



## DETRAINING EFFECTS OF THE TRANSITION PERIOD ON ENDURANCE AND SPEED -RELATED PERFORMANCE PARAMETERS OF AMATEUR SOCCER PLAYERS

### Physical Education

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### ABSTRACT

The aim of the present study was to evaluate, via standard field tests, the changes that occur during the transition period (off-season) in soccer players. The sample of the study consisted of 12 amateur soccer players (age 19-24) with no injury problems. Initial measurements were made at the end of the competitive season and final, prior the beginning of the pre-competition season. This transition period was four weeks long. Height and body weight were recorded in order to calculate body mass index (BMI). Twenty-meter shuttle test (20-MST), maximum acceleration (10m), maximum 20m running speed with 10m (Flying start) acceleration, maximum track speed (30m) and the Illinois Agility Run Test, were performed in both occasions. For the statistical analyses of the data, the SPSS 24 statistical package was used, and t-test paired analyses were performed with a significance level set at  $p < 0.05$ . The results of this study showed a statistically significant increase in body weight, fat percentage and BMI. There was also a statistically significant increase in the time of 20m Sprint-10m Flying, 30m sprint and agility tests. Finally a non significant trend was observed in the 10m sprint and the aerobic test conducted. We conclude that a mild training program should be employed during the off-season of soccer players, in order to preserve or at least attenuate the decay that was observed in this study of the endurance and speed-related performance parameters, as well as, their body composition.

### KEYWORDS

transition period, physical condition, soccer players, BMI, 20-meter shuttle test, Illinois Agility Test

### INTRODUCTION

Soccer is a complex sport and players must perform numerous actions that require endurance, strength, speed, jumping ability and agility. Therefore, physical fitness tests in Soccer should include the following components: aerobic endurance, anaerobic power, jumping ability, strength, speed and agility. (Helgerud *et al.*, 2001, Reilly *et al.*, 2003, Bloomfield *et al.*, 2007, Koundourakis *et al.*, 2014).

Many soccer players are not engage in any training activity after the end of the competitive season, up to the start of the next season's pre-competitive phase, and this may affect performance. This period between competitive and precompetitive season is termed transition period (off-season).

Research on various team sport professional players showed that aerobic ability, speed and agility increased during the pre-competitive and competitive season but decreased during the transition period (Helgerud *et al.*, 2001; Casajus 2001; Haritonidis *et al.*, 2004), while a 6 to 12-week transition period with no training is sufficient to reduce aerobic capacity, sprinting speed, vertical jump and agility, while increasing body fat percentage (Caldwell *et al.*, 2009; Koundourakis *et al.*, 2014).

The aim of this study was to evaluate, via standard field tests, the changes that occur during off-season in soccer players.

### METHODS

#### Participants

The sample of the study consisted of 12 ( $n = 12$ ) Greek amateur football players (ages 19 to 24 years), with no injury problems. The selection process was randomized (random number) from a large pool of players members several amateur clubs that expressed interest in participating in the study. All athletes signed a written informed consent in order to participate.

#### Procedures

Initial measurements were made at the end of the competitive season, and final measurements prior the initiation of the next season's pre-competitive phase. This off-season period lasted four weeks.

#### BMI and body fat

Height and body weight were recorded to calculate BMI (body weight / Height<sup>2</sup>)

Body fat percentage was estimated by means of a skin fold caliper thickness measurements at 4 different sites: biceps, triceps, suprailiac, subscapular. Body fat percentage was estimated based on the equation of Durnin JV and Rahaman MM, (1967)

$$BF (\%) = [(4.95/D) - 4.5] \times 100$$

$$D = 1.161 - 0.0632 \times \log(S_1 + S_2 + S_3 + S_4)$$

*Picture 1.: Equation for calculating body fat percentage*

#### Field Tests

##### Aerobic Capacity - 20m Shuttle Run

The 20-meter shuttle run test (20-MST) was used on the soccer field. Test participants run 20m to the finish line and return on time according to audio signals (sounds that broadcasted by a prerecorded tape). The athletes continue until exhaustion while their performance in the 20-MST test was then used to estimate  $VO_{2max}$  according to the equation of Leger *et al.*

##### Speed

The following tests were used to assess speed:

- Assessment of the ability to achieve maximum acceleration (10m).
- Measurement of the maximum 20m running speed with an initial acceleration of 10m (Flying start).
- Measurement of the maximum running speed (30m).

##### Agility - Illinois Agility Test

The Illinois Agility Run Test was used on a soccer field. 8 cones and a

double beam of photocells (Autonics, BX5M - MFR - T) were placed at the beginning and at the end of the test. Four cones defined the start, the end and the points of return, while the inner cones were 3.3 m apart.

