

## **CHANGES IN BODY COMPOSITIONS OF ELITE LEVEL AMATEUR AND PROFESSIONAL SOCCER PLAYERS DURING THE COMPETITIVE SEASON‡**

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### **SUMMARY**

Body composition is likely to influence soccer performance. However, there is no adequate information regarding seasonal changes in body concerning soccer players. The purpose of this study was to assess alterations in body mass, fat percentage, fat free mass, body mass index, and skinfolds of thigh and calf among Turkish elite professional and amateur soccer players in the competitive season. A total of 22 amateur and 25 professional male soccer players from four different clubs participated in the study for pre- and post- tests at the beginning and the end of a full season. Amateurs were found to be significantly heavier than professionals ( $p<0.05$ ). Other physical characteristics were similar for professionals and amateurs. Mean body mass decreased significantly for only professional soccer players in the competitive period, yielding a significantly ( $p<0.05$ ) different seasonal alteration comparing with amateurs. Body fat changes during the competitive season were also significantly different ( $p<0.05$ ) for professional and amateur players. For amateurs and all players, a significant decrease ( $p<0.05$ ) was observed in mean tight skinfold thicknesses at the end of the competitive season. The results herein obtained may serve the coaches for comparing teams of similar level.

**Key words:** Body composition, fat free mass, body mass index, soccer, exercise

### **ÖZET**

#### *ELİT AMATÖR VE PROFESYONEL FUTBOLCULARIN MÜSABAKA SEZONUNDAKİ VÜCUT KOMPOZİSYONU DEĞİŞİMLERİ*

*Vücut kompozisyonu futbol performansını etkileyebilmektedir. Ancak, bu konuda futbolcuların sezonluk gelişimleri üzerine yeterli bilgi*

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‡ Presented at the VIth World Congress on Science and Football, January 16-20, 2007, Antalya, Türkiye

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*yoktur. Bu çalışmanın amacı bir müsabaka sezonunda vücut ağırlığı, yağ oranı, yağsız vücut kitlesi, vücut kitle endeksi ve bacak ile baldır deri katmanı ölçümlerinin elit Türk amatör ve profesyonel futbolcu gruplarında izlenmesidir. Çalışmaya alınan dört takım oyuncularından 22 amatör ve 25 profesyonel futbolcunun sezon başı ve sonu ölçümleri gerçekleştirildi. Amatörler profesyonellerden anlamlı düzeyde ( $p<0.05$ ) daha ağırdı. Profesyonel futbolcuların vücut ağırlıkları sezon boyunca anlamlı düzeyde düşerken, amatörlerde artış meydana gelerek iki grup arasında anlamlı ( $p<0.05$ ) sezonluk farklılık gözlemlendi. Vücut yağ oranı değişimleri de iki grup için farklılık ( $p<0.05$ ) gösterdi. Amatörler ve tüm grup için bacak deri katmanı ölçümleri sezon sonunda daha düşük ( $p<0.05$ ) bulundu. Bu çalışmanın sonuçları, oyuncularını bu parametreler açısından kontrol etmek ve değerlendirmek isteyenlere ışık tutabilecektir.*

**Anahtar sözcükler:** *Vücut kompozisyonu, yağsız vücut kitlesi, vücut kitle endeksi, futbol, egzersiz*

## INTRODUCTION

Body composition is one of the many factors that contribute to optimal soccer performance. Low body fat percentages are often emphasized within many sports with some discrepancy (2). Some studies (3,4) have evaluated the seasonal alterations in body compositions of different elite athletes. However, there is no adequate information and comparison regarding changes in body composition during the competition period especially 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 such as body mass (BM), fat %, fat free mass (FFM), body mass index (BMI), and skinfolds of thigh and calf) among Turkish elite professional and amateur soccer players in the competitive season.

## MATERIAL AND METHODS

A total of 22 amateur and 25 professional male soccer players from four different clubs (Two teams from the second division and two teams from the first amateur division in the Turkish National League) participated in the study for pre- and post- tests at the beginning and the end of the 2005-2006 season. University ethical committee approval was obtained from the Research Ethics Committee at the University of Kırıkkale. All participants were informed verbally and in writing about

the nature and demands of the study after receiving a detailed explanation of the study benefits and its risks.

In estimating body fat content and FFM, a bioelectrical impedance technique was used (Tanita BC 418 Segmental Professional Analyzer, Japan). Body weight was measured with the same equipment to the nearest 0.1 kg. Harpenden skinfold caliper (Holtain, UK) was used in measuring thigh and calf skinfold thickness. All measurements were performed between waking up and breakfast (in a post-excreted manner following a 10-hour overnight fast). Body composition and anthropometric measurements were taken with the subjects wearing shorts only.

