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Research Article

EFFECTS OF 7% MALTODEXTRIN SUPLEMENTS INGESTION DURING AEROBIC ACTIVITY ON MALE HIGH SCHOOL ATHLETE STUDENTS ANAEROBIC INDICIES

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ABSTRACT
The main purpose of this study was to investigate the effects of Maltodextrin 7 % ingestion during an aerobic exercise on the anaerobic indexes in male student athletes. The participants of this study were 30 athlete students that selected randomly. Participant dividend in two experimental groups (Maltodextrin, 15 athletes) and control group (H2o, 15 athletes).In this study Digital scale Seca 767 model, Treadmill Tecno Gym, Calipers for measuring subcutaneous fat layer were used. Descriptive analysis was used for data description, mean and standard deviation. Kolmogorov- Smirnov test was used to determine distribution of data and Levin test was used to homogeneity of variance. Independent t-test was used for data analysis. The results indicate that ingestion of 7% Maltodextrin solution during 70% maximal heart rate (MHR) exercise failed to improve anaerobic performance and power output of the high school students compared to a placebo drink (0.05).

Keywords: *Maltodextrin Supplementation, Anaerobic Performance, Anaerobic Power, Male Student-Athlete*

INTRODUCTION
Whereas 100 y ago beef (protein) was believed to be the most important component of an athlete's diet, nowadays it seems to be pasta (carbohydrate). Athletes are often advised to eat a high- carbohydrate diet, consume carbohydrate before exercise, ensure adequate carbohydrate intake during exercise, and replenish carbohydrate stores as soon as possible after exercise. In the most recent position statement of the International Olympic Committee (IOC) on nutrition for athletes, it was stated: "A high carbohydrate diet in the days before competition will help enhance performance, particularly when exercise lasts longer than about 60 min" and "Athletes should aim to achieve carbohydrate intakes that meet the fuel requirements of their training programs and also adequately replace their carbohydrate stores during recovery between training sessions and competition. This can be achieved when athletes eat carbohydrate-rich snacks and meals that also provide a good source of protein and other nutrients." These recommendations have also been discussed in detail in reviews resulting from this IOC consensus meeting in 2003 (Coyle, 2004; Hargreaves *et al.*, 2004). Carbohydrate also played a central role in a joint position statement3 of the American College of Sports Medicine, the American Dietetic Association, and the Canadian Dietetic Association on nutrition for athletic performance, and several recommendations were made specifically for carbohydrate. The use of dietary interventions and the consumption of nutrients for the purpose of increasing performance are age-old practices. This is not surprising considering the highly competitive atmosphere that athletes engage in and considering their motivation to win. The willingness of athletes to experiment with scientifically sound nutritional interventions is a phenomenon that grows every day. While the use of nutritional supplements used by athletes is common, many facets relative to appropriate consumption of supplements and nutritional interventions still need to be discussed (Correia, 1996).As such, carbohydrate ingestion is recommended for athletes that participate in competitions that last an hour or more due to its rapid oxidation and its ability to be digested and absorbed quicker than proteins and lipids (Jacobs, and Sherman, 1999). Maltodextrin '(C H O)n.H O' is a mixture of Maltodextrin '(C H O)n.H O' is a mixture ofpolysaccharides and oligosaccharides with DE lower than20 (not sweet), which is available as white powders mostlyor concentrated solution (Alexander, 1992). Maltodextrin is more soluble in water than native starches, also is cheaper incomparison with other

major edible hydrocolloids and its solutions have a bland flavour and smooth mouth feel (Dokic-Baucal *et al.*, 2004). Maltodextrin as a food additive has been applied forabout 35 years (Chronakis, 1998). It performs multifaceted functions in food systems, including buxlking, caking resistance, texture and body improvement, films formation, binding of flavour and fat, serving as oxygen barriers, giving surfacesheen, aiding to dispersion and solubility, increasing of soluble solids, crystallization inhibition and control offreezing point, fillings and as product extenders. Maltodextrin has been studied as a plasticizer to reduceglass transition temperature in materials. It has beenproven useful to reduce Maillard reactions and is used inmicroencapsulation of food components such as vitamins, minerals and colorants (Chronakis, 1998; Dokic-Baucal *et al.*, 2004; Setser and Racette, 1992).

