

THE EFFECT SHORT - RANGE OF ANTIOXIDANT AND CARBOHYDRATE SUPPLEMENTATION ON AEROBIC AND ANAEROBIC POWER OF YOUNG FEMALE VOLLEYBALL PLAYERS

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Abstract. The purpose of this study was the short-term effect of antioxidant and carbohydrate supplementation on aerobic and anaerobic power of young female volleyball players in Qazvin Province. In this study 36 people were selected from a members of a volleyball team called. They were randomly divided into three groups. Each group consisted of 12 people: carbohydrate, antioxidant and placebo. Pre-test was done and variables related to aerobic and anaerobic power were tested by Mc Ardle test and RAST test. After 14 days, athletes received 120 ml of 5% monosaccharide and 100 ml of vitamin E and 200 mg vitamin C as antioxidant and 60 cc of maltodextrins. The result showed that there is no significant difference between short-term consumption of carbohydrates, antioxidants and placebo on aerobic capacity of girl volleyball players.

Keywords: carbohydrate, antioxidant, aerobic capacity, anaerobic power

1 Introduction

In today's world, physical education and sports is not limited to a specific field of expertise, art or skill and is regarded as a science with various aspects of theoretical and practical. Sports nutrition is considered as a branch of science including exercise that deals with the scientific study of the nutritional status of athletes in training and competitions and offers guidelines for nutrition. Research conducted in different countries in relation to nutrition and its impact on sporting performance is very widespread which provide the athletes with the new findings. Increasing achievement of sports as well as high expectations of athletes in different fields have caused the athletes to have a considerable attention to nutrition and dietary supplements from childhood and adolescence hood. Most experts believe that supplement nutrition have a key role in the success of athletes both in training and in recovery and as well as in tournaments. Although at this age the more attention should be toward technique and tactics. But, children's participation in heavy competition, such as national, continental and global championships have increased the importance of supplements and vitamins usages. It is because food alone cannot provide micronutrients in the body and leads micronutrients deficiencies. Sports injuries in soft and hard tissue is among the other issues that elite professional athletes and especially teens are facing wherein the proper usage of nutrients will play an important role in its improvement. Therefore, research has shown that protein carbohydrate supplementation will be effective in speeding up the recovery of athletes (Zoppi et al., 2006). The health of the young athletes in future is also very important in addition to the championships. Thus, the related research in this field implies that consumption of vitamin E have an important role in preventing cardiovascular disease. It is also to be noted that consumption of supplements postpones fatigue in the athletes (Bloomer, et al., 2007). Carbohydrates is considered as the main source of energy and the excessive usage of them lead to incensement of the energy of the body while the effects of E and C vitamins is not increased with the excessive usage and cause some problem in the body. Technical problems at different levels of sports is almost equal and it is the non-technical matters that transcends individual or team against another person. Issues such as nutrition, psychology, etc., in the past has lead the countries such as former Soviet Union (tables of Olympic medal before the collapse of the Soviet Union) and China to be among the top countries in the world (medal table 2008 Olympics). Scientific research suggests that nutritional and dietary supplements and antioxidants is to

