

# The Study of the Effect of Glycerol-containing Beverages Drinking Method before Exercise in the Environment of High Temperature and High Humidity

X. Huang & H. Wu

*Capital University of Physical Education An Sports, Beijing, China*

W. W. Yao

*Beijing Wangsiying Zhongxin Middle School, Beijing, China*

**ABSTRACT:** Dehydration is one of the most common problems in sports in the environment of high temperature and high humidity. It is an important cause of sports fatigue and lead to a serious challenge to the development of health and the sports performance. This study selected 25 cycling enthusiasts to drink a certain amount of glycerol-containing beverages before exercise, and to explore the effect of intervention of the water storage to human body in the environment of high temperature and high humidity to provide some drinking advices to improve their health and sports performance.

**KEYWORD:** Dehydration; Drinking Method before Exercise; Glycerol-containing Beverages

## 1 INTRODUCTION

Dehydration is one of the most common problems in sports in the environment of high temperature and high humidity. It is an important cause of sports fatigue and lead to a serious challenge to the development of health and the sports performance. This study selected 25 cycling enthusiasts to drink a certain amount of glycerol-containing beverages before exercise, and to explore the effect of intervention of the water storage to human body in the environment of high temperature and high humidity to provide some drinking advices to improve their health and sports performance.

## 2 METHODS

This study was a self-control experiment. The interventions were glycerol containing beverage (E) and placebo beverage (C), the specific components of two kinds of drinks and the major difference between them Implement a double-blind to researchers and subjects. The subjects of the study consists of 25 healthy male cyclists from Beijing Riding Association, and their average age was  $27.4 \pm 5.58$  years old, the cyclists performed two times to form a self-control, test related indicators in the process of test.

The cyclists kept the power bicycle 60 r/min, following the rhythm of the metronome. The beginning power was 60Watt, and plus 30W per 10min, until exhausting. The lactate, body

temperature and RPE were tested per 5min and then were tested after testing. Exercise duration and the max exercise load were recorded.

The movement environment: the temperature was controlled in  $35 \pm 2^\circ\text{C}$ , and the humidity was controlled in  $60 \pm 5\%$ .

## 3 RESULTS

### 3.1 The urine output volume

The urine output volume after exercise and total urine volume of the experimental group were lower than the control group, which of the experimental group was  $212.00 \pm 24.84\text{ml}$  and  $447.73 \pm 57.66\text{ml}$ , and which of the control group was  $315.40 \pm 39.13\text{ml}$  and  $548.41 \pm 49.05\text{ml}$ , and there was a significant difference ( $P < 0.05$ ).

Table 1 the change of the urine output volume ( $\bar{X} \pm \text{SD}$ )

Urine volume(ml)	group C	group E	P
after exercise	$315.40 \pm 39.13$	$212.00 \pm 24.84^*$	0.032
total	$548.41 \pm 49.05$	$447.73 \pm 57.66^*$	0.032

\*showed that  $P < 0.05$ .

### 3.2 The change of the weight

After exercise, the control group's weight loss was  $1.32 \pm 0.10\text{kg}$ , the experimental group decreased value was  $0.96 \pm 0.10\text{kg}$ , there was very significant difference ( $P < 0.01$ ) between the two groups.

Table 2 the change of the weight

Weight (kg)	Group C	Group E	P
Before exercise	3.15±2.50	73.04±2.53	0.507
After exercise	71.83±2.45	72.07±2.48	0.142
change valume	1.32±0.10	0.96±0.10**	0.001

### 3.3 Endurance riding time

The experimental group's endurance riding time was 45.92 ± 9.19 minutes, which was longer than that of the control group was 42.76 ± 7.86 minutes, there was a significant difference (P<0.01).

Table3 the change of the endurance time ( $\bar{X}$  ±SD)

	Group C	Group E	P
Endurance time	42.76±7.86	45.92±9.19**	0.004

\*\* showed that P<0.01.

### 3.4 The change of the lactate

The lactate after exercise of experimental group was 6.26 ± 2.67mmol/L, significantly lower than the control group, which is 7.54 ± 3.06mmol/L.

Table 4 the change of the lactate ( $\bar{X}$  ±SD)

Lactate(mmol/L)	Group C	Group E	P
Before exercise	3.11±0.89	2.88±0.79	0.324
After exercise	7.54±3.06	6.26±2.67*	0.030

## 4 ANALYSIS

### 4.1 The effect of glycerol-containing beverages drinking to the body weight

A human lost 5%-10% of body weight everyday even when in normal temperature. Human need drink 3-4 times water when in high temperature much more than in low temperature. Body emit quality of heat mostly through sweating. A human sweat and loss water 1.0-2.5L/h, and water losing made the body weight decreasing. So dehydration can be showed by comparing the body weight before and after exercise.

In this study, the body weight of group C and E both decreased, so the two groups both appeared dehydration. However, the group E decreased much less than the group C, that showed Glycerol-containing Beverages Drinking before exercise could keep water storage in human body.

### 4.2 The effect of glycerol-containing beverages drinking to the urine output volume

Human used to drinking a great deal of water, for forbidding dehydration. However diuresis made the

water out of the body, and decreasing the water storage of the human body.

Drinking Glycerol-containing Beverages before exercise could keep water in our body. In the study, the urine output volume of group E was much less than that of group C, which showed that Drinking Glycerol-containing Beverages before exercise decreased the urine output volume.

### 4.3 The effect of glycerol-containing beverages drinking to the lactate

Lactate was the mid production of glucose metabolizing in the human body. Coaches used to use lactate to estimate the training impact.

In the study, the lactate after exercise of group E was much less than that of group C, which showed that Drinking Glycerol-containing Beverages before exercise could improve the aerobic capacity in a certain extent.

### 4.4 The effect of glycerol-containing beverages drinking to the endurance riding time

Endurance exercise time in the resistance exercise was one of important indexes. Schett's research showed that 8 male athletes increased the time of exercise to exhausting.

In this study, the endurance riding time of group E was much more than that of group C, which showed that Glycerol-containing Beverages Drinking before exercise could prolong the endurance riding time. The reason perhaps was that Glycerol-containing Beverages decreased the urine output volume, and increased the water storage in the body, delaying the dehydration, so the endurance riding time increased, and the exercise capacity was improved.

## 5 CONCLUSIONS

1. The comparison of the weight and urea volume before and after the exercise between the two groups showed that the method of drinking a certain amount of glycerol-containing beverages before exercise would improve the water storage capacity.

2. The results of the endurance riding time and the lactate showed that the method of drinking a certain amount of glycerol-containing beverages would delay spots fatigue and increase the exercise time.

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