



The Effective of Specific Training Program to Improve Aerobic and Anaerobic Capacity in Wushu Sanda Athletes

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Abstract

Background and Aim: In martial arts sparring programs, athletes' specialized attributes include aerobic and anaerobic capacity. In contemporary Wushu sparring training, it is common to emphasize the need to achieve absolute strength, while often neglecting the specialized training of Wushu sparring. The lack of specialized training can lead to deficiencies in the practical combat ability of Wushu Sanda athletes. These deficiencies can adversely affect the athlete's overall athletic performance. This study aims to develop and implement a specific training program to improve aerobic and anaerobic capacity in Wushu Sanda athletes.

Materials and Methods: This study was an experimental study. The participants of this study can divided into 5 groups as follows: (1) To study the current situation and problems with the training program to improve aerobic and anaerobic capacity in Wushu Sanda, 60 Wushu Sanda athletes from the Guangdong Sanda team were invited to conduct a questionnaires survey, with the IOC value of 0.80, and 6 Wushu Sanda coaches were invited to conduct an interview, the IOC value for interview form was 0.8; (2) 7 experts invited to conduct expert interviews; (3) 12 experts were selected to conduct a focus groups for developing a special training program; (4) 7 experts were selected to evaluate and validate such special training program; (5) 60 Wushu Sanda athletes were participate in the experimental as a sample group. The experiment was conducted for 8 weeks of training and aerobic and anaerobic tests were performed before training, after week 4 of training, and week 8 of training to analyze and compare the data. In this research, mean, standard deviation, one-way ANOVA, and t-test dependent were used to analyze the data. The level of significant difference was 0.05.

Result: The results showed that after the experiment, there was a significant difference between the pre-test, after 4 weeks of training, and post-test of the VO₂max test and Wingate 30s test. The Wushu Sanda special training program designed by the researchers was effective in improving the aerobic and anaerobic capacity of the athletes.

Conclusion: It can be concluded that the aerobic and anaerobic capacity of Wushu Sanda athletes can be effectively improved through the special training of Wushu Sanda. In Wushu Sanda competitions, better aerobic and anaerobic capacity can help athletes achieve better results.

Keywords: Wushu Sanda; Specific Training Program; Aerobic Capacity; Anaerobic Capacity

Introduction

Wushu Sanda is one of the traditional sports in China, which has a wide range of social and competitive values. In the training process of Wushu Sanda, the improvement of aerobic and anaerobic capacity is crucial. Scientific and orderly special training in Wushu sparring can effectively improve aerobic and anaerobic capacity, which can better show the characteristics of the Wushu sparring program and is also the core factor of Wushu sparring competition to win over the opponent, and it is also an important guide for the rapid development of the competitive level of Wushu sparring program. Wushu Sanda is a high-intensity, high-confrontation sport, and aerobic anaerobic capacity is indispensable. Wushu sparring training can improve the aerobic working capacity of the human body, and the development of the aerobic working capacity of the human body should be emphasized in sparring training. (Zhang Guohai, 2005). In terms of anaerobic capacity, the instantaneous explosive power and anaerobic endurance of athletes are improved through high-intensity technical and tactical training. The endurance that serves as the greatest support in the course of a sparring match is anaerobic endurance, of which the one that plays an auxiliary support role is aerobic endurance. According to the proportion of energy supply during exercise, anaerobic energy supply accounts for about 85%, and aerobic energy supply accounts for about 15% of the sport of Wushu Sanda, anaerobic endurance training is crucial, and aerobic endurance training should not be neglected (Zhao, 2021).

Wushu Sanda athletes hold significant importance in both the cultural and athletic domains, contributing to the promotion and preservation of traditional Chinese martial arts. Through their



dedicated training and participation in international competitions, these athletes play a crucial role in elevating the global visibility and understanding of Wushu. As ambassadors of Chinese martial arts, their performances not only showcase exceptional physical skills but also embody the cultural and philosophical principles inherent in Wushu. Additionally, the endeavors of Wushu Sanda athletes contribute to fostering cross-cultural exchanges and enhancing international cooperation. This acknowledgment is supported by studies on the cultural impact of martial arts, highlighting the role of athletes as cultural ambassadors (Smith, 2018; Lee & Kim, 2020). The recognition and support of Wushu Sanda athletes are essential for the continued growth and preservation of this rich cultural heritage.