Carbohydrate ingested before and during exercise provides an alternate source ofmuscle fuel that can support moderate and moderately high-intensity physical activity (Coyle, 1993). Maltodextrin is a carbohydrate polymer utilized preferentially as diet recourse in exercise. The gastric emptying for glucose polymer is faster than glucose solutions, avoiding a sudden drop in blood glucose and hyperinsulinaemia induced hypoglycemia during exercise (Ruffo, 2009). Athletes in long-duration types of sports (e.g. runners, triathletes and cyclists) benefit from the use of carbohydrate and glutamine together.

Several studies have demonstrated that hepatic and muscular glycogen is important to maintain performance during exercise (Mcconell, 2000; Andrews, 2003). There is a correlation between initial glycogen levels and time of exercise duration when performing at a moderate intensity (75% VO2max). It has also been shown that the relative contribution of skeletal muscle glycogen and glucose to energy production during exercise varies due to intensity and duration (Wilmore and Costill, 2001).

MATERIALS AND METHODS

The participants of this study were 30 athlete students that selected randomly. Participant dividend in two experimental groups (Maltodextrin, 15 athletes) and control group (H2o, 15 athletes). Prior to participating, the subjects read and signed an informed consent form and completed a physical activity and health readiness questionnaire that was previously approved by the researchers and previous investigators' experiences. Furthermore, before undergoing the tests, the subjects were given explanations about the assessment procedures, the study objectives, and the possible benefits and risks. In order to measurement of body composition and fat caliper is used, for fat mass.

Measures

Digital scale Seca 767 model, with a stadiometer, made in German in order to determine height and body weight with0.5 Cm accuracy and 0.01 k.g for scale.

Treadmill Tecno Gym made in Italy, data that represented on the machine include: Heart rate, distance, caloric output, time, speed and grade of the device.

Calipers for measuring subcutaneous fat layer with following specifications:

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Procedure

Test was divided into three separate days: First day, full explanation about the use of supplements, exercise programs and recommendations. Second day, contain measuring Vo_2max. Third day, five days after identifying Vo_2max, the variables in groups were as follow: in order to determine agility, speed, lower limb explosive power, peak power , mean power, minimum power and fatigue index of the control group (water), 5-0-5, 60 meter , Sargent and RAST tests as pre-test were conducted on the control group.

Methods

Descriptive analysis was used for data description, mean and standard deviation. Kolmogorov- Smirnov test was used to determine distribution of data and Levin test was used to homogeneity of variance. In order to data analysis SPSS.16 with $P \leq 0/05$ level was used.

RESULTS AND DISCUSSION

As table one indicates there are differences between descriptive characteristics of control and experimental groups of subjects.

Table 1: Descriptive statics of control and experimental groups

Variable	Group	Mean	Minimum	Maximum	SD
Age	Control	12.16	16	18	0.19
	Experimental	21.17	16	18	0.80
Height	Control	46.171	162	183	5.28
	Experimental	88.169	165	181	5.62
Weight	Control	67.69	57	82	5.25
	Experimental	87.68	61.5	75	3.29
Fat percent	Control	62.9	8.89	12.55	2.84
	Experimental	32.9	7.29	14.38	2.52
Heart rate pre-activity	Control	64.68	55	87	5.88
	Experimental	71	59	80	5.25
Heart rate during activity	Control	88.151	148.00	164.00	3.96
	Experimental	53.152	146.00	160.00	4.50
Maximal heart rate	Control	27.203	202	204	0.80
	Experimental	33.203	202	204	0.82
Vo_2max	Control	68.52	41.00	65.00	5.45
	Experimental	73.49	42.00	59.00	5.93

As table 2 indicates there is a not significant difference between control and experimental group's pre and post test mean scores in 5-0-5 record of agility. Also, the other results indicate that there is not significant difference between control and experimental group's pre and post test mean scores in Sargent jump. It means that pre and post tests score in control group is lower than experimental group but this variability is not significant. Moreover, the results indicate that there is not significant difference between control and experimental group's pre and post tests mean scores in 60 meter sprint. The mean scores of both groups in post test have declined but this rate was highest in control group and carbohydrate intake cause to increase performance but this difference was not significant. As table 2 indicates there is not significant difference between control and experimental group's pre and post test mean scores in peak power. Also, there is not significant difference between control and experimental group's pre and post test mean scores in mean power.It means that this means is increased in both groups but this increase in experimental group is higher than control group that this increase indicates the positive effects of Maltodextrin 7% on power means but this effect was not significant. Again, there is significant difference between control and experimental group's pre and post test mean scores in minimum power.

