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Original article

EFFECT OF ENERGY COCKTAIL DRINK ON CERTAIN BIOCHEMICAL VARIABLES AND RECOVERY AFTER 4000M RUNNING

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Abstract

Aim. A dietary supplement is intended to provide nutrients that may otherwise not be consumed in sufficient quantities. The aim of this study was to investigate that Effect of energy cocktail drink on certain biochemical variables and recovery after 4000m running.

Methods. The study was approved by physical education Faculty Ethics Committee each participant gave informed consent to take part in the study. Twenty male participants attended the test session. Selection criteria were males (18.1, 18.4) years of age, height (175, 177.5) cm, weight (70.2, 72.1) kilogram, fat percentage (13.85, 13.7%) for placebo and experimental groups. The participants divided into two equal groups, experimental and placebo. They were required to be non-smokers who were not taking any prescribed medication, who regularly consumed breakfast, statistical analysis of the results was carried out with the use of SPSS software.

Results. The experimental group had improvement higher than placebo group in certain biochemical variables and recovery time.

Conclusion. With reference to the research results, the qualities of the used methods and following the statistical analysis, the researchers could conclude the following: The energetic cocktail drink would boast athlete's performance. It is recommended to include food supplement to the elite athletes.

Keywords: Energy Cocktail Drink, Fat Percentage, MDA. Running

Introduction

The increased desire, reflected by coaches, trainers, and those in charge of sports activities to win championships, out of political, national, or economic motives, has led them to explore all avenues to promote physical performance.

The following are some of the means pursued to achieve this goal:

1. More attention is paid to pre-games warm-up and massage.
2. Take further interest in nutrition through providing diets with all needed elements: vitamins, salts and glucose.
3. Focus on sports physiology during general & special preparation period.
4. Further concern is given to pharmacology.
5. The first three factors have had a positive impact on athletes where of the second in particular has contributed to a higher performance rate. While the fourth factor refers to the importance of knowing the proper use of pharmacology in terms of knowing, the banned steroids taken widely these days by athletes before and after the competition or the sports events in contravention with the Olympic rules to provide equal chances for the rivals.

Because our study decided to focus in the second item (further interest in nutrition through providing balanced diets), we will try to show the role played by a natural diet comprised of (honey queen nee food "Royal Jelly"), pollen grains, along with ginger and ginseng stimulant, in resisting fatigue and enhancing performance.

The marketing and sale of sports and energy drinks has become a multibillion-dollar industry. A wide variety of sports drinks is available for everyone from the back yard basketball player to the elite endurance athlete. In 2006, nearly 500 new brands of energy drinks were introduced, and more than 7 million adolescents reported that they have consumed an energy drink (Worcester, 2007).

Such fast development makes today soft and sport drinks a constant element in diet of difference social classes and age brackets and it has been driven by the following major influences: (i) changing consumer attitude and expectations, (ii) changes in the regulatory environment, (iii) advances in food science and technology. (iv) growing understanding of the link between dietary constituents and physiological process. To this regard, there is in fact an increasing awareness that nutritional factors can influence the physical and mental performance capacity of individuals involved in intense exercise. Moreover, specific

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nutritional substances are thought to influence physiological functions of metabolism in such away that performance enhancement may be achieved (Brouns, Kovacs, 1997).

A far as sport drinks are concerned, this category has already been recognized by the EU scientific committee for foods in its reports of July 2000. Recommendations for the composition of both solid and liquid products within the category were included and will form the basis of European-wide legislation on all sports nutrition products to be drafted.

The present study aimed to investigate the effect of suggested drink made of some substances previously recommended by related researches with a cocktail drink that is made from national substances available in Egypt, cocktail ingredients: Honey, ginseng, vitamin C, pollen grain, royal jelly, ginger). To obtain valuable information for evaluating its action on performance, some biochemical variables and recovery time, for University students.

Samples

The study was approved by physical education Faculty Ethics Committee each participant gave informed consent to take part in the study. Twenty male participants attended the test session. Selection criteria were males (18.1, 18.4) years of age, height (175, 177.5) cm, weight (70.2, 72.1) kilogram, fat percentage (13.85, 13.7%) for placebo and experimental groups.

The participants divided into two equal groups, experimental and placebo. They were required to be non-smokers who were not taking any prescribed medication, who regularly consumed breakfast.

Experimental Design

One test drink was administered 200ml one hour before running 4000 m, the cocktail drink was composed of 5000 gram honey, 5 gr. royal jelly, 20 gr. Ginger, 50 gr. Ginseng, Vitamin C, pollen grain 15 gr, the placebo group received 200 ml of a placebo drink.

Procedure

On the test day (4000 m running), the participants were instructed to consume only water, the experimental group was provided with 200 ml of the cocktail drink, and a placebo drink (200 ml) for the placebo group, one hour before 4000 m. running. Participant were instructed to consume all the drink (volume 200 ml) within 5 min. 5 ml

venous blood was withdrawn using syringe before and after the test from each participant in a polyethylene tube, Biochemical variables were glucose, lactate, reduced glutathione (GSH) Malondialdehyde, cholesterol and triglycerides, they were analyzed using spectrometry.

