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INFLUENCES OF RE-HYDRATION OF SAFFRON SYRUP, MILK AND WATER ON WEIGHT REBOUND, ALDOSTERONE HORMONE AND CREATINE KINASE SERUM OF GIRL STUDENTS

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ABSTRACT

The purpose of the present study was determination and comparison of the effects of saffron syrup, milk and water consumptions on body weight, aldosterone serum and creatine kinase (CK) serum of 16 to 18 year old girl old.

Twenty-four 16-18 year old girl students, who were homogeneous in aspect of aerobic power and had average age of 16.95±0.15 year old, height of 162±8 cm and weight of 62.800±21.400 kg, divided to three groups of saffron syrup, milk and water and participated in the protocol of intermittent aerobic exercises. They executed some periods of 6 min half Cooper running test with moderate intensities. Six minutes rest spans were assigned between the periods of exercise. During rest intervals, the subjects were weighted with least possible clothes, to control lost weights, more accurately.

Sweat loss of each exercise period was determined by body weight reduction. The alternation of exercise and rest continued until the moment in which the subject lost approximately 1.64 percent of their initial weights. After ultimate weighting, each subject received saffron syrup, milk or water, in amount of 150 percent of her weight loss, at the minutes of 15, 30 and 45. The subjects' weights were gauged and blood samples were taken from them, before and after exercise protocol.

The results indicated there was no significant difference between the effects of saffron syrup, milk and water on post-exercise re-hydration, weight, aldosterone and CK serums, and the three beverages could consume, in regard of the athlete's liking. However, further investigations should accomplish, yet.

Keywords: Liquids Equilibrium, Exercise, Aldosterone, Creatine Kinase, Milk, Saffron Syrup

INTRODUCTION

Because of perspiration during exercise, water of the body would continuously decrease, and the athletes would lose a lot of water. The water reduction accompanies to body storages and electrolytes. These factors would lead to dehydration and consequently fatigue. As the level of dehydration and fatigue grow, the implications, like low rate of retrieval, weak harmony and decrease in speed and strength of muscle contraction, would become larger **[1]**. Lost liquids must be replaced to reduce dehydration and its harmful influences on exercise performance. The athletes, who want to perform long-term exercise, should prepare themselves with hydration, before the exercise **[2]**.

The amount of perspiration during exercise is often from one to two (liter/hr), and when the amount of excretory liquids exceed that of consuming, its outcome are dehydration of the body **[3]**. Thirst is aroused because of some mechanisms, which are cellular dehydration, serum osmolarity, decrease in blood volume, amount of angiotensin II and psychological factors **[4, 5]**. Nevertheless, the hydration could not be recognized through thirst, and involuntary dehydration exists during exercise in the heat. The subjects, who are exposed to dehydration in very hot weather conditions, have noticeable decrease in enduring performance. Craig and Cummings (1966) indicated exercise capacity would drop 20%, with two percent of weight reduction, and when the weight reduction is four percent, the performance will reduce to 45% **[6]**.

An appropriate setup of drinking should subsist to compensate lost solutes and water. Drinking electrolyte carbohydrate solution, in comparison to the same volume of water, could increase venous return and therefore would cause the retrieve development. The mentioned issue would improve exercise performance and relief increment of central temperature of the body, during long-term exercises. The rate of post-exercise hydration is substantial and in requirements, and its goal is compensation of carbohydrates, electrolytes and liquids. The lack of water would cause probable damages of skeletal muscle, and the hydration would affect reloading muscle

glycogen, too. When the liquid contains electrolytes, solutes and other nutrients, its absorption will become faster. The required water of the body are supplied from the beverages and foods that composition, taste, and electrolytes and carbohydrate levels of the beverages and foods make some differences in the amounts of hydration, provisions of electrolytes and resources of the body and execution development. This issue led to surveying and comparison of the re-hydration rates between the three beverages (saffron syrup, milk and water, in the present research.

Hence, the aim of the present study was determination and comparison of consumptions of saffron syrup, milk and water on weight of the body, aldosterone serum and CK serum, among 16 to 18 year old girl students.

