THE EFFECT OF CREATINE USAGE ON YOUNG SOCCER PLAYERS' BODY COMPOSITION AND AGILITY

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ABSTRACT

This study was conducted with the aim of evaluating the effect of creatine usage on young athletes' body composition and agility. 20 male soccer players with average age of 16,30±,73 participated in the study. Before starting the tests, the body weights and body compositions of the soccer players were tested with the TANITA BC-418 device. Among the obtained data, body mass index (BMI), body fat ratio, fat weight, lean body weight and total body fluid amount are available. Then, with the Illinois test, agility measurements were tested twice, right and left, according to the participant's priority preference at each time. Between the two tests a participant was expected to reach the number of resting heart beats. Participants continued their training using 0.3 g of creatine monohydrate per kg for 5 days, taking 0.3 g of dry milk per kg for 5 days, without taking any food supplements. Body composition and Illinois agility test times were examined after participants' dry milk and creatine loading. Although there was an increase in body weight, body fat percentage and total body fluid after creatine loading, no statistical significance was found (p> 0.05). Significant differences were found statistically between the first measurement (20,99) and the measurements made after creatine loading (21,77) in body mass index matching (p <0.05). Especially with the effect of tests done after creatine loading, positive significant differences were found between Illinois test times (p<0.05).

Keywords: *Sport, Young Soccer Players', Creatine, Agility*

INTRODUCTION

Ergogenic helpers are substances that increase energy production or provide more efficient use of existing energy (Williams, 1992). Creatine (α-methyl guanidine acetic acid) is among the nutritional ergogenic supplements among the ergogenic supplements that are examined in different categories according to their usage and methods (Persky and Bazeau, 2001)

Although creatine can be synthesized endogenously, close to half of daily required is provided by exogenous nutrients (~ 2g) in sedentary individuals. Outsourced creatine can be taken from natural nutrients such as meat and fish as well as synthetic supplements (Bemben and Lamont, 2005).

Adult individuals have approximately 120 g of creatine. 95% of total creatinine is stored in skeletal muscles and ~ 60% is converted to phosphocreatine (FK) by phosphorylation by the reaction of creatine kinase (CK). The remaining amount (~ 40%) is stored as free creatine (Persky and Bazeau, 2001; Greenhaff, 1997; Mesa et al., 2002).

The use of creatine also causes changes in body composition (Balsom et al., 1993). The most frequent occurrences of these changes are the increase in VAT and the decrease in VAT. Creatine, which has an osmotically active structure, increases BW (body weight) as a result of fluid retention (Volek et al., 1997). Although the role on fluid balance depends on the dose and duration of use, creatine causes an increase in both intracellular and extracellular fluid percentage (Hultman et al., 1996).

The fact that exhibition of repetitive sprints and spas at optimum performance which are inherent in team sports are among the factors affecting the result of the game. Soccer players are also among the team athletes applying creatine to improve the quality of sprints and spas based on the anaerobic system (Johnson and Landry, 1998). Repeated resistance and maximal force exercises together with repeated sprints and splits constitute preferred exercise protocols in creatine studies. Much of the literature on the effects of creatine in soccer-like sprint conditions suggests that repeated sprint performance is significantly increased after the creatinine loading process (Izquierdo et al., 2002; Aaserud et al., 1998; Mujika et al., 2000). There are publications in the literature on repeated vertical bounce performances that show that creatine leap performance improves even though it does not have as much positive effect as repeated sprint performance (Bosco et al., 1997, Stout et al., 1999, Volek et al., 1997).

Although a significant increase in various performance outcomes is the common finding of many studies; there is a considerable amount of studies indicating that creatine has no effect on performance. However, it is possible to encounter conflicting results in the literature about the changes that short-lived creatine charges have on body composition. This study was conducted with the aim of examining the effects of creatine use on young athletes on body composition and agility.

METHODOLOGY

20 young soccer player have participated in this work. A written permission document has been obtained after the purpose and potential risks of working with all the soccer players participating in the study have been explained. All soccer players participating in the study were measured in cm, with the heel adjacent, the body upright and without shoes. Body weight and body fat ratio measurements were tested with TANITA BC-418 model device using feet naked, bioimpedance method with 0.01 sensitivity. At the same time, the Illinois agility test, which is among the indicators of anaerobic performance, has also been conducted.

