ISSN : 0974 - 7435 Volume 8 Issue 11

BioTechnology
An Indian Journal

FULL PAPER

BTAIJ, 8(11), 2013 [1533-1538]

The experimental study on the effect of different fitness programs on the fitness of older people

Xuebing Bai
Faculty of Science, Jiangxi University of Science and Technology, Ganzhou, Jiangxi 341000, (CHINA)
E-mail: bsh1977@126.com

ABSTRACT

To study the effect of different fitness programs on the fitness of older people, we selected the older people who had long been engaged in balloon volleyball, dancing, gate ball and walking as research subjects. The result shows that the fitness of the people who had long been engaged in physical activity was better than the fitness of the ones who had not long been engaged in physical activity, the grip of the people who had worked in balloon volleyball was the best, the bone mineral density of the people who had worked in dancing was best, all test indicators of the people who had taken part in gate ball and walking had no remarkable change. In general, the fitness of the ones who had taken part in balloon volleyball and dancing was better than the others.

KEYWORDS

Different fitness projects;
Older people;
Fitness.

INTRODUCTION

Health was the base of continuing human life and the interpretation of health in different historical developmental stage and cultural background was discriminative. The condition of national physical fitness can reflect a comprehensive national strength, practicing fitness and health monitoring regime and formulating evaluation criterion of fitness was an important portion of Nationwide Fitness Program and developing the study of human fitness was a basis of achieving the task[1]. Fitness was a unique visual angle about study the healthy problem in sports circles and more and more researches showed that physical exercise had an important positive function of health[2]. More and more exercise ways appeared on the life of people, but we need know that which mode of motion was more suitable for you and how select the exercise event which was suitable for older people.

Retired older teaching and administrative staff in Jiangxi University of Science and Technology were taken as objects of study by the guiding ideology which is "People- oriented, health first". We hoped to find problems out which their fitness were affected, sum up and conclude the factors that the status resulted in physiology, psychology, environment (family and social), by comparing and analyzing national standard of study, come to a valuable conclusion and propose relevant views and suggestions, take effective measures early to monitor middle-aged and old teachers' health in universities and colleges, and offer reference information for more fully and more perfect improving their fitness

work.

OBJECT OF THE STUDY AND RESEARCH METHODS

Object of the study

The study chose retired older teaching and administrative staff in Jiangxi University of Science and Technology as test objects in three days of school sports meeting by a principle of voluntary participation, then 248 volunteers were tested and we selected 200 valid datum including 83 men and 117 women. Their basic states were shown in TABLE 1.

TABLE 1 : The condition of older teaching and administrative staff in Jiangxi University of Science and Technology playing sports

Sex	Man	Woman	Total
Often exercise	55	83	138
No exercise	28	34	62

The block method in the study was that the subjects were grouped into the group of often exercise and not often exercise by exercise frequency weekly and exercise time at every turn. The subjects in the group of often exercise had 3 time physical training in a week and over 30 minutes training time, and the subjects in the group of not often exercise had no physical training or seldom physical training.

Research methods

In the test, they were asked not to take food, empty the bowel and urine in half an hour before the experiment and keep silence. Male and female volunteers were respectively divided into 3 groups for analysis and comparison according to 10 year-old as a group from <<2005 National Fitness Supervising Project>> by State General Administration of Sport.

Experimental apparatus

Venus5.5, Body Composition Analyzer (Bios Pace Company in Korea)

OSTEOPPO, Ultrasound Bone Densitometer (Jason Company in Korea)

Research index

Body shapes (height, weight, FAT%) and physiological functions (systolic pressure, diastolic pressure, quiet pulse frequency, bone mineral density) were selected in the experiment.

Data processing

Data was analyzed by SAS system 6.12 and the results were measured by ($X \pm S$).

RESULTS AND ANALYSIS

The basic information of older people in different sports events taking part in exercise

There were 55 men and 83 women in the group of often exercise and 28 men and 34 women in the group of not often exercise. There were 5 men and 25 women in the group of dancing, 15 men and 19 women in the group of balloon volleyball and 20 men and 19 women in the group of walking. Their specific states were shown in TABLE 2.