improve the performance of the athletes (Mendel and Ehofheins, 2007). The effects that antioxidants and supplements on the rate of contraction of muscle in different forms is among the issues that have preoccupied the minds of researchers. Since previous studies have shown that supplementation has not a significant effects on the performance. However, the use of some of them effects on body composition and aerobic power. And the use of some supplements had no effect on some elements of fitness such as flexibility. On the other hand it has been found that athletes who eats food as the only supplier of energy have energy deficiencies. This energy deficit in men and in women in such a case is 4.7% and 2.7% respectively that should be covered using dietary supplements. In determining the appropriate nutritional advice in any sport, the assessment of the essential needs and determination of the prerequisite materials that limits the performance is crucial. In team sports, the players perform different exercises that the exercise intensity can change at any time and varies from the steady state to the extreme activities. Because of the nature intermediary of team sports the performance of the athlete at the end of the race after a period of intense activity is disrupted. Therefore, consumption of nutrients and supplements in team sports will be offered according to interval training. The found results shows that increasing the amount of muscle glycogen before competition can increase the performance in a team sport competitions. In agreement with this view, there is a finding that has been observed that the use of glycogen in the first half was more than its use in the second half of the competition. In addition, players with lower initial glycogen, covered a shorter distance, and had a lower activity especially in the second half, with respect to the players with the usual amount of muscle glycogen before the competition. Usually drinking liquids that contain carbohydrates provides few calories but is enough to delay fatigue during the tournament. And since the team sports use all of three means of energy during exercise and aerobic exercise is also one of the major systems involved in these types of activities, It should be noted that carbohydrates are the primary fuel source are aerobic system and only the macronutrients can be metabolized to produce energy. Therefore, in the absence of carbohydrates in team sports, athletic performance is in jeopardy. So, with a suitable food strategy in the days and hours prior to the match, the athletes of the team sports have a rare muscle carbohydrate stores at the end of a game seems desperate. However, this does not mean that the ability of the athlete at the end of a game will not be affected. In addition, the antioxidant activity of some vitamins such as vitamin E and C and their positive effects against the harmful effects of free radicals, preventing arteriosclerosis, the heart attacks and ... cannot be ignored. In this study, researchers sought to answer this theory that:

Does carbohydrate supplementation and antioxidants can affect aerobic and anaerobic power of young volleyball players?

Is there a difference between the short term usage of carbohydrates and antioxidants complement on the aerobic and anaerobic power?

The results of this research can provide the coaches of volleyball team in different age level with the required knowledge on the usage of the carbohydrates and antioxidants supplements in the tournament. Also the effect of this drug on aerobic and anaerobic power, will be effective in improving the level of preparedness.

2 Methodology of the Research

This research is a quasi-experimental study and application. The study population consists of players selected from youth volleyball player of Bouin Zahra club in Qazvin Province. The number of athletes at this age category who were 85 people are between the ages of 18 and 25 years old and all the individual from the statistical society who participated in the study completed consent form. 36 athletes of the volleyball player who

had regular exercise were selected and then randomly divided into three groups of 12 subjects and before the start of training complementary carbohydrate solution and vitamins E and C were feed to two different group, and the third group received placebo (maltodextrins). All the participant in the study were team members of Bouin Zahra youth volleyball team who

participated as volunteers. Statistical society were consisted of Bouin Zahra youth volleyball players who were selected purposively all with the physical health who participated as volunteer. All these athletes has a previous athletic records with a suitable performance in volleyball.

Table1. weight, height and age of the participants

<i>variable</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Average</i>	<i>Standard Deviation</i>
<i>Weight</i>	40	70	58.8	5.8
<i>Height</i>	154	169	161.8	3.7
<i>Age</i>	18	25	25.8	6.7

In this study, the independent variables include carbohydrate supplements and vitamins E, C consumption and dependent variables are aerobic and anaerobic power. In order to measure the relevant factors, anaerobic and anaerobic power, the stair test of Mac Ardel and speed running test of RAST were used. In this study a 40 cm stair and a metronome with the brand of Wittner Junior made by Germany for measuring VO₂max in the stairs test of Mac Ardel was used. Data were collected through field trials. Considering that the aim of this study was to evaluate the long term effect of carbohydrate supplement and antioxidant on the aerobic and anaerobic power, when this material was used by the athletes that the effect of exercise on aerobic and anaerobic had it impact were almost constant and only the effect of carbohydrate supplements and vitamins were assessed. The time of the pre-test and post-test and carbohydrate supplementation and antioxidants consumption were between 2 successive competitions. And thus one day before and one day after the 14-day consumption of carbohydrates and vitamin supplements the aerobic and anaerobic power tests were taken. Before the beginning of the exercise carbohydrate supplement in the form of water-soluble and vitamins E and C were given to two different groups. And maltodextrins as placebo was given to the third group a group (it is to be noted that all the three groups were is the same condition and individuals participated as volunteer). Mac Ardel stair test was used to measure aerobic power with a 16-inch (40 cm) stair with a four-step beat (top - up - down - down) and Compound of steps per minute for women. The duration of the test is three minutes.