SUBJECTS AND METHODS

Statistical society of this research consisted of 180 girl students from the whole sport high schools of Qom Province of Iran, who were in the age range of 16 to 18 year old. Eighty people of the statistical society proclaimed their readiness. After the Copper test, 24 persons, who were homogeneous in aspect of aerobic power, were selected with average age of 16.95±0.15 year old, height of 162±8 cm and weight of 62.800±21.400 kg. Thereafter, these elected girls were randomly placed in three groups of saffron syrup, milk and water. Before the study execution, the elected subjects received the research details and their parents signed the subscription. In addition, the research had made formal approval of education office of Qom province. The subjects had not any medicine issue or decease precedence. After accordance with the education office and sport gymnasium of physical education high school of Qom province, the 24 elected and approved students were gathered in the gym. They were demanded to avoid doing unusual and intense exercises, taking medicine and consuming diuresis beverages, like café, Nescafe and lots of tea, during 24 hr before the first meeting. The first test started at 2:00 p.m. and the subjects were asked to drink water adequately and drain urine. Thereafter, 5 ml blood samples were taken from forearm veins, and then each subject's weight was gauged with the least wear (naked body mass) by a digital scale (with accuracy of two decimal digits). The subjects performed their physical exercises in gym temperature of 28℃ and humidity of 35%. The intermittent aerobic exercises were adapted in the research. Manner of the exercises were series of half-Copper 6 min running with moderate intensities. Distances and spans of exercises

were the same for the groups. Six minutes rest intervals were placed between each two successive exercise periods. Which means; 1 to 1 proportion was adapted. In order to gauge weight loss of the body, each subject was weighted with least clothes, during the rest intervals. Sweat loss of each exercise period was determined with change of the body weight. The alternation of exercise and rest was continuing until the subjects lost almost 1.64 percent of their initial body weights. So, five repetitions of 6 min running were executed. After final weighing, each subject received test beverage of the relevant group, in amount of 150 percent of her weight loss. Compositions of the consumed beverages of the three groups (fat-free milk, saffron syrup and water) were presented in **Table 1**. These beverages were given to the subjects in three equal shares, at the minutes of 15, 30 and 45. The beverages were preserved and consumed at temperature range of 10-12 centigrade degree. One hour after the drinking period, the subjects were requested to drain their bladders, and blood re-sampling was done. For measurement of aldosterone serum, Elisa aldosterone kit (made by IBL international GmbH Co. in Hamburg, Germany) was used, which was done in Nour laboratory of Tehran. For measurement of creatine kinase, HITACHI 917-photo analysis device was utilized in Baqiat-allah laboratory of Qom. A digital scale named Sahand (PORTABLE model, power: AC 920-250V/50Hz/12w, GSI certification of Canada) was used, to weigh the subjects. In order to accomplish the statistical analysis of data, mean and standard deviation of each group of data were calculated, at first. Thereafter, inner-group variations were surveyed by T paired test, and inter-groups comparisons were accomplished by using independent Two-way ANOVA. The significance level was assigned as $P<0.05$ for entire statistical calculations. All of statistical test was carried out with SPSS.

RESULTS

Statistical descriptions of weight about the three steps of weighing of the present research have been shown in **Table 2**. In order to survey inner-group changes of variables, the results of T paired test have been reported in **Table 3**. The results of independent two-way ANOVA for inter-groups comparisons have been presented in **Table 4**, too.

Average weight of the milk group had a large variation from before to after the test and significantly increased ($P=0.001$). Average weight of the saffron syrup group had a large change from before to after the test and increased, significantly ($P=0.001$). Average weight of the water group had a large change

from before to after the test and increased, in a significant figure (P=0.001).

