

Research Article

The Research of the High-energy Sports Drinks' Effect on Physical Training

Xianfeng Zhang

Xi'an Physical Education University, Xi'an, China

Abstract: The study analyzes the high-energy sports drinking's effect on the body's sports ability, fatigue elimination, functional status adjustment, etc, by the means of experimental study. Recently, there are lots of "sports drinks" in our market", but those with the scientific level and good drinking effect are few. The drinks adding the protein nutrient (such as polypeptide) that has the functions doesn't appear in the market. Through the comparative analysis on the changes of blood sugar and blood lactic acid, it is demonstrated that the high-energy sports drinking can cope with the depth of the exercise fatigue effectively and improve training efficiency significantly.

Keywords: Comparative analysis, high-energy, sports drinks

INTRODUCTION

Energy drink is a general term of this kinds of drinks that refer to including sports drinks and energy drinks and other special function drinks (such as the drinks adding vitamin and mineral nutrient; the herbal drinks adding ingredients of Chinese herbal medicine, etc.) and the drinks offering special healthy nutrient functions for the special crowd. With the continuous improvement of people's consumption level, the increasing attention to their health and the constantly increasing sales on energy drinks, the energy drinks have become a new generation of drinks after the carbonated drinks, drinking water, fruit and vegetable juice, tea drinks. Nowadays, the annual output of the global drinks is more than 300 billion and the energy drinks has become one of the fastest growing drinking varieties (Chen, 2008).

MATERIALS AND METHODS

The development history of energy drinks: The development of energy drinks began in the 1930s. In 1938, the first generation of energy drinks appears, "Lucozade", as the first generation of energy supplying drinks, supplies energy through water and carbohydrate. In 1965, the energy drinks that Dr Robert Kate, the member of the kidney and the electrolyte development centers in the United States, developed for the football team of Florida University had attracted the attention of a great people, which was called "Gatorada" later. It contains three main nutrients: water, carbohydrates and minerals. Later, the sports drinks of energy drinks appeared isotonic drinks, which first appeared in Europe and "Isostar" is one of the earliest brands on behalf of isotonic drinks. The isotonic drinks has the same particle concentration with blood, so when

drinking, people's intestine has the best absorption to water, minerals and energy, which focus on adjusting fluid capacity, regulating electrolyte and acid-base balance, timely supplying energy, improving the thermoregulation and the body's metabolic processes. In 1987, "Red Bull" arose at the historic moment as a new drink (the first generation of energy drinks), which includes the main functional components: caffeine, taurine, water and carbohydrate. It is designed to use caffeine as a stimulating factor and use taurine to enhance the body immunity and combine them to supply energy and refresh people.

Sports drinks: Recently, most sold sports drinks basically is mainly the mode with carbohydrate, vitamin and minerals. Someone makes the following discussion about the technical questions of this mode:

- The effect is not obvious. For sports drinks, quenching thirst and eliminating fatigue should be two important points. But the effect of some products in the market is not obvious.
- They don't develop specific formula for certain people. Actually, the people with different gender or different age need different nutrition when doing sports, so some products should be developed to meet the sports needs of various consumers.

According to the research of the sports nutrition, considering the effect on blood sugar levels and emptying rate in the gastric, 4~6% sugar content are more suitable for sports drinks. And the composition of different kinds of carbohydrate, can not only control the rising speed of blood sugar, extend the time of power, overcome the repeated low blood glucose reaction, but also improve the osmotic pressure so that drinks are more likely to achieve isotonic state. But the

composition of different kinds of carbohydrate and adding minerals and salts could also bring the imbalance taste and imperfect taste (Drăgan *et al.*, 1992). Through a large number of repeated experiments and sensory evaluation, the sports drinks source with the compounding use of cane sugar, low poly maltose and fructose according to a certain proportion, can not only meet the needs of sports drinks and achieve the balance on the palate. Owing to the different releasing time of these three sugars (fructose is the first to achieve the releasing peak, the following is cane sugar and the low poly maltose is the last one), their impacts on the taste are different in the drinks. Determined by tests, the maximum of the release time of sports drinks fragrance is in the period precisely between the release peak of fructose and that of cane sugar. Therefore, only they are combined to use, it can achieve the maximum matching releasing degree of taste and fragrance (Guo, 2005).

