Characteristics of Physical Fitness and Age-Related Changes in People over 60 Years of Age

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Abstract

This study analyzed the characteristics of health and physical fitness of 60 - 70 years old people with age. A total of 1253 elderly people (65.4 ± 3.2) years old were screened by questionnaire and divided into 60 - 64 years old group, 65 - 69 years old group and over 70 years old group according to the age. The results showed that there was a significant difference between the elderly with eyes closed and standing on one foot in different age groups ($P < 0.05$), but the other indexes were not significant ($P > 0.05$). The sitting body flexion index did not change with the increase of age. Compared with the group over 70 years old, the change rates of lung capacity and standing on one foot with eyes closed were the largest in the 65 - 69 years old group. It can be seen that the health and physical fitness level of the elderly over 60 years old increases with age and presents a downward trend.

Keywords

Physical Testing, Health and Fitness, Fitness in Elderly People

1. Introduction

The term "physical fitness" originated in the United States (Zhang, 2002). Due to changes in social development, people at that time did not exercise enough, the incidence of various diseases increased year by year, the aging of the population and other reasons. In 1987, the United States government put forward a health education plan, which defined physical fitness as the physical fitness in addition to People's Daily life and work. The human body will not feel too tired, but also have extra energy to participate in activities and deal with emergencies. Nowadays, health fitness plays an important role in physical research. Among them,

the most important elements are cardiopulmonary fitness, body composition, musculoskeletal fitness and flexibility (Chen, Wang, & Bai, 2012).

According to the seventh national census carried out in 2020, the proportion of the population over 60 years old has increased by 5.44% compared with the past, which means that the aging degree of China's population is becoming increasingly serious (Dong, 2021). With the development of economy and the growth of age, the physical function of the elderly will also undergo a series of changes. Health problems such as the rising incidence of chronic diseases and the deterioration of national health are gradually emerging, and the health problems of the elderly have gradually become the focus of our attention.

2. Research Object and Method

2.1. Objects

This study adopts the method of sampling survey, and the selected research objects are the female aged over 60 years old. Adopted a sampling survey method (reference), from April to June 2021, 1300 elderly people (females aged between 60 - 70 yrs old) were randomly selected. The inclusion criteria adopted in this study was that they were not restricted by any disease, but they must be free in movement, in good physical condition, able to complete various tests, and able to detect indicators. After preliminary analysis, only 1253 old people meet the requirements of the test. According to China's "National physical fitness measurement standard", the old people are divided into a group of 5 years old according to the division, the survey object is divided into 60 to 64 years old group, 65 to 69 years old group and 70 years old group. Each age group accounted for 42.2%, 48.3% and 9.5% respectively.

2.2. Methods

Questionnaire Survey

Face to face, the elderly are asked about their personal situation, diseases and whether they usually do physical exercise. The subjects of this study were all female, a total of 1253, aged (65.4 ± 3.2) years old, weighing (65.4 ± 9.0) kg, and height (158.1 ± 6.0) cm. According to the survey statistics, 982 elderly people often do physical exercise, accounting for 78%; The number of elderly people suffering from chronic diseases was 850, accounting for 68%, among which, the elderly people suffering from hypertension accounted for the largest proportion, followed by cardiovascular diseases and diabetes. Although the test subjects have a large proportion of chronic diseases, they have good self-care ability and often participate in physical exercise, so they can successfully complete the test.

3. Procedure

The test contents of the middle-aged and elderly part of the national physical fitness test were adopted, including height and weight, vital capacity, grip strength, sitting forward, standing on one foot with closed eyes and selective response

time, etc., which were divided into six indexes for analysis and discussion, including body composition, lung function, muscle strength, flexibility, balance ability and sensitivity.

In this study, SPSS21.0 was used to complete data entry, analysis and statistics. SPSS21.0 was used to calculate the mean value and t test of the obtained test data, and statistical charts were drawn by Excel.