The levels of aldosterone serum of the milk group had large variations from pre-test moment to post-test one, and have shown significant increments (P=0.050). In the other hand, the levels of aldosterone serum of the saffron syrup group varied from pre-test time to that of post-test and have shown reductions, though these decreases were not statistically significant (P=0.128). The levels of aldosterone serum of water group changed from pre-test moment to that of post-test and have shown reductions, although these reductions were not statistically significant (P=0.320). The levels of creatine kinase serum of the milk group had large variations from the pre-test time to that of the post-test, and have shown significant increases (P=0.001). In addition, the levels of creatine kinase of the saffron syrup group had large changes from the pre-test time to the post-test one, and have shown significant increments (P=0.008). the levels of creatine kinase serum of the water group had large changes from the pre-test moment to that of the post-test, and have shown significant increments (P=0.013), too.

In addition, it has been indicated, there is no significant difference between re-hydration by any of the three mentioned beverages in weight rebound, aldosterone serum and creatine kinase (P is 0.25, 0.51 and 0.46, respectively).

Table 1: Nutrient compositions of test beverages

Composition	Milk	Saffron syrup	Water
Carbohydrate (g/l)	50	25	0
Fat (l/g)	0	0	0
Protein (l/g)	32	0	0
Energy (kcal/l)	328	100	0
Sodium (mmol/l)	33	27	0.2
Potassium (mmol/l)	43	2	0
Chlorine (mmol/l)	35	1	0
Osmolality (mosmol/kg)	280	248	0

Table 2: Statistical descriptions of variables at various steps of measurement

Variable	Group	De-Hydrated	Re-Hydrated
	Milk	60.06±12.76	61.05±12.92
Weight	Saffron Syrup	52.87±7.30	53.75±7.43
	Water	51.37±11.14	52.16±11.32
	Milk	112.63±140.45	136.75±125.92
Aldosterone	Saffron Syrup	96.25±51.98	81.00±49.90
	Water	86.14±72.40	60.43±44.32
	Milk	164.75±66.85	202.50±80.24
Creatine Kinase	Saffron Syrup	155.25±111.47	183.63±126.50
	Water	105.71±39.99	150.0±70.79

Table 3: Results of T paired test to investigate inner-group variations

Group	Variable	T	df	P-value
Milk		**7.701**	**7**	**0.001***
Saffron Syrup	**Weight**	**1.726**	**7**	**0.128**
Water		**3.707**	**7**	**0.008***
Milk		**12.443**	**7**	**0.001***
Saffron Syrup	**Aldosterone**	**2.359**	**7**	**0.050***
Water		**6.697**	**7**	**0.001***
Milk		**5.965**	**7**	**0.001***
Saffron Syrup	**Creatine Kinase**	**1.084**	**7**	**0.320**
Water		**3.493**	**7**	**0.013***

**** Significant at the level of P<0.05***

Table 4: Results of independent two-way ANOVA to compare inter-groups variations

Variable	F	df	P-value
Weight	**1.48**	**2**	**0.25**
Aldosterone	**0.68**	**2**	**0.51**
Creatine Kinase	**0.79**	**2**	**0.46**

DISCUSSION

In the present study, the influences of saffron syrup, low-fat milk and simple water on weight rebound, or post-exercise liquid equilibrium, and levels of creatine kinase and aldosterone hormones were surveyed, in relation to re-hydration. The prime purpose of the research was examine of the influences of the three mentioned beverages and find an appropriate beverage as the recovery and retrieve target of the rest intervals, in which there is not sufficient breathing room for natural re-hydration. The present results denote the three beverages have significant influences on weight rebound, one hour after drinking, which are in agreement with those of Shirreffs (2007), Watson et al (2008) and Geon park et al (2012) **[7,8,9].** However, the present study did not show any difference in weight rebound between the three beverages. Whether the recovery and re-hydration period was longer, significant differences might be observed. Because the level of aldosterone hormone, which owns some influences on the re-hydration, remained high, this hormone would cause the reduction of urinate and liquid excretion from the body, whereas this level decrease, in the two other groups.

Osterberg et al (2010) and Kenefick et al (2007) did not indicate any influence of aldosterone hormone on the re-hydration **[10,11].** Nevertheless, the level of aldosterone hormone of the milk group increased in the present research, whereas those of the two other groups indicated some reductions, and this issue denotes the influences of milk on the re-hydration, and its ability for using as a re-hydration beverage. However, there was not observed any difference about inter-groups comparison, between the three groups,

yet. Further investigations are required, about this issue.