The test of energy drinks' efficacy evaluation:

Through the researches of the effect on anti-fatigue effects that energy drinks' nutrient supplement, reducing their consumption, adequate excited and others make and with serum lactic acid content, muscle glycogen content, etc as the metrics, it can be shown that whether the nutrients of energy drinks can take effect on anti-fatigue function and tolerance, strengthen the body movement function and delay fatigue (Qin, 2000).

The test metrics and methods of sports drinks supplement:

Test metrics: The experimental group A will be taken blood in the ear every 30 min when doing sports to measure blood glucose and lactic acid; they will be offered 250 mL high-energy drinks every 30 min before the large load endurance training. After the sport is over, they must keep the all urine immediately on the 15th min to measure urine specific gravity and sweat (sweat refers to the sum with the water intake and the gap between the weight before sports and that after sports) and fill in the chart of subjective feeling. On the

morning of second day, they will be taken the venous blood to test some metrics of the venous blood after sports and the second day, such as homograph, CK, BU, MDA, the activity of SOD, the activity of GSHPX, serum magnesium, serum potassium and others. The contrast group B will be provided 500 mL mineral water according to the method of Group A; the contrast group C will be provided 500 mL sugar water (Nikawa *et al.*, 2002).

Statistical methods: Data processing adapts SPSS10.0 software, all of the data will be represented by mean±standard deviation. Using variance and matching t-test method to test the significance of difference.

The changes of testers' blood-sugar level: The subjects' blood-sugar levels before sports, at the 30th min, 60th min during sports and at the 15th min after sports are shown in the Table 1. The data analysis shows, these two subjects' blood-sugar has no significant differences when they are quiet, but the blood sugar levels of the subjects in group A is significantly higher than that of group C at the 30th min, 60th min during sports and after sports immediately and at the 15th min after sports. And immediately after exercise and after 15 min of sports finishing, the blood sugar of group A is obviously higher than that of group B; at the 60th min during the sports and 15th min after the sports, blood sugar of group B is obviously higher than that of group C.

From the blood lactic acid concentration, it can be seen that three groups' blood lactic acid concentrations are not changed obviously when they are quiet and at the 30th min, 60th min during sports and after sports immediately. However, at the time of 3rd, 6th, 9th, 12th and 15th min, respectively after finishing sports, subjects' blood lactic acid in group A is markedly lower than that of group C. In addition, the blood lactic acid concentration of group A is restored to the level in quietness immediately after exercise, group B will restore at the 3rd min after finishing sports and group C is at the 6th min after sports (Table 2).

Table 1: Blood-sugar levels

Blood sugar levels/mg/dL					
Group	Quiet	Sport (30 min)	Sport (60 min)	Immediately after sport	15 min after the sport
A	77.67±8.52	84.00±10.18	85.17±8.09	79.67±5.47	111.00±5.66
B	76.83±6.49	72.83±9.37	76.00±3.16	71.67±5.85	80.17±7.20
C	82.00±8.67	68.50±3.24	70.67±2.73	68.17±5.47	69.83±7.63

Table 2: The comparison of blood lactic acid concentrations

Blood sugar levels/mg/dL									
Group	Quiet	Sport (30 min)	Sport (60 min)	Right now after sport	3 min after the sport	6 min after the sport	9 min after the sport	12 min after the sport	15 min after the sport
A	1.52±0.36	2.45±0.56	2.54±0.45	2.16±0.63	1.48±0.29	1.35±0.33	1.24±0.39	1.22±0.38	1.27±0.38
B	1.53±0.62	3.23±0.74	3.26±0.88	2.70±1.13	2.38±0.71	2.01±0.63	1.84±0.60	1.67±0.45	1.54±0.46
C	1.64±0.67	3.22±1.22	3.34±1.54	3.68±1.94	3.03±1.03	2.23±0.77	2.05±0.82	1.78±0.37	1.43±0.34

