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ORIGINAL

ANALYSIS OF THE APPLICATION OF ACTUAL COMBAT IN SANDA TRAINING BASED ON SPECIAL ENVIRONMENTAL SCENARIOS

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ABSTRACT

Sanda is a modern competitive sport in which two people use offensive and defensive techniques such as punches and legs in martial arts to overcome the opponent's unarmed confrontation according to certain rules. Sexual fighting items. In the game, Sanda players should adjust the game tactics at any time according to the situation of the opponent on the field, pay attention to the defense in the attack, and be able to seize the opportunity to give the opponent a fatal blow while defending. Therefore, in addition to having a good level of technical and tactical skills, Sanda athletes must also have sufficient physical reserves to ensure the normal performance of technical and tactical skills. Sanda competition has high requirements on the physical quality of Sanda athletes, so the body's three energy supply systems, ATP-CP system, glycolysis system and aerobic metabolism, play a vital role in the competition, among which the most direct and most important the energy supply for anaerobic glycolysis requires Sanda athletes to have higher lactate tolerance and lactate scavenging ability. With the development of the times, Sanda sports training has gradually moved from a single training study to a multidisciplinary scientific training. This paper takes 6 Sanda athletes as the research objects to track and test their physiological and biochemical indicators during the actual combat training in the plateau environment. The training provides an effective theoretical basis. During the plateau training, the hemoglobin and red blood cell index of the male Sanda athletes were well improved, which increased by about 10% compared with those before the plateau training, indicating that the aerobic capacity of the Sanda athletes was well improved.

KEYWORDS: Plateau Environment, Sanda Athletes, Actual Combat Training,

Blood Cell Index

1. INTRODUCTION

Sanda is an unarmed fighting event, and it is an important form of competition in Chinese martial arts. In the game, the two use traditional martial arts techniques such as kicking, hitting, throwing and other offensive and defensive techniques to defeat their opponents according to certain rules. In Sanda training, actual combat refers to a comprehensive confrontation in accordance with the rules of the game. Actual combat in special environmental scenarios refers to actual combat with limited conditions. According to different training purposes, different conditions are set for confrontation training to improve the actual combat ability of Sanda athletes in one aspect. In fighting events such as Sanda, actual combat in special environmental scenarios is one of the important training methods to improve the technical and tactical level of Sanda athletes. By studying the characteristics of actual combat training in special environmental scenarios, the important role of actual combat in Sanda training in special environmental scenarios and special environments The classification and application of actual combat in the scene, clarify the pertinence and purpose of training, enrich the teaching methods of actual combat in special environmental scenarios in Sanda training, and improve the competitive level of Sanda athletes (Teng et al., 2024). The actual combat in a special environment scenario is based on the condition setting and based on the actual combat confrontation, to improve the actual combat ability of Sanda athletes in a certain aspect. Adversarial is the fundamental attribute of actual combat training in special environmental scenarios, and its core is the confrontational training aimed at winning within the constraints. Compared with special training methods such as air strike training and target training, the actual combat in special environmental scenarios is a confrontation between people, which is reflected in the specified technology, time, venue and other conditions. Hit the opponent to win, and the confrontation is stronger, which is more difficult and closer to the game (Qu, 2015). For example, the whip leg technique is prescribed for actual combat training in a special environment. When both sides understand the attacking technique, the defense is more rigorous and the changes are relatively small. At this time, Sanda athletes need to find elements outside the framework such as footwork and fake movements to change. Look for fighter planes, if in this situation can successfully use the technology to hit the opponent and win, it will more effectively improve the Sanda players' ability to use the technology in actual combat. Compared with other training methods of Sanda, the actual combat training method in special environmental scenarios is more flexible and changeable. Different conditions are set according to different situations, and different conditions are set according to different problems. In competition and training, Sanda athletes will have ever-changing situations and problems, and in actual combat in special environmental scenarios, different situations will be set for training according to the

