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The Effects of Taking Ginseng G115 During Training on the Athletic Ability of the Middle-and-long Distance Athletes

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Abstract: This study explores the law of impact of taking G115 for a long time on the athletic ability through adopting the method of taking ginseng extract G115 continuously in order to provide a scientific basis for the rational application of traditional Chinese medicine to improve human exercise ability. **Methods:** This experiment takes the middle-and-long distance athletes as the research object. The athletes are divided into two groups during training, the group of taking medicine takes G115 and the control group takes placebo. Twelve minute run and related changes in physiological indicators of the group of taking medicine and the control group should be observed and measured after eight weeks. **Results:** Compared with the control group, hemoglobin and blood sugar of the group of taking medicine significantly increased ($p < 0.05$). There is no significant difference ($p < 0.05$) in activity of creatine kinase, the anaerobic threshold and anaerobic threshold intensity and 12 min run between the group of taking medicine and the control group. **Conclusion:** Taking ginseng G115 during the training can significantly improve content of hemoglobin and blood sugar of athletes and tends to lower activity of creatine kinase, to increase anaerobic threshold and anaerobic threshold intensity and to increase scores of 12 min race.

Key words: Ginseng G115, middle-and-long distance runners, athletic ability

INTRODUCTION

Herbal Classic of Shennong records that ginseng is the top grade of Chinese herbal medicine, which is provided with good tonic effect and non-toxic side effects. In addition, the manual for ginseng also confirms the efficacy of ginseng. A large number of literatures on animal experiments conduct research on effect and mechanism of ginseng and its active ingredients from different aspects. The results show that ginseng and its active ingredients are able to improve the athletic ability of the body. Most human experimental results also show that ginseng and its active ingredients are able to improve the athletic ability of the body. However, some of experimental results are contrary to them. This study inquires into fitness, athletic ability and related physiological indicator of the group of taking medicine and the control group through adopting ginseng extract G115 and experiment and explores the action mechanism of the body on physical fitness and athletic ability in order to provide experimental support and scientific basis for the research and development of traditional Chinese medicine preparation which is able to improve the performance of athlete, to provide strong supplements of non-stimulant to athletes.

MATERIALS AND METHODS

Materials and methods: Experimental subjects and experimental control: The middle-and-long distance runners (the exercise level of athletes is grade two) of track and field team of Hunan University of Science and Technology. Members are a total of 14 persons, including 8 male players and 6 female players. The subjects are healthy and they are divided into the group of taking medicine (A) and the control group (B) according to the gender and athletic ability of the athletes with mechanical sampling methods so as to conduct experiment. The situation of athletes is shown in Table 1.

The athletes of two groups have meal together during training and smoking, drinking and taking other drugs are not allowed. The athletes of two groups are trained by the same trainer (The trainer do not know of grouping situation). Training content: the first two weeks are recovery period and 3-7 weeks are the training period and the eighth week is the contest period.

Table 1: The general situation of study object

N	Age(y)	Height (cm)	Weight (kg)	Training	
				period(yr)	Level of athlete
8 male	22±4	175±6	68±5	4±3	Second level
6 female	21±3	166±5	60±4	4±3	Second level

Drugs and reagents: Ginseng extract G115 is purchased from Changsha Nutramax Biological Technology Co., Ltd., a pale yellow powder, whose purity is 80%. It is dissolved with sterile saline solution one day before providing medicine and sealed and stored in refrigerator at 4°C for reserve. The required reagent boxes are purchased from Nanjing Jiancheng Bioengineering Institute.

Methods of providing medicine and dosage: The medicine is taken by the subjects. The medication dose shall refer to report of (Engels *et al.*, 2001) The athletes of the group of taking medicine take daily 400 mg standardized ginseng extract G115 (twice a day, 200 mg will be taken before training on the morning and 200 mg will be taken after training in the afternoon). The control group takes the same dose of saline solution.

Sample collection: Blood is drawn twice in the course of experiment (operated by the doctors whether before the experiment or after the test). The 10 mL vena blood will be drawn from two groups of subjects under quiet fasting state in the early morning (6:30-7:00). Blood samples are injected into the centrifuge tube. After being frozen naturally it will be put in low temperature centrifuge and centrifuged for 15 min at the rotating speed of 3600 r min⁻¹ and serum should be put under 70°C for spare after it was taken out.