Consumption of chocolate milk had not any influence on level of creatine kinase, in research of Pritchett et al (2009) **[12].** In the other hand, Gilson (2010) found some significant decreases in levels of creatine kinase, following consumption of chocolate milk **[13].** There was not observed any significant difference between the levels of creatine kinase, following consumption of any of the three beverages, in the present research. Which means, there was not seen any significant difference in those levels between the gathered samples of the three groups, after 1 hr recovery. Nevertheless, according to the results of the present study, the level of creatine kinase in the group of saffron syrup was slightly lower than the two other groups. Whether the recovery period was longer, rather influences would arise, which might be the reason of antioxidant effects of saffron. This matter could be the subject of further studies. However, more researches are required, in this field.

CONCLUSION

According to the results of the present study, it is concluded there is no significant difference between post-exercise re-hydration influences of milk, saffron syrup and water on weight rebound, aldosterone and creatine kinase serums. Hence, each of these beverages could be consumed, upon desire of the athlete. However, if a conclusion is drawn as simple as mentioned, a blunder will befall. Further studies in more controlled conditions should be accomplished to achieve rather thoroughgoing conclusion.

REFERENCES

[1] Bumpa T, Exercise Timing, translated by Siahkooian M, Agha-Ali-Nejad H, Rajabi H, 1st publication, Exercise Sciences Pub, Tehran., 2012.

[2] Robergs RA, Fundamental principles of exercise physiology, translated by Ga'ini AA, Dabidi-Rovshan M, first cover, Samt Pub, Tehran., 2011.

[3] Sawka MN, Mountion SJ, Lotzka WA, Hydration effects on thermoregulation and performance in the heat, Comp Biochem Physiol., 2001, 128: 679-690.

[4] Greenleaf JE, Problem: thirst, drinking behavior, and involuntary dehydration, Med Sci Sports Exerc., 1992, 24:645-656.

[5] Kenny WL, Chiu P, Influence of age on thirst and fluid intake, Med Sci Sport Exerc., 2001, 33:1524-1532.

[6] Craig Fv, Cummings EJ, Dehydration and muscular work, J Appl Physiol., 1966, 21: 670-674.

[7] Shirreffs SM, Watson Ph, Maughan RJ, Milk as an effective post-exercise

rehydration drink, British J of Nutrition., 2007, 98: 173-180.

[8] Watson Ph, Love TD, Maughan RJ, Shirrefs SM, A comparison of the effects of milk and a carbohydrate-electrolyte drink on the restoration of fluid balance and exercise capacity in a hot, humid environment, Eur J Appl Physiol., 2008, 104(4): 633-642.

[9] Geon park S, Jung bae Y, Soo lee Y, Jo kim B, Effects of rehydration fluid temperature and composition on body weight retention upon voluntary drinking following exercise-induced dehydration, Nutr Res Pract., 2012, 6(2):126-131.

[10] Osterberg KL, Pallardy SE, Johnson RJ, Horswill CA, Carbohydrate exerts a mild influence on fluid retention following exercise-induced dehydration, J Appl Physiol., 2010, 108: 245-250.

[11] Kenefick RW, Maresh CM, Armstrong LE, Riebe D, Echegaray ME, Castellani JW, Rehydration with fluid of varying tonicities: effects on fluid regulatory hormones and exercise performance in the heat, J Appl Physiol., 2007, 102(5):1899-905.

[12] Pritchett K, Bishop Ph, Pritchett R, Green M, Katica Ch, Acute effects of chocolate milk and a commercial recovery beverage on post exercise recovery indices and endurance cycling performance, Appl Physiol Nutr Metab., 2009, 34: 1017-1022.

[13] Gilson FS, Saunders MJ, Moran CW, Moore RW, Womack CJ, Todd MK, Effects of chocolate milk consumption on markers of muscle recovery following soccer training, J Int Society of Sports Nutr., 2010, 7:19.