corresponding problems (Lei & Lv, 2022). With the development of the times, sports training has gradually moved from a single training science to a multidisciplinary scientific training. On the basis of mastering special training, coaches must also learn scientific monitoring methods to ensure that Sanda athletes will not experience overtraining and sports injuries while improving their special sports ability. An important tool in scientific training is also a necessary condition. In the form of numbers, coaches can intuitively understand the training effect and adjust the training plan in time, which can also quickly and effectively help Sanda athletes improve their athletic ability (Wan & Luo, 2014). The physiological and biochemical monitoring of sports training includes the monitoring of training load, the monitoring of the effectiveness and rationality of training methods, the monitoring of physical functions of Sanda athletes, and the monitoring of recovery methods and effects (Li, 2020; Liu et al., 2023). By observing the changes in physiological and biochemical indicators and aerobic exercise capacity of Sanda athletes during hypoxic preconditioning combined with long-term plateau training and subsequent plain training, this paper systematically studies the physical performance status of Sanda athletes combined with hypoxic preconditioning combined with long-term plateau training. influence (Ma & Dong, 2022). Through the research on the special training monitoring method of Sanda athletes' long-term high-altitude training, we will expand the methods of low oxygen training and high-altitude training in Sanda events, effectively improve the understanding of the rules of low oxygen and high-altitude training, and provide theory and practice for the improvement of Sanda sports competition level. Guiding significance. In this paper, 6 Sanda athletes were taken as the research objects, and some physiological and biochemical indicators were tracked and tested during the plateau training period and during the period after the plateau. to monitor and analyze the physical function changes of Sanda athletes in Anhui Province during high-altitude training and post-high-altitude training, and to understand and master Sanda athletes in the Change rules and characteristics of some physical and chemical indicators during plateau training and plains, and timely and accurately feedback the research results to the teaching and research team, so that coaches can understand the physical function of Sanda athletes at the first time, so as to continuously adjust and optimize the training plan. Through the exploration of the changes of physiological and biochemical indicators in plateau and plain areas, the change rules and characteristics of physiological and biochemical indicators during plateau training were explored, and an effective theoretical basis for the scientific training of Sanda exercise was provided. Chapter arrangement of this paper: The first chapter introduces the relevant scholars' research on sports training; the second chapter introduces the definition and indicators of training in the plateau environment; the third chapter introduces the six Sanda athletes as the research object. Various experimental metrics tested during altitude training; Chapter 4 summarizes the full text. The innovation of this paper: This paper systematically studies the

effects of hypoxic preconditioning combined with long-term altitude training on Sanda athletes by observing the changes in physiological and biochemical indicators and aerobic exercise capacity during the combination of hypoxic preconditioning and long-term plateau training and subsequent plain training. Influence of bodily functioning status.

2. Related Work

The actual combat training in special environmental scenarios can be classified according to different needs, different stages, condition settings, and different goals. Aiming at the stage can be divided into athlete primary training stage, intermediate training stage and competition preparation training and other stages. Actual combat in special environmental scenarios can also be classified according to conditional setting elements. Conditional elements are the basic units of actual combat in special environmental scenarios, including common techniques and tactics, time, opponents, venues, battle situations and other elements, and actual combat training in any special environmental scenario. It is necessary to set specific conditions for elements, and clarifying the conditions of each element can enrich the training methods of actual combat in special environmental scenarios and effectively improve the training level of athletes (Ma, 2017). Theeboom et al believes that in strength training, an intensity lower than 30% of an athlete's maximum strength has no training effect. Likewise, athletes should train with stimulation intensities exceeding 60% of their maximum capacity to obtain training effects that improve athletic performance (Theeboom et al., 2017). In his research, Yu G pointed out that martial arts technique is not only a method used by Sanda or other fighting athletes to defeat opponents, but also the main means of scoring, and this technique plays a key role in the performance of athletes. Therefore, the training content of fighting skills mainly revolves around whether to improve and improve the skills of athletes. These technologies are divided into offensive skills of athletes in competitions, defensive skills of athletes in competitions and counterattacks of athletes in emergency conditions (Yu, 2016). Huang X, University Z W defines the concept of offense as: in the game, athletes actively use techniques such as kicking, hitting, and throwing to attack the opponent, forcing them to be in a passive state. The concept of defense is defined as: in the game, athletes passively use technical methods such as moving and blocking to avoid and defuse the opponent's attack, protect themselves and prepare to attack the opponent's alert state. The concept of offense-defense transition is defined as: Sanda confronts the actual type of transition from offense to defense or from defense to offense (Huang & University, 2016). Huang C, Gui Y, Li Z, et al. believe that leg technique is one of the important scoring methods in Sanda competition, and the quality of leg technique directly affects the performance of the game. The whip leg and the side leg are important scoring techniques. Sanda competition is not a single slapstick

