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Effect of Supplementary Food and Resistive Running Training Program on Performance of Athlete

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Abstract

The purpose of this study was to determine the effects of supplementary food containing creatine, glucose and protein, and resistive running training program on short sprint running and leg muscular strength of players. For this study forty students of 18 to 25 years of B.P.E, and M.P.Ed courses were randomly selected from the Mahadev Desai Sharirik Shikshan Mahavidyalaya, Sadra, District-Gandhinagar, Gujarat. The subjects were randomly divided in four groups viz. A, B, C and D and each group contained 10 players. Training program was designed for eight week period and training was implemented thrice a week. On the remaining days of a week during training period, subjects were given warming up sessions. Groups were given following treatments- Group A (Creatine + Glucose + Protein and milk with resistive running training); Group B (Protein + Milk with resistive running training), Group C (resistive running only) and Group D (control). Results show that sprinting speed ability and leg muscular strength performance were found best in players of group A followed by B and C all differs significantly at 5% level. Group D showed poor performance. The study concludes that if the resistive training is implemented with the dietary supplements, the performance of athletics can be improved.

Key Words: Supplementary food, creatine, glucose, ATP (adenosine triphosphate), ADP (adenosine diphosphate), CP (creatine phosphate), resistive training, leg muscular strength, and sprinting ability.

Introduction

Over the past several years there has been increasing use of creatine supplementation in diets of athlete[1]. The use of this substance has most increased in college athletes, especially football players and body builders. Creatine has also become commercially available and there are several companies that are now marketing the product. Creatine is a component of meat extract and was first discovered in 1835 by Chevrealas[2]. In human body creatine is excreted by the kidney. Creatine is unique because it is neither reabsorbed nor secreted by the kidney and because of this property its excretion rate is used to measure the function of kidney. Energy production by all cells, including muscle originates in a process called oxidative phosphorylation. This process involves breakdown of glucose (glycolysis) and other substances to produce high-energy phosphate bonds in the form of ATP. The breakdown of ATP produces energy, which is then used to drive reactions needed for cell survival. ATP is also used as energy source of muscle contraction. Creatine accepts a high-energy

phosphate from oxidative phosphorylation and forms phosphocreatine. This phosphate acts as a storage form of high-energy phosphate under physiological conditions. Phosphocreatine permit ATP concentrations to be maintained in muscle when ATP is rapidly being utilized as a source of energy for muscular contraction[3]. On the other hand, when ATP is plentiful the phosphocreatine contraction can build up to act as a store of high-energy phosphate. In muscle a creatine phosphate shuttle has also been described, which transports high-energy phosphate from mitochondria (organelle which is the site of oxidative phosphorylation) to the sarcolemma which acts as a high- energy phosphate buffer. Creatine is converted to phosphocreatine by the enzyme phosphocreatine kinase. The phosphate group is transferred from one molecule of ATP. It has been postulated that the availability of high-energy phosphate for energy production during muscle contraction can be increased by increasing the amount of phosphocreatine. It is the major sources of energy during fast and non-sustained muscle contraction such as that of the 100 mts[4]. Creatine phosphate produces more ATP during the first 4-5 seconds of anaerobic glycolysis (the breakdown of glucose in the absence of oxygen to produce ATP). In contrast, during more sustained exercise, aerobic metabolism is the principal source of ATP where the major fuel sources are blood glucose and free fatty acids, which are broken-down and go through the citric acid cycle to produce reducing equivalents, which then are used to produce ATP. It is therefore more likely that if creatine supplementation has an effect it would only be seen during a brief anaerobic exercise. Creatine phosphate, the phosphorylated derivative of creatine found in muscle, is high-energy compounds that can reversibly donate a phosphate group to ADP to form ATP. The reaction catalyzed by creatine kinase, provides a small but rapidly mobilized reserve of high-energy phosphates that can be used to maintain the intracellular level of ATP during the first few minutes of intense muscular contraction. The objective of present study was to find out the link between creatine supplementation in diet and strength performance. The effect of supplementary food and resistive running training program on short sprint running and leg muscular strength was also studied.

