Effects of Health Education on Cardiovascular System in Middle-aged and Elderly People—Take Aerobic Exercise for Example

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ABSTRACT
Our country has entered the aged society, the health education in the elderly is imminent. The studies in the effects of aerobic exercise mode on the cardiovascular system in the middle-aged and elderly people will provide theoretical basis and practice mode. Research methods: 30 healthy people (aged 50-70) were selected to undertake 8-week exercise as the aerobic exercise model (45mins/day, 5times/week). Measured indexes such as cardiovascular functions, hemodynamics flow, blood fat and renin-angiotensin-aldosterone system (RAAs) before and after the exercise, and then analyzed and compared them by mathematical statistics. Research result: 1) Cardiovascular function indexes pulse rate (PR), pulse pressure(PP), systolic pressure(SP), diastolic pressure(DP), valid pump effort(VPE) of left heart, heart oxygen consumption volume (HOV) decrease more or less, while cardiac output(CO), stroke volume(SV), stroke index(SI), cardiac index(CI) is obviously higher than before (p<0.01). 2) There is no significant difference in hemorrheology indexes like thrombus formation lime (TFL), microcirculation strees time (MST), and erythrocyte aggregation index(VAI), while blood viscosity (ηb), blood reduced viscosity (ηr), fibringen (PFc), plasma viscosity (ηp), hematocrit (Hct) drop apparently (p<0.05). 3) Blood-lipoid indexes cholesterol (Ch), triglyceride (Tg), low density lipoprotein (LDL) gets lower after the experiment, while high density lipoprotein (HDL) is higher (p<0.01). 4) Angiotensin I (Ang I) is obviously lower than that before the experiment, but angiotensin II (Ang II) and aldosterone (Ald) has no significant differences. Research Conclusion: the aerobic exercise model of jogging plus broadcast gymnastics is beneficial for middle-aged and elderly people 1) improve their cardiovascular system function. 2) decrease the blood viscosity with a certain significance to prevent high blood viscosity syndrome (HVS) for them. 3) prevent the coronary atherosclerosis in them. 4) accelerate renal blood flow in them, reduce angiotensin I secretion, improve cardiovascular functions, strengthen cardiovascular compliance, prevent and reverse the risk of cardiovascular disease.

INTRODUCTION
The core of health education is to educate people to build up the health consciousness, urges people to change unhealthy behaviors and life style, and develops good life style to reduce or eliminate the risk factors affecting health (Mustafa G., Rumeysa D., Bilgen B. 2017). Sports health education is an important part of health education. However due to the little scientific studies on the relationship of the physiological and motion attributes (including events, time, intensity, location), education is also rare. Which causes many people exercise less, or blindly exercise, not only failed to reach the purpose, but also the opposite effects. With the whole world stepping the old people’s society, sports health education has become an important problem that many countries and people need to solve urgently (Fan K. K., Xiao P. W. and Su C.H. 2015).
Aerobic exercise refers to the exercise that is undertaken in the circumstances of adequate oxygen supply. Its basic character is that the supply and demand of oxygen is equal, thus to reach physiological balance (WANG Zheng-zhen & ZHAO Hui-juan, 2005). Jogging and free-standing exercises are all the most common aerobic exercises as well as the most commonly undertaken and favorite exercises for the middle-aged and elderly people. However, they are more beneficial for just one particular part of your body both on health and exercise, and it’s boring and dull to do one single sport. Apparently, an all-body exercise filled with fun is more attractive and much healthier than a single one. Cardiovascular diseases are common among middle-aged and aged people (MA Zhi-jun, 2010), which are harmful for people’s health, and even the killer for those people. Like hypertension is the major cardiovascular risk factor that caused the increase of mortality (Chobanian AV, Bakrris GL & Black HR, et al, 2003), affecting nearly one billion people worldwide. It is people’s common aspiration to keep cardiovascular system healthy and enhance cardiovascular immunity. Undoubtedly, it’s very important to study the effect of an aerobic exercise model on cardiovascular system in middle-aged and elderly people, and strengthening the sports health education for them.

The following research questions are explored in this study:
1. How and to what extent does the Aerobic exercise effect on the Cardiovascular System Function?
2. How and to what extent does the Aerobic exercise effect on the Hemorheology Indices?
3. How and to what extent does the Aerobic exercise effect on the Blood Lipid?
4. By what way does the Aerobic exercise Prevent Cardiovascular Diseases?

RESEARCH DESIGN AND APPROACH

Select 30 healthy volunteers aged 50 to 75 (12 males, 18 females) from Yuelu District in Changsha City as the objects. On inquiring and testing, all of them don’t have contraindication to exercise.

Warming-up, undertaken on 20 August 2016, five times per week, began in six pm per day. At first, the participants keep running for 20-minute and aerobic gymnastic with the exercise intensity of 50% maximal heart rate (220-age) (LI Xiu-li, 2003), then increased 3-5 minutes exercising time and intensity every day mainly by fastening running stride and the rhythm of aerobic gymnastic. The experiment really started on 1 September and took place during 6 pm to 7 pm every day. The aerobic exercise mode was 15 minutes jogging + 5 minutes joint and ligaments motion + 15 minutes setting-up exercises of “the energy of youth” + 5 minutes relaxation running and tapping movement. Heart rate of the jogging and setting-up exercises had to reach 60%-75% of the HR max (MA Zhi-jun, 2010; LI Xiu-li, 2003; ZHOU Li-ying, WANG Xin & HONG Le-feng, et al, 2008; YU Wan-bing, 2008). The participants did the exercise for 8 weeks, 5 times a week and were measured indexes before and after the experiment.