$$VO_{2Max_{woman}}=111.33-0.42(\text{recovery beat rate in one minute})$$

In order to measure anaerobic power of youth volleyball players the test of RAST was used in which the player had to run a distance of 35 meters 6 times with 10 seconds of rest between each repetitions and then according to the time from every 35 meters, the required power of each repetition was is obtained.

$$Power (w) = \text{body mass (kg)} * \text{displacemet}^2 / \text{tim}^3$$

The peak power - the highest amount

The minimum power - the lowest amount

Mean power - mean power of 6 stages

Fatigue index =the total time of 6 stages / minimum power - peak power

The Monosaccharide were used as additives in this study. The first group of athletes used 120 CC a 5% solution of it, half an hour before exercise and the second group consumed 100 mg of vitamin E and 200 milligrams of vitamin C of Vigel type as well as chewing ascorbic acid daily (Zoopi 2006, Mokhlesi 1999, Ali Karami, 2009), and the third group used 60 CC of placebo (maltodextrins) respectively. In this study the obtained data were described and analyzes in two parts. In the first part, research variables were described using statistics such as mean, standard deviation, and tables and related charts and in the second part, to test the hypotheses, analysis of covariance (ANCOVA) and to compare the two groups Bonferroni post hoc test at the level of 0.05 with version 20 of the SPSS software was used.

3 Research findings

The results showed that there is no significant difference between the average effect of short term usage of carbohydrate supplement, antioxidant and placebo on aerobic capacity of young female volleyball players but there is no significant difference between the average short-term usage of carbohydrate supplementation, antioxidant and placebo on anaerobic power, the anaerobic maximum power and fatigue index;

In the other words, short-term usage of carbohydrate supplementation resulted in a significant increase in anaerobic power, maximum anaerobic power and fatigue index compared to the use of short-term antioxidant and placebo groups and there is no significant difference between the antioxidant intake and placebo on the maximum anaerobic power and anaerobic power and fatigue index.

4 Founding in three groups

4.1 Investigation of the effect of carbohydrate supplement on the anaerobic power:

There is no significant difference between the short-term usage of carbohydrate supplementation on aerobic capacity of young female volleyball players. By the analysis of variance (ANCOVA); $p= 452.0$ the null hypothesis is confirmed. In fact, there was no significant difference on the average of adjusted aerobic power of volleyball players of carbohydrate ($M = 41.0$) and placebo groups ($M = 40.8$).

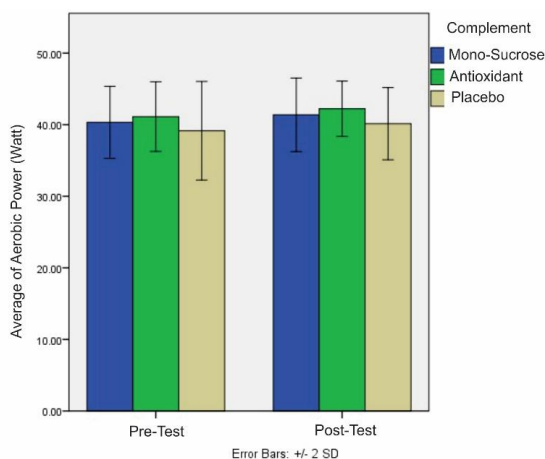


Figure 1. Average and standard deviation of aerobic power of research groups in pretest and post test

Table 1. Results of variance analysis (ANKOA) of aerobic power

Source	SS	df	MS	F	Sig
Pre-test	108.2	1	108.2	45.9	0.0
Carbohydrate	3.83	2	1.91	814.0	452.0
Error	75.4	32	2.35		