Wushu Sanda's special training needs to be improved. The current special training lacks creativity, which reduces the results of training and does not meet the pace of the times. The training program should be arranged reasonably, the attack and defense techniques should be clear, and it should reflect innovation and science. The aerobic and anaerobic capacity of sparring athletes has a very important role in the process of playing at their technical level, and the usual training must strengthen the aerobic and anaerobic capacity training, and at the same time, the training program should be improved according to the results of the aerobic test. To better scientific training, several relevant tests should be conducted between each training cycle to accumulate data and evaluate the training to achieve the optimal training effect (Chen, 2020). Therefore, this study aims at the effect of specialized training in martial arts sparring programs on improving the aerobic and anaerobic capacity of sparring athletes to win in martial arts sparring competitions. The designed special training program will not only enable athletes to achieve higher performance in Wushu sparring event competitions but also improve the competitive level of Wushu sparring athletes and make the development of the Wushu sparring program more perfect.

In contemporary Wushu sparring training, it is common to emphasize the need to achieve absolute strength, while often neglecting the special training of Wushu sparring. As a result, many Wushu sparring athletes have encountered a series of problems. The lack of specialized training can lead to deficiencies in the practical combat ability of Wushu sparring athletes, resulting in poor execution of specialized skills, lack of endurance, and explosive speed. These deficiencies can adversely affect the athlete's overall athletic performance. This study aimed to address this problem by focusing on the development and implementation of a training program specifically designed for the enhancement of aerobic and anaerobic capacity by specialized training in Wushu sparring, with the main objective of significantly improving the aerobic and anaerobic capacity of Wushu sparring athletes.

By analyzing the training of 30 Wushu sparring athletes from the Guangdong Province sparring team, a specific training program was utilized to provide theoretical references for future training of athletes and coaches. A set of excellent, reasonable, and scientific Wushu Sanda special training programs can better reflect the competitiveness and spectacle and is also the core factor for the success of the Wushu Sanda program.

This paper adopts the literature method, experimental method, mathematical statistics, and analysis method, and the main object is 30 Wushu sparring athletes from the Guangdong Province sparring team. After 8 weeks of specialized training in Wushu Sanda, these 30 Wushu Sanda athletes were tested again for aerobic and anaerobic capacity. The study analyzed the improvement and effect of aerobic and anaerobic before and after training. The comparison between before and after training fully proved that the Wushu Sanda training program can effectively improve the aerobic and anaerobic capacity of Wushu Sanda athletes.

Objectives

Main Objective

To study the effectiveness of specific training programs to improve aerobic and anaerobic capacity in Wushu Sanda athletes.

Subsidiary Objectives

1. To investigate the problem and obstruction of aerobic and anaerobic capacity in Wushu Sanda athletes.



2. To construct specific training programs to improve aerobic and anaerobic capacity.
3. To compare the aerobic and anaerobic capacity of Wushu Sanda sparring athletes before and after a specific training program.

Literature Review

1. *The significance and value of Wushu Sanda for young people*

Wushu Sanda is an important part of traditional Chinese culture, it can develop intelligence, and cultivate the spirit of hard work, perseverance, and self-improvement, so that the development of humility, tolerance, conscientiousness, progressive, and responsibility for good quality, shaping a perfect personality and strong physique, improve self-confidence. At the same time, it can also strengthen the body. Any physical exercise can improve the physical quality of young people and enhance the body's immunity, and Wushu Sanda sparring is no exception. Secondly, it can exercise children's limbs and increase muscle strength, so that children's muscles gradually become plump, strong, and powerful. Then it can also promote blood circulation, improve immunity, and reduce the number of illnesses. In general, youth Wushu Sanda sparring training is not only good for physical fitness, but also has great benefits for the child's intellectual and physical development, and helps to cultivate the child's positive, courageous, optimistic, healthy, and upward attitude towards life. Non-professional athletes and scientific training, can make young people physically strong and develop in a balanced way, to improve the overall physical quality of young people. Youth participation in Wushu Sanda sports can effectively improve the brain's ability to react, so that the body's endurance, coordination, flexibility, flexibility and good development, of the child's life will be very beneficial. Teenagers are in the development of the body and the maturity of the mind, practicing Wushu Sanda regardless of the exercise of the body of young people or the shaping of the personality a general sports program can not be compared to the role. Teenagers in the body's growth and development stage, especially elementary school students, are mostly between the ages of 6 to 12 years old, the bones and ligaments are soft, the joints have a large range of motion, are in the development of flexible qualities of the sensitive period of the Wushu Sanda is the flexibility of the body to exercise a certain requirement of the project, to seize the children of this sensitive period, so that they are in the process of practicing Wushu Sanda to improve the quality of flexibility of the body, and for the future to learn to exercise the other projects to lay a good foundation. Good foundation. During this period they are in the stage of physical growth and development, bone they are in the stage of growth and development of their bodies, and their bones are relatively soft, so the strength exercises should be based on overcoming their body weight, which can lengthen the pike muscles and improve the coordination of muscles and inter-muscles. Wushu Sanda in various forms of flip over and kicking the leg out of the fist and kick is in line with the requirements of children's strength exercises, these actions are on the development of the lower extremity explosive force, waist and abdominal strength and fast power, Wushu Sanda movements are rich, technically complex, the practice of action changes in a variety of fast and slow, just and soft, there are ups and downs, and there are static, and each action has its specific requirements. It is often an effective exercise content, so it is said that Wushu Sanda has a very good effect on improving the strength of all parts of the body of children.

