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Effect of practicing Health Qigong-Yijinjing on cardiac function and respiratory function in the elderly population.

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Abstract

Objective: To investigate the effect of practicing Health Qigong-Yijinjing on cardiac function and respiratory function in the elderly population.

Methods: 80 cases were selected as the research subjects and were randomly divided into exercise group and control group, with 40 subjects in each group. The exercise group practiced an hour of Health Qigong-Yijinjing every morning, the control group carried out the fast walking exercise. The cardiac function and the respiratory function were compared before and 6 months after exercise in two groups.

Results: Before exercise, there was no significant difference in the indexes of cardiac function between the exercise group and the control group (P>0.05); 6 months after exercise, the values of stroke volume (SV) and mitral valve early diastolic velocity peak value (VE) in the exercise group were significantly higher than those in the control group (P<0.05), and were significantly higher than those before the exercise (P<0.05). The VE- late diastolic velocity peak value (VA) value was significantly higher than that before the exercise (P<0.05). However, in the control group, there was no significant difference in all indexes of cardiac function before and 6 months after exercise (P>0.05). There was no significant difference in the VE-VA value before and 6 months after exercise in 2 groups (P>0.05). In comparison of immediate cardiac function before and 6 months after exercise, the values of VE and VA decreased significantly (P<0.05), while no significant changes were found in the values of SV and VE-VA in the exercise group (P>0.05). Before exercise, there was no significant difference in the indexes of respiratory function between the exercise group and the control group (P>0.05). 6 months after exercise, the values of vital capacity (VC), maximum ventilation per minute (MVV) and time vital capacity (FVC) in the exercise group were significantly higher than those in the control group (P<0.05), and were significantly higher than those before the exercise (P<0.05).

Conclusion: Compared with the fast walking exercise, Health Qigong-Yijinjing could improve cardiac function and respiratory function in the elderly population, and was worthy of application and promotion.

Keywords: Health Qigong-Yijinjing, Fast walking exercise, Elderly population, Cardiac function, Respiratory function.

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Introduction

With the aging trend of the global population, more and more people are concerned about the health of the elderly population. Exercise is one of the effective means to postpone the aging of the body. Therefore, the physical fitness activities of the elderly population are not only paid attention to by the elderly population, but also become a concern of the whole society [1,2]. The functional of the human heart and the respiratory system decline with age. The main reasons for the aging of respiratory system are the decrease of respiratory muscle strength and endurance, the decrease of respiratory reserve, and the increase of respiratory resistance caused by the compliance of lungs and thorax [3]. The fast walking exercise improves the capacity of the aged people's vital capacity and maximum ventilation [4]. Aerobics, running, swimming exercise can improve the cardiac function in the elderly population [5,6]. However, it is not conclusive which exercise is more effective in improving cardiac function and respiratory function in the elderly population. "Health Qigong-Yijinjing" is one of the new methods created by China Sports Health Qigong management center, which is rich in form, safe and easy to learn, and can meet the fitness needs of middle-aged and elderly population people [7]. Health Qigong-Yijinjing is one of the many Chinese ancient exercises, consisting of a series of forms, such as the meditation, deep breathing, and slow movement of the extremities, which help to promote the circulation of qi' (vital energy) and regulate the function of the internal organs [8]. In previous study, the effects of Health Qigong-Yijinjing and the fast walking exercise on cardiac function and respiratory function in the elderly population were compared, which could provide reference for the elderly population to choose the exercise prescription.

Materials and Methods

Objects

A total of 80 cases were selected as the research subjects. Among them, there were 48 males and 32 females; The age was 62 to 74 (63.5 ± 1.7) years, the height was 153 to 175 (166.4 ± 2.5) cm, the body weight was 54 to 70 (63.6 ± 4.2) kg; Education level: 50 cases were above college, 27 cases were in secondary school, 3 cases were in primary school; The objects had no history of systematic exercise or serious disease. The objects were randomly divided into exercise group and control group, with 40 subjects in each group. There was no significant difference in sex, age, height, body weight and education level between the two groups (P>0.05) (Table 1).

Table 1. Comparison of general information in 2 groups.

Group	n	Sex		Age (y)	Height (cm)	Body weight (Kg)
		Male	Female			
Control group	40	24	16	63.3 ± 1.9	166.8 ± 2.8	63.9 ± 4.3
Exercise group	40	24	16	63.7 ± 2.0	166.1 ± 2.4	63.5 ± 4.1
t				5.274	4.798	5.456
p				>0.05	>0.05	>0.05

Methods

The exercise group practiced an hour of Health Qigong-Yijinjing every morning, and the tutors were responsible for instructing them and ensuring that the exercise time is more than 5 days a week. The practice requirements and teaching guidance of Health Qigong-Yijinjing were based on the edition of the founding version of the Health Qigong management center of the Chinese sports administration. The control group carried out an hour of the fast walking exercise, 5 days a week.

