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Research Article

The Influence of Sports Supplements on the Blood Indexes of Snowboard Athletes

[1]Wang Fu-Qiu and [2]Wu Guang Liang
[1]College of PE and Sports, Beijing Normal University,
[2]Department of Physical Education, Renmin University of China, Beijing, China

Abstract: It is a scientific monitoring of the snowboard function of athletes a nutrition intervention to improve athletic performance and provide experimental evidence. This study selected a race against China′s national team athletes, the experiment of 9-week training and nutrition intervention at the same time and take blood samples before to research the influence of sports supplements on the blood indexes of snowboard athletes.

Keywords: Athlete, blood index, hematology, snowboard, sports supplements

INTRODUCTION

All athletes consider taking dietary supplements because they are looking for the "magic ingredient" to increase performance. In the extreme case of performance-enhancing supplements, athletes (particularly bodybuilders) may choose to use illegal substances such as anabolic steroids, compounds which are related to the hormone testosterone, which can quickly build mass and strength, but have many adverse effects such as high blood pressure and negative gender specific effects. Blood doping, another illegal ergogenic, was discovered in the 1940s when it was used by World War II pilots. Snowboarding is developed by the land slide project, due to the high risk and entertaining of the project, it is favored by extreme athletes. Development up to now, there have been more than 20 years of history and was classified as official event in Nagano Winter Olympics in 1998 (Ding, 2014). The competitive of snowboarding projects is increasing currently. With the improvement of the project competitive level in our country, sports load intensity and volume are much more than competition level. The current research about snowboarding fitness training project and the literature is very limited. Snowboarding exercise belongs to long period projects, in the long time snowboarding, the main materials that provide energy are sugar and fat, the characteristics of energy metabolism are it is mixed metabolize including aerobic metabolism, glycolysis and the ATP-CP these three function systems and mainly based on aerobic metabolism. In the process of aerobic metabolism of blood oxygen transport capacity is the main restrictive factors, improve oxygen transport capacity through means of nutrition including red blood cell morphology and hemoglobin content has a very important role in improving the level of training of snowboarding athletes. This experiment starting from the overall according to the characteristics of snowboarding (Li *et al*., 2014), providing snowboard athletes with comprehensive nutritional supplements, aims to study nutrition supplements complementary effect, speed up the intensive training and competition athletes body function recovery and improve, provide experimental basis to nutrition intervention of snowboard athletes to improve their sports performance scientifically.

This study will integrate theory with practice, to research how the sports supplements works on snowboarding project, to ensure timely understanding of the physical condition of athletes, scientific organizing training and competition and ensuring the training effect will increase steadily.

THE OBJECTS AND METHODS OF RESEARCH

The objects of research: There were 20 national male snowboarding athletes. They were randomly divided into two groups, a control group and a nutrition group, each group has 10 people.

The complement of sports supplements: Choose Hemofolic TM haem iron, l-carnitine capsule, glutamine capsule, lycopene, thistle saponin and Chang Bai Jing Xian ling as nutritional supplements of the snowboarding athletes. See the biological functions of each sports supplement in literature.

Every day, athletes take 5 pieces of heme iron flew TM; 2~5 grains of l-carnitine capsule one time, 2~3 times one day. The amount of glutamine capsule impact

Corresponding Author: Wu Guang Liang, Department of Physical Education, Renmin University of China, Beijing 100872, China

is 15 grains 1 day, after a week maintain the dose at 2~3 grains one time, 2~3 times 1 day. Lycopene 1 grain one time, 1 times/day. Athletes take tribulus terrestris saponins together with Chang Bai Jingxianling, they take two grains of thistle saponins for breakfast, lunch and dinner and take Jing Xian ling 1 branch every morning and night. The control group complement the same dose of a placebo, a total of 9 weeks.

Sports training project: Training project is shown in Table 1.

Blood routine test: Test before breakfast in every week choosing the data of the 1st, 3rd, 5th, 7th and 9th week, respectively for analysis. Instruments are Japanese Sysmex SF-3000 blood cell analysis instruments. Main test hematology indexes associated with aerobic endurance, including the RBC, HB, HCT, MCV, MCH, MCHC and RDW.