Social changes have intensified the development of the times, which to a certain extent reflects the people's demand for life. In the context of the new era, the desire for a better life prompts people to focus on the pursuit of health. At the same time, the Outline of the "Healthy China 2030" Plan clearly points out that "the promotion of national fitness living supports the promotion of taijiquan, fitness qigong, and other national folklore and folk traditional sports programs." It makes clearer the special value of health for people in the context of the new era. Wushu as the most representative of traditional sports, with other sports, can not be compared to the advantages, born in the ancient times of the ancestors of the survival of the Wushu Sanda movement, its technical value is naturally placed in the first place, although with the development of the times of the people's demand for Wushu more or less there are differences, there is no denying that the value of the technical value of the Wushu is still the essence and the core of the wushu. Traditional Wushu Sanda emphasizes physical fitness and self-defense and focuses on the internal practice of "qi" in their gongfu methods. As the saying goes, "Train the sinews and bones externally, but train the breath internally", which is precisely the state of health



pursued by the Wushu Sanda from the inside to the outside of the body. In the interpretation of the separation of Wushu Sanda attributes, we can see that Sanda also possesses the ontological value and cultural connotation of Wushu Sanda. As a competitive sport of same-field confrontation, in the practice of Sanda techniques, the training of technical movements and pace transitions to a large extent helps to improve the body's core qualities such as strength, speed, and endurance. In addition, the hot development of the unarmed confrontation program in competitive sports has strengthened the value and status of Wushu Sanda in the context of national fitness. At the same time, analyzed from the sports perspective of Sanda, the intense confrontation can relieve people's pressure in daily life to a certain extent. After the inheritance of the Wushu Sanda spirit of "practicing three nines in winter and three volts in summer", Sanda is more capable of cultivating the strong will quality of individuals and realizing the pursuit of the value of the human body's function and connotation at two levels. (Bai, 2020)

2. The importance of aerobic and anaerobic capacity in Wushu Sanda sparring

Wushu Sanda is a kind of competitive sport integrating strength, speed, and skill, which not only has very high requirements for athletes' physical ability but also has strict standards for their skills and tactical thinking. Among them, aerobic and anaerobic capacity play a vital role in Wushu Sanda.

First of all, good aerobic capacity is crucial for sparring athletes. Aerobic exercise is supplied by aerobic, which mainly relies on glycogen and fat burning to provide energy. During competition, especially in long matches, aerobic capacity helps athletes maintain a steady speed and endurance, allowing them to remain strong in the second half of the match.

However, aerobic capacity alone is not enough. In sparring competitions, athletes need to instantly explode with great power, which requires their anaerobic capacity to back them up. Anaerobic training improves an athlete's muscular strength and explosiveness, allowing them to perform high-intensity movements quickly and in a short period.

In addition to improving physical fitness, aerobic and anaerobic capacity also have an important impact on the mental fitness of sparring athletes. On the one hand, with the improvement of aerobic capacity, athletes can better control their breathing and emotions, which allows them to keep calm and not be affected by unexpected situations during the game. On the other hand, the improvement of anaerobic capacity can make athletes more confident and braver, making them believe that they can cope with any challenges.

In conclusion, aerobic and anaerobic capacity in Wushu Sanda has an important influence on athletes' physical and psychological quality. Only through scientific training and continuous improvement of these two abilities can sparring athletes perform at their best and achieve excellent results in competitions.