competition, nor is it a competition event where one or two leg techniques can determine the outcome. In normal training, leg techniques can be used as an athlete's dominant movement to strengthen training for the victory of the game. Lay the foundation, and it is unrealistic to rely on one or two leg techniques to win. Sanda sports is the embodiment of the comprehensive ability of athletes' boxing, legs and throwing techniques. It is impossible to score and win only by relying on the leg technique, and the leg technique scoring must be achieved under the coordination of boxing technique and throwing technique and good physical quality. The complementarity of various techniques is an important direction for the future development of leg score (Huang et al., 2011). Cynarski et al's research found that the scoring point of left and right straight punches is the most effective in actual combat, because it is the fastest and most direct attacking method. Among Sanda, boxing and Muay Thai, all three have comparative advantages in training. Boxing is stronger than Sanda and Muay Thai, Muay Thai is tougher than boxing and Sanda, and Sanda is in between. Compared with the left straight fist, the three right hand straight fists have a lot of the same parts. For the training of the right hand and the mastery of techniques, the three focus on the training of strength and speed, and they are all powerful points in the game (Cynarski et al., 2017). Yu 's elaboration on the concept of action speed of Sanda Action speed refers to the ability of the human body or a certain part of the human body to quickly complete a certain action. In the Sanda project, the action speed is an important part of its technical movement elements. shown in this form (Yu, 2013). Baker et al. believes that leg technique is one of the important scoring methods in Sanda competition. The quality of leg technique directly affects the performance of the game. Whip leg, kick leg and side leg are the three types that athletes use more frequently and have a higher success rate. Leg technique; Athlete's good physical fitness is a prerequisite for the effective use of various leg techniques (Baker et al., 2003). Alnaqbi think that the sports characteristics of Sanda players' rules themselves and the theoretical basis for formulating the rules of Sanda players' competition. It is believed that the formulation of the rules of Sanda players must rely on the inherent regularity of the skills of Sanda players, must conform to the laws of the market economy, must reflect the practical characteristics, and must reflect the national character (Alnaqbi, 2020)]. Schulzke believes that even the best athletes cannot learn all combinations of movements. The complexity and variability of combination movements determines that combination movements have great potential for development both in actual combat and in training. When formulating a training plan, high-frequency combined movement training for competition should be the main focus, supplemented by single movement training (Schulzke, 2017). By summarizing the above literature, we know that any sports project is implemented by relying on the contraction and relaxation of skeletal muscles, and any sports training is inseparable from the training of muscle strength. Muscle strength is an

important physical factor that determines athletic performance, and any improvement in athletic performance is inseparable from the improvement of muscle strength. In order to ensure high-quality completion of each round and each game, athletes need to have a higher energy supply capacity of the lactic acid glycolysis system and the energy supply capacity of the aerobic energy supply system. The level of anaerobic exercise ability of Sanda athletes is directly related to the performance of techniques and tactics on the field. Relevant scholars have done a lot of research on Sanda training methods, but they have not considered the environmental factors during training. Based on this problem, this paper studies the impact of sanda training in plateau environments.

3. Definition of Altitude Training and Physical Fitness Indicators

The competition characteristics and time characteristics of Sanda sports determine that this project is a mixed and alternate energy supply of the phosphogen system and the glycolysis system, with anaerobic energy supply as the main energy supply, supplemented by aerobic metabolism energy supply. The characteristics of Sanda sports determine that excellent Sanda athletes need to have outstanding energy supply capacity of phosphate and glycolysis. Sudden offense, defense and offense-defense transition all require the energy supply of their own phosphate system; in order to maintain Completion of each high-intensity game requires Sanda athletes to have a good glycolysis energy supply system and rapid recovery ability. Plateau training is to use an environment of drought, cold, low pressure and hypoxia between 1000m and 2700m above sea level. Under the action of sports training, Sanda athletes can withstand high altitude hypoxia and also deal with hypoxia during exercise. The stimulation of the body makes the body produce a strong stress response, thereby stimulating the greatest potential of Sanda athletes' bodies. Training in a plateau environment, due to the stimulation of low pressure and hypoxia, it is difficult for Sanda athletes to complete the exercise intensity prescribed by the coaches, so it is difficult for some Sanda athletes with anaerobic energy supply and explosive force to improve their professional ability. Due to the double hypoxia stimulation of hypoxia and training in the plateau environment, the oxygen-carrying capacity of the body's blood can be improved, so the maximum oxygen uptake is improved and finally the aerobic exercise capacity of Sanda athletes is improved. However, in specific practice, the stimulation of the high-altitude environment to the body is very complex, including low pressure, low temperature, high radiation and other factors. The success of altitude training is also affected by other factors, such as altitude, residence time, training schedule, altitude training experience, nutritional supplements, and competition time intervals. The mechanism by which altitude training improves the body's aerobic exercise capacity is shown in Fig 1.