Anaerobic threshold and determination of anaerobic strength: Blood lactate analyzer of palm-sized LT-1710 type produced by Japan will be used for blood lactate test. Incremental load (running platform) will be used in the course of movement. The fingertip blood will be collected to test blood lactate immediately after the end of each level load and the average power of each level of load will be record. (Running platform is puisarit 4.0 produced by h\p\cosmos, a Germany company).

The measure of athletic ability: The measure of 12 min race results Stopwatch of 03000143 model produced by GuangDong will be used, measuring in standard 400 m track and field by hand.

Statistical analysis: Statistical significance was set at the $p < 0.05$ and values are expressed as Means $\pm$ SD. A one-way ANOVA with correction for multiple time-points was used to detect a time effect (IL-6 mRNA, plasma-IL-6, phosphorylation JNK and muscle glycogen). When ANOVA showed significant differences, the Student-Newman-Keuls post hoc test was performed to discern statistically significant differences.

RESULTS

Hemoglobin: The experimental results: there is no significant difference ($p > 0.05$) in Hb between the control group and the group of taking medicine before the experiment. Compared with before the experiment, significant change ($p < 0.05$) occurred in Hb of the control group after the experiment. The significant change ($p < 0.01$) occurred in the group of taking medicine before and after the experiment. After the experiment, the average value of Hb of the group of taking medicine is 14.28 g dL⁻¹ and the average value of Hb of the control group is 12.85g dL⁻¹. As a result, there are significant differences ($p < 0.05$) between group A and B, suggesting that taking ginseng extract G115 enables athletes to raise HB. The results studied (Craig *et al.*, 2000) show that Chinese traditional medicine containing ginseng and blood soup can effectively improve concentration of hemoglobin of rats (Table 2).

Scholars are coincident, that is, taking ginseng and drugs containing ginseng can improve hemoglobin content of athletes' body. The experimental results obtained in this study are nearly similar to that the researchers mentioned above, suggesting that taking ginseng is of significance to improve the movement ability of the middle-and long distance runners.

Blood glucose: The experimental results: there is no significant difference ($p > 0.05$) in mean of blood sugar between the group of taking medicine and the control group before the experiment. There is significant difference ($p < 0.05$) in blood sugar of the control group before and after experiment. There is extremely significant difference ($p < 0.01$) in blood sugar of the group of taking medicine before and after experiment. The mean of blood sugar of the group of taking medicine after experiment is 6.76 mmol L⁻¹ and the mean of blood sugar of the control group is 5.25 mmol L⁻¹. Therefore, there is significant difference between the two groups (Table 3).

The study conducted by X Starkie RL found that human has regulation effectiveness on changes in blood sugar concentration and ginsenosides can stimulate gonadotropin and insulin secretion and thus improve the body's ability to regulate blood sugar concentration.

Table 2: The comparison of the content of hemoglobin (Hb) between the control group and the group of taking medicine before and after the experiment (g dL⁻¹)

	n	Taking medicine group A	The control group B
Before experiment	7	12.21 $\pm$ 1.71**	12.04 $\pm$ 1.56*
After experiment	7	14.28 $\pm$ 0.96*	12.85 $\pm$ 0.81

Comparison between groups before and after the experiment, * $p < 0.05$, ** $p < 0.01$. Comparison between the control group and the group of taking medicine before and after the experiment, $\Delta p < 0.05$

Table 3: The comparison of the content of blood glucose between the control group and the group of taking medicine before and after the experiment (mmol L⁻¹)

	n	Taking medicine group A	The control group B
Before experiment	7	4.77±1.12**	4.93±0.24*
After experiment	7	6.76±0.46?	5.25±0.44

Comparison between groups before and after the experiment, *p < 0.05, **p < 0.01. Comparison between the control group and the group of taking medicine before and after the experiment, *p < 0.05

Table 4: The comparison of creatine kinase activity (U mL⁻¹) between the control group and the group of taking medicine before and after experiment

	n	Taking medicine group A	The control group B
Before the experiment	7	809.14±537.56**	809.40±489.17*
After the experiment	7	504.27±373.92	788.00±510.02

Comparison between groups before and after the experiment, *p < 0.05, **p < 0.01

As can be seen from the above experimental studies, the results of this experiment are basically the same as them, suggesting that taking ginseng extract can effectively improve the body's blood sugar, which is of extreme significance to improve athletic ability of middle-and-long distance athletes.

