EFFECTS OF TAI JI ON THE PHYSICAL HEALTH OF FEMALE UNIVERSITY STUDENTS

EFEITOS DO TAI CHI CHUAN SOBRE A SAÚDE FÍSICA DAS ESTUDANTES UNIVERSITÁRIAS

EFECTOS DEL TAICHI CHUAN EN LA SALUD FÍSICA DE LAS ESTUDIANTES UNIVERSITARIAS

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ABSTRACT

Introduction: Tai Ji is a martial art rich in traditional Chinese ethnic characteristics. Its flexible, free and open movements make its practice popular and esteemed by many female college students. However, there is a demand for experimental research on the impacts of the art on the physical and mental health of its college practitioners. Objective: Verify the effects of Tai Ji practice on the physical health of university students. Methods: This study used the methods of literature, experimental and mathematical statistics, through the influence of Tai Ji style number 24 on the physical health of female university students in different groups. Results: The research shows that under the intervention of this style, with the same content, intensity, and time of exercise, the physical health of female college students in the low-fitness group was significantly improved. Conclusion: Female college students in the medium and high fitness group improved their physical health indicators due to their physical preconditioning. ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Tai Ji; Therapy, Exercise; Student Health; Female.

RESUMO

Introdução: O Tai Chi Chuan é uma arte marcial rica em características étnicas tradicionais chinesas. Seus movimentos flexíveis, livres e abertos fazem com que a sua prática seja popular e estimada por uma ampla gama de estudantes universitárias. Porém, há uma demanda de pesquisas experimentais sobre os impactos da arte sobre a saúde física e mental de seus praticantes universitários, no intuito de conduzir e orientar os seus praticantes durante a realização dos eventos esportivos. Objetivo: Verificar os efeitos da prática de Tai Chi Chuan sobre a saúde física das estudantes universitárias. Métodos: Este estudo utilizou os métodos da literatura, experimental e estatística matemática, através da influência do Tai Chi Chuan estilo número 24 na saúde física das estudantes universitárias femininas em diferentes grupos. Resultados: A pesquisa mostra que sob a intervenção desse estilo, com o mesmo conteúdo, intensidade e tempo de exercício, a saúde física de estudantes universitárias do sexo feminino no grupo de baixa aptidão física foi significativamente aprimorada. Conclusão: Estudantes universitárias do sexo feminino no grupo de aptidão física média e alta melhoraram seus indicadores de saúde física devido ao seu pré-condicionamento físico. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

***Descritores*:** *Tai Chi Chuan; Exercício Terapêutico; Saúde do Estudante; Feminino.*

RESUMEN

Introducción: El Taichi Chuan es un arte marcial rico en características étnicas tradicionales chinas. Sus movimientos flexibles, libres y abiertos hacen que su práctica sea popular y apreciada por un amplio abanico de estudiantes universitarios. Sin embargo, existe una demanda de investigación experimental sobre los impactos del arte en la salud física y mental de sus practicantes universitarios, con el fin de conducir y guiar a sus practicantes durante los eventos deportivos. Objetivo: Verificar los efectos de la práctica de Taichi Chuan en la salud física de estudiantes universitarios. Métodos: Este estudio utilizó los métodos de la literatura, experimental y estadística matemática, a través de la influencia de Taichi Chuan estilo número 24 en la salud física de las estudiantes universitarias en diferentes grupos. Resultados: La investigación demuestra que, bajo la intervención de este estilo, con el mismo contenido, intensidad y tiempo de ejercicio, mejoró significativamente la salud física de las estudiantes universitarias del grupo de baja forma física. Conclusión: Las estudiantes universitarias del grupo de aptitud física media y alta mejoraron sus indicadores de salud física gracias a su preacondicionamiento físico. ***Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.***

***Descriptores*:** *Taichi Chuan; Ejercicio Terapéutico; Salud del Estudiante; Femenino.*

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INTRODUCTION

Taijiquan is an excellent national cultural heritage in China. It is not only a traditional folk sport, but also a fitness method that can prevent and cure a variety of diseases. It is an excellent boxing type in the treasure house of martial arts in China.[1] It comprehensively inherited and developed the Ming dynasty in the folk and army popular boxing, combined with the ancient "guide" and "spit", and absorb the classical philosophy of Yin and Yang and the basic theory of traditional. The 24