Preliminary tests of 30 footballers participating in the study were carried out and continued on to the soccer training sessions on the training plans for 5 days without any food supplement. On the 6th day the results of all tests (Illinois and body compositions) were recorded. As of 7th day, 0.3 g / kg milk was mixed with fruit juice for 5 days as a placebo and on the 12th day, all tests (Illinois and body compositions) were repeated. As of 13th day, use of creatine monohydrate started and all tests (Illinois and body compositions) were repeated for the last time on 18th day. The daily total use of dry milk or creatinine is 0.3 g per kg and is consumed by mixing with fruit juice 3 times a day packed in 3 equal doses per day. Contents of the package have not been said with the purpose of removing the psychological effect.

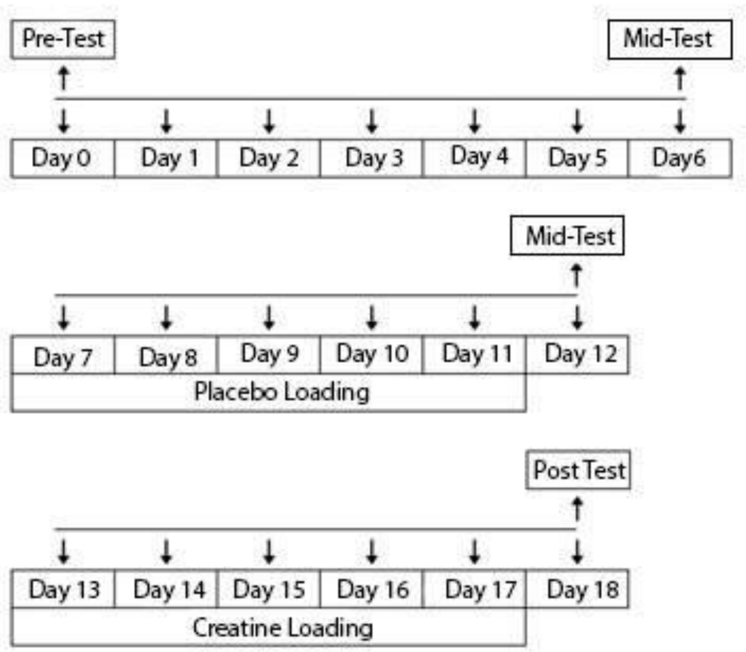

Figure 1. *Demonstration of Work Design*

Illinois Test Protocol

Illinois test is a method conducted to evaluate the agility (Vesconi and McGuigan, 2007). Schematic presentation of the test is given in Figure 2 (Raya et al., 2013). The test track, on a synthetic grass soccer pitch consisting of three rows of lines, is laid out on a straight line with a width of 5 m, a length of 10 m and a width of 3.3 m in the middle section. The test consists of 40 m straight slalom run including 180 º turns and 20-meter slalom run (Katis and Kellis, 2009). After the test track was prepared, a two-photocell electronic timekeeping system (Newtest Powertimer 300 System Revival Medical Plus Import & Export Ltd.Co, Turkey) was installed to measure the start and end with a precision of 0.01 s. Before the test, the demonstrators were allowed to run 3-4 trials on the low temp after the introduction of the course and the necessary explanations. After that, the subjects have made 5-6 min low tempo warming and stretching exercises which they have defined. The subjects exited the starting line of the test track, the face in the lying position, and the hand held in contact with the ground at shoulder level. The track completion time is recorded in seconds. The test was performed twice, once started from the right and once from the left.