**Instruments**

**Photocells**

In order to measure the maximum running speed with an initial acceleration of 10-20 m (Flying start) and the maximum run-in acceleration (10 m) as well as maximum speed (30 m) with an upright start, two photocell hedges (Autonics Beam Sensor BL5M-MFR) consisting of two beams were used, each of which had two pairs of photocells. A Saint Wien Digital Timer Type H5K, with a minimum measuring time of 0.01 sec and a measurement error of ± 0.01 sec was also used.

**Polar Team**

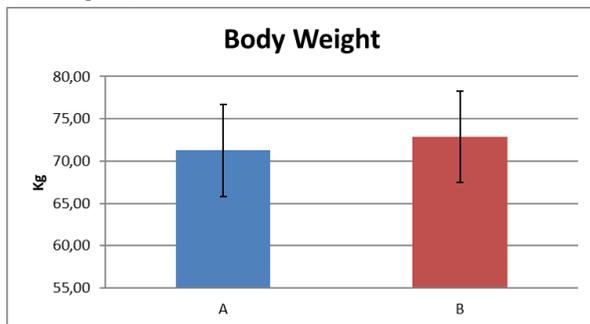
To record heart rate of the athletes, the Polar Team system was used with telemetric heart rate monitors

**Statistical Analysis**

For the statistical analysis of the data, the SPSS 24 statistical package was used, where a paired t-test analysis was performed, with a significance level set at  $p < 0.05$ .

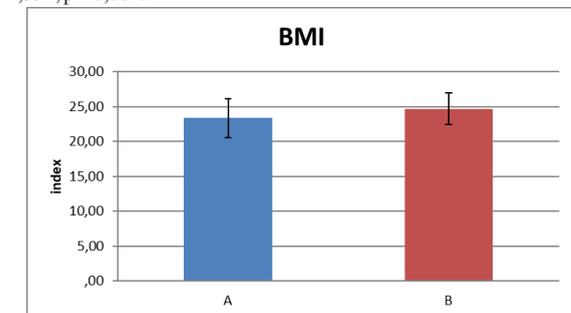
**RESULTS**

(Body Weight) A statistically significant increase were found between the initial A=71,25kg compared to the final measurement B=72,86kg.  $t = -5,254, p = 0,000$ .



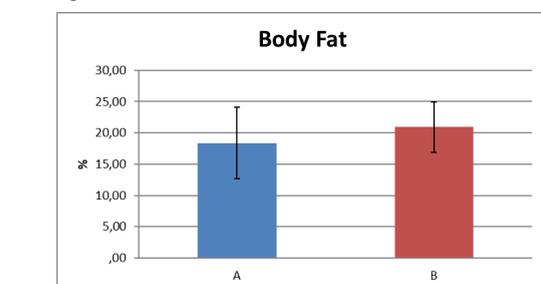
**Table 1. Body Weight**

(BMI) A statistically significant difference were found between measurement A=23,34 compared with measurement B=24,7.  $t = -4,394, p = 0,001$ .



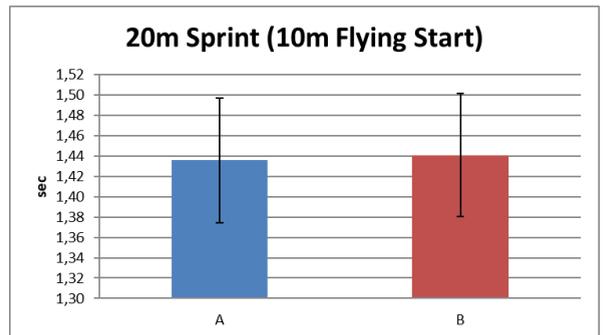
**Table 2. BMI**

(Body Fat) A statistically significant difference were observed between measurement A=18,37% compared with measurement B=20,93%.  $t = -2,810, p = 0,017$ .



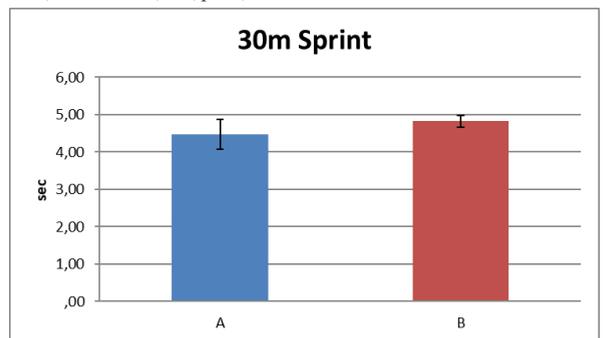
**Table 3. Body Fat %**

(20m Sprint -10m Flying start) A statistically significant difference were found between measurement A= 1,43sec, compared with measurement B= 1,44sec.  $t = -2,569, p = 0,026$ .