Prof. Tian Maijiu mentioned Sanda as a confrontational sport in his "Theory of Item Group Training". Physical, technical tactical, psychological, and intellectual factors are the main factors in the process of confrontation between the two sides, and the combined level of these factors influences the athletes' competitiveness or ability to win. A good level of endurance is not only conducive to the performance of techniques and tactics but also allows SAND athletes to make timely psychological adjustments during the competition and effectively improve their sports intelligence. Therefore, whether or not the athletes have good endurance is one of the keys to determining the athletes' competitive ability in the sport. Good endurance quality can ensure that the original technical movements of Sanda athletes do not change shape and are easy to operate during a long period of Sanda training or competition. Each sport has its special endurance, and good endurance in sparring can maximize the protection of the whole body of sparring athletes so that they can face the pressure of special loads in competitions and training with a better physiological state, which is more conducive to the athletes to obtain excellent special achievements. If the endurance of the sparring players is categorized into aerobic endurance and anaerobic endurance, then the endurance that is the biggest support in the process of sparring is anaerobic endurance, and the one that plays an auxiliary support role is aerobic endurance. According to the proportion of energy supply during exercise, anaerobic energy supply accounts for about 85%, and aerobic energy supply accounts for about 15% of sparring,

anaerobic endurance training is crucial, and aerobic endurance training should not be neglected (Zhao, 2021).

3. Aerobic training

Continuous and prolonged aerobic endurance combination training can strengthen the muscles of the whole body, improve cardiorespiratory fitness, and help athletes to better cope with continuous intense movements during the competition. Wushu Sanda training can improve the aerobic metabolism of the body. Sanda exercise not only requires the body to have good anaerobic work capacity but also has high requirements for aerobic work capacity. This suggests that the development of aerobic capacity should be emphasized in sparring training. (Zhang & Ye, 2005)

4. Anaerobic training

Athletes are acclimatized to the stressful environment of competition and the practical use of aerobic and anaerobic capacity to improve their performance in high-intensity confrontation through simulation of real-life battles as well as real-life training. The aerobic and anaerobic capacity of sparring athletes has a very important role in the process of their technical level play, the usual training must strengthen the training of aerobic and anaerobic capacity, and at the same time, we should improve the training program according to the results of aerobic test. To better scientific training, several relevant tests should be conducted between each training cycle to accumulate data and evaluate the training to achieve the optimal training effect. (Chen, 2022).

Conceptual Framework

The conceptual framework for this research is as follows

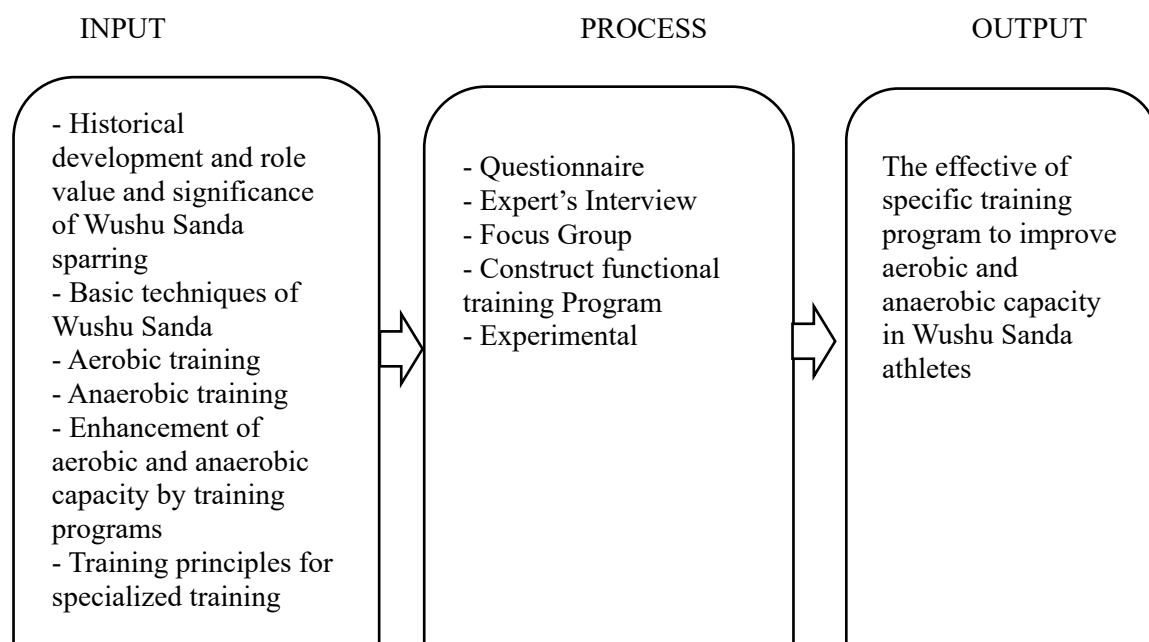


Figure 1: Conceptual framework of the research

Methodology

1. Research Tools

The research tools of this research are as follows: 1. questionnaire (IOC value = 0.8); 2. aerobic test; 3. anaerobic test; 4. specific training program developed by the researchers.