TABLE 2 : The condition of older people taking part in different training events

Sex	Dancing	Gate ball	Walking	Balloon volleyball
Man	5	15	20	15
Woman	25	20	19	19

The effect of different training events on body shape

Height

Height was vertical dimension which was from the top of head to the floor and it was greatly affected by genetic factors. There were many factors that affected height, such as heredity, nutrition, exercise, surrounding, lifestyle, race, endocrine, the condition of sexual maturity, the marriage of distant and close relative, medical science progress and so on. To some extent, the height of middle-aged and older people being often measured might evaluate their degrees of aging.

Skeleton was made to adapt stress exercise like any other tissue and it could change strong when being stimulated and vice versa, jump exercise regularly contributed to slow down the descent speed of height[3]. However, Specker's research showed that only calcic acceptable daily intake exceeding 1000mg had exercise promoted the increase of skeleton quantity and excessive exercise resulted in the lose of calcium in multitude when calcic acceptable daily intake was

lack, if do that, skeleton quantity couldn't increase and might depress[4].

The research revealed that the average height of older people who took often part in balloon volleyball was 164±8.2, that of older people who took often part in dancing was 160±5.5, that of older people who took often part in gate ball was 163±12.1 and that of older people who did not take part in exercise. Their specific states were shown in TABLE 3.

TABLE 3 : Comparation of the effect of different fitness programs on height (Unit: cm)

	Dancing	Gate ball	Walking	Balloon volleyball	No exercise
Height	160±5.5	163±2.1	160±9.4	164±8.2	162±10.4

Because the test adopted cross section measurement, the subjects couldn't be compared with height before exercising and we couldn't learn the effect of different fitness programs on the height. But long-term fitness program might improve skeletal density and slow down the descent of height.

Body weight

With the growing of age, the majority of older people had a gradual decline of body weight. The cause of older people' body weight declining was connected with atrophy of cell and tissue and decrease of moisture. The computational formula of standard body weight was

Man: Weight=Height (cm)-105 Woman: Weight=Height (cm)-100

If weight didn't exceed or reduce 5 kg of standard body weight, it was in normal range, but if it exceeded or reduced by 5 kg, we should pat attention to the change, exceeding 10 kg was obesity and reducing 10 kg was only skin and bone, we shouldn't neglect them [5].

The effect of endurance training on the improvement of the older people's body composition had a similarity with young people. Even if body weight kept no change, the change that training had reduced 1%-4% fat of older people was stable. In addition, a research reported that it was important that the body weight of older men reduced 2.5 kg by training but their abdominal fat reduced by 25%, because the growing of abdominal fat with age was the fastest and was a pathogenic factor of other cardiovascular diseases.

From TABLE 4, it could been seen that the body weight of 2 subjects taking part in dancing was out of limits, that of 5 subjects taking part in gate ball was out of limits, that of 4 subjects taking part in balloon volleyball was out of limits and that of 28 subjects not exercising was out of limits.

TABLE 4 : Comparation of the effect of different fitness programs on body weight

	Dancing	Gate ball	Walking	Balloon volleyball	No exercise
Headcount	30	35	39	34	62
Over-weight	2	5	8	4	28

The above results indicated that the body weight of older people who had took often part in movement maintained very well and only that of few people was ascended, especially that of subjects in dancing groups maintained no change. Thus nothing but the regular physical exercise could reduce redundant body fat, reduce the burden of body and maintain in good health.

Percentage of body fat (FAT%)

Body fat was a index which reflected the percentage of fat in vivo, and hyperliposis could influence human health. Body fat was divided subcutaneous fat and visceral fat.

Nowadays with growing in the living standard of people, a lot of older people had a rise of body weight and increase of body fat, the most badly, the fat of some older people didn't been accumulated under the skin but around viscus[6]. If overmuch fat was accumulated around viscus, it had would be called visceral fat, it might cause harm of liver and other organs and result in fatty liver, disturb metabolism, cause Type 2 diabetes and sterility, and it would increase the probability of cardiovascular disease, give rise to artery inflammation and lead likely to depression.

FAT%=body fat mass (kg)/body weight (kg), the normal value of FAT% was 10-20% of man and 20-30% of woman, when FAT% of man was over 20%, it was obesity and when FAT% of woman was over 30%, it was obesity.

