



## Effect of Carbohydrate Solutions with Different level of Sugar on Average Anaerobic power and Fatigue index of karate Players

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**Abstract.** Main aim of this research was investigating effect of carbohydrate solutions with different level of sager on average anaerobic power and fatigue index of karate players. Statistical sample of this research was 72 karate players of Khorasa Razavi province and 48 people were selected randomly. Average age, weight, height, and BMI were measures Average age of athletes was 22.23, average height 175cm and average weight 72.77. We used frequency distribution tables and indexes of the central (mean) and dispersion (standard deviation) also Kolmo Gorov Smirinov test and F test. Results of research indicated that, significant relationship exists between carbohydrate solutions and different index of sugar on index of fatigue. Moreover, significant relationship exists between effects of carbohydrate solutions with index of different level of sugar on anaerobic power. Finally, Proper pre-workout carbohydrate supplementation on anaerobic power karate players affects competition and improves athletic performance; however, there was no specific effect of carbohydrate supplementation on fatigue index karate players.

**Keywords:** Carbohydrate Solution, Anaerobic Power, Glucose, Fructose, Starch

### 1. INTRODUCTION

The use of diet and nutrients to enhance athletic performance is growing due to the competitive environment (Mamus et al, 2006). One of important issue of sport tries to reduce fatigue after exercise and during competition (Burke Edmund, 2006). One of mail problems of intensity and long term activities is fatigue due to reduce amount of Glucose blood and Muscle glycogen and eventually reduce level of return and endurance capacity. This amount has been reported between 20 percent in 30 initial minutes. The main role of carbohydrate is energy fuel for the body. Energy derived from the breakdown of glucose, glycogen, ultimately to reinforce muscle contraction and other forms of biological actions (Bruke et al, 1998). Energy stored in the muscles as glycogen and glucose for brain and Foods that contain carbohydrates before and during exercise can increase glycogen stores in muscles and brain (Coyle et al, 1999). Dietary carbohydrates during exercise reduction in blood concentrations decreased carbohydrate oxidation, increasing muscle glycogen and liver glycogen can be rebuild. This leads to early fatigue and maintaining normal blood levels, reduced muscle glycogen loss, and thus improve athletic performance (Sjodin, 1999).

#### 1.1. Anaerobic power testing:

Anaerobic performance was measured by using the Wingate anaerobic test, with a fraction-loaded cycle crgometry (Monark) interfaced with a microcomputer. The resistance was set 75Kg of body mass. The test was preceded by a 4-min warm up on the cycle ergometer with a brief all-out sprint at the end of the warm –up period. The test was started after the subject reached at pedal rate of 80. The following power variable were obtained during the res test: peak power (PP), average power during the first 5 sec (AP %), 10 sec (AP10), 20sec (Ap20)and 30sec(AP30) of the test.

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Karate players require intermittent physical activity in which sequences of actions requiring a variety of skills of varying intensities are strung together. Running is the predominant activity, yet explosive type efforts such as sprints, jumps, duels, and kicking are important factors for successful soccer performance.

These efforts depend on maximal strength and anaerobic power of the neuromuscular system, more particularly of the lower limbs. Maximal strength refers to the highest force that can be performed during one maximum voluntary contraction, and is considered important for soccer performance [Grangate et al, 1992; Leatt et al, 1987; Oberg et al 1986; Rochcongar et al, 1988; Bangsbo, 1994; Brewer and Davis 1991, Oberg et al, 1986]. By increasing the available force of muscular contraction in appropriate emuscles or muscle groups, acceleration and speed in skills, critical to soccer such as turning, sprinting, jumping, and changing pace may improve [Bangsbo, 1994]. Indeed, in many studies some strength and anaerobic power characteristics differentiated elite from on-elite karate players Brewer and Davis, 1991; Gauffin, 1989].

The subjects were randomly assigned to four groups:

Group receiving 10% glucose solution (containing 25 grams of pure glucose which water was brought to a volume of 250 ml).