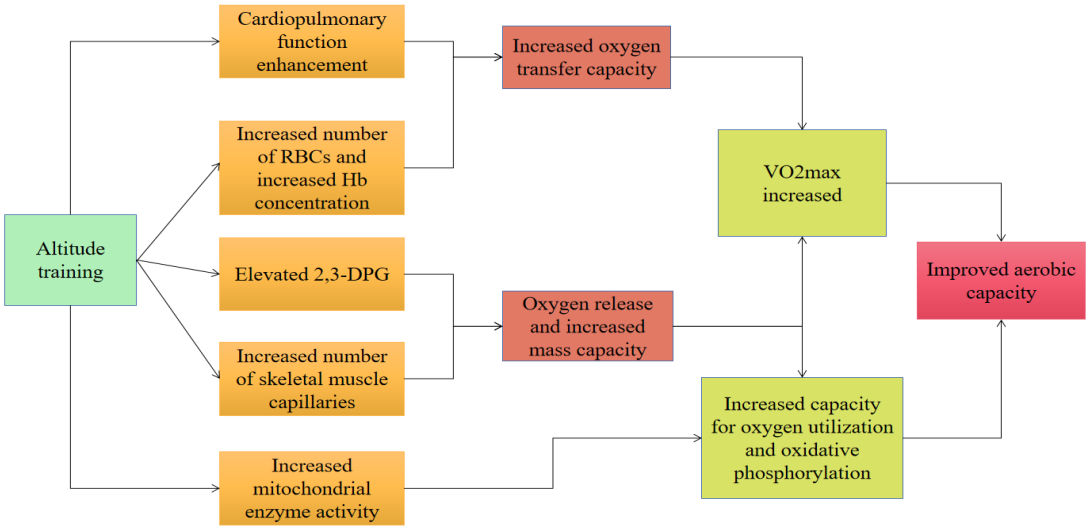

Figure 1: Mechanism of altitude training to improve aerobic capacity

In the early stage of high-altitude training, Sanda athletes will experience a certain degree of stress reaction process in the body, but most Sanda athletes last for a short time. A series of complex changes mainly include the improvement of oxygen transport capacity, the enhancement of the body's ability to use oxygen, the enhancement of tissue operation and the ability to use energy substances, the increase of capillary formation, and the increase of local blood flow through vasodilation. One of the main purposes of altitude training is to improve the aerobic metabolism of Sanda athletes. The mechanism may be that proper altitude training improves the cardiopulmonary function of Sanda athletes, increases the levels of RBC and Hb in the blood, which is conducive to oxygen transport. At the same time, 2, The increase of 3-DPG concentration is conducive to the release of oxygen, and the increase of skeletal muscle capillaries can improve the ability of tissues and cells to utilize oxygen, and the maximum oxygen uptake is increased. Changes in blood volume caused by prolonged altitude training, high altitude dehydration, loss of body fluids or drinking water may affect the changes in the concentration of EPO and other indicators in the blood. Changes in blood volume were calculated according to the values of Hb and Hct before and after exercise, and blood biochemical indexes were corrected. As shown in formula (1) and formula (2).

$$PV = 100 \times \left[\frac{Hb_1}{Hb_2} \times \frac{[1-Hct_2 \times 10^{-2}]}{[1-Hct_1 \times 10^{-2}]}\right] \quad (1)$$

$$Vc = Vm \times \left[\frac{Hb_1}{Hb_2} \times \frac{[1-Hct_2 \times 10^{-2}]}{[1-Hct_1 \times 10^{-2}]}\right] \quad (2)$$

In the living body, muscle contractions are innervated by the central nervous system. The impulses from the central nervous system to the muscles are arranged in rows and strings. A continuous shortening state that occurs

when a muscle receives a series of consecutive excitatory impulses or stimuli that are closely spaced apart from each other, called tetanic contractions. The strength of muscle tetanic contraction increases with the increase of stimulation frequency and stimulation intensity within a certain range. However, if the stimulation frequency and stimulation intensity are too large, the height of the muscle tonic contraction curve will be reduced, that is, the strength of muscle contraction will be reduced. Therefore, the load should be appropriate when performing strength training. Excessive training loads cannot achieve the intended training purpose. The increase in force can be obtained by changing either or both of the two factors, mass or acceleration, as shown in Equation (3) and Equation (4).

$$Fmax_{max} \tag{3}$$

$$Fmax_{max} \tag{4}$$

In practice, there is a negative correlation between the magnitude of the force and the speed of the force; similarly, there is a negative correlation between the force exerted by a Sanda athlete and the duration of the exertion. As a result, the exercise load and exercise speed in strength training are mutually restrictive. When one factor is strengthened, the other factor is weakened accordingly. High altitude environment training maximizes the effect of simulating hypoxia training. During training, it not only ensures that hypoxia will produce good adaptive changes to the blood system during high residence, but also ensures that hypoxia training can improve the body's exercise capacity (López-Miñarro et al., 2009).

4. Sanda Training Experiment in Plateau Environment

4.1 Indicator Test and Method

The research objects of this experiment are 6 Sanda athletes, whose basic information is shown in Table 1.