The cocktail drink constitute mainly of carbohydrate (CHO), glucose and fructose, electrolytes (Sodium, potassium, magnesium, calcium), vitamins A, E, C. carbohydrates effects are of primary interest, because fats and proteins are less effective oral energy sources during exercises and have no significant effects on fluid absorption (Brouns, Kovacs, 1997). It has also been shown that the (CHO) content is the most important factor influencing the rate of gastric emptying of re-hydration drinks (Vist, Maughan, 1995). Electrolytes, sodium play a major role in fluid homeostasis and improve water retention (Rehrer, et al. 1993).

In case of calcium, potassium and magnesium, it is often stated that supplementation is required to avoid muscle cramp and to maintain optimal muscle action; they may assist the maintenance of normal physiological function (Clarkson, 1991).

Vitamins are essential cofactors in many of the enzymatic reactions that are involved in energy production and in protein metabolism (Brouns, Kovacs, 1997).

Statistical analysis

All statistical analyses calculated by the SPSS statistical package. The results are reported as means and standard deviations (SD). Differences between two groups were reported as mean difference $\pm 95\%$ confidence intervals (meandiff $\pm 95\%$ CI). Mann-Whitney test, X score was used and the level of skewness between experimental and placebo values. The $p < 0.05$ was considered as statistically significant.

Biochemical analysis:

Triglycerides (TG) and Total cholesterol (TC) were determined according to the methods of Fossati and Precipe, (1982), Finely (1978) MDA, Malondialdehyde was measured by using the method of Uchiyama and Mihara (1978). Reduce glutathione (GSH) activity was determined after Habig et al., (1974). Glucotrend apparatus determined glucose concentration. As for lactate concentration, Accusport apparatus was used.

Results

Table (1) characteristics of the experimental and placebo groups in age, height, weight, fat percentage and skewness.

| Variable | Unit | Mean | | SD | | Skewness | | Kurtosis | |
|----------|---------|---------|--------------|---------|--------------|----------|--------------|----------|--------------|
| | | Placebo | Experimental | Placebo | Experimental | Placebo | Experimental | Placebo | Experimental |
| Age | General | 18.3 | 18.1 | 0.737 | 0.737 | -0.734 | -0.734 | -0.166 | -0.166 |
| Height | Cm | 175 | 177.5 | 4.557 | 3.979 | -0.151 | 1.694 | 0.598 | - |
| Weight | Kgm | 70.2 | 72.1 | 2.149 | 4.557 | 0.734 | 1.913 | -0.166 | 1.187 |
| Fat % | % | 13.85 | 13.7 | 1.001 | 1.475 | -0.428 | -0.030 | 0.419 | -0.425 |

Table (2): Mean (\pm SD) of Different variables of the two groups before 4000 running

| Variable | Unit | Mean | | SD | | Skewness | | Kurtosis | | Z value |
|------------------|---------------|---------|--------------|---------|--------------|----------|--------------|----------|--------------|---------|
| | | Placebo | Experimental | Placebo | Experimental | Placebo | Experimental | Placebo | Experimental | |
| Glucose | mgm/dL | 75.2 | 74.5 | 5.996 | 5.759 | 0.131 | 0.013 | -1.108 | -0.407 | -0.114 |
| Lactic | Mmole/L | 11.1 | 1.08 | 0.144 | 0.193 | -0.214 | 0.236 | -0.987 | 0.961 | 0.447 |
| Glutathione | Unit/L | 64.744 | 64.777 | 3.065 | 2.9663 | 0.572 | 0.313 | -0.506 | -0.948 | -0.113 |
| Malondi-aldehyde | μ mole/dL | 1.877 | 1.8667 | 0.720 | 0.7158 | -0.039 | 0.155 | -1.450 | -0.920 | -0.038 |
| Cholesterol | mgm/dL | 166.222 | 165.555 | 10.604 | 12.370 | -0.292 | -0.281 | -0.927 | -1.011 | 0.001 |
| Tri glyceride | mgm/dL | 143.777 | 145.444 | 10.974 | 11.237 | -0.144 | -0.472 | -1.445 | -1.285 | -0.265 |

Table (3): Mean (\pm SD) of Different variables of the two groups after 4000 running

| Variable | Unit | Mean | | SD | | Skewness | | Kurtosis | | Z value |
|------------------|---------------|---------|--------------|---------|--------------|----------|--------------|----------|--------------|---------|
| | | Placebo | Experimental | Placebo | Experimental | Placebo | Experimental | Placebo | Experimental | |
| Glucose | mgm/dL | 159.8 | 177.6 | 4.825 | 4.141 | 1.424 | 0.791 | -0.440 | 0.027 | 2.2236 |
| Lactic | Mmole/L | 5.00 | 4.32 | 1.415 | 1.29 | 3.192 | 0.654 | 1.4 | 0.611 | -3.183 |
| Glutathione | Unit/L | 80.6 | 83.13 | 3.281 | 1.579 | -0.223 | 0.439 | 2.45 | 0.479 | -3.717 |
| Malondi-aldehyde | μ mole/dL | 5.26 | 4.17 | 0.914 | 0.77 | 0.904 | 2.43 | 1.039 | 0.995 | -2.879 |
| Cholesterol | mgm/dL | 153.3 | 143.6 | 7.717 | 6.818 | 0.004 | -0.20 | 0.303 | 0.397 | -2.390 |
| Tri glyceride | mgm/dL | 132.3 | 122.6 | 4.83 | 4.115 | 0.828 | -0.03 | 0.406 | 0.166 | -3.120 |