From TABLE 5, we found that the average body fat of subjects in balloon volleyball group was 26.7% and there was visceral fat in 5 subjects, that of subjects in gate ball group was 27.2% and there was visceral fat in 8 subjects, that of subjects in walking group was

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30.7% and there was visceral fat in 10 subjects, that of subjects in no exercising group was 31.6% and there was visceral fat in 17 subjects.

TABLE 5 : Comparation of the effect of different fitness programs on body fat

	Dancing	Gate ball	Walking	Balloon volleyball	No exercise
Headcount	30	35	39	34	62
visceral fat	5	8	10	5	17
FAT%	28.5%	27.2%	30.7%	26.7%	31.6%

We found from the above result that FAT% of older people who took often exercises was lower than that of older people who didn't take exercises and the number of people who suffered from visceral fat was fewer than others, especially FAT% and visceral of older people in balloon volleyball and dancing groups was lower, that was to say, the physical condition of older people in balloon volleyball and dancing groups was best, that in gate ball and walking group was better and that in no exercising group was poor.

Bone mineral density

Bone mineral density was one of the important indicators to reflect the degree of osteoporosis, also was the important basis to predict fracture risk. Bone Densitometer could calculate automatically the data compared to young adult and same age people according to the patients data, it was Young Adult and Age Matched. It reflected tester's bone mineral density situation, and then counted the bone density situation of all ages, i.e. the proportion of normal, bone mineral density decrease and osteoporosis [7]. Normal bone mineral content was closely related to gender, age. There were differences between the sexes in the same age group, which women less than men. The same gender corresponding changed with age, after age 35-40 bone mineral content was gradually decline trend, especially women. There were many reasons for bone mineral density decrease, such as increasing age, exercise less, insufficient calcium intake, female menopause estrogen secretion.

There were many different kinds of sports, different exercise had different function on bone load and different effects on bone mineral density. Bone mass and bone mineral density was increased with the increase of sports load. When the load exceeded a certain value, such as strong sports load might cause negative effects on bone health. Especially excessive exercise training could reduce the athletes' sex hormones, which will affected the bone mineral density.

From TABLE 6 only 1 person was osteopenia and nobody was osteoporosis in often dancing elderly. 2 persons were osteopenia and nobody was osteoporosis in balloon elderly. 2 persons were osteopenia and 1 person was osteoporosis in gate ball elderly. 3 persons were osteopenia and 2 persons were osteoporosis in walling elderly. 5 persons were osteopenia and 4 persons were osteoporosis in no exercise elderly. Above results showed: The bone mineral density of exercise elderly was higher than that of no exercise elderly. In terms of extent of osteoporosis and osteopenia, the whole bone mineral density of elderlly who participated in dancing, gate ball or balloon was normal, while there were more osteoporosis and osteopenia elderly in walking and no exercise elderly people.

TABLE 6 : Comparation of the effect of different fitness programs on bone mineral density

	Normal bone	osteopenia	osteoporosis.
Dancing	30	1	0
Gate ball	35	2	1
Walking	39	3	2
Balloon	34	2	0
No exercise	63	8	4

The effect of different fitness programs on body function

Quiet pulse

The quiet pulse was a reflection index of cardiovascular function. It had the obvious individual differences. The quiet pulse included physical, psychological, pathological and other factors, such as sports, mood changes, all kinds of heart disease or arrhythmia, taking certain medications, etc. These could cause the heart rate the changes of increasing or decreasing. Usually, under the condition of beyond the above aspects for special factors, the low quiet heart rate was the good performance of cardiovascular function[8].

Pulse was artery beat, the pulse frequency was pulse frequency. A normal pulse was consistent with heart rate. A normal adult was 60 to 100times/min, usual

70 to 80times/min, average about 72times/min. Older people was slower for 55 to 60times/min. The normal man's pulse is regular. There was no the phenomenon of different interval length. Normal pulse equal and the alternation of strong and weak wouldn't appear. Moreover, quiet pulse was lower that was on behalf of the better cardiovascular function.