Table 1: Basic information of Sanda athletes

ATHLETE NUMBER	HEIGHT	WEIGHT	AGE	SPORTS GRADE
1	175	64	23	A
2	177	65	22	B
3	174	69	22	A
4	182	75	23	A
5	178	73	22	B
6	176	64	23	A

The first stage of plateau training is a one-week adaptation period. In this stage, aerobic training and physical fitness are the main components,

accounting for about three-fifths of the total training sessions. The purpose is to make the body fully adapt to the plateau hypoxic environment. The next training, in the special training, mainly focuses on consolidating technical movements, so as to make physical and psychological preparations for the subsequent intensive training. The second stage is the special-intensity load period. Most Sanda athletes have already adapted to the hypoxic environment of the plateau. At this stage, they begin to gradually increase their training volume. In this stage, add some moderate-intensity classes for a short period of time. The training intensity should reach the level of competition. The intensity and training methods are mostly based on actual combat and simulated actual combat. The third stage is the adjustment period. This stage is mainly to prepare the mental and physical functions of Sanda athletes for training and competition in the plains. The main purpose of this plateau training is to strengthen the cardiopulmonary function of Sanda athletes and improve the body's ability to carry oxygen and transfer oxygen; the second is to improve the body's acid resistance and oxygen utilization efficiency; the third is to train Sanda athletes in difficult conditions. mental toughness. Starting from the training purpose, the coaches arrange the training load based on the amount of exercise, and focus on the exercise intensity, and strengthen the training of the mixed aerobic ability of Sanda athletes. After getting off the plateau, the first week of entering the plain is to adjust and adapt to the training in the plain environment, generally mainly focusing on aerobic and technical training; through a week of adjustment and adaptation, gradually increase the training in the second- and third-weeks volume and training intensity. All blood samples in this experiment were collected by cubital vein vacuum blood collection. The advantage of the vacuum blood collection method is that the whole blood collection process is carried out in a completely closed state. The blood directly and automatically flows into the vacuum tube through the negative pressure in the vacuum tube, and pollution caused by blood spillage will not occur, and the vacuum blood collection tube is convenient for storage. and run. All the data in this paper are analyzed by computer software, which is expressed in the form of mean. The data are statistically analyzed by descriptive statistics, independent sample T test and one-way analysis of variance. When $P<0.05$, the significance level is considered. When $P<0.01$, it is very significant level; when $P>0.05$, there is no significant difference and no statistical significance.

4.2 Changes of Some Blood Cells After High Altitude Training

The red blood cell membrane is a lipid bilayer, so it has selective permeability, fat-soluble gas can pass freely, and negative ions and urea can also penetrate. Red blood cells also have the ability to deform, and in the process of blood circulation, it is convenient to enter and exit the pores of capillaries and blood sinuses. The main function of red blood cells is to transport oxygen and carbon dioxide for the body, and they are the main cells in the

pulmonary circulation. The production of red blood cells requires vitamin B2 and folic acid to participate in its DNA synthesis, and protein and iron are the basic raw materials for its synthesis. The average lifespan of red blood cells is about 120 days, and as they age, their deformability diminishes and they rupture easily. The level of red blood cells of Sanda athletes is higher than that of ordinary people, but continuous heavy exercise will cause damage to red blood cells. The changes of some blood cell indexes of Sanda athletes before and after high altitude training are shown in Table 2 and Fig 2.

Table 2: Test results of some blood cell indexes of Sanda athletes before and after plateau training

TIME	RED BLOOD CELLS (10^{12}/L)	HEMOGLOBIN (G/L)
FIRST WEEK	4.57	141.57
SECOND WEEK	4.91	153.02
THIRD WEEK	4.95	155.29
FOURTH WEEK	5.01	156.71
FIFTH WEEK	5.04	167.71
SIXTH WEEK	5.09	172.8
SEVENTH WEEK	5.19	174.4

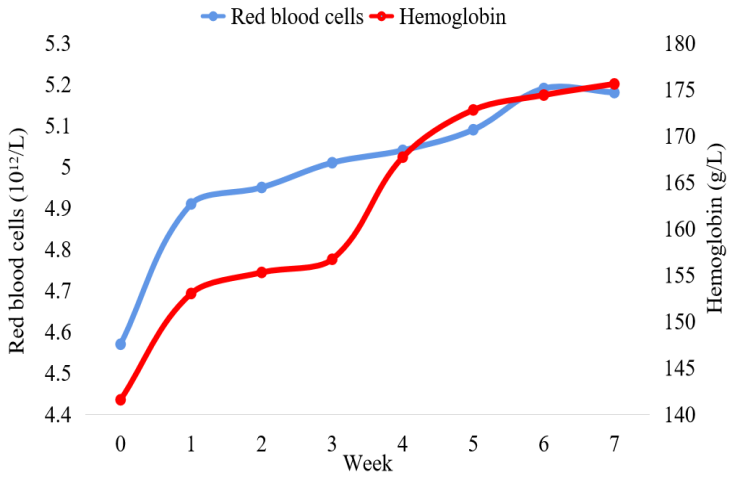

Figure 2: The test results of some blood cell indexes of Sanda athletes before and after plateau training