2. Population and Sample

The population of this research was 60 Wushu Sanda athletes from the Wushu Sanda training center in Guangdong province, all of whom were not Wushu Sanda non-professional athletes at the high school level, who were between 15-18 years old and 6 Wushu Sanda coaches.



The sample of this research: Aerobic and anaerobic capacity test was performed on 60 Wushu Sanda athletes, the test results were calculated to obtain the average value. 30 Wushu Sanda athletes whose test results were below the average were selected as the sample group for the experimental.

3. Data Collection

1. Questionnaire: Questionnaires were distributed to 30 Wushu Sanda athletes and through mailboxes, to study the current situation and problems with the special training program to improve aerobic and anaerobic capacity in the Wushu Sanda event. Questionnaire data were collected and analyzed.

2. 6 Wushu Sanda coaches were invited to conduct face-to-face interviews to examine the current status and problems of special training programs to improve aerobic and anaerobic capacity in Wushu Sanda programs.

3. Interviews with experts: 7 experts conducted expert interviews through face-to-face interviews to gain insights into the current situation and problems with aerobic and anaerobic capacity in Wushu Sanda and draft a framework.

4. Using focus groups with 12 experts to develop the special training program to improve aerobic and anaerobic capacity in the Wushu Sanda event.

5. Evaluation and refinement of the developed specific training programs by using the Connoisseurship method with 7 experts.

6. Experimental: Tests of aerobic and anaerobic capacity were applied to test 30 Wushu Sanda athletes before they had undergone a specific training program in Wushu Sanda and after 8 weeks of training. The experiment was conducted for a total of 8 weeks, every week, with 5 days of training per week, Monday through Friday, with training times of 9:00 a.m. - 11:30 a.m. and 3:00 p.m. - 5:30 p.m., each session lasting 150 minutes. Saturdays and Sundays are off, and testing is scheduled for every Monday.

7. Collecting data and writing summary reports.

4. Data Analysis

This study mainly used software packages to analyze the data.

4.1 Employed descriptive statistical techniques, such as calculating the mean (\bar{x}) and standard deviation (SD), to analyze the data collected from the questionnaire.

4.2 One-way ANOVA was conducted to analyze the results of the pre-test, after 4 weeks of training and post-test. The results of the study showed that there was a significant effect of implementing the training program after the pre-test.

4.3 T-test dependent was used to compare the results of (1) the pre-test and after 4 weeks of training; (2) after 4 weeks of training and post-test; and (3) the pre-test and the post-test, to assess the differences between one group.

4.4 When assessing the mean score derived from expert-provided information, the researcher utilized the Likert scale to ascertain the average measure score. The scale's evaluations range from 1 = Lowest, 2 = Low, 3 = Moderate, 4 = High, 5 = Highest. The score criteria details are outlined below.

Average score range	Meaning
1.00 - 1.79	Lowest
1.80 - 2.59	Low
2.60 - 3.39	Moderate
3.40 - 4.19	High
4.20 - 5.00	Highest

Results

1. Exploring the current situation and problems with the special training program to improve aerobic and anaerobic capacity in Wushu Sanda.

Questionnaire Analysis:



Table 1 Questionnaire for Wushu Sanda athletes

Questionnaire items	Totals		Result
	\bar{x}	S.D.	
Were you satisfied with the training site?	5	0	Highest
Suggestions for specialized martial arts training	3.8	0.98	High
Satisfaction with the duration of this training program	5	0	Highest
Satisfaction with the training facilities.	5	0	Highest
Does this Wushu Sanda sparring-specific training improve anaerobic capacity?	3.73	1.03	High
Does this Wushu Sanda-specific training improve aerobic capacity?	3.73	1.03	High
Do you understand aerobic and anaerobic capacity	3.33	0.94	Moderate
Can strengthening aerobic capacity improve the athletic ability of Wushu Sanda Athletes?	4.5	0.76	Highest
Whether enhancing anaerobic capacity can improve the athletic ability of Wushu Sanda Athletes.	4.5	0.76	Highest
Adequacy of coaches for this special training program.	3.63	1.22	High