From TABLE 7, the average pulse of older people in gas volleyball sports was 68.4±7.2 and 70.1±6.8. The average pulse of older people in dance sports was 70.3±8.0 and 72.2±6.2. The average pulse of older people in a goal kick was 76.6±6.3 and 77.8±5.5. The average pulse of older people in walking was 77.3±6.6 and 78.5±8.3. The average pulse of older people who didn't participate in sports was 79.2±8.7 and 80.1±8.9.

TABLE 7 : Comparation of the effect of different fitness programs on quiet pulse (Unit: t/min)

		Dancing	Gate ball	Walking	Balloon volleyball	No exercise
Pulse	Man	70.±8.0	76.6±6.3	77.3±6.6	68.4±7.2	79.2±8.7
	Woman	72.±6.2	77.8±5.5	78.5±8.3	70.1±6.8	80.1±8.9

The above results showed that older people's average pulse who often took part in physical exercise was significantly lower than older people' pulse who didn't. Especially, older people' quiet pulse in gas volleyball and dance was lower. That was to say they had better cardiovascular function. There was no significant difference between older people in goal kick and older people in walking exercise.

Blood pressure

Blood pressure was the pressure that blood flowing within the blood vessels had effects on blood vessel walls. It was the motive force of promoting blood flow in blood vessels. The heart pumps out blood to form systolic blood pressure which also was called high pressure. When blood flowed back to the heart, diastolic blood pressure came into being which also was called low pressure. Blood pressure generally increased with the increase of age, mainly because with the aging of the human body, the elasticity of blood vessel reduced gradually and gradually increased peripheral resistance of blood flow. Normal blood pressure meant systolic blood pressure was higher than 90 mmHg and lower than 140 mmHg and at the same time, diastolic blood pressure was higher than 60 mmHg and lower than 90 mmHg.

TABLE 8 showed older men and women in gas volleyball had the lowest blood pressure on average; The second was the elderly in dance; The blood pressure of the elderly in goal kick was close to the that of the elderly in walking exercise; The elderly no exercise had the highest blood pressure.

TABLE 8 : Comparation of the effect of different fitness programs on blood pressure (Unit: mmHg)

	Blood pressure	Dancing	Gate ball	Walking	Balloon volleyball	No exercise
Man	Systolic pressure	137±12	140±13	143±15	130±11	149±5
	Contractive pressure	81±8	85±10	91±9	89±8	91±7
Woman	Systolic pressure	140±10	144±12	147±8	141±11	152±6
	Contractive pressure	83±10	90±8	90±7	88±8	95±4

By above results we could conclude that the blood pressure of the elderly who often took part in sports was lower than the blood pressure of those who did not play sports, and the blood pressure of the elderly was higher; The blood pressure of older people who played sports was normal wholly, especially older people in the dance and gas volleyball. The reason was the movement may increase the heart's volume, weight, contraction force, expanding blood and made the vessel wall of heart elastic and the heart more durable.

The effect of different fitness programs on physical quality

The index of physical quality included strength, velocity, sensitivity, flexibility, balanced capacity, reaction capacity and so on. We selected grip strength as an index testing physical quality of older people.

TABLE 9 : Comparation of the effect of different fitness programs on grip strength (Unit: kg)

Event		Dancing	Gate ball	Walking	Balloon volleyball	No exercising
Grip strength	man	40±3	45±3	41±6	51±4	39±3
	woman	31±3	37±4	27±3	40±5	28±3

Grip strength was an index in common use which reflected static strength of forearm and flexor retinaculum of the hand and at the same time was an important index which reflected physical. The research in table.8 found that grip strength of older people in balloon volleyball group was the biggest, that in gate ball group

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was bigger and there was no notably different between dancing group and walking group and that in no exercising group was the smallest. The result interpreted that the effect of balloon volleyball on upper body strength was better than other programs and the strength of older people was poor.

CONCLUSION

(1) Older people who took often exercises possessed better constitution.
(2) Blood pressure and pulse of older people in balloon volleyball group and dancing group was better than that in gate ball group and walking group.
(3) The effect of different fitness programs on physical quality of older people was different. The strength of older people who took often exercises was bigger than that who didn't take exercises.
(4) The effect of different fitness programs on bone mineral density and body fat of older people was different. Physical exercise could strengthen bone mineral density of older people and the effect of the different physical was different.
(5) The constitution of older people in balloon volleyball group and dancing group was better than other groups.

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