During high altitude training, Sanda athletes have increased blood cell indexes. The red blood cell count was higher than the basal value during the plateau training, and there was a significant difference, and it remained at a high level in the second week of the plateau, which was significantly different from the basal value. In the 1st, 3rd and 4th week of the plateau, the hemoglobin level was higher than the basal value, and there was a significant difference, and there was a very significant difference between the 3rd and 4th week and the basal value. week, the hemoglobin level decreased in the fourth week, but there was no significant difference.

4.3 Changes of Creatine Kinase and Blood Urea After High Altitude Training

The most essential function of skeletal muscle is to convert the chemical energy of the human body into mechanical energy expressed in the form of movement. Under the control of the motor center, the nerve impulses are transmitted to the skeletal muscles, and contraction and relaxation are generated through the sliding of the muscle filaments, thereby completing various movements. In this process, skeletal muscle needs the energy supply of ATP, so the activity of related enzymes is particularly important. The changes of creatine kinase before and after high altitude training are shown in Table 3 and Fig 3.

Table 3: Test results of creatine kinase and blood urea in Sanda athletes before and after high altitude training

TIME	CREATINE KINASE (U/L)	BLOOD UREA (MMOL/L)
FIRST WEEK	247.56	5.17
SECOND WEEK	275.73	6.48
THIRD WEEK	209.43	5.75
FOURTH WEEK	520.41	6.17
FIFTH WEEK	334.56	6.21
SIXTH WEEK	327.47	6.32
SEVENTH WEEK	334.84	6.37

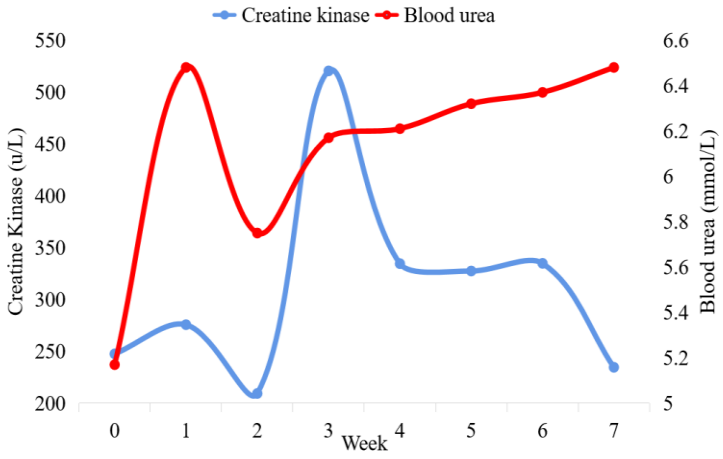

Figure 3: Test results of creatine kinase and blood urea before and after high altitude training for Sanda athletes

The creatine kinase of Sanda athletes changed greatly during high altitude training, reaching the peak in the third week, which was significantly different from the basal value, and then decreased in the 4th week, but still higher than the basal value, and there was no significant difference. In the first week and the 2. week compared with the base value, although there is an increase, but there is no significant difference.

4.4 Changes of Erythrocyte Index in Combination with Hypoxic Preconditioning Combined with Long-Term High-Altitude Training

The changes of Hb and RBC during plateau training are shown in Fig 4 and Fig 5.