Data processing: The experimental data are processed using SPSS 12.0 statistics software and processing t test, the result of the experiment is shown by (X±S.D.).

Table 1: Exercise training project based on research

Phase division	Week	Agents type
First stage Base preparation period	1st	Attach most important to strength training, focusing on harmony exercise of the correlation strength and the coordination of body. Body flexibility training is given priority to preparation activities.
Second stage Ability promoting period	2~4	Gradually increase the workout and improve the athletes' aerobic capacity, special endurance training is given priority to.
Third period Periodic adjustment period	5th	Attach most important to relatively large intensity, the smaller amount of exercise training, conducting intermittent training; maintain the special ability of athletes.
Fourth period Consolidation and promoting period	6~8	Use the combination of continuous training, intermittent training and variable speed training methods and so on under high intensity to improve special abilities of athletes.
Fifth period Pre-game preparing period	9th	Decreasing the intensity load and exercise relatively, restoring the athletes' physical strength, avoiding the fatigue caused by training to ensure that the athletes have abundant physical strength in the competition.

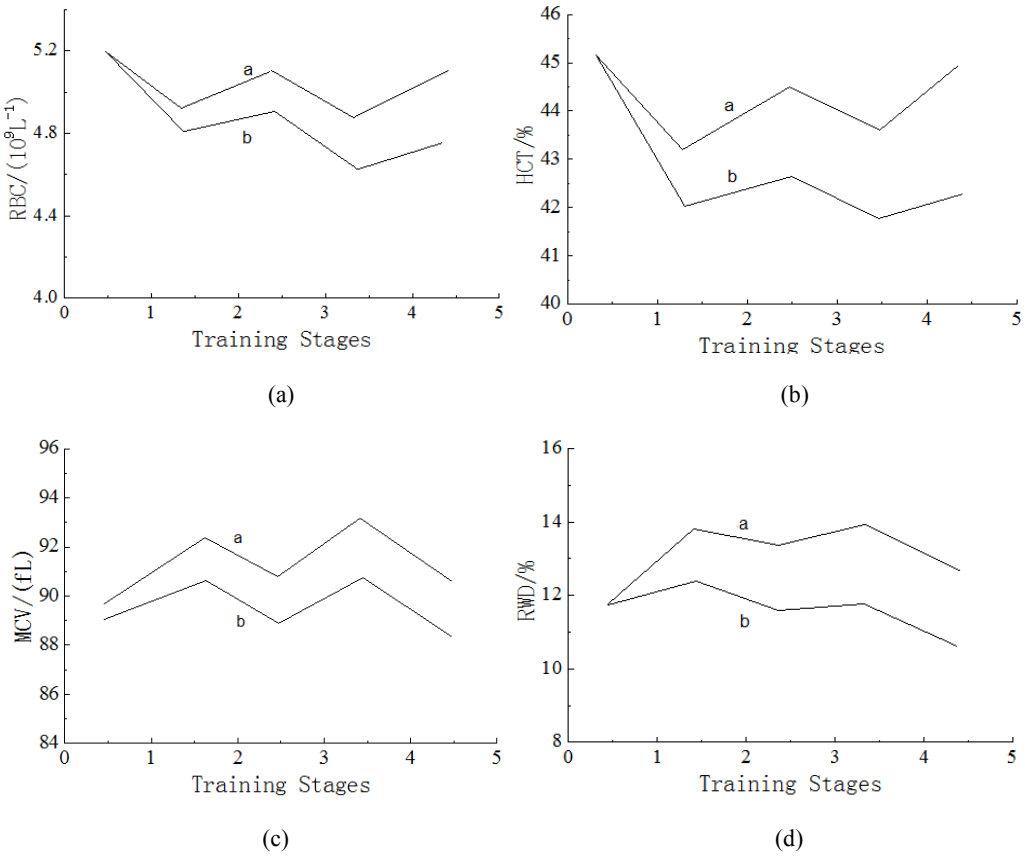

Fig. 1: Comparison of blood cell parameters in different training stages of supplement group and control group, (a) RBC, (b) HCT, (c) MCV, (d) RDW
a: Control group; b: Supplement group

RESULTS AND DISCUSSION

The related parameters of erythrocytes: The RBC, HCT, MCV and RDW contents of athletes in supplement group and the control group during different stages of training, are shown in Fig. 1.