Cardiovascular function indexes: pulse rate (PR), pulse pressure(PP), heart oxygen consumption volume (HOV), stroke volume(SV), cardiac output(CO), cardiac index(CI), stroke index(SI), systolic pressure(SP), diastolic pressure (DP), valid pump effort(VPE) of left heart, effect work of Kinetics (EWK), arterial compliance(AC) etc.

Hemorheology indexes: fibrinogen (PFC), hematocrit (Hct), blood viscosity

(ηb), blood reduced viscosity (ηr), plasma viscosity (ηp), microcirculation stress time (MST), erythrocyte aggregation index(VAI), hrombus formation lime (TFL) etc.

Blood-lipoid indexes: cholesterol (Ch), triglyceride (Tg), high density lipoprotein (HDL), low density lipoprotein (LDL).

Renin angiotensin aldosterone system indexes: Angiotensin (Ang I), angiotensin II (Ang II), aldosterone (Ald).

Test Instruments and Reagents: Three-leads electrocardiograph AT-1, RGZ-RT weight scale, and Mindray BS-400 automatic biochemistry analyzer by Contec Medical Systems Co., Ltd, AZN-III A cardiovascular function examination apparatus by Institute of Intelligent Machines, Chinese Academy of Sciences.

Date Processing: Adopting the software SPSS to process the detection parameters and the result is represented in average ± standard deviation. The difference between groups were analyzed by test, and the significance level is p<0.05.
RESULTS

The Changes of Cardiovascular Function Indexes: Compared the cardiovascular function indexes before and after the experiment, pulse rate (PR), pulse pressure (PP), heart rate (HR), cardiac output (CO), stroke volume (SV), cardiac index (CI), stroke index (SI), arterial compliance (AC), effective blood volume (BV), artery elasticity count (FEK), total peripheral resistance (TPR), pulmonary arterial resistance (PVR), and pulmonary artery wedge pressure (PAMP) had great changes (p<0.05) (see Table 1).

The Changes of Hemorrheology indexes: Compared hemorrheology indexes before and after the experiment, no significant difference can be observed in thrombus formation time (TFT), microcirculation streses time (MST), and erythrocyte aggregation index (VAI), while blood viscosity (ηp), blood reduced viscosity (ηr), fibrinogen (PFC), plasma viscosity (ηp), hematocrit (Hct) had great changes (p<0.05) (see Table 2).

The Changes of Blood-Lipoid Indexes: Compared blood-lipoid indexes before and after the experiment, the blood levels of cholesterol (Ch), triglyceride (TG), low density lipoprotein (LDL) were lower after the experiment, while high density lipoprotein (HDL) was higher (p<0.01) (see Table 3).

The Changes of Renin Angiotensin Aldosterone System Indexes: Angiotensin I (Ang I) was obviously lower than that before the experiment, but angiotensin II (Ang II) and aldosterone (Ald) had no significant differences (see Table 4).

DISCUSSION AND CONCLUSION

The Aerobic Exercise Model of Jogging + Broadcast Gymnastics can Promote Cardiovascular System Function: The experiment proved that the aerobic exercise model of jogging + broadcast gymnastic can effectively improve cardiovascular system function, especially in toning the walls of veins and preventing arteriosclerosis of middle-aged and elderly people, which is the same with the study result directed by GAO Lin-Zhou et al (1997). The mechanism is that aerobic exercise can regulate the balance of central nervous system between excitation and inhibition, especially can improve the autonomic nervous system function, shown as the reinforcement of...
The experiment results show: After eight weeks of aerobic exercise, Ang II and Ang III cardiovascular function, strengthen cardiovascular compliance, prevent and reverse the risk of cardiovascular supply and reduces the secretion of renin and Ang II. The experiment, which proved that aerobic exercise can fast renal blood flow, makes renal arterioles get a rich blood supply, while high density lipoprotein (HDL) was higher, which showed that aerobic exercise can effectively improve the level of lipase in rats, and the reason is that the organism will accelerate decomposition of LDL-C and CM by increasing the level of LPS in blood (Cui YouQiong & Wu HongYing, 2010). Some researchers found that aerobic exercise can cause significant decrease in the level of ApoB and increase in the level of ApoA I, thus resulting in the decrease of LDL and the increase of HDL (Cui YouQiong & Wu HongYing, 2010). LPL is not only the key enzyme in metabolism of lipoprotein, but also plays an important role in promoting the transition from LDL to HDL. Besides, aerobic exercise can increase HOL and decrease Tg by improving LPL’s activity (Seip RL, Angelopoulos TJ & Semenkovich CF, 1995).

The experiment results prove that cholesterol (Ch), triglyceride (Tg), low density lipoprotein (LDL) were lower after the experiment, while high density lipoprotein (HDL) was higher, which showed that aerobic exercise can effectively improve lipid metabolism rate and levels of HDL, and lower the concentration of Ch, Tg, and LDL, thus to prevent various diseases like coronary atherosclerosis, hypertension, heart disease, and cerebral arteriosclerosis.

Aerobic Exercise Model of Jogging + Broadcast Gymnastics can Prevent Cardiovascular Diseases: The experiment results show: After eight weeks of aerobic exercise, Ang I was obviously lower than that before the experiment, which proved that aerobic exercise can fast renal blood flow, makes renal arterioles get a rich blood supply and reduces the secretion of renin and Ang I. All these show that the aerobic exercise model can promote cardiovascular function, strengthen cardiovascular compliance, prevent and reverse the risk of cardiovascular disease.
REFERENCES