Detection index

In order to avoid the influence of human biological rhythm, all the tests were arranged in the morning.

(1) **Cardiac function test:** Before and 6 months after exercise, the cardiac function was tested in 2 groups by American ATL-HDI3000 color Doppler ultrasonic diagnostic instrument. The test site was in heart function room with room temperature of 25 ± 3°C. During the test, the patient took the left decubitus position, and the heart fan scan probe was used. The working frequency was from 2.5 to 4.0MHz, and the probe was placed in the third, fourth intercostal spaces of the left margin of the sternum, showing the standard left ventricular long axis section. The M type sampling line was perpendicular to the ventricular septum and left posterior wall of the left ventricle. After scanning, the systolic and diastolic diameter of the left ventricle was measured. Stroke volume (SV), mitral valve early diastolic velocity peak value (VE) and late diastolic velocity peak value (VA) were recorded, and the difference (VE-VA) was calculated. Each test strictly adhered to the operating regulations of the instrument. The test instrument and the main surveyor were relatively fixed to reduce the systematic error of the experiment. The test was blind, and the testers were not sure whether the subjects were in exercise group or in control group.

Six months after exercise, the immediate cardiac function was detected in the exercise group. Methods: The subjects were first tested for cardiac function, and practiced Health Qigong-Yijinjing 2 times in the accompaniment of music for about 30 minutes, then tested for cardiac function again.

(2) **Respiratory function test:** Before and 6 months after exercise, the respiratory function was test by Japanese AS-500 MINATO lung function apparatus in 2 groups. The indexes included vital capacity (VC), maximum ventilation per minute (MVV) and time vital capacity (FVC). The cardiac function and the respiratory function were compared before and 6 months after exercise in two groups.

Statistical analysis

SPSS 21.0 statistical software (IBM, USA) was used for statistical analysis. χ^2 test was used to analyze the count data, and t test was used to analyze the measurement data. P<0.05 meant the difference was statistically significant.

Results

Comparison of cardiac function before and after exercise in 2 groups

Before exercise, there was no significant difference in the indexes of cardiac function between the exercise group and the control group (P>0.05); 6 months after exercise, the values of SV and VE in the exercise group were significantly higher than those in the control group (P<0.05), and were significantly higher than those before the exercise (P<0.05). The VE-VA value was significantly higher than that before the exercise (P<0.05). However, in the control group, there was no significant difference in all indexes of cardiac function before and 6 months after exercise (P>0.05). There was no significant difference in the VE-VA value before and 6 months after exercise in 2 groups (P>0.05) (Table 2).

Table 2. Comparison of cardiac function before and after exercise in 2 groups.

Group	n	SV (ml)	VE (cm/s)	VA (cm/s)	VE-VA

		Before exercise	6 months after exercise	Before exercise	6 months after exercise	Before exercise	6 months after exercise	Before exercise	6 months after exercise
Control group	40	56.78 ± 11.13	57.93 ± 12.55	64.78 ± 12.32	65.91 ± 13.06	84.23 ± 13.12	82.45 ± 13.10	-19.41 ± 12.66	-15.31 ± 12.65
Exercise group	40	56.54 ± 11.27	68.36 ± 12.71	64.63 ± 12.16	76.32 ± 14.55	83.12 ± 13.89	83.95 ± 14.04	-17.53 ± 13.43	-11.26 ± 13.34
t		0.418	4.903	0.479	6.007	0.108	0.377	0.367	6.128
p		>0.05	<0.05	>0.05	<0.05	>0.05	>0.05	>0.05	>0.05

Comparison of immediate cardiac function before and after exercise in exercise group

In comparison of immediate cardiac function before and 6 months after exercise, the values of VE and VA decreased significantly (P<0.05), while no significant changes were found in the values of SV and VE-VA in the exercise group (P>0.05), as shown in Table 3.

Table 3. *Comparison of immediate cardiac function before and after exercise in exercise group (n=40).*

Index	Before exercise	6 months after exercise	t	p
SV (ml)	56.56 ± 13.01	58.93 ± 14.25	0.249	>0.05
VE (cm/s)	72.32 ± 13.53	63.47 ± 13.32	6.103	<0.05
VA (cm/s)	88.47 ± 14.45	80.36 ± 13.94	5.472	<0.05
VE-VA	-19.11 ± 13.76	-18.26 ± 13.32	0.328	>0.05

Comparison of respiratory function before and after exercise in 2 groups

Before exercise, there was no significant difference in the indexes of respiratory function between the exercise group and the control group (P>0.05). 6 months after exercise, the values of VC, MVV and FVC in the exercise group were significantly higher than those in the control group (P<0.05), and were significantly higher than those before the exercise (P<0.05), as shown in Table 4.

