (4.2)	110.5 (13.3)	82.8 (9.8)	76.4 (7.7)	80.0 (11.3)
MBF(kg)	29,3 (3,33)	21.3 (6.2)	13.1 (2.9)	32.6 (7.1)	20.3 (5.3)	15.2 (3.9)	13.7 (6.9)
PBF(%)	27,7 (2.4)	23.7 (5.1)	18.0 (3.6)	29.3 (3.4)	24.4 (4.5)	19.7 (3.1)	16.6 (5.8)
BMI.	32.2 (1.7)	28.0 (2.8)	23.4 (2.1)	33.7 (3.8)	26.7 (2.7)	24.5 (1.5)	23.9 (4.2)
AGE	25.1 (1.3)	23.7 (2.3)	22.7 (2.3)	22.3 (2.4)	22.2 (1.3)	21.1 (1.9)	24.7 (2.3)

MBF=Mean body fat, PBF.=Percent body fat, BMI=Body mass index.

DISCUSSION These data provided a basic template for body composition among various positions of Turkish football players and allow comparisons with other studies. When the results of Turkish players were compared with other players, it was seen that Turkish players were shorter and fatty than the others (Kremer et al., 2005). Size, strength, and endurance are obvious advantages for the successful player (Shields et al., 1984). Results of other studies indicate as the level of competition increases so do height, weight, and fat-free weight of the players (Williford et al., 1994). We concluded that Turkish players require strength and power training as to increase fat-free weight.

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KEY WORDS American football, body composition.