4. Results

As can be seen from Table 1, there were significant differences between the 65 - 69 years old group and the 70-plus years old group in the closed-eye single-leg station ($P < 0.05$), but the mean changes of BMI, vital capacity, grip strength and sitting body flexion were not significant. There was also a significant difference between 60 to 64 years old group and 70 years old group ($P < 0.05$). There were no significant differences in other age groups ($P > 0.05$).

As shown in the Table 2, BMI and grip strength of different age groups showed small changes, with the rates of change ranging from 0.11% to 1.41% and −3.04% to −2.46%, respectively. There were no regular changes with the increase of age. In terms of BMI, the group aged 65 to 69 and the group aged over 70 showed the

Table 1. Comparison of health and physical fitness of the elderly in different age groups.

	BMI	Lung capacity (ml)	Grip strength index (kg)	Sit forward (cm)	Stand on one foot with eyes closed(s)	Selective reaction time(s)
60 - 64 years old (n = 529)	26.16 ± 3.61	2118.49 ± 538.56	24.33 ± 4.27	10.07 ± 9.40	10.31 ± 9.54	0.63 ± 0.97
65 - 69 years old (n = 605)	26.19 ± 3.48	1978.38 ± 547.09	23.59 ± 5.16	9.14 ± 9.48	9.29 ± 9.76△□	0.66 ± 0.1
More than 70-year-old (n = 119)	26.56 ± 3.16	1779.31 ± 510.74	23.01 ± 4.17	9.27 ± 9.11	7.57 ± 5.80○○	0.69 ± 0.13

Note: In the comparison of significant differences between the 60 - 64 age group, 65 - 69 age group and the 70-plus age group, ○, △ and □ were used respectively.

Table 2. Changes of health and physical fitness of the elderly in different age groups.

	X	Y	Z	Absolute change (rate of change %)	
				X/Y	Y/Z
BMI	26.16	26.19	26.56	0.03 (0.11%)	0.37 (1.41%)
Lung capacity	2118.49	1978.38	1779.31	−140.11 (−6.61%)	−199.07 (−10.06%)
Grip strength index	24.33	23.59	23.01	−0.74 (−3.04%)	−0.58 (−2.46%)
Sit forward	10.07	9.14	9.27	−0.93 (−9.24%)	0.13 (1.42%)
Stand on one foot with eyes closed	10.31	9.29	7.57	−1.02 (−9.89%)	−1.72 (18.51%)
Selective reaction time	0.63	0.66	0.69	0.03 (4.55%)	0.03 (4.55%)

Note: 60 - 64 years old group is represented by X, 65 - 69 years old group is represented by Y, and over 70 years old group is represented by Z.

largest change. In terms of vital capacity, the range of change was larger among different age groups, with a decreasing trend, and the change rate ranged from −6.61% to −10.06%. In terms of flexibility and fitness, the flexion index of the sitting body did not change regularly with the increase of age, but increased in the group over 70 years old, and the index ranged from −9.24% to 1.42%. In terms of eye closure, there was a significant downward trend, with the change rate ranging from −9.89% to 18.51%, especially in the group from 65 to 69 years old to over 70 years old, the change rate was the largest. In terms of the choice of response time, the response speed was slower and slower with the increase of age, showing a positive correlation trend.

5. Discussion

At the age of 30 or so, the peak of human body function level will decrease by 0.75% - 1% every year. With the increase of age, various organs and tissues of the human body will produce the phenomenon of aging, especially in the case of lack of exercise, the physical quality will be much worse than before. Among the indicators of physical fitness, the most obvious ones are maximal oxygen uptake, muscle strength, reaction ability and flexibility, etc. Meanwhile, fat will also increase (Du, 2008). From the test results analysis of yantai elderly physical quality characteristics also accord with this law.

From the perspective of mass fitness, BMI, also known as human mass index, is one of the important indicators used to assess the obesity degree of the general population (Liu, 2011). According to the indicators formulated by the World Health Organization, they are accurately divided into WHO standards, Asian standards and Chinese standards. For Chinese citizens, BMI between 18.5 and 22.9 is normal, while BMI between 24 and 27.9 is overweight. This study confirmed that the BMI index of the elderly is overweight, which reflects that the elderly should pay more attention to physical fitness, strengthen physical exercise, enhance physical fitness, improve health, and promote the development of physical and mental health as their physical function declines year by year with the growth of age. According to the data, the comparative change rate of the elderly in different ages ranges from 0.11% to 1.41%. The above analysis shows that there is no regular change with the increase of age.