Table 3 indicated that non-significant changes in some variables. Also, significant changes in variables (lactate, reduced glutathione, triglycerides, where Z value more than (+3, -3).



Table (4): correlation between pulse rate after 3 min and variables of the experimental group, these was non-significant relation between variables and the recovery time through pulse rate after 3rd min.

| Factors | Glucose | Lactic acid | Glutathione | MDA | Cholesterol | Triglyceride |
|--|---------------|---------------|--------------|--------------|--------------|--------------|
| Pulse after 3minutes for experimental | -0.157 | -0.301 | 0.226 | 0.454 | 0.552 | 0.472 |

Discussion:

Data showed that students of the experimental group, that ingested the cocktail mixture before 4000m. Running caused significant increase in serum T. cholesterol and triglycerides after the test, with lower concentration of both variables compared to the placebo group after the race. The decreased T. cholesterol and triglycerides may be attributed to the need of the energy needs by both groups, the lower concentration of T. cholesterol and triglycerides might be caused by the utilization of lipid of the experimental group on the expense of CHO. This indicates a positive effect of the cocktail mixture.

This result was in agreement with that of (Mikki, Patricia 2007; O'Dea, 2003).

Data also indicate that in the experimental group, after cocktail ingestion, reduced glutathione (GSH) significantly increase compared to the placebo group, while at the same time Malondialdehyde decreased than the placebo group.

The recorded results may be attributed to the elevated antioxidant concentration, and decreased of free radical due to the benefit action of cocktail mixture to the experimental group. This suggestion is confirmed by (Amani, 2007; Lee, et al. 2002) which indicated that food supplement have proved their ability to decrease the tension of oxidative stress and resist the destructive effect of the free radical.

Murray, et al. (1990) reported that glutathione is a tripeptide consisting of glutamic acid, cysteine and glycine. glutathione is abbreviated to GSH. GSH is an important defense mechanism against certain compound, such as some drugs and carcinogens. If the levels of GSH in a tissue are lowered then that tissue can be shown to be more susceptible to injury. They also added that glutathione has other important functions in human cells apart from its role in xenobiotic metabolism as it participates in the decomposition of hydrogen peroxide in the reaction catalyzed by glutathione peroxidase.

An increased glucose concentration after 4000m running to experimental and placebo groups. The experimental group showed a higher level of glucose after test. This might be to the higher load of CHO in cocktail mixture ingested. Hargreaves et al., (1996) reported that carbohydrate-electrolyte drinks are 50 designed to

replace fluid and provide a boot of carbohydrate energy to the working muscles. (J. Gonzalez-Alonso et al. 1992) added that the carefully selected levels of CHO and electrolytes ensure effective fluid retention by preventing the diuresis that is normally observed when only water in consumed and helps to maintain the osmotic drive of drink, providing an additional stimulus for ample fluid intake.

Katz, et al. (1986) stated that during exercise skeletal muscle glucose uptake can increase several fold, depending upon exercise intensity and duration. This is a consequence of enhanced glucose delivery to contracting skeletal muscle as a result of increased muscle blood flow and capillary recruitment and increased glucose extraction as measured by a greater arteriovenous glucose difference.

Lactate concentration increased after 4000m running in both groups, the experimental group showed a lower level of lactate after running, compared to placebo one. The lower lactate concentration observed in case of experimental group might result from the cocktail drink, which provide a higher supply of CHO, electrolyte and vitamins, and might delay fatigue.

Wilmore & Costill (2005) reported that portable lactate analyses are becoming more popular amongst coaches and athletes at all levels, they added that a portable analyzer is only one half of the equation. As any physiological test is only as reliable as the tester's ability to follow a set protocol. Even when a suitable assessment has been chosen, numerous variables must be kept constant for the test to remain accurate and reliable.

As for performance time, experimental group achieved the 4000 m running faster than the placebo group (14-16 min). This result indicated that the cocktail mixture might effect performance, as the cocktail mixture composition of CHO, electrolytes and vitamins can influence the onset of fatigue and delay it occurrence.

Robergs and Roberts (1997) stated that adequate strength is considered an important part of health-related fitness and optimal physiologic function for both children and adults. It is also recognized as an important contributor to improved motor performance.



Conclusion

With reference to the research results, the qualities of the used methods and following the statistic analysis, the researchers could conclude the following: The energetic cocktail drink would boast athlete's performance. It is recommended to include food supplement to the elite athletes.

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