Type Taijiquan was adapted by the National Sports Commission in 1957 on the basis of Yang Style Taijiquan. It compiles the main movements of Yang Style Taijiquan together, which can be said to be the refined Yang Style Taijiquan. It has the characteristics of scientific, simplified, adaptive, once mastered lifelong benefit.[2] The 24-type Taijiquan movements are round, stable, slow and coherent, relaxed, smooth, relaxed and natural, rigid and soft. In the exercise process, it involves various muscle groups and joints of the body. Therefore, 24 type tai chi not only inherit T traditional tai chi has "brain, gas, body" three functions, contains fitness, heart and disease prevention and treatment effect, but also has a simple, easy to learn, easy to practice, easy to promote, not by age, gender, venue, time limit: namely everyone can practice, always can practice, can practice everywhere.[3] Everyone can practice; namely, the elderly, middle-aged people, children, men, women, patients, pregnant women, Chinese people, and foreigners can also practice. Always can practice; Taijiquan is not the martial arts, but the whole national fitness.[4] Therefore, after getting up early, you can practice before going to bed, and you can also practice after work. Practice everywhere; whenever the air is fresh, practice is possible in the mountains, rivers, parks, playground, auditorium, corridors, courtyards, and even at home.[5]

Taijiquan is a cultural form rich in Chinese traditional ethnic characteristics. It has a strong openness's.[6] Its movements are flexible, generous, free, and not restricted to the form. It is a traditional national sports with great exercise value, and it is popular and loved by a wide range of female college students.[7] Previous studies have shown that Taijiquan exercise can effectively improve the physical and mental health of female college students, but few studies have confirmed whether the physical quality can achieve the same sports effect with the same exercise content, the same exercise intensity and the same exercise duration under the individual differences affected by congenital heredity and acquired multiple factors. Based on this, experimental research on the impact of Taijiquan on the physical and mental health of female college students is conducted to correctly guide female college students to carry out effective sports events and accurately formulate exercise prescriptions, so as to improve the physical and mental health level of female college students.[8] Therefore, this study for the present situation of female college students fitness and physiological development characteristics, will be scientific, comprehensive, adaptive, set "brain, gas and body" three role of 24 tai chi as the main content of exercise prescription, from Shandong normal university sophomore students randomly selected 68 healthy girls (age 20.121.08) and randomly divided into experimental group (n=37) and control group (n=31) for six months of comparative experiments.[9] Observe and compare the multiple physiological indicators of the two groups of students, in order to provide some exploratory references and suggestions for the popularization and promotion of the 24-style Taijiquan among female college students.[10]

Research object and research method

Subjects of study

In this experiment, 68 healthy female students from the second grade department of Shandong Normal University were randomly selected and divided into experimental group and control group. For 68 female college students in the control and experimental group, the four physical qualities were 95.6%. Never learned 24-style Taijiquan. The control group had a normal study and life. The experimental group first learned the 24-style Taijiquan (using PE class and spare time) and then mastered the movements, and began the tracking training.

The study is Purely observational studies which no need to registry ID of ICMJE, and all the participants were reviewed and approved by Ethics Committee of Hainan Tropical Ocean University, China (NO. 2021021)

Research Methods

Literature review: According to the research needs of this subject, more than 50 pieces of Taijiquan and fitness were collected in the library of Shandong Normal University, Shandong Normal University Physical Education College, Shanghai Sports Institute Library and Liaocheng Normal University Library, and the documents were summarized and classified.

Mathematical statistics method: the data measured by various indicators before the exercise is processed by Spas11.5 statistical software, and the paired test method in the 1 test is used. Statistical results took $p < 0.05$ as the significant difference, $p < 0.01$ as the very significant difference, and $P > 0.05$ as the nonsignificant difference.

Teaching experiment design

Selection of test indicators: cardiopulmonary function indicators: pulmonary capacity, maximum oxygen intake, heart rate, cardiac output, cardiac output, blood pressure (systolic pressure, diastolic pressure), pulse pressure difference, mean arterial pressure, peripheral resistance, vascular compliance, blood viscosity.