Experimental

Forty students of B.P.E. and M.P.Ed courses were randomly selected from the Mahadev Desai Sharirik Shikshan Mahavidyalaya, Sadra, District- Gandhinagar, Gujarat. The age of the students ranged between 18 to 25 years. The research subjects were randomly divided in four groups A, B, C and D and each group contained 10 research subjects. Training program was designed for eight (8) week period and training was implemented thrice a week. On the remaining days of a week during training period, subjects were given warming up sessions. Group A was exposed to Resistive Running as well as Supplementary diet. Before starting the training session subjects were given 7g Creatine + 20g Glucose with 1 glass moderate hot water and after completing the training sessions subjects were given 20g protein + 200g milk with moderate hot water mixture. Group B was exposed to Resistive Running as well as Supplementary diet where 20g protein+ 200g milk with moderate hot water mixture was given after completing the training session only. Group C was exposed to Resistive running only without and supplementary food and Group D was kept control (No resistive running and no supplementary food).

Subjects were tested before and after the completion of training period for sprint test (to measure Sprinting Speed ability) and vertical jump test (to measure Leg Muscular Strength). The distance was measured in yards in sprint test and in centimeters in vertical jump test.

Statistical analysis

The data were analysed by ANOVA and ANCOVA technique. The hypothesis was tested at 0.05 significance level.

Results and Discussion

Results show that supplementary diet and 8 week of resistive training program improved the sprinting speed ability and leg muscular strength of the subjects at P <0.05 significant level (Table 1 and 2). Group A and Group B were given different supplementary food and same type of resistive training programs. Sprinting speed ability and leg muscular strength performance of Group A was best followed by B, C and D groups. Within groups there was no significant difference found in the sprinting speed ability and leg muscular strength of the Group D whereas for other groups it was significant at 0.05 level. Between groups the effect was found significant for sprint running and vertical jump performance for all the group pairs except groups B and C where it was non-significant at 0.05 level.

Statistical Analysis and results of the study proves that if the resistive training will be implemented with dietary supplements, the performance can be improved. Oral supplementation of creatine monohydrate has been shown to increase the resynthesization of ATP from ADP during muscle contractions. ATP is the molecule that muscle cells burn during muscle contraction. When the energy is released from the ATP molecule it drops off a phosphate, thus becoming ADP. Creatine combines with a phosphate molecule forming a phosphocreatine molecule, which delivers the phosphate to the ADP molecule reforming ATP. This resynthesized ATP

Table1. ANOVA and ANCOVA Analysis for Short Sprint Running Performance

Test	Groups				Sum of Squares	df	MSS	F-ratio
	A	B	C	D				
Pre Test Mean	23.74	23.22	23.73	22.41	A 11.80	03	3.93	2.13
					W66.46	36	1.84	
Post Test Means	27.76	26.02	25.97	22.61	A138.93	03	46.31	46.31*
					W36.00	36	1.00	
Adjusted Means	27.68	26.02	25.89	22.74	A111.08	03	37.02	38.96*
					W34.22	36	0.95	

*significant at 0.05 level

Table – 2 ANOVA and ANCOVA Analysis for Vertical Jump Performance

Test	Groups				Sum of Squares	df	MSS	F-ratio
	A	B	C	D				
Pre Test Mean	52.70	49.90	47.70	51.82	A 147.28	03	49.09	1.63
					W1082.70	36	30.07	
Post Test Means	59.60	54.60	51.50	50.50	A502.10	03	167.36	6.68*
					W901.80	36	25.05	
Adjusted Means	58.01	55.05	53.55	49.57	A368.53	03	122.84	14.30*
					W309.36	36	8.59	

*significant at 0.05 level

molecule is then ready to be utilized for energy again. Because the body can stores only 8 to 12 Second supply of ATP, it is very important to increase the creatine pool and to maximize the ATP-ADP phosphate shuttle[5]. The results of creatine supplementation are more explosive muscular contractions, increased stamina and endurance, grater intensity and less muscular fatigue, which deliver more muscle size and strength.

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