Creatine kinase activity: The experimental results: there is no significant difference (p > 0.05) in mean of creatine kinase between the group of taking medicine and the control group before experiment. There is significant change (p < 0.05) in the control group before and after the experiment. There is extremely significant change (p < 0.01) in the group of taking medicine before and after experiment. The mean of creatine kinase the group A of taking medicine after experiment is 504.27 U mL⁻¹ and the mean of the control group B after experiment is 788.00 U mL⁻¹ and the difference was not significant (p > 0.05), suggesting that Ginseng extract G115 cannot reduce the activity of creatine kinase. However, seen from the experimental data, it can be seen that creatine kinase activity of the group of taking medicine tends to be decreasing, compared with the control group (Table 4).

The experiments conducted by Tang *et al.* (2011) the experiments on adult male Sprague-Dawley rats show that taking ginseng can reduce the activity of body's creatine kinase. Some scholars conducted studies of human body in this area, thinking that taking ginseng for long time can reduce the activity of body's creatine kinase. it can be found from the experimental data that taking G115 can not significantly reduce the activity of body's creatine kinase but the trend of reduction in the creatine kinase activity of athletes occurred. The results of this experiment are different from that of Hsu CC and Tang *et al.* (2011). The reason for such results may be the short-time medication and medication dose.

Anaerobic threshold and anaerobic threshold intensity: It can be drawn from this experiment that taking ginseng

Table 5: Comparison of anaerobic threshold (AT) and anaerobic threshold intensity(ATI) between the control group and the group of taking medicine before and after the experiment

	Taking medicine group A	The control group B
AT before the experiment	3.64±0.61**	3.84±0.43*
AT after the experiment;	4.54±0.96	4.20±0.62
ATI before the experiment;	2.71±0.19**	2.89±0.63*
ATI after the experiment;	3.62±0.53	3.12±0.63

Comparison between groups before and after the experiment, *p < 0.05, **p < 0.01

Table 6: Comparison of the 12 min race results between the control group and the group of taking medicine before and after the experiment

	n	Taking medicine group A	The control group B
Before experiment	7	2952±466.98**	2944±368.01*
After experiment	7	3228±466.93	3028±374.53

Comparison between groups before and after the experiment, *p < 0.05, **p < 0.01

extract G115 tends to delay anaerobic threshold and improve the intensity of anaerobic threshold but the effect is not very significant (p > 0.05). This result may be arising from short-time medication or the effect of G115 on anaerobic threshold or the intensity of anaerobic threshold is not obvious (Table 5).

12-minute race results: The result of this experiment is that the effect of taking ginseng extract G115 on improvement in endurance of athletes is not obvious but there is a trend of improvement. The experimental conclusion of Sun *et al.* (2011) is that taking traditional Chinese medicine of ginseng spleen can enhance the athlete's movement ability. The experiment conducted also show that ginseng extract can improve greatly exercise capacity of rats (Table 6).

It is reported from experiments that ginsenosides can significantly inhibit the formation of sulfur acid reactive substrate and lipid peroxidation caused by free radicals. However, the main ingredients of ginsenosides Rg1 and Rb1 do not have this effect, suggesting that other types of saponin may have this effect (Gu *et al.*, 2011).

A large number of foreign animal and human experiments show that ginseng extract G115 can improve the body's movement. There is little human experimentation in this regard in China and report on animal experiments that is strictly designed is less. The results of their research are that taking ginseng can improve the ability of the body's movement.

CONCLUSIONS

Taking ginseng standard extract G115 can significantly increase hemoglobin of the athlete.

Take ginseng standard extract G115 can significantly increase the content of blood sugar of the athlete.

Taking ginseng standard extract G115 cannot reduce the activity of athletes' creatine kinase but there is an increasing trend.

Taking ginseng standard extract G115 cannot make athletes' anaerobic threshold and anaerobic threshold intensity increase but there is an increasing trend.

Whether taking ginseng standard extract G115 can raise results of middle-and-long distance runners worthy of being further investigated.

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