Body composition indicators: body fat weight, no-fat body weight (lean body weight), body weight.

Muscle strength index: right hand grip strength.

Flexibility index: sitting body forward flexion.

Sports: 24 type Taijiquan

Practice group: 37 healthy female students in the sophomore year.

Exercise intensity: aerobic exercise, moderate downintensity, calculated at 60 to 70% of the highest heart rate. At the same time, students' feelings are measured and recorded through subjective feelings.

Exercise Frequency: 31 and 5 times a week (on Monday afternoon, Tuesday morning, Wednesday morning, Wednesday afternoon, Thursday evening, Saturday morning).

Practice time: 40 to 80 minutes per time

Auxiliary exercise: Tai Chi exercises and Tai Chi training exercises.

Time of exercise prescription implementation: samples were selected in mid-May 2002 for electrocardiogram and lung function index test; 24 Taijiquan teaching from late May to late June. From August 2002 to January 2003, the 24-type Taijiquan exercise prescription training was implemented.

Note: Each practice in a comfortable and quiet environment. When practicing, always keep the correct posture and a happy and relaxed state of mind, pay attention to the coordination between mind and breathing, as well as the order of power to exercise. First practice, use the nose breath, mouth breath, breathing should be natural, uniform, slow. With the skilled action, try to use abdominal breathing, that is, qi sink field and field rotation method. Every student should persevere and try to stick to it to the end.

Experimental result and analysis

cardio-pulmonary function

As can be seen from Table 1, after six months of Taijiquan training, pulmonary output, heart rate, cardiac output, cardiac output, peripheral resistance, vascular compliance, systolic blood pressure, diastolic blood pressure and maximum oxygen intake ($p < 0.05$) between the systolic blood pressure, heart pressure, heart rate, cardiac output, maximum oxygen intake and blood. The three indexes of tube compliance increased significantly before and after, while the blood viscosity decreased, but it was not statistically significant. Up or down, but not statistically significant ($p > 0.05$), only the peripheral resistance was significantly increased.

Table 1. Comparative analysis of the cardiopulmonary function.

Indicators	Control group			Experimental group		
	First time	Second time	P	Pre-experiment	After the experiment	P
VC (ml)	2646.9±471	2685.6±4.18	#	2900.67±429	3051.88±401	*
VO_2max (l/min)	1.84±0.22	1.88±0.25	#	2.02±0.31	2.11±0.29	*
HR (beat/min)	73.82±9.2	73.72±9.4	#	79.09±10.15	74.33±9.06	*
SV (ml/beat)	69.71±12.6	63.75±13.1	#	66.27±18.2	56.21±15.2	*
CO (l/m)	5.05±0.72	4.65±1.02	#	5.12±1.05	4.06±0.85	*
PS (kpa)	13.59±0.75	13.32±1.5	#	14.22±1.4	13.0±1.2	*
PD (kpa)	8.20±0.93	8.31±0.83	#	9.69±1.80	8.58±0.85	*
TPR (pru)	0.90±0.19	1.01±0.23	#	0.96±0.22	1.14±0.28	*
AC (ml/mmhg)	1.81±020	1.77±0.18	#	1.65±0.25	1.76±0.24	*
V (cp)	3.99±0.25	4.08±0.26	#	3.84±0.34	3.81±0.34	*

Note: # p> 0. 05 * p <0. 05.

Changes in the physiology of the subjects before and after the experiment

Taijiquan exercise is mainly about qi in practice. Requirements of "containing chest pull back", "qi sink Dan field", the use of deep and long abdominal breathing, can make the diaphragm rhythmically increase up and down the movement, so that the alveoli can fully play a role, absorb more oxygen, so that the chest is wide and static, the abdomen is full. Improve the persistence of respiratory function, improve lung ventilation function, and increase vital capacity. When tai Chi practice, it is required to get top strength, sink shoulders and fall elbow, relax finger sitting wrist, include chest pull back, loose waist and hips, loose hips and open crotch, wrap knees and grasp feet, etc. Thus, the sympathetic nerve excitation that governs and regulates the internal organs is weakened and the excitability of the vagus nerve is enhanced, and the blood volume in the stored blood bank is better mobilized to strengthen the blood circulation, so that the cardiac beat volume increases, and the heart rate decreases at rest.