Table 4. *Comparison of respiratory function before and after exercise in 2 groups.*

Group	n	VC (L)		MVV (L)		FVC (L)	
		Before exercise	6 months after exercise	Before exercise	6 months after exercise	Before exercise	6 months after exercise
Control group	40	2.40 ± 0.35	2.42 ± 0.45	68.02 ± 12.56	69.23 ± 12.44	1.96 ± 0.35	2.02 ± 0.41
Exercise group	40	2.40 ± 0.42	2.64 ± 0.48	68.66 ± 16.21	73.94 ± 15.23	1.93 ± 0.39	2.19 ± 0.37
t		0.563	4.844	0.309	5.126	0.315	4.651
p		>0.05	<0.05	>0.05	<0.05	>0.05	<0.05

Discussion

The factors affecting the blood regulating function of the left heart ventricular include preload, postload, myocardial contractility, heart rate, and ventricular wall motion coordination [9]. VE should be greater than VA when the diastolic function is normal [10]. With the increase of age, the function of the heart is gradually declining. Before exercise, the VE value was smaller than VA value in the two groups, and the VE-VA value was negative, indicating that the myocardial compliance of the subjects (the adaptation of the ventricular wall to the anterior and posterior load) decreased, and the left ventricular diastolic function decreased. After 6 months of continue practicing Health Qigong-Yijinjing regularly, the values of SV and VE were increased significantly in the exercise group. And though the value of VE-VA was still negative, it increased significantly compared with before exercise, while there were no changes in the control group. These suggested that practicing Health Qigong-Yijinjing could promote the body's blood circulation, increase myocardial contractility and improve heart postload, which finally made heart stroke volume increased; As the volume of cardiac emptying increased, the preload was improved and the myocardial compliance and diastolic function were enhanced, which could improve the heart function [11].

Traditional Chinese medicine believes that heart governs the blood. The normal beating of the heart mainly depends on the warming and promoting role of heart Yang. Only the Yang Qi of the heart is abundant, the normal heart contractile force, heart rate and heart rhythm can be maintained, and the blood can run normally and reach the whole body [12]. Health Qigong-Yijinjing can adjust and promote the circulation of Qi and blood through the form of guidance, regulate the function of the viscera and strengthen the function of the heart's main blood vessel through the stretch movement of the tendons and meridians, improve heart function and physical fitness through the combination of spirit and shape and gas which inspires the Qi of the whole body and the nourishing of the yuan [13,14]. Such as: Chapter one fengtuo offer pestle, through the palms to the chest, palm points root is as high as Tanzhong. Tanzhongxue for pericardium Mu acupoints on cardiac function, adjust the specific role, hands with the soul of a gas, dingshen convergence, can play a role in the regulation of cardiac function. Chapter five pulling down nine oxtail type,

through the twisting of the waist, drive the scapula activity, stimulate the back pinch, lung Yu, Xinshu and other points, enhance the myocardial contractility. Chapter six, a claw bright fin, guided by the arm pushing palm, bent arm, arm extending shoulder exhibition of the collection of palm movements, repeated opening and closing, Cloud Gate Palace and other points, to open Lung Qi. All vessels converging in lung and can help heart to circulate blood.

In previous study, before exercise there was no significant difference in the indexes of respiratory function between the exercise group and the control group ($P>0.05$). 6 months after exercise, the values of VC, MVV and FVC in the exercise group were significantly higher than those in the control group ($P<0.05$), and were significantly higher than those before the exercise ($P<0.05$). These showed that practicing Health Qigong-Yijinjing could improve respiratory function in the elderly population significantly than fast walking exercise. Exercise improves the ability of material metabolism, improves the supply of blood and oxygen in various organs and tissues, strengthens blood vessel elasticity, strengthens cardiac nutrition and enhances the stability of blood vessels and nerves. At the same time, exercise improves the regulating function of the central nervous system and the coordination of various organs in the body [15]. Exercise can improve resilience and airway patency, improve muscle strength, endurance and coordination, improve respiratory function, delay the aging of respiratory system in the elderly population [16]. We hypothesized that practicing Health Qigong-Yijinjing can improve respiratory function in the elderly population due to the comprehensive effect of ventilator respiratory muscle and nervous system.

In conclusion, compared with the fast walking exercise, Health Qigong-Yijinjing could improve cardiac function and respiratory function in the elderly population, and was worthy of application and promotion.

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