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Effect of aerobic exercise on young women teachers cardio-pulmonary function

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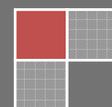
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ABSTRACT

In order to study the effect of aerobic exercise on young women teacher's cardio-pulmonary function, this thesis employs contrast test. By choosing 68 full-time young women teachers of a university to do the aerobic exercise for 6 months (5 times/d and 35 min/ time) and doing statistical analysis of a large number of data from the measured and recorded parameter of young women teachers' lung ventilation function before and after the test, the research shows that the young women teachers get fitter and fitter through aerobic exercise, physical index such as BMI and WHR are apparently better than those women teachers who have never done aerobic exercise, and especially vital capacity, stroke volume, maximal oxygen uptake and ejection fraction are greatly improved as well as myocardial systolic function is obviously enhanced. The pulmonary function of these tested women teachers is greatly raised after doing aerobic exercise for 6 months, for instance, MVV (Maximal Voluntary Ventilation per minute) and the vital capacity have an apparent enhancement, whose difference ($q < 0.001$) has a great statistical significance. The obvious increasing in stroke volume and negative accelerating in heart rate make the difference statistical significance ($q < 0.001$) more noticeable. Always doing aerobic exercise can improve the heart. The index of heart's total volume of the people who always do aerobic exercise is increased, the cardiac volume and the ventricular wall thickness are raised, ventricular chamber becomes bigger, because the bigger ventricle is help to increase ventricular filling volume and also is good to cardiac function. To sum up, aerobic exercise can effectively enhance cardio-pulmonary function of young women teachers.

KEYWORDS

Cardio-pulmonary function of young women teachers; Aerobic exercise; Cardio-pulmonary effect; Myocardium force.



INTRODUCTION

It is well known that aerobic exercise is good for people's health, especially the effect on heart. Firstly, aerobic exercise can improve the changes of heart rate; Secondly, it can enhance the myocardium force of aerobicizers. Heart rate is the sign of strong or weak of cardiac function. The impact of aerobic exercise on heart can be distinguished by the change of heart rate and on circulatory function can be indicated by the increase of cardiac output. Aerobic exercise can also redistribute the blood flow of various organs; particularly can accelerate blood flow of skeletal muscles so as to meet energy supply when its mechanism is enhanced^[1]. The heart has a certain reserve function, whose normal cardiac output approximately accounts for 1/4 of maximal output. While aerobic exercise can increase the output so as to enhance people's ability of exercise to improve their healthy condition.

The relation among the output per minute, heart rate and stroke volume is: output per minute= heart rate×stroke volume. There are two groups of data for comparison: at the quiet state: the normal group 3.9L=60 times/min×0.09L, Athlete 3.5L=40times/min×0.07L; Doing exercise with maximal intensity: normal group: 33L= 289 times/min×0.22L, athlete: 41L= 201times/min×0.2L. Aerobic exercise is a kind of sports event with comprehensive arts combining high value of appreciation with keeping fit, which is a new sports activity bringing together the elements such as sports, dance and musi^[2]. Aerobic exercise can reveal the beauty in Table, strength and health through all kinds of fluent movements and it is bound to be an elegant and fluent sports event. In order to enrich students' sports activities, many colleges and universities offer the compulsory course--aerobic exercise, which gets students' positive response and makes a good teaching results. With the development of colleges and universities, the course of Dance Sport has become an emerging course in some colleges. It not only improves student's physical quality but also has an active effect on cultivating students' character of comprehension. For example, through learning Dance Sport, students can improve their Tables and the appropriate activities can coordinate body, optimize body curve as well as strengthen and beautify postures.

At present, aerobic exercise has been a kind of fashionable activity of body-building. As a result, studying on aerobic exercise has a great importance to exercisers' body shape, composition and the effect on cardio-pulmonary function. Researches form several research institutes have demonstrated that aerobic exercise can surely improve part of body function^[3]. In order to study the effect of aerobic exercise on young women teachers' Table, composition and cardio-pulmonary function comprehensively, the study has done statistical analysis of Table, body composition and cardio-pulmonary function of young women teachers' who mainly take part in aerobic exercise from May, 2005to October, 2004. The aim of the study is to discover the effect of aerobic exercise on young women teachers, describe the role of aerobic exercise in young women teachers' cardio-pulmonary function in detail and provide reliable theoretical and practical basis for doing aerobic exercise scientifically.