The control group (receiving water at a rate of 250 ml)

Groups receiving fructose, 10% (containing 25 grams of pure fructose with water was brought to a volume of 250 ml)

Receive a 10% starch solution (containing 25 grams of pure starch with water was brought to a volume of 250 ml)

## 2. METHODOLOGY

Statistical sample of this research was 72 karate players of Khorasa Razavi province and 48 people were selected randomly. Average age, weight, height, and BMI were measured. We used Kolmogorov Smirnov in order to test SPSS 17 software for analyzing data and tests. Normality. Following, we used F test in order to measure relationship between dependent variables and finally we used

**Table 1:** Demographic characteristics and body composition (mean ± SD).

	Age	Height	Weight	Lean body mass	BMI
Controlling group	1.781±23.08	8.306±176.5	7.112 ±76.67	7.86±62.14	1.814±24.65
Fructose	1.912± 22.75	2.151±175.91	3.697±72.99	2.49±60.1	1.262±23.62
Starch	0.792±20.91	6.694±173.08	11.368±64.59	7.25±54.92	3.552±21.53
Glucose	1.85±22.83	6.157±174.5	9.451±76.84	3.08±61.12	1.933±25.11

**Table 2:** Frequency distribution based on the average anaerobic power test.

Average Anaerobic power	Groups				Total
	Control	Fructose	Starch	Glucose	
Mean	5.34	6.03	6	5.49	5.71
Standard Deviation	0.652	0.733	0.615	0.516	0.688

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**Table 3.** Frequency distribution based on fatigue index (W/Kg).

Fatigue index(W/Kg)	Groups				Total
	Control	Fructose	Starch	Glucose	
Mean	21.26	18.04	21.44	22.69	20.86
Standard Deviation	1.637	7.787	4.277	4.197	5.122

**Table 4.** Descriptive findings and compare average anaerobic of Karate players in Carbohydrate solutions with different sugar index.

Groups	Descriptive findings		Homogeneity of variances	F	Sig
	Sd	Mean			
Controlling groups	5.34	0.659	0.561	3.671	0.019
Low amount of Fructose	6.035	0.732			
Average amount Starch	6	0.615			
High amount of Glucose	5.49	0.516			

In according to table 4, due to significant level of test of homogeneity of variances is 0.561 and is more than 0.05, therefore, assumption of equality is approved. Furthermore, in test of ANOVA amount of F is 3.761 and significant level is 0.019 and it is less than 0.05, therefore, null hypothesis is rejected and it shows that significant relationship exists between Carbohydrate solutions with different of sugar indices and average anaerobic power karate players.

**Table 5.** The post hoc test compared the average anaerobic power consumption of soluble carbohydrates for karate players in groups of varying of sugar index.

First group	Second Group	Sig
Control	Low amount of fructose	0.011
	Average amount of starch	0.015
	High amount of glucose	0.551
Low amount of Fructose	Controlling group	0.011
	High amount of Glucose	0.044
	Average amount of starch	0.898
Average amount Starch	Controlling group	0.551
	Low amount of fructose	0.044
	High amount of Glucose	0.059
High amount of Glucose	Controlling groups	0.015
	Low amount of fructose	0.898
	Average amount of starch	0.059

### 3. RESULT OF LSD TEST

1. Significant relationship exists between average anaerobic power of karate players in controlling groups and low amount of Fructose (0.011).
2. There is not significant relationship exists between average anaerobic power of karate players in controlling groups and high amount of Glucose (0.551).
3. Significant relationship exists between average anaerobic power of karate players in controlling groups and average amount of Starch (0.015)
4. Significant relationship exists between average anaerobic power of karate players in controlling groups and low amount of Fructose (0.011)