It can be seen that different stages of training order supplement group and the control group, RBC, HCT, adapt to changing for the MCV and RDW values. Compared with the first stage, in the second and the fourth stage, RBC, HCT values have declined significantly ($p<0.05$). The third and fifth stage, RBC, HCT value also have the fall but there is no significant difference ($p>0.05$). The contents of MCV and RDW have significant difference ($p<0.05$) in the second and the fourth stage. The third and fifth order period of MCV and RDW values are rising but there is no significant difference ($p>0.05$). Executed in the same conditions of training program, to have the oxygen endurance sports ability has a positive effect, RBC, HCT two indicators in the supplement group were higher than the control group different training stage, the supplement group of athletes in the second, third, fourth and fifth stages RBC values don't compare on group rise at 2.10, 3.64, 2.37 and 6.19%, HCT rise at 2.25, 5.41, 2.25 and 7.81%, respectively have a negative effect of MCV and RDW two indicators in different stages of training supplement group were lower than the control group. Supplement group of athletes the MCV values in the second, third, fourth and fifth, respectively, compared with the control group at 1.73, 2.69, 3.58 and 3.38%, RDW were lower than the control group at 8.00, 8.00, 18.49 and 18.49%, respectively.

The content and related parameters of HB: Different training stages the contents of HB, MCH and MCHC of athletes in supplement group and control group appear suitable change. Compared with the first stage, the HB, MCH and MCHC value of second and fourth stages of decrease and there are significant differences ($p<0.05$); The third and fifth phase HB, MCH and MCHC value rise, some groups have significant differences ($p<0.05$). Under the condition of the same training, three indexes as HB, MCH and MCHC have positive effects on aerobic endurance exercise ability in different stages of training athletes in supplement group are higher than the control group.

Results:

Analyze on RBC and the change of relevant parameters: The normal content of male's RBC is $4.0*10^{12}$~$5.5*10^{12}$/L. The main physiological functions of red blood cells are that breathing carrier carrying oxygen from the lungs to each organization of the whole body and transporting CO_2 in organizations to the lung tissue and exhale out to the body. The HB released by Red blood cells after their destruction degradation in mononuclear-macrophage system. HCT is also called PCV, refers to the volume ratio of red blood cells in the blood. Under this experimental condition, the value of RBC and HCT of athletes which have positive effects on aerobic endurance exercise ability are both higher in supplement group than the control group in the second, third, fourth and fifth phases. The two indicators of MCV and RDW which have negative effects are lower in training supplement group than the control group in different stages, showing that various supplements have good effects of RBC and its parameters.

Analyzed on hemoglobin level and the change of relevant parameters: Agent is an advanced computing, if we compare with the traditional numerical analysis method. It not only provides modeling methods, but also gives solution of the problem. In particular, agent-oriented system may deal with complex interactions between environment and the robot. Now more and more people think that the intelligence of robot is increased in these interactions.

Discussion: Taken the studies together, compared with control group, the taken of different sports supplements compatibility can inhibit decline of RBC and its parameters caused by the intensive training, showing that compound supplements can prevent the oxidative damage and the ageing process of red blood cells, so as to protect the integrity of the red blood cell structure. Different sports supplements compatibility taking can inhibit the reducing of HB content and its parameters caused by the intensive training, compositing that supplements can promote the synthesis of the body of the HB, prevent the occurrence of athletes motility anemia, having a good effect on improving the level of the athletes' aerobic endurance exercise, improving the function of athletes' function condition.