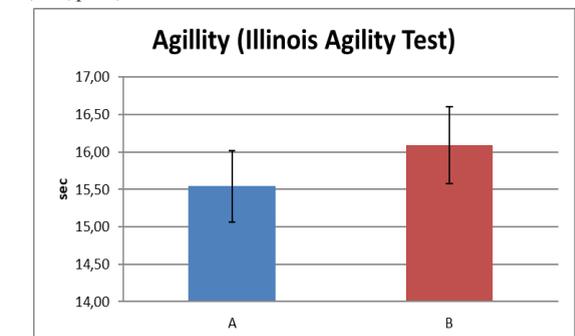
**Table 4. 20m Sprint -10m Flying Start**

(30m Sprint) A statistically significant difference were observed between measurement A=4,46sec compared with measurement B=4,82sec.  $t = -2,811, p = 0,017$ .



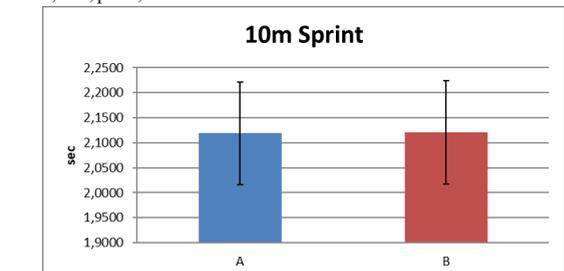
**Table 5. 30m Sprint**

(Agility) A statistically significant difference were found between measurement A= 15,54 compared with measurement B= 16,09.  $t = -10,816, p = 0,000$ .



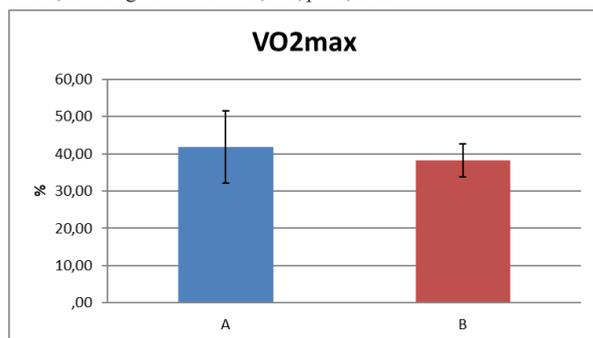
**Table 6. Agility**

(10m Sprint) No significant difference were observed between measurement A= 2,11sec compared with measurement B= 2,12sec.  $t = -1,483, p = 0,166$ .



**Table 7. 10m Sprint**

( $\text{Vo}_2\text{max}$ ) No significant difference were observed between measurement A=41,83 ml/kg-1/min-1 compared with measurement B=38,77 ml/kg-1/min-1.  $t=0,810$ ,  $p=0,398$ .



**Table 8.**  $\text{Vo}_{2\text{max}}$

## DISCUSSION

The results of the present study revealed significant differences in most variables measured. There were significant increases in body weight, body fat percentage and BMI. Significant increases were also observed in the time of 20m Sprint -10m Flying, 30m sprint and in the agility test.

Most of the off-season detraining effects on various team sport professional player studies showed that aerobic capacity, speed and agility increased during the pre-competition and competition periods where decreased during the transition period (Helgerud *et al.*, 2001; Casajus 2001; Haritonidis *et al.*, 2004; Kraemer *et al.*, 2004). These findings are in line with the results of the present study, while a 6 to 12-week transition period is showed to be needed in order to reduce aerobic capacity and sprint speed, with simultaneous body fat increases (Caldwell *et al.*, 2009; Koundourakis *et al.*, 2014) This might explain the non significant trend in these two parameters in our study since the off-season period was 4 weeks long, probably not a sufficient period of time for significant decreases.

Literature (Bangsbo 1994; Brady *et al.*, 1995; Reilly *et al.*, 1996; Silva *et al.*, 2016) suggests that during off-season, athletes should be trained to maintain the desired levels of fitness required for the beginning of pre-competitive period.

Silva *et al.*, (2016) suggested a program as the 'minimum effective dose' to maintain or at least attenuate the decay of endurance- and neuromuscular-related performance parameters, as well as to restore an adequate strength profile. This periodization strategy suggested the authors, may improve the ability of players to cope with the elevated training demands of pre-season training and therefore reduce the risk of injury. Moreover, this strategy will favor a more efficient development of other relevant facets of performance during the pre-competition phase

Studies (i.e. Sotiropoulos *et al.*, 2009) conducted on the implementation of training programs during the transition period, showed that soccer players that followed a four week training program had significantly lower body fat levels compared to those who did not follow any organized training program. In addition, changes that have been observed in body weight can be attributed to changes in body fat.

We conclude that it is important that soccer players should participate in organized physical training during the transition period in order to maintain their physical condition at the necessary levels for easier adjustments when returning to the pre-competitive period.

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