TEST OBJECTS AND METHODS

Test objects

Choose randomly 100 full-time young women teachers from 4 colleges and universities as test group and take the other 100 young women teachers at same age who have never participated in systemic aerobic exercise as contrast group. The test randomly selects 100 students from two colleges respectively, in which, 100 students take part in Dance Sport and the other 100 students don't take part in it. To avoid the interference in age difference, the selected objects are young women teachers of colleges and universities.

Test methods

Test instruments

The instruments for testing vital capacity (pony), height, blood pressure, conventional vernier caliper, and instrument for testing heart ultrasonic (Aloka-SSD71).

TABLE 1 : Basic situation of test objects

	Age	Weight/kg	Height/m
Aerobic Exercise Group (n=100)	21.5±1.5	54.5±8.2	1.61±2.75
Contrast Group	21.6±1.3	55.3±7.3	1.60±3.17
P	>0.05	>0.05	>0.05

Test index body shape: height, weight, chest circumference, waist and hip circumference

Calculation of volume and density (TABLE 2) The evaluation method employs experimental design method. Under the condition of not affecting student's knowing nothing about it to proceed test, which has good reliability. The method is comparative mature and is always applied into teaching research. The testing mode combining with the study is peer group before and after test design.

TABLE 2 : Calculation of volume density of lingmu-changing

Age	Male	Female
9~11	$D=1.0879-0.00151 \times X$	$D=1.0794-0.00142 \times X$
12~14	$D=1.0868-0.00133 \times X$	$D=1.0888-0.00153 \times X$
15~18	$D=.0977-0.00146 \times X$	$D=1.0931-0.00160 \times X$
Above19	$D=.0913-0.00166 \times X$	$D=1.0897-0.00133 \times X$

D: Volume density X: The sum of skin-fold thicknesses of upper arm and inferior angle of scapula. The testers input the testing data with their companions and check the data seriously to ensure its accuracy^[4]. Intervention phrase: arrange the test group to participate in Dance Sport for three months, including: 1) The introduction of teaching objectives on Dance Sport, technical characteristics and music in dancing; 2) The training of special actions and skills; 3) Learn and practice specified footwork; 4) Learn and practice standard dance. The whole training gives priority to practical training and assisted by theoretical training, adopting diversified teaching methods and combining class teaching, extracurricular training with watching video, while the contrast group doesn't accept any training on Dance Sport.

Test methods

The test is proceeded on the basis of standard regulations of national physique monitoring system issued by China Physical Fitness Surveillance Center in 2000. The test for cardio-pulmonary function is operated strictly in accordance with relevant standards.

Statistic processing

The method employs independent sample of students in mean comparison of spss10.0 for windows to evaluate 5 levels "none (1 point), light (2 points), medium (3 points), severe (4 points) and especially serious (5 points)" according to the situation of project description. Scale's evaluation method: study and analyze experimental data by calculating the sum of scores from 90 items and the average of project (i.e. grand average).

RESULTS AND ANALYSIS

The effect of aerobic exercise on body shape

Data from TABLE 3 indicates that the weight and chest circumference of aerobic exercise group are obviously greater than contrast group. Dance Sport training can effectively resist college students' psychological disorders. It can also improve people's ability to endure stimulation and to release stress as well as effectively resist psychological diseases such as "anxiety" and "depression". The findings of the research show that Dance Sport has positive impact on psychological soundness of college students. We can propagate the benefits of Dance Sport actively with the hope that the activity can be popularized in college in a planned way. We should establish reasonable teaching mode of Dance Sport in colleges and strengthen the construction of Dance Sport team to achieve the expected results and fitness beauty (TABLE 3).

TABLE 3 : Index of body shape

Index	Test Group	Contrast Group	P value
Height/cm	160.12±10.48	159.48±10.83	0.068
Weight/kg	52.56±5.58	49.96±5.38	0.045
Chest/cm	83.95±14.3	80.12±12.1	0.044*
Waist/cm	59.12±4.1	61.01±7.2	0.045*
Hip/cm	88.89±12.53	86.67±13.8	0.044*
BMI(kg/cm ²)	21.1±3.47	20.2±3.12	0.068

Note: * indicates interblock; * indicates $p < 0.05$; ** indicates $p < 0.01$; *** indicates $p < 0.0005$. The following Tables are same.