Researches both at home and abroad show that, hemoglobin are closely related to nutrition rest and training intensity of athletes. When athletes can't appropriate with nutrition supplements, hemoglobin levels will tend to decline, especially during the period of high intensity training and competition, the athletes' hemoglobin content is influenced by the nutrition, exercise and rest loads. The normal factor for males is 120~160 g/L. Measuring the content of HB contributes to understanding the athletes' nutritional status, adaptation and body functions of load level and so on and so forth. This study under the same exercise intensity, The HB content of athletes in supplement group are higher than that of control group, showed a variety of supplement have played a good role to promote the synthesis of HB. The fifth stage compared with the first stage, supplement of HB content rises 6.69% which in the control group does 3.49% in the

supplement group. Compared with control group HB content rises 3.29%. MCH, MCHC and HB content have a similar change rule. The fifth stage compared with the first stage, supplement group, MCH, MCHC rise 9.88 and 6.08%, respectively, the MCH/MCHC of control group rise MCH/MCHC of 3.29/4.69%, respectively, supplement group. Its mechanism may be: lycopene has antioxidant function, which can prevent the oxidative damage and aging process of red blood cells, so as to prevent hemolysis of RBC and HB osmosis (Yan and Liu, 2002; Xiong and Liu, 2003; Liu, 2006; Mascio Di *et al*., 1989). Rhodiola hematopoietic progenitor cells and peripheral blood of mice have different blood components to stimulate hyperplasia, protect and repair functions. Huang Zengyan and other researchers have shown that rhodiola can obviously prolong swimming time in mice, significantly improve the level of HB (Jianqing *et al*., 1998). Experiments show that the long-term intensive training can cause the Hemoglobin (HB) content significantly lower ($p<0.05$), swallowing thistle extract can inhibit the trend, make the training rats HB content has significant rise (Xiong and Liu, 2004). Whey protein is basic raw material for the synthesis of protein and repair tissue, it can be mended and restore big movement HB damage intensity, stable in normal hemoglobin level. Composite supplements containing rhodiola and thistles can inhibit the HB concentration decline caused by intensive training; improve the function of the athletes, to adapt to the high intensity exercise training on the stimulation of the body. Heme iron and red blood cell formation and mature, into the young red blood cells in the bone marrow hematopoietic tissue, combined with porphyrin formation is blood red element, the latter again and globin synthesis of hemoglobin; Heme iron has a good promoting bone marrow hematopoietic and treat animals hemolytic and uncontrolled hemorrhagic anemia, are known to man is the most ideal for anemia drugs (Kun *et al*., 2008). Heme iron used cookies to iron fortified research of anemia, female college students, found that a moderate amount of female college students to increase the anemia of heme iron intake can obviously improve the nutritional status of iron, effective prevention and treatment of iron deficiency anemia (Zhong *et al*., 1995) in rat hemoglobin recovery of heme iron are experimentally studied with the function and biological efficiency of anemia, the results show that heme iron is good for anemia (Zhong and Ma, 1989). Due to a variety of supplements function complementary role player HB, MCH and MCHC values compared with control group, all have different degrees of improvement.

CONCLUSION

The HB, MCH and MCHC of Athletes in the second and fourth phases are relatively low intensity show that exercise intensity is heavier in these phases, the body consumption increases, the hemolysis of athletes are larger in the body, releasing more free hemoglobin, resulting in MCH and increase MCHC. Red blood cell aging shrinking at the same time, the volume decreases and MCHC increases, the viscosity increased. Red blood cell aging and oxidative damage, HB leakage happens, also can increase MCHC and then explain the two stages of red blood cells of aging and the aging. Man snowboarding players in the third and fifth phases of HB, MCH and MCHC recovered show the stages of exercise intensity smaller plus supplements the accelerated the recovery of the body. The mechanism may be to lycopene with antioxidant function, can prevent the oxidative damage and aging process of red blood cells, so as to prevent hemolysis of RBC and HB extravasation. Rhodiola hematopoietic progenitor cells and peripheral blood of mice have different blood components to stimulate proliferation, protect and repair functions. Rhodiola can obviously prolong swimming time in mice; significantly improve the level of HB. Long time intensive trainings are able to cause the Hemoglobin (HB) content significantly lower ($p<0.05$) in swallowing thistle extract can inhibit the trend, make training rats HB content have significantly higher ($p<0.05$). Whey protein is basic raw material for the synthesis of protein and repair tissue, can promote the synthesis of the body of the HB, the HB content stability in normal. Heme iron has a good promoting on bone marrow hematopoietic and treating animals' hemolytic and uncontrolled hemorrhagic anemia is ideal antianemic agents (Zhong *et al*., 1995).

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