From the point of view of lung function, lung capacity is a kind of lung function. Lung capacity is the volume of air exhaled at full capacity after maximum inhalation. The decline of vital capacity year by year is mainly caused by the decline of respiratory center functions at all levels, the increase of elastic resistance of lung and thorax and inelastic resistance of respiratory tract (Lu, Ren, & Hao, 2005). This study confirmed that vital capacity decreases with age, especially in those over 70 years old. There was no significant difference in different age groups ($P > 0.05$), and the difference between the group aged 60 - 64 and the group over 70 was very obvious, but the main reason for the difference was that the sample size of the group over 70 was too small.

From the point of view of muscle force, muscle force refers to the human body in the voluntary movement of the situation, the strength of muscle contraction. There are many ways to test muscle strength, and grip strength is the most convenient and safe method for the elderly to test muscle strength. Rantance believes that grip strength not only reflects the muscle strength of the upper limb, but also reflects the muscle strength of other parts (Rantanen, Era, & Heikkinen, 1994). This study confirmed that the grip strength index did not change regularly with age. The size of muscle strength is related to the number and size of H-type muscle fibers. The less the number of H-type muscle fibers, the fewer muscle motor units in the elderly, therefore, it will lead to the weakening of explosive power and muscle strength (Wang & Zhang, 2015). In daily life, the elderly need to strengthen exercise, for example, taijiquan can exercise the quadriceps muscle, or pull their own strength exercise with their bare hands, in order to delay the aging of muscles, but must be ready for the premise of activity.

From the point of view of flexibility, the sitting body flexion index can reflect a person's flexibility. The joint capsule and ligaments deteriorate with age, limiting the range of motion of the joint and resulting in decreased flexibility. This study confirmed that the flexibility of the elderly in different age groups was at the upper middle level and decreased with the increase of age, but the flexibility of the group over 70 years old was better than that of the group between 65 and 69 years old, which may be related to the small sample size data of the group over 70 years old. This decrease in overall flexibility can lead to a gradual decrease in the range of motion in older people, leading to various injuries and diseases. Therefore, we should strengthen the exercise of flexibility, avoid muscle stiffness, pay attention to step by step in sports, to prevent sports injury.

From the perspective of balance ability, it refers to the ability to maintain the body in a stable state. For the sake of safety, this test adopts the one-legged stand with closed eyes. One-legged stand with closed eyes is one of the balance ability, which mainly relies on the cerebellum to maintain the body stability. This study shows that balance decreases with age. Nowadays, people over 65 years old are the most likely to die due to falls, and the decline of balance ability is an important cause of falls (Zhang, Ji, Jiang, Zhao, & Zhang, 2019). Therefore, to improve the balance ability of the elderly, it is necessary to adjust weight, improve vestibular function, improve proprioception ability, strengthen muscle and reduce the use of drugs.

From the sensitivity point of view, this test uses selective response time. Selection of response as a physical quality of the human body, showing the speed of response by signals and so on. This study confirmed that the response speed increases with age and has a positive correlation trend. There are a variety of sports to improve the reaction speed of the elderly. For the elderly with good physical strength and certain sports foundation, the first choice is table tennis, soft ball and other ball games with weak contact and resistance, while for the rest of the elderly can choose a simple way to exercise, to avoid sports injury.

6. Conclusion

With the increase of age, most of the indicators of health and physical fitness of the elderly over 60 years old show a downward trend, and the older the older, the more obvious the decline of indicators. The elderly can carry out low-intensity exercise in daily life, so as to slow down muscle aging, avoid muscle stiffness, for maintaining the sensitivity, flexibility, muscle strength and lung function of the elderly has a good effect.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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