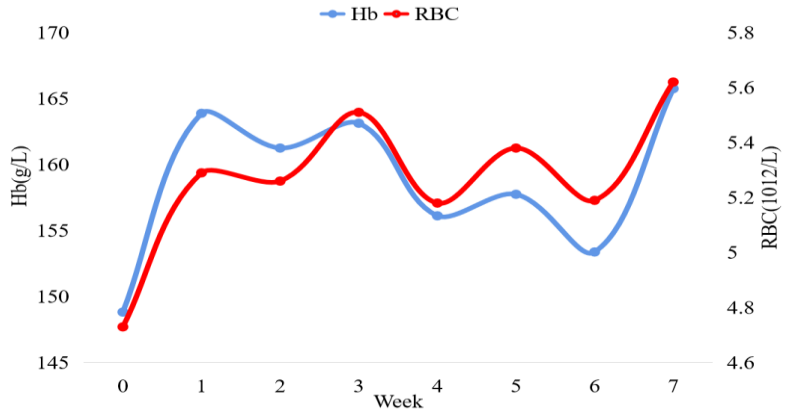

Figure 4: Changes of Hb and RBC

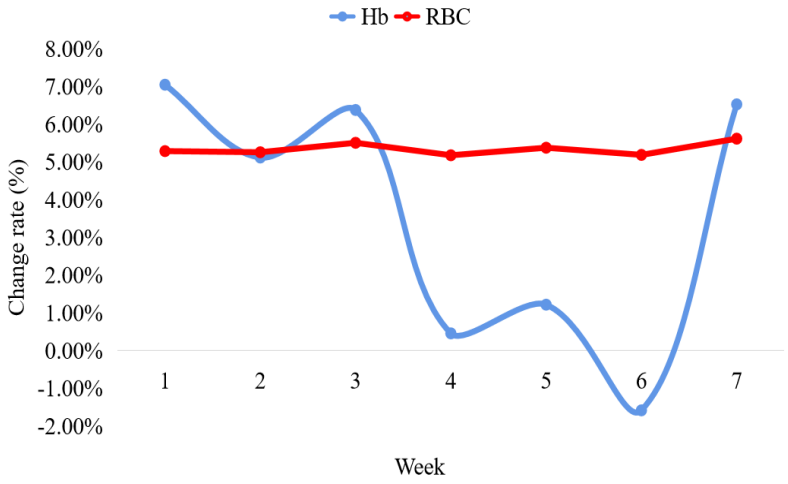

Figure 5: Hb, RBC rate of change

The overall change of Hb was wave-like, and it decreased significantly in the 3rd week of hypoxia, then increased, reached the highest value in this test in the 3rd week of plateau training, and then maintained a high state until the 3rd week of plateau training, and then decreased in the 4th week of plateau training. Before the hypoxia, it rose steadily, reaching the second peak in the 7th week of plateau training, dropping to the pre-hypoxia in the 1st week after the plateau, and reaching the third peak in the 2nd week. Overall, RBC rose after hypoxia, remained elevated throughout the plateau training period, and persisted until week 3 after lowering the plateau.

4.5 Changes in Body Indicators After Plain Training

The red blood cell and hemoglobin index test of Sanda athletes after

sub-plain training are shown in Fig 6.

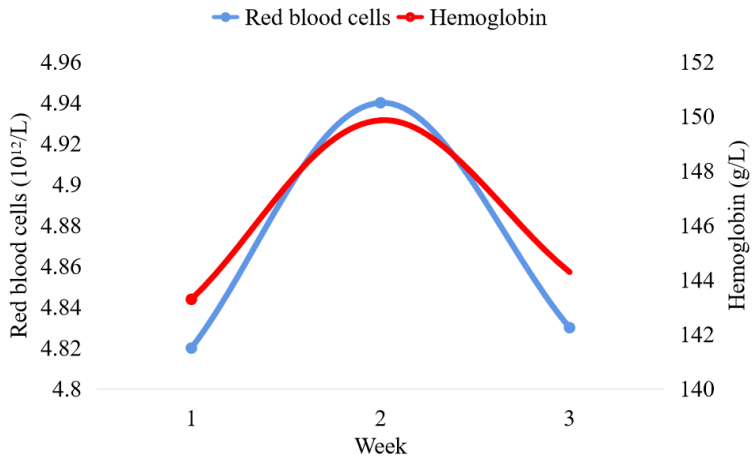

Figure 6: The test results of some blood cell indexes of Sanda athletes after sub-plain training

In the second week of the plain, the red blood cell count remained high, which was significantly different from the basal value. In the first week of the plateau, the hemoglobin level decreased in the fourth week of the plateau, but there was no significant difference. The changes of creatine kinase and blood urea after plain training are shown in Fig 7.

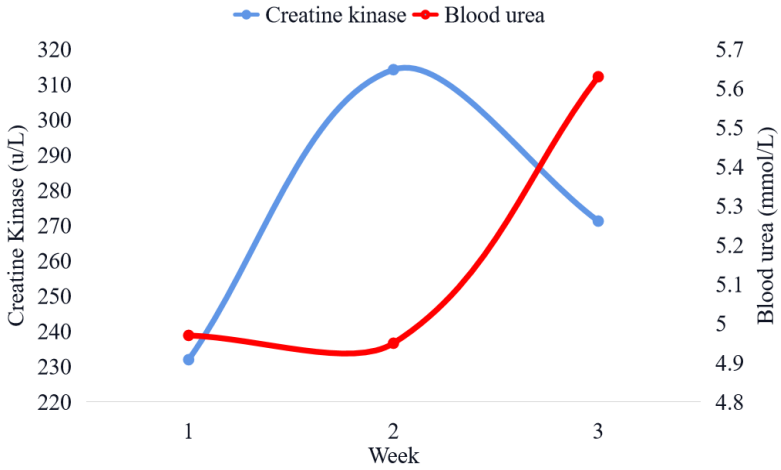

Figure 7: Changes of creatine kinase and blood urea in Sanda athletes after sub-plain training