5. Significant relationship exists between average anaerobic power of karate players in low amount of Fructose and high amount of Glucose (0.044)
6. There is not significant relationship between average anaerobic power of karate players in low amount of Fructose and average amount of Glucose (0.898)
7. There is not significant relationship between average anaerobic power of karate players in high amount of Glucose (0.551)
8. Significant relationship exists between average anaerobic power of karate players in high amount of Glucose and low amount of Fructose (0.044)
9. Significant relationship exists between average anaerobic power of karate players in high amount of Glucose and average amount of Starch (0.059)
10. Significant relationship exists between average anaerobic power in average group of Starch and controlling group (0.015)
11. There is not significant relationship between average anaerobic power of karate players in average amount of Starch and average amount of Glucose (0.898)
12. There is not significant relationship between average anaerobic power of karate players in average amount of Starch and high amount of Glucose (0.059)

**Table 6.** Descriptive findings and compare average anaerobic of Karate players in Carbohydrate solutions with different sugar index.

Groups	Descriptive findings		Homogeneity of variances	F	Sig
	Sd	Mean			
Controlling groups	1.637	21.26	0.098	1.906	0.143
Low amount of Fructose	8.787	18.04			
Average amount Starch	4.277	21.44			
High amount of Glucose	4.197	22.69			

In according to table 6, due to significant level of test of homogeneity of variances is 0.098 and is more than 0.05, therefore, assumption of equality is approved. Furthermore, in test of ANOVA amount of F is 1.906 and significant level is 0.143 and it is more than 0.05, therefore, null hypothesis is not rejected and it shows that there is not significant relationship between effects of carbohydrates with different of sugar indices on fatigue.

#### 4. CONCLUSION AND DISCUSSION

The aim of this study was investigating the effect of carbohydrates with different of sugar index on average anaerobic power and fatigue index. In according to importance diet of athletes and particularly karate players, current research investigate equal amount of different sugar index by high glycemic (glucose), medium (starch) and low (fructose). Findings of research indicated that there is not significant relationship between effect of carbohydrate solutions with different index of sugar and fatigue index. Furthermore, results shows that significant relationship exists between effects of carbohydrate solutions in sugar index on average anaerobic power of karate players.

Results indicated that consumption of foods with a low glycemic index to keep blood sugar an hour before exercise will improves performance during activity and then increase anaerobic medium in anaerobic cycle. This is also true with regard to moderate glycemic index. In conjunction with a high glycemic index, carbohydrates and control findings showed that consumption of these foods before exercise has no effect on anaerobic and it may be due to reduction in blood glucose and a significant increase in blood lactate. It can be said that in according to elevated levels of blood lactate causes fatigue and reduced athletic performance level of lactate accumulation to occur earlier. Consistent result like Glesson et al (1986), Koivosti et al 1981 has been reported. Furthermore, results of this research shows that

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consumption foods include a low-and moderate glycemic index in comparison with foods high glycemic index are more efficient than anaerobic mean and peak anaerobic power. This issue leads to period of fatigue in athletes who consume low and average glycemic is longer than athletes who consumed high glycemic. This result is consistent with research of Thomas et al (1994). Moreover, Thomas et al (1994) found that one hour prior consumption of carbohydrates and prior to sport activity amount of sugar blood in all groups reduced. In rare research like Fabbraio et al and Stewart (1998) and Bone et al (1998) investigated effect of increase the rate of muscle glycogen during exercise and recovery and found there was no relationship between two factors and reason for this inconsistency may be used by researchers of different concentrations of glucose and result of research is consistent with research of Coyle et al (1986), Klark et al (2000) .

Finally, it can be concluded that low glycemic index carbohydrate supplementation and the average one-hour before exercise significantly effective in anaerobic middle karate athletes and it leads to improve anaerobic power. Moreover, using the glycemic index suitable as an effective tool for increasing the speed and muscle strength for karate athletes and it can increase athletic performance. In according to Glucose is the primary fuel for the brain in addition it increases the speed and muscle strength and concentration indeed. Eventually, Proper carbohydrate supplementation prior to practice and competition also helps boost brain function. In fact, supplemental carbohydrate with low and average glycemic index one hour before exercise can improve the performance of athletes during training Karate.

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