Table 2: The results of T- tests about control and experimental groups

Variable	Group	Mean	SD	t	Sig	P
5-0-5 record of agility	Control	0.04	0.24	1.97	0.58	P≤0/05
	Experimental	-0.12	0.21			
Sargent jump	Control	-0.27	3.61	0.56	0.58	P≤0/05
	Experimental	-0.93	2.890			
60 meter sprint	Control	0.44	0.25	1.80	0.082	P≤0/05
	Experimental	0.06	0.531			
Peak power	Control	69.65	130.86	1.118	0.28	P≤0/05
	Experimental	18.14	122.65			
Mean power	Control	8.27	71.89	-0.59	0.96	P≤0/05
	Experimental	10.05	91.15			
Minimum power	Control	4.77	65.89	-0.976	0.34	P≤0/05
	Experimental	30.10	75.89			
Fatigue index	Control	1.66	4.49	0.80	0.43	P≤0/05
	Experimental	0.43	3.84			

It means that this means is increased in both groups but in experimental group is higher than control group. This indicates that Maltodextrin 7% ingestion has positive significant effects on minimum power but this difference is not significant. The result of table 2 also, indicates that there is not significant difference between control and experimental group's pre and post test mean scores in fatigue index. Although, positive mean of fatigue index indicates performance decline in post test but this mean in experimental group is less than control group. It means that ingestion of Maltodextrin 7% cause to less fatigue in subjects.

Conclusion

The main purpose of this study was to investigate the effects of Maltodextrin 7 % ingestion during an aerobic exercise on the anaerobic indexes in male student athletes. The results this study indicate that there is not significant difference between control and experimental group's pre and post test mean scores in 5-0-5 record of agility, Sargent jump, 60 meter sprint. In this regard, Anthony *et al.,* (1999) found that carbohydrate ingestion has not significant effect on maximal speed performance of women cyclist on 50 minute vigorous physical activity. Welsh *et al.,* (2001) reported that carbohydrate ingestion has not significant effect on speed and acceleration and lower body power. This finding is in line with the results of this study. Other results also indicate that carbohydrate ingestion during team sport cause to maintain physical and mental performance as well as increase of Sargent jump (Renata *et al.,* 2006).

The rate of ingested carbohydrate by subjects is the other effective factor on the results of this study. For example, in the Palmer *et al.,* (1998) study subjects used 40 g carbohydrate and the carbohydrate ingestion was not same as per kilogram of body weight, but in this study as Welsh *et al.,* (2001) study carbohydrate was used. Therefore, all subjects received same rate of carbohydrate and the external validity of this study is increased. It seems that periodic protocol used this study willone of the reasons that changes were not significant.

The other results of this study indicate that there is not significant difference between control and experimental group's pre and post test mean scores inpeak power, mean power, minimum power, and fatigue index. Morris *et al.,* (2003) indicate that drinking carbohydrate solution at 60 meter spirit wuth 15 minute frequency had not significant effect on subsequent speed performance and also there in not significant difference between fatigue index, peak, mean and minimum power that this results is in line with the findings of this study. Jeukendrup *et al.,* (2008) investigate the effects of carbohydrate ingestion on 16 km time trial cycling and found that speed, power and group acceleration has significant increase. Philips *et al.,* (2010) investigate effect Ingesting a 6% carbohydrate electrolyte solution improves endurance capacity, but not sprint performance, during intermittent, high-intensity shuttle running in adolescent team games players aged 12-14 yearsand indicate that there is not significant difference between speed and peak power in pre and post tests at training situation that subjects ingest carbohydrates. But there is significant difference in speed, peak power and mean power when subjects used placebo. Despite this, the result of this study is not consistent with the results of Renata *et al.,* (2006), Ricardo (2000). Another likely reason for the lack of improvement in the performance of the experimental group in this study is the low rate of carbohydrate intake. Coggan and Coyle (1988) suggested that increasing performance in high intensity is likely due to the availability of carbohydrate.

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