Table 3: Serum CK comparison

Group	Time	CK activity/U/L	Content of the BU/mmol/L
A	The morning before exercise	25.30±162.56	7.24±3.39
	The next morning after exercise	162.24±65.20	4.11±1.39*
B	The morning before exercise	212.22±66.11	6.05±3.60
	The next morning after exercise	145.12±81.05	4.26±1.14
C	The morning before exercise	143.32±100.13	4.92±1.85
	The next morning after exercise	172.20±39.61	6.03±1.82

*: The next morning after exercise and exercise early in the morning before the comparison; There are significant difference, p<0.05

The test results of serum enzyme and urea: Through the comparison between the next morning after sports and the morning before sports, the three groups' serum Ck is shown no significant different, but that of group A, B has a downward and that of group C is upward; the serum BU of group A declines obviously and that of group B, C has no obvious difference comparing with the situation before experiment (Table 3).

RESULTS AND DISCUSSION

During the training with large amount of exercise, the body's blood biochemistry will have corresponding changes, which is the adaptive process of the body to sports training stress. ALT mainly exists in all kinds of tissue cells and the content in the liver cells is the most. Normally, only very few of ALT is released into the blood, so the serum enzyme activity is low. The large amount of exercise's or high strength training is one of reasons that ALT is higher in the next day. In normal circumstances, AST exists in the tissue cells and is the most in the myocardial cells, followed by the liver. LDH is an important enzyme in the process of energy metabolism in the body. This enzyme exists in all organizations such as cardiac muscle, skeletal muscle. When the skeletal muscle is injured, LDH will rise. Wang Zhiping and other people reports, that LDH and the isoenzyme of long-distance runner and road cycling athletes will rise obviously after the sports.

From the whole experiment, the BLA concentration of subjects who drink the sports drinks will return to the level of the quietness immediately after sports and that of the group that is provided sugar water will restore in 3 min after sports and the contrastive group is at the 6th min. Meanwhile, the heart rate of subjects that drink sports drinks will recover fast. The increasing of the recovery speed of BLA and heart rate is beneficial to extend the exercise endurance and the high-energy solid drink as energy supplement, can complement the content of sugar in the blood fast and efficiently. On one hand, the sugar will be converted to liver glycogen and muscle glycogen to maintain the high-level muscle glycogen reserve, in order to offer energy for the muscle operation; on the

other hand, the normal blood sugar can provide energy for the brain tissue, play an important role of keeping that the central nervous system can work normally. In the 2-4 h after sports, the blood sugar level doesn't decline and show the increasing trend; until in 6 h, although the level has a small drop, it is still higher than that in the morning and before training. Therefore, the sports drink is beneficial to improve the sports ability.

CONCLUSION

Taking sports drinks can keep higher level of blood sugar in big strength sports for the long time. After sports, the stability of serum potassium and magnesium ions show that the sports drinks can maintain the stability of the inner environment of sporters. Adding sports drinks can decrease the blood lactic acid content in quantitative movement, accelerate the recovery of blood lactic acid after sports and strengthen the capacity of aerobic exercise. The supplement of sports drinks can make the subjects has a obvious decline of BU in the next day after motion and serum SOD is increased significantly, the grade of RPE is also declined significantly, which prompts the drink has some anti-fatigue function.

REFERENCES

- Chen, J., 2008. Sports drink consumption effect of the human body. *Sports Sci.*, 18(1): 62-70.
- Drăgan, I., V. Stroescu, I. Stoian, E. Georgescu and R. Baloescu, 1992. Studies regarding the efficiency of Supro isolated soy protein in olympic athletes. *Rev. Roum. Physiol.*, 29(3-4):63-70.
- Guo, L., 2005. The lactate clearance rate after exercise and sport ability. *J. Shanghai Sport. Inst.*, 29(2): 44-47.
- Nikawa, T., M. Ikemoto, T. Sakai, M. Kano, T. Kitano *et al.*, 2002. Effects of a soy protein diet on exercise-induced muscle protein catabolism in rats. *Nutrition*, 18(6): 490-495.
- Qin, S., 2000. Carbohydrates, water, electrolyte and sports drinks. *Sports Sci. Technol.*, 21(1): 32-34.