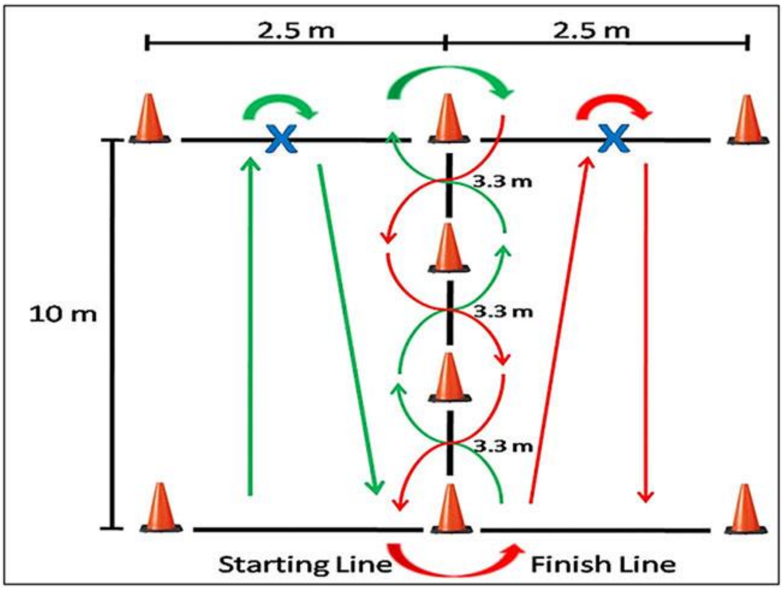

Figure 2. *Chart of Illinois Test Protocol (Raya et al., 2013)*

FINDINGS

Descriptive statistical information of the young footballers participating in the study and the results of the study on the effect of creatine usage on body composition and agility were tabled below.

Table 1. *Descriptive Statistics of Participants*

Age and Body Composition (n=20)	Mean	±Std. Deviation
Age (year)	16,3	±,73
Body Weight (kg)	63,9	±6,20
Height (cm)	175	±4,70
Body Mass Index (kg/m^2)	20,86	±1,91
Body Fat Ratio (%)	13,0	±3,04
Total Body Fluid (%)	40,67	±3,94

As shown in Table 1, the mean age for this study was 16.3 ± 0.73 years, body weight means 63.9 ± 6.20 kg, height average 175 ± 4.70 cm and body fat ratio 13 ± 3%,04 volunteer soccer players participated in the study.

Table 2. *Descriptive Statistics of Repetitive Measurements for Body Weight (BW)*

Body Weight (kg) (n=20)	Mean	±Std. Deviation
BW1 (kg)	63,92	±6,04
BW2 (kg)	63,96	±5,91
BW3 (kg)	64,88	±6,03

When repeated measures of body weights (BW) were examined, the mean pre-test as BW 1 was found as 63.92 ± 6.04 kg, after 5 days of dry milk as a placebo BW 2 average 63.96 ± 5.91 kg; average of BW 3 which repeats right after 5 days of creatine monohydrate and finally after use of dry milk 64,88 ± 6,03 kg

Table 3. *Difference Identified Matches in Body Weight (kg) values*

Body Weight (kg) (n=20)	Ort.	±Std.D.	*t*	*df*	*p*
BW 1 (kg)	63,92	±6,04	-5,326	29	,000**
BW 3 (kg)	64,88	±6,03			
BW 2 (kg)	63,96	±5,91	-4,775	29	,000**
BW 3 (kg)	64,88	±6,03			

***p<,001*

When repeated measures of body weights (BW) were examined, there was a statistically significant difference in the level of p <0.001 between BW 1 and BW 3 averages. There was also a statistically significant difference between the BW 2 average and the BW 3 average in the level of p <0.001.

Table 4. *Descriptive Statistics of Body Mass Index (BMI)*

Body Mass Index (kg/m^2) (n=20)	Mean	±Std. Deviation
BMI 1 (kg/m^2)	20,9	±1,90
BMI 2 (kg/m^2)	20,6	±1,76
BMI 3 (kg/m^2)	21,8	±1,89

When repetitive measurements of BMI were examined in Table 4, pre-test average shown as BMI 1 was found as 20,9 ± 1,90, after 5 days of dry milk as a placebo BMI 2 average 20,6 ± 1,76, and BMI 3 average after use of creatine monohydrate as 21,3 ± 1,89.

Table 5. *Difference Identified BMI Match in Body Composition values*

Body Mass Index (kg/m^2) (n=20)	Mean	±Std. D.	*t*	*df*	*p*
BMI 1 (%)	20,89	±1,91	-2,690	19	,014*
BMI 3 (%)	21,76	±1,90			

**p<,05*

When repetitive measurements of Body Mass Index (BMI), a significant difference between BMI 1 and BMI 3 average values in the level of p<,05 has been found.