The creatine kinase of Sanda athletes after plain training was increased compared with the baseline value in the first and second weeks, but there was no significant difference. The blood urea was lower in the first and second weeks, and increased after the third week. Training in the plateau hypoxic environment has a great influence on various indicators of blood cells in the body of Sanda athletes. It is one of the more sensitive indicators to evaluate the

changes in physical function of Sanda athletes. At the same time, the change of blood cell index is an important index to objectively reflect the oxygen-carrying capacity and nutritional status of the body. From the results of this study, the hemoglobin of male Sanda athletes rose rapidly after entering high altitude training, and reached a peak value in the fourth week. Speeds up the production of red blood cells. One week after the plateau training, hemoglobin decreased, but reached the highest value during the plateau training in the second week, and then decreased but remained higher than the baseline value in the third and fourth weeks, and there were significant differences. On the whole, the hemoglobin values during the plateau training and during the plateau training after going off the plateau are higher than the basic value on the plain, which may indicate that Sanda athletes have undergone a series of compensations in their body functions during the training in the plateau hypoxic environment. Respond to and adapt to training in different environments. After returning from the plateau to the plain, the physical function changes of Sanda athletes will show three peaks of ability over time, namely the peak of oxygen difference exercise after the first week of going down the plateau, the peak of functional exercise after the second week, and Athletic status is high after the third week. After returning to the plain after high altitude training, with the change of the environment, the physical function of Sanda athletes has also changed. The hemoglobin of the male Sanda athletes reached the highest value in the plain stage in the 2nd week after going off the plateau. It is possible that after a week of acclimatization training in the plain, the physical function of the Sanda athletes improved, the hemoglobin increased, and the aerobic capacity improved. Therefore, on this basis, starting to strengthen and supplement the special ability is of great help to improve the special competitive ability of Sanda athletes. In terms of the changes of red blood cells in this paper, the changes of red blood cells and hemoglobin are almost synchronous, starting to rise from entering the plateau, peaking in the fourth week, and then reaching the highest value during the plains in the second week of descending the plateau. On the whole, the red blood cells increased after the plateau training compared with the basic value of the plain, and there was a significant difference. Since hemoglobin is a protein inside red blood cells, it changes as the red blood cells change. Under the stimulation of the hypoxic environment at high altitudes, the concentration of erythropoietin in the body's blood increases, which promotes the production of red blood cells, which significantly increases the number of red blood cells in the body, which in turn strengthens the synthesis of hemoglobin, thereby improving the aerobic capacity of Sanda athletes. From the test results of the two indicators of hemoglobin and red blood cells, after four weeks of high-altitude training, the hemoglobin, red blood cells, and hematocrit of the body's red blood cell indicators all increased compared with the basic values of the plain, and there were significant differences. It shows that the plateau environment training has certain help to the improvement of the aerobic capacity of the male Sanda athletes, and the effect of this plateau

training is more obvious.

5. Conclusions

The Sanda project is basically a speed endurance type project with the main energy supply of phosphate and glycolysis, supplemented by aerobic energy supply. Due to the acidification of the intracellular environment of muscle cells caused by blood lactic acid, the output power of anaerobic endurance cannot be maintained for a long time, which affects the body's exercise ability. In order to overcome the adverse reaction of hypoxia in the high-altitude environment, the human body will produce a series of adaptations Sexual change, the increase of hemoglobin is an adaptive adjustment of the body to adapt to the plateau hypoxic environment. In a hypoxic environment, a large amount of EPO is secreted inside the body, which improves the hematopoietic function of the bone marrow and promotes the development and maturation of red blood cells, thereby increasing the hemoglobin and hematocrit. Hemoglobin is responsible for transporting oxygen, carbon dioxide and buffering blood pH in the body. Sanda athletes will produce a large number of acidic substances in the body during training, and the oxygen demand will also increase greatly, so the appropriate increase of hemoglobin and red blood cells plays a crucial role in improving the aerobic metabolism of Sanda athletes. During the plateau training, the hemoglobin and red blood cell index of the male Sanda athletes were well improved, which increased by about 10% compared with those before the plateau training, indicating that the aerobic capacity of the Sanda athletes was well improved. The Sanda athletes studied in this paper are in the plateau environment for only 7 weeks. The monitoring of the physiological and biochemical indicators of the Sanda athletes should be long-term and systematic. The indicators of athletes are compared longitudinally to find out the difference between plain training and plateau training for Sanda athletes, and make corresponding adjustments.

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