4.2 Investigation of the effect of carbohydrate supplement on anaerobic power

There is no significant effect between the short-term usages of carbohydrate supplementation on anaerobic power of youthful female volleyball players. Bonferroni test results; (P=5.0)

therefore the null hypothesis is rejected. Short-term usage of carbohydrate supplementation resulted in a significant increase in anaerobic power of young female volleyball players and there is also a significant difference between the adjusted average of anaerobic power of the consumer of carbohydrate supplementation (M=6.263) and placebo (M=7.210)

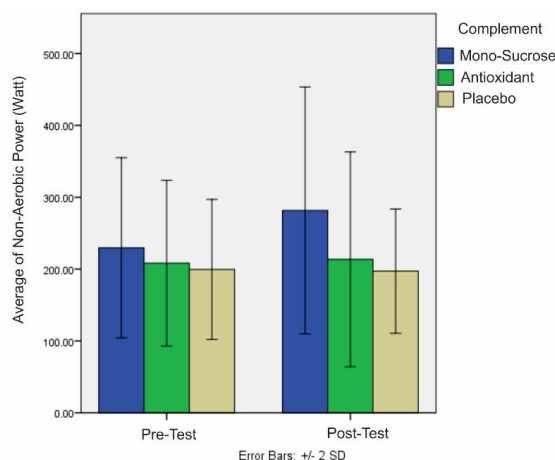


Figure 2. Average and standard deviation of anaerobic power of research groups in pretest and post test

Table 2. Variance analysis test (ANKOVA) of anaerobic power

Source	SS	df	MS	F	Sig
Pre-test	11569.0	1	115690.9	77.8	0.0
Carbohydrate	18791.4	2	9395.7	6.3	5.0
Error	47537.7	32	1485.5		

4.3 The effect of antioxidants on aerobic power

There is no significant effect between the short-term usages of antioxidants on aerobic capacity of young female volleyball players. Analysis of variance (ANCOVA). Hence, the null hypothesis is confirmed. There is no significant difference between the adjusted average of aerobic power of youthful

female volleyball players the of the antioxidants consumer (M=6.41) and placebo groups (M=8.4).

4.4 The effect of antioxidants on anaerobic power

There is no significant difference between the effects of short-term usage of antioxidants by young female volleyball athletes

on the anaerobic power. Bonferroni post hoc test; ($P=0.1$). Therefore, the null hypothesis is confirmed. There was no significant difference between the anaerobic power of the Young girl volleyball player consumer of antioxidant and placebo groups.

4.5 Reviewing the impact of carbohydrates and antioxidants supplementation on aerobic and anaerobic power

There is no significant difference between the impact of short-term usage of antioxidant and carbohydrate supplementation on aerobic and anaerobic power of young female volleyball players. Bonferroni post hoc test, so the null hypothesis is rejected. There is a significant difference between the adjusted average young girl volleyball player of carbohydrates, antioxidants and placebo groups in aerobic and anaerobic power. In the other words the results of Bonferroni test showed that the usage of the carbohydrate supplementation of results in a significant increase in aerobic power of female young volleyball players with respect to antioxidants usage.

5 Discussion and conclusion

5.1 Discussion

Ramezanpoor (2003) performed a study entitled ergogenic effect of 8 weeks supplementing usage of vitamins C and E in adult football players and the results showed that in both groups speed, maximum strength, aerobic capacity, and the fatigue time is improved and the variation of blood lactate concentration after maximal exercise is decreased. Comparison of the two groups in the pretest and post test showed that there is no significant difference in any stage. This research is consistent with the present study. Hoffman et al., (2008) conducted a study as testing an energetic supplement before the exercise on the performance of the exercise. The study was conducted on 12 strength athlete males in which one groups was feed 120 ml of energetic beverage while another group was given a same amount of placebo which was done after 2 minutes at the end of each agility practice and after 10 minutes of aerobic test the obtained results showed there is no significant difference in performance between groups using the ineffective drug and the group using the supplement. This research is consistent with the present study.