Examination of the results of interviews with six Wushu Sanda coaches and a questionnaire survey of 30 athletes revealed that it was found that aerobic and anaerobic capacity in the Wushu Sanda program plays an important role in enhancing the athletic ability of Wushu sparring, lack of aerobic endurance will lead to a rapid decline in physical strength and slight energy supply shortage in the actual combat of the game, and the lack of anaerobic capacity will lead to a lack of explosive power in the actual combat of the game, and the anaerobic metabolism of a slow supply of serious shortage of energy. Therefore, special training should reflect its rationality, clear training direction, reflect the innovation of the special training program, after expert interviews, the current situation and problems of the special training situation of Wushu Sanda are as follows:

Single training content

At present, some coaches pay too much attention to single-skill training and neglect the overall development of athletes' physical quality when making training plans. This kind of training method easily leads to the uneven physical quality of athletes, affecting their performance in the game.

Unreasonable training load

Training load is a key factor affecting the improvement of athletes' abilities. However, some coaches fail to fully consider the individual differences of athletes when making training plans, resulting in too high or too low training loads, thus affecting the training effect.

Neglect of recovery training

In the process of high-intensity training, recovery training is equally important. Some coaches overly pursue training volume and neglect recovery training, resulting in the accumulation of athlete fatigue, which can easily lead to sports injuries.

Wrong teaching concept

In the process of teaching, some coaches emphasize too much on the "spirit of suffering" and neglect scientific training methods. This concept can easily lead to athletes' resistance to training, which in turn affects the training.

2. Results of constructing a special training program by Expert Focus Group

2.1 The process of constructing a training program

Develop the training outline by discussing with the experts and collecting the opinions of all experts.

Expert opinion

The opinions of the 12 experts in the focus group provided an important reference for the development of specialized aerobic and anaerobic capacity training in Wushu Sanda. When formulating the training plan, coaches should develop a scientific and reasonable training program according to the specific conditions of the athletes and the opinions of the experts. At the same time, coaches also need to pay attention to the athlete's physical condition and psychological state to ensure



the reasonableness and safety of training. Only in this way can the aerobic anaerobic capacity of the athletes be effectively improved, helping them to better fulfill their potential and achieve better competition results.

Evaluation and Adjustment: During the training process, the training effect needs to be evaluated regularly and appropriate adjustments need to be made according to the evaluation results. For example, if aerobic capacity is found to be insufficient, the proportion of aerobic training can be increased appropriately; if anaerobic capacity is found to be insufficient, the proportion of anaerobic training can be increased appropriately.

2.2 Results of constructing the training program

1. Elements of Wushu Sanda special training

Wushu Sanda is a sport that combines strength, skill, endurance, agility, and intelligence, which requires athletes to use a variety of offensive and defensive skills and practical strategies in the arena. To improve the specialized skills of Wushu Sanda, athletes need to master and apply a series of training elements. The specialized training of Wushu Sanda requires comprehensive consideration of physical, technical, tactical, psychological, and practical elements. Through scientific training programs and continuous efforts, athletes can continuously improve their special skills and achieve better results in competitions.

Table 2 Classification and content of specialized training

Classification and content of specialized training	
Basic training	Kicking, punching, wrestling, taking, defense and offense
Physical exercise	Training for cardiorespiratory fitness, building muscle strength, improving flexibility, and increasing reaction time.
technical training	Punching, kicking, wrestling, ground fighting, and defense techniques. Through repeated practice and real-world simulation, athletes can gradually master these techniques and utilize them flexibly in competition.
Tactical training	Analyze the strengths and weaknesses of opponents, develop suitable tactics for themselves, as well as adjust tactics according to the actual situation during the game. Through simulated matches and practical training, athletes can better understand and apply tactics.
Psychological training	Meditation, simulated race scenarios
On-the-spot training	Real-world confrontation for simulated matches

According to Table 2, the researcher sent the above information to 12 experts for the study and as a result, 12 experts unanimously approved this training content which can be used as the training content for this experiment.

2.3 Development of training program

Training is divided into four phases. The first phase is from October 7 to October 21, 2023, which is the basic training phase of Wushu Sanda kicking, hitting, wrestling, and taking. The second phase, from October 22 to November 6, 2023, is the aerobic special technique improvement phase, with aerobic endurance as the main goal based on the basic training in the first phase. The third stage is from November 7 to November 21, 2023, to strengthen the anaerobic special training, to increase the training difficulty by high intensity to interval training, and to improve the practical skills. The



fourth stage is from November 22, 2023, to December 7, 2023, mainly to improve the first three stages of mastery of the foundation and aerobic and anaerobic capacity for practical training.