Data are expressed as means  $\pm$  standard deviation. A probability level less than 0.05 was accepted as being statistically significant. To analyze the differences in variables for pre- and post- conditions paired T-tests, and to compare the seasonal alterations between professional and amateur players, independent T-tests were used. The data were analyzed using the SPSS program, version 11.0 (SPSS Inc., USA).

## RESULTS

Some physical characteristics of all team players are listed in Table 1. Amateurs were significantly heavier than professionals ( $p < 0.05$ ). Other physical characteristics (height, percent fat and BMI) were similar among professionals and amateurs.

**Table 1.** Physical characteristics of amateur and professional soccer players together with measured pre- and post- test values (Means  $\pm$  SD).

Parameter	Amateurs (n=44)	Professionals (n=50)	All measures (n=94)
Age (year)	24.7 $\pm$ 5.0	22.0 $\pm$ 3.0	23.3 $\pm$ 4.0
Sports age (year)	11.1 $\pm$ 2.0	10.2 $\pm$ 2.0	10.5 $\pm$ 2.0
Weight (kg)	73.0 $\pm$ 6.0	70.0 $\pm$ 8.0	72.0 $\pm$ 7.0
Height (cm)	176.1 $\pm$ 5.0	175.4 $\pm$ 5.0	176.0 $\pm$ 5.0
Body fat (%)	9.8 $\pm$ 3.0	10.1 $\pm$ 3.0	9.9 $\pm$ 3.0
BMI (kg/m <sup>2</sup> )	23.5 $\pm$ 1.0	22.7 $\pm$ 2.0	23.0 $\pm$ 2.0

Results of body mass, percent body fat, fat free mass, calf and thigh skinfold changes throughout the season for selected amateur and professional soccer players are presented in Table 2. Mean body mass of elite level professional soccer players decreased significantly in the

competitive period but there was no significant change in amateurs. So, significant differences were observed in seasonal alterations in body mass between amateur and professional soccer players ( $p < 0.05$ ).

**Table 2.** Body composition values of amateur ( $n=22$ ) and professional ( $n=25$ ) soccer players in the pre- and post-competition period (as means  $\pm$  SD).

Parameter	Timing	Amateurs	Professionals	All players
Weight (kg)	Pre	72.7 $\pm$ 6.0	70.5 $\pm$ 8.0	71.5 $\pm$ 7.0
	Post	73.3 $\pm$ 5.0	69.6 $\pm$ 7.0*†	71.3 $\pm$ 7.0
Body fat (%)	Pre	9.5 $\pm$ 3.0	10.2 $\pm$ 3.0	9.9 $\pm$ 3.0
	Post	10.2 $\pm$ 3.0	10.0 $\pm$ 3.0†	10.0 $\pm$ 3.0
FFM (kg)	Pre	65.8 $\pm$ 5.0	63.2 $\pm$ 6.0	64.3 $\pm$ 6.0
	Post	65.7 $\pm$ 5.0	62.6 $\pm$ 6.0	64.0 $\pm$ 6.0
Skinfold, calf (mm)	Pre	6.4 $\pm$ 3.0	8.1 $\pm$ 4.0	7.3 $\pm$ 3.0
	Post	6.1 $\pm$ 3.0	8.0 $\pm$ 4.0	7.1 $\pm$ 4.0
Skinfold, thigh (mm)	Pre	11.0 $\pm$ 5.0	12.4 $\pm$ 6.0	12.0 $\pm$ 5.0
	Post	10.0 $\pm$ 4.0*	11.6 $\pm$ 5.0	11.0 $\pm$ 5.0*

\*: Significant differences between pre- and post- test results.

†: Significant differences in seasonal changes between amateur and professional soccer players.

Body fat changes during the competitive season were also significantly different ( $p < 0.05$ ) for professional and amateur players. While amateurs displayed 0.7% increase in fat composition, professionals' body fat lowered by 0.4%. For amateurs and all players a significant decrease ( $p < 0.05$ ) of 1.0 mm was observed in mean tight skinfold thicknesses at the end of the competitive season.

## DISCUSSION

In soccer, players are considered to be a somewhat homogenous group (6). The present study results also agree with this consideration. Height and body mass values observed were similar for both amateur and professional elite Turkish players. Results have revealed that body size, body mass and body mass index are almost uniform in amateur and professional soccer players.

Mean percent body fat values observed in this study were similar to some of those reported in the literature (1,4,5), but were lower when compared with some other studies (6,7). This discrepancy could be due

to different methods to assess percent body fat, different timing of data collection, and differences in training and match programs.

In conclusion, body composition is likely to change during the course of the competitive season as a result of soccer activities in elite amateurs and professionals. However, seasonal variation in body composition was not as much as expected, particularly in amateurs. This study should be of interest to the coaches and athletes since they can compare their status with the results obtained and can be aware of their seasonal status.

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This study was supported by the Institute of Scientific Research Projects at Kırıkkale University.

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