Mahrooghi, (1998) performed a study aimed to comparison of the effects of creatine supplementation with mixture of creatine-Carbohydrates on the anaerobic power and cellular damage indices (CK, LDH) in boys aged 18-15 years of Koohrang city. The results showed that in the second experimental group the usage of creatine supplementation improved anaerobic power ($P < 0.05$). Also the usage of creatine significantly increased the levels of creatine kinase and lactate dehydrogenase ($P < 0.05$) in this group. But in the group which has used creatine along with carbohydrates, anaerobic power increased significantly ($P < 0.001$), whereas CK and LDH enzyme did not increase significantly. No significant differences observed in CK and LDH enzymes and anaerobic power of the carbohydrates group. The above research is not consistent with the present study. It may be because the subject were not athletes and the usage period of the supplement was short and they were with different age and gender.

Rahimi, (2003) performed a study entitled the effects of a supplementation on the levels of ATP, muscle strength, power and endurance. The results showed that there is no difference in the vertical jump (anaerobic power) but the level of ATP is increased. This study is not in line with the results of the present study it may be because of the difference between the type of carbohydrates in two research and the period of its consumption or because of the difference in gender and age of the subjects.

Rahim (2009) performed a study as the effect of ascorbic acid supplementation on aerobic and anaerobic power of handball players and there was no significant changes in aerobic and

anaerobic performance of the groups with respect to placebo group. This research comply with the present research study given that antioxidants combination of vitamins E and C, and with a much more time was used in the present study there was no significant difference on the aerobic and anaerobic power.

Gaeini and Rajabi (2003) performed a study entitled six-week effect of usage of Q10 coenzyme supplementation on aerobic endurance, maximum power, minimum power, average power, and fatigue index of football players. The results showed there is significant differences ($P < 0.05$) in the amount of aerobic capacity. While in contrast no significant change observed in the amount of anaerobic performance parameters including maximum power ($p=0.933$), minimum power ($P=258$), average power ($P=625$) fatigue index ($P=0.569$). This research is consistent with the present study.

DeNysschen et al., (1999) in their research investigated effect of two regimes of vitamin c (100 and 200 mg) on the aerobic (vo2max) and anaerobic power. The results showed that daily doses of 100 and 200 mg of vitamin C for a week of have no significant effect on the aerobic and anaerobic power of physical education students of Gilan. This research is consistent with the present study. Given that antioxidants combination of vitamins E and C, with a more period of time is used in this research but as the above study, no significant difference was observed on the aerobic and anaerobic power.

Kreider et al., (2007) performed a study entitled fallacy effect of usage of the dietary supplements used by young athletes of Great Britain. The research was on girls and boys 12 to 21 years old ($403 = N$) was performed. The research showed that the consumer of the supplements believe that there is a direct link between the use of their favorite supplements and their performances. Now young athletes are moving away from health and only focus on their performances. This research study do not match. It seems that the carbohydrates and antioxidants supplements usage have a positive effect on several factor of the present study including anaerobic power, maximum aerobic power and fatigue index which may be because of the difference between the types of the carbohydrate or antioxidants or because of the difference between the time and period of usage of these supplements.

Clark et al., (2000) conducted a study entitled the effects of vitamins E, C and combination of both on bioenergetical index of sports man. The results of this study showed that a daily intake of 400 mg of vitamin E, 1000 mg of vitamin C and 400 mg of vitamin E along with 1000 mg of vitamin C for three weeks has a significant effect on the aerobic and anaerobic power of the students. This research study do not match with the present study.

6 Conclusion

According to the results we can say that the daily usage of carbohydrate supplementation at a rate of 120 cc for 14 days may be effective on the anaerobic power, maximum aerobic power and fatigue index of young girls, but the daily consumption of 100 and 200 mg of vitamin E and C for 14 days have no significant effect on aerobic power and anaerobic power (maximum anaerobic power and fatigue index). So the usage of the carbohydrate can be suggested to the athletes and coaches this sport in this age group with the he determined amount of intake.

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