Dance Sport is a kind of activity combining sport and dance, developing from social dance. It is comprehensive art with high value of appreciation and keeping fit, which is a new sports activity bringing together the elements such as sports, dance and music. Furthermore, Dance Sport can reveal the beauty in Table, strength and health through all kinds of fluent movements and it is bound to be an elegant and fluent sports event^[5]. In order to confirm above conclusions, we measured and compared the index of body shape of test group before and after aerobic exercise at the same time (TABLE 4). With the

rapid life pace and increase of learning pressure, there are more psychological problems among college students, such as depression, extremity and lacking of communication, etc. The thesis mainly studies whether the effect of Dance Sport on psychological health of college students has a positive significance. Through the survey and summary of data gotten from survey to demonstrate aerobic exercise has a positive impact on body shape of women college students.

TABLE 4 : Index comparison of body shape between before and after test in aerobic exercise group

Index	Before Test	After Test	P value
Weight/kg	50.96±4.38	52.56±5.58	0.046*
Chest/cm	79.82±12.21	83.95±14.3	0.044*
Waist/cm	61.02±7.2	59.12±4.1	0.045*
Hip/cm	85.87±13.8	88.89±12.53	0.044*
BMI/kg·cm ²	20.2±3.12	21.1±3.47	0.068
Weierweike Index	80.9±13.28	84.6±13.72	0.023*
WHR	70.39±11.24	66.5±10.48	0.010**

The effect of aerobic exercise on body composition

The influence of aerobic exercise on sebum thickness of each body parts

From TABLE 5, it can be seen that in each part, the sebum thickness of abdomen is the largest, followed by leg and scapular area. Intervention phrase^[6]: arrange the test group to participate in Dance Sport training for three months, including: 1) The introduction of teaching objectives on Dance Sport, technical characteristics and music in dancing; 2) The training of special actions and skills; 3) Learn and practice specified footwork; 4) Learn and practice standard dance. The whole training gives priority to practical training and assisted by theoretical training, adopting diversified teaching methods and combining class teaching, extracurricular training with watching video, while the contrast group doesn't accept any training on Dance Sport.

TABLE 5 : Effect of aerobic exercise on body composition

Index	Testing Group Contrast	Group	P value
Arm/mm	10.21±2.14	12.25±2.61	0.045*
Scapular/mm	10.74±3.22	13.32±3.14	0.010**
Chest/mm	10.67±2.95	12.36±3.23	0.044*
Abdomen/mm	11.96±3.53	13.98±3.72	0.0045***
Thigh/mm	11.04±2.61	13.57±4.26	0.010**
Shank/mm	10.08±2.67	11.32±3.24	0.045*
LBW/kg	41.83±9.86	36.96±8.46	0.010**

The effect of aerobic exercise on lbw, body fat% and body density

From the data of TABLE 5, it can be revealed that weight is not changed before and after test; proportion of testees: The data of TABLE 5 shows that there are not noticeable differences between aerobic exercise group and test group; the conclusion indicates that the proportion of women teachers whose total score of health evaluation scale below 160 is 73.5% while the total score of students' over 160 is 16.5%. From that, it can be concluded that the health level of women teachers in the region is not as good as imagination and there are healthy problems in some students.

The effect of aerobic exercise on cardio-pulmonary function

TABLE 6 has demonstrated that the vital capacity and self ventilatory capacity per minute of young women teachers in aerobic exercise is apparent higher than contrast group and has noticeable difference ($p < 0.05$). Dance Sport training can effectively resist college students' psychological disorders. It can also improve people's ability to endure stimulation and to release stress as well as effectively resist psychological diseases such as "anxiety" and "depression". The findings of the research show that Dance Sport has positive impact on health condition of young women teachers. We can propagate the benefits of Dance Sport actively with the hope that the activity can be popularized in college in a planned way. We should establish reasonable teaching mode of Dance Sport in colleges and strengthen the construction of Dance Sport team to achieve the expected results.