Table 3 Training Program

Training time	Training purpose	Training content
Phase I October 7 to October 21, 2023	Consolidate basic kicking, punching, wrestling, and holding techniques	Training time: 150 minutes Aerobic training: 6 sets of 8-12 reps of each movement with 60 seconds rest between sets. Straight, swing, and hook punches, front stomps, side kicks, and whip kicks. Anaerobic: 6 sets of 6-10 reps per combination with 30 seconds rest between sets. Boxing and Kickboxing Small Combinations
Phase II October 22 to November 6, 2023	Improve aerobic capacity	Training time: 150 minutes Aerobic training: 8 sets of 10-16 reps for each movement, 60 seconds rest between sets. Boxing and kicking small combinations, dodging and shoulder touching training,
Phase III November 7 through November 21, 2023	Improvement of anaerobic capacity	Training time: 150 minutes Anaerobic training: 6 sets of 8 reps of each exercise with 15-30 seconds of rest between each combination. Boxing combinations, kicking combinations, punching and kicking combinations, dodging and shoulder touching training.
Phase IV November 22 to December 7, 2023	Consolidate and utilize aerobic and anaerobic capacity in Wushu Sanda combat.	Training time: 150 minutes Simulated combat: 3 sets of 8-10 shoulder touches with 20 seconds of rest per set. Combat: 3 games according to the rules

3. Evaluation Specific Training program by Connoisseurship Method

Table 4 Analysis of the training program using an expert questionnaire

Questionnaire items	Totals		Result
	\bar{x}	S.D.	
The formulated Wushu Sanda special training program is reasonable	5	0	Highest
The training duration of the special training program for Wushu Sanda is reasonable.	5	0	Highest
Is the exercise load of the special training program for Wushu Sanda reasonable?	5	0	Highest
The training program for Wushu Sanda is scientific.	5	0	Highest
The rest period during training in the special training program is appropriate	5	0	Highest
The special training program for Wushu Sanda can improve the athletes' aerobic capacity.	5	0	Highest
The special training program for Wushu Sanda can improve the athletes' anaerobic capacity.	5	0	Highest



Questionnaire items	Totals		Result
	\bar{x}	S.D.	
The training program appropriate for practical application in training Wushu athletes	5	0	Highest

Through Table 4, 7 experts analyzed the special training program for Wushu Sanda. 7 experts believe that Wushu Sanda's special training can effectively improve the aerobic and anaerobic capacity of athletes, so the special training program for Wushu Sanda developed at this time is acceptable.

4. Comparative results of the aerobic and anaerobic capacity of Wushu Sanda athletes before, after 4 weeks of training, and after 8 weeks of training with a special training program

Table 5 Results for maximal oxygen uptake

Period	VO ₂ max test mL/ (kg·min)	F Inspect		Multiple Comparisons
		F	P	
Pre-test	58.91±2.78	119.52	0.000	Post-test > Middle-test > Pre-test
After 4 weeks of training	59.13±2.73			
Post-test	59.60±2.70			

From the results of Table 5, it was concluded that after the experimental, there was a significant difference between the pre-test, after 4 weeks of training, and the post-test of the VO₂max test, $f=193.17$, $P<0.001$.

Table 6 VO₂ max test Multiple Means Comparison

Measurement sequence		Mean difference	Standard error	Significance b	95% confidence interval for the difference b	
					Lower limit	Limit
1	2	-0.220	0.029	0.000	-0.292	-0.148
	3	-0.68	0.060	0.000	-0.839	-0.534
2	3	-0.467	0.042	0.000	-0.573	-0.360

Table 6, shows multiple means comparison of the VO₂max test, and the comparison between the pre-test, after 4 weeks of training, and post-test were all significantly different, with a significance of $P<0.001$ for all of them, which indicates that the VO₂max test was significantly elevated in both phases of the experimental intervention process.

Table 7 Results for peak anaerobic power

Period	Wingate 30s test W	F Inspect		Multiple Comparisons
		F	P	
Pre-test	1320.17±186.41	139.554	0.000	Post-test > Middle-test > Pre-test
After 4 weeks of training	1411.893±243.54			
Post-test	1494.82±253.90			



From the results of Table 7, it was concluded that after the experimental intervention, there was a significant difference between the pre-test, after 4 weeks of training, and post-test of the Wingate 30s test, $f=193.17$, $P<0.001$.