Table 6. *Descriptive Statistics (%) of Body Fat Ratio (BFR)*

Body Fat Ratio (%) (n=20)	Mean	±Std. Deviation
BFR 1 (%)	12,6	±3,33
BFR 2 (%)	12,7	±3,22
BFR 3 (%)	12,9	±3,83

When repetitive measurements of body fat ratio were examined in table 6, BFR 1 average was found as 12,6 ± 3,33, BFR 2 was 12,7± 3,22; and after use of creatine and monohydrate, BFR 3 was 12,9 ± 3,83. Since body fat ratio determination is done by bioimpedance method, the increase in body weight within 5 days may be due to the increase in total liquid amount, which may indicate body fat ratio as increased.

Table 7. *Descriptive Statistics of Total Body Fluid (TBL) amount (%)*

Total Body Fluid (%) (n=20)	Mean	±Std. Deviation
TBF 1 (%)	40,67	±3,94
TBF 2 (%)	40,41	±3,83
TBF 3 (%)	41,10	±3,86

When we look at the descriptive statistical results of total body fluid amounts of 20 young soccer players participating in our work; the TBS 1 average without using any ergogenic aid was. After 5 days of dry milk as a placebo, we found the average as 40,41 ± 3,83, and third measurement average as 41,10 ± 3,86 after the last 5 days of creatinine monohydrate. Considering the values, we can say that the amount of body fluid with the highest percentage is after creatine use.

Table 8. *Difference Identified Matches in Total Body Fluid (kg)*

Total Body Liquid (%) (n=20)	Avg.	±St.D.	*t*	*df*	*p*
TBF 1 (%)	40,67	±3,94	-3,696	29	,001*
TBF 3 (%)	41,10	±3,86			
TBF 2 (%)	40,41	±3,83	-3,338	29	,002*
TBF 3 (%)	41,10	±3,86			

**p<,05*

When repetitive measurements of total body fluid (TBF) were examined, a statistical significant difference between TBF 1 and TBF 3 in the level of p<,05. Moreover, a statistical significant difference between TBF 1 and TBF 3 in the level of p<,05.

***Table 9.** Descriptive Statistics of Illinois Agility (right agility, left agility)*

Agility test / left (n=20)	Average	±Std. Deviation
Agility Test / left 1	15,85	±,271
Agility Test / left 2	15,91	±,378
Agility Test / left 3	15,89	±,364
Agility Test / right 1	15,76	±,329
Agility Test / right 2	15,83	±,330
Agility Test / right 3	15,89	±,336

The test measurements of agility test, which were conducted at different times, results at are shown in Table 9. No significant differences were found in the positive direction between the repeated agility test results after the use of creatine monohydrate and no ergogenic aid and the test results of the placebo-induced dry milk afterwards.

DISCUSSION

This study was conducted with the aim of evaluating the effect of creatine usage on young athletes' body composition and agility. In this direction; an increase of 0.02 g was observed in the use of placebo in the body weight average, while an increase of 0.96 g in creatine use was observed. Some researchers (Dawson, et al., 1995; Balsom et al., 1995; Gren et al., 1996; McNaughton et al., 1998; Balsom et al., 1993) stated that creatine loading for a short-term caused an increase in body weight of 0.7 to 2.0 kg.

The placebo and creatinine loading protocol which was also used in this study was applied in many studies and the efficacy has been reported (Gren et al., 1996; Greenhalff et al., 1994; Fox et al., 1999; 1995; Prevost et al., 1997). High intensity activities are needed in many sports such as football, basketball, volleyball, handball and so on. If recovery time in such intermediate exercises is so short, the performance in the initial sprints was found to decrease gradually (Birch et al., 1994; Ferreira et al., 1997; Greenhaff et al., 1993; Kreider et al., 1998; Bayraktar, 2017). Ozkara et al. (2000) found improvement in sprint performance by performing 0.3 g creatine loading per kg for a period of four days.

CONCLUSION

In conclusion, it can be concluded that in amateur young soccer player who were loaded with acute creatine. Healing seen in short-term of high intensity efforts such as agility which is known to effect the result of a match has a positive effect on soccer performance and it can be said that it is applicable for soccer players to use creatine monohydrate as an ergogenic aid.

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