TABLE 6 : The effect of aerobic exercise on cardio-pulmonary function

Index	Test Group	Contrast Group	P value
Vital Capacity/ml	3011.65±120.72	2915.42±113.72	0.045*
VC/Weight	51.85±3.15	49.26±3.68	0.044**
SVC/min (L/S)	114.4±5.48	103.4±4.73	0.044*
SV/mL	73.15±12.71	70.12±10.46	0.045*
CO(l/min)	4.83±0.81	4.76±0.94	0.068
EF/%	0.69±0.03	0.67±0.06	0.045*
HR/bpm	67.12±7.42	69.42±3.32	0.068
ET/s	0.28±0.02	0.30±0.01	0.068
MSER/cm·s-1	1.16±0.02	1.08±0.04	0.044*
MVCF/ cm·s-1	245.78±16.18	232.11±13.26	0.038*

The Changes of Cardiac Pump Function Before and After Test. SV and EF reflect the function of cardiac pump. The data in TABLE 6 has shown that SV and EF in aerobic exercise group are apparently bigger than contrast group and have noticeable difference ($p<0.05$); Heart rate in aerobic exercise group is also distinctly lower than contrast group ($p<0.05$); Difference of CO between the two groups is not evident. The main aim of higher education is to cultivate high-quality talents and it is the top of school sports education. It is an important platform for students to learn theoretical knowledge and skills as well as to establish scientific thoughts. However, from the present state of higher education, the physical health of college students has a downward trend, which mainly shows: weak, sub-health and mood swings etc. In addition to objective factors, higher education input less in quality evaluation of sports teaching and there isn't such an unified evaluation criterion that it is difficult to reflect differences in sports education of colleges and universities. In order to evaluate the quality, professors and colleagues of Tokyo University of Science published the article *Motivator and Hygiene Factor in Quality* in October, 1979, which introduced criterion of satisfaction and dissatisfaction into quality management system. SV will be increased and EF will change too at the same time^[7].

For respiratory system, aerobic exercise can improve the power and endurance of respiratory muscle. To analyze by making use of total correlation method and T test, it is shown that all of T tests reach conspicuous level (i.e. $p<0.05$) while the total correlation levels also arrive at conspicuous level (i.e. $p<0.05$). Finally, full subjects should be reserved to prepare for later analysis. Firstly, assume reliability of each subscales and whole scale is Cronbach's coefficient. When reliability $x>0.7$, it is very high; when $0.35<x<0.7$, it is in medium; when $x<0.35$, it is low. The X coefficients of 5 levels in the positive questions are respectively: tangibility coefficient is 0.85; reliability coefficient is 0.82; responsiveness coefficient is 0.74; indemnificatory coefficient is 0.66; empathetic coefficient is 0.80 and total scale coefficient is 0.86.

HR in the study dropped obviously because movement can descend excitability of sympathetic nerve and increase tension of nervi vague. According to specific situation of sports education in college, important index of professional assessment requirements and the principle of KANO theory, five evaluation index of sports education quality in colleges including tangibility, reliability, responsiveness, indemnificatory and empathizing are established. Specifically speaking, tangibility means tangible teaching space; reliability refers to physical teachers are able to finish teaching task reliably; responsiveness means physical teachers can help students study actively; indemnificatory refers to physical teachers have professional knowledge ability to perform credibly and empathizing means teachers can help students to think from student's perspective.

Change of Cardiac Systolic Function Before and After Test. In the study, EF in test group is smaller than contrast group and MSER and MVCF are higher apparently than contrast whit noticeable difference ($p<0.05$). Distinctly, it indicates that aerobic exercise has positive effect on the improvement of heart, for instance, obvious effect of improving myocardial contractility and ability to supply blood for heart.

CONCLUSIONS

The study mainly analyzes and introduces the effect of scientific aerobic exercise on young women teachers. Doing aerobic exercise for a long time can increase the index of heart volume, which can be testified by comprising with persons who don't participate in aerobic exercise. Always doing aerobic exercise can increase heart volume and ventricular wall thickness and enlarge ventricular chamber, while the expansion of ventricular can make the growth of ventricular filling volume. At last, the function of heart reserve is improved. In summary, the quantity of respiratory oxygen of a person who always does aerobic exercise is more than one person who doesn't do that, that is why cardio-pulmonary function of the person who always takes part in aerobic exercise is enhanced.

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