According to Table 2, the heart rate and blood pressure varied significantly before and after the experiment. This shows that Tai Chi has a remarkable effect in improving human function.

DISCUSSION ANALYSIS

Maximum oxygen intake (vO2max) is the maximum amount of oxygen used by the muscle when inhaled every minute by the human respiratory system and transported to the muscle by the circulatory system. It is an important indicator to assess the aerobic capacity during exercise. After six months of 24 simplified 24 Taijiquan training, the maximum oxygen absorption in the experimental group increased from (2.020.31) to (2.110.29), and the significant difference before and after exercise was P <0.05. In the control group, the maximum oxygen intake changed from (1. 84 to 0.22) to (1. 88 to 0.25), with no significant change of P> 0. 05. The maximum oxygen absorption for the 24 type Tai Chi exercise is shown in Figure 1. The 24-type Tai Chi exercise can improve the integration of nervous system function, thus affecting the central mechanism of Vo2 max. We know that the nervous system, especially its higher part, is a hub to regulates and governs the organs of all systems. Human beings rely on the activity of the nervous system (through conditioning and no conditioning) to adapt to the external environment and improve the external environment; human rely on the activity of the nervous system to unify

Table 2. Changes in subject physiology before and after the experiment.

Indicators	Heart rate (beats/min)	Blood pressure (mmHg)	
		Systolic pressure	Diastolic blood pressure
Pre-experiment	79.08±10.15	106.82±10.52	70.64±9.05
After the experiment	75.13±9.06	97.74±13.56	64.51+6.36
P	<0.05	<0.05	<0.05

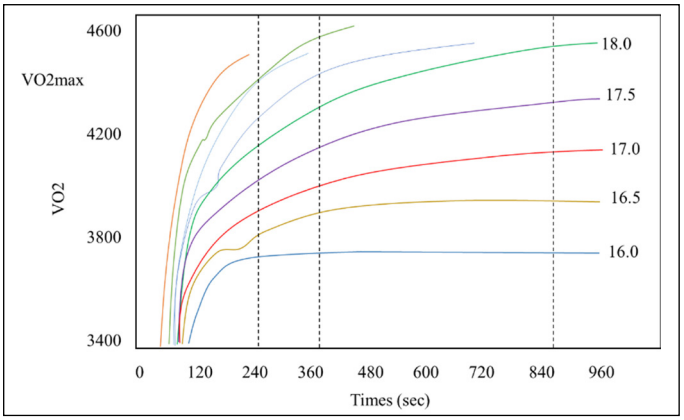

Figure 1. Maximum oxygen absorption of 24-type Taijiquan.

the function of various systems and organs as needed, therefore, any method of exercise can enhance the function of the central nervous system, have healthy significance for the whole body, the advantage of the 24 Taijiquan. Practicing 24-style Taijiquan requires "calm", pay attention, and pay attention to "intention", all of which have a good training effect on brain activities. When female college students do 24 type Taijiquan movements, they need to "complete", from eyes to upper limbs, trunk, upper limbs, upper and lower care, coherent and continuous. At the same time, because some parts of the movements are more complex, they need good control and balance ability.

CONCLUSIONS

The 24 type of Taijiquan exercise can well improve the cardiopulmonary function of female college students, which is all significantly changed in the cardiopulmonary function indicators, including lung activity capacity, maximum oxygen intake, heart rate, cardiac output, cardiac output, blood pressure (systolic pressure, diastolic pressure), vascular compliance and peripheral resistance. The long-term exercise of 24-type Taijiquan is effective in improving the body composition of female college students, which is manifested as a significant decline in body weight, body fat weight and body mass index. Taijiquan can improve the flexibility quality of healthy female college students, which is significantly improved in the sitting posture. The significant change of the right hand grip strength shows that the 24-type Taijiquan training can improve the muscle regulation ability of the central nervous system of female college students. The tracking experiment results of the 24 type of 24 Tai Chi exercise show that it obviously promotes the health of female college students. Combined with the characteristics of the 24th type of Tai Chi, it is feasible to popularize and promote the 24th type of Tai Chi among female college students.

The author declare no potential conflict of interest related to this article

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