Table 8 Wingate 30s test Multiple Means Comparison

Measurement sequence	Mean difference	Standard error	Significance b	95% confidence interval for the difference b	
				Lower limit	Limit
1	2	-109.726	13.506	0.000	-144.044 -75.409
	3	-192.654	16.308	0.000	-234.092 -151.216
2	3	-0.467	0.042	0.000	-0.573 -0.360

Table 8, shows that multiple means comparison Wingate 30s test, the comparison between the pre-test, after 4 weeks of training, and post-test have a significant difference with significance of $P<0.001$ for all of them, which indicates that there is a significant enhancement of the Wingate 30s test in both phases of the experimental intervention process.

Experimental Summary

From the experimental results, it can be concluded that the aerobic and anaerobic capacity of Wushu Sanda athletes can be effectively improved through the special training of Wushu Sanda, which prompts the athletes' sports level to improve as well. In Wushu Sanda competitions, better aerobic and anaerobic capacity can help athletes achieve better results. During the experiment, it was found that the special training of Wushu Sanda can significantly improve the aerobic and anaerobic capacity of athletes. Therefore, it can be concluded that the experimental results are in line with the set of hypotheses.

Conclusion

This research conducted an 8-week training experiment on 30 Wushu Sanda athletes through the designed Wushu Sanda special training program, and the experimental results fully proved that the Wushu Sanda special training can effectively improve the aerobic and anaerobic capacity of sparring athletes, which is in line with the hypothesis of this paper.

Discussion

The results of the study showed that the specific specialized training program had a significant improvement effect on both the aerobic and anaerobic capacities of the sparring athletes.

This is mainly attributed to the rationality and specificity of the training program. In terms of aerobic capacity, the cardiorespiratory function of the athletes was significantly improved by prolonged low-intensity aerobic exercise; this is consistent with the findings of Zhang & Ye, (2005) who concluded that Wushu Sanda training can improve the aerobic working capacity of the human body and that the development of the aerobic working capacity of the human body should be emphasized in sparring training.

In terms of anaerobic capacity, the instantaneous explosive power and anaerobic endurance of the athletes were improved through high-intensity technical and tactical training. Zhao (2021) pointed out that endurance which is the biggest support in the process of sparring is anaerobic endurance, and the auxiliary support is aerobic endurance. According to the proportion of energy supply during the exercise, anaerobic energy supply accounts for about 85% and aerobic energy supply accounts for about 15% of the sport of sparring, so the training of anaerobic endurance is crucial, and the training of aerobic endurance should not be neglected.

Wushu Sanda's specialization training needs to be improved. The current special training lacks creativity, which reduces the results of training and does not meet the pace of the times. The training program should be organized reasonably, and the attack and defense techniques should be clear and should reflect innovation and science. This is consistent with the conclusion of Chen (2020) that the





aerobic and anaerobic capacity of sporadic athletes has a very important role in the process of their technical level of play, and the usual training must strengthen the training of aerobic and anaerobic capacity, and at the same time improve the training program according to the results of the aerobic test. To better scientific training, several relevant tests should be conducted between each different training cycle to accumulate data and evaluate the training to achieve the optimal training effect.

The conclusions drawn by the above three authors have similarities with the conclusions of this paper, and all of them proved that the specialized training of Wushu Sanda can effectively improve the aerobic and anaerobic capacity of athletes.

Recommendation

1. Optimize the training content: In the special training plan of Wushu Sanda, the comprehensive development of athletes' physical quality should be fully considered, and aerobic and anaerobic training should be combined to improve the overall quality of athletes.

2. Reasonable adjustment of training load: Coaches should adjust the training load reasonably according to the individual differences of the athletes to ensure the training effect while avoiding over-training.

3. Strengthen the recovery training: In the process of training, coaches should pay attention to the recovery training, and reasonably arrange the training and recovery time, to reduce the risk of fatigue accumulation in the athletes.

4. Updating teaching concepts: Coaches should update their teaching concepts, learn advanced training methods, and emphasize the cultivation of athletes' psychological quality to improve the training effect.

Further Research

1. The relationship between aerobic and anaerobic capacity in specific training programs will be conducted research.

2. The relationship between aerobic and anaerobic capacity in the supply of energy in the Wushu Sanda program will be researched.

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