

# Methodological Research on Effective Improvement of Physical Quality of Intellectuals in Institutions of Higher Learning

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## Abstract

This article applied document literature method, questionnaire survey method, interview method, logical analysis method and mathematical statistics method to make an in-depth research on the physical quality of intellectuals in institutions of higher learning. According to the research, this group of people presents a continuous downtrend in terms of their physical quality. The concept of physical quality is more extensive than the concept of physical agility, since physical agility is a component of physical quality. Planned physical agility exercise can effectively enhance the level of physical quality. To bring the core strength exercise in physical agility training to exercise means of intellectuals in institutions of higher learning is not only a span in the thinking way, but also is more effective than the traditional exercise means. Then, the article listed exercise means for the core strength of this group of people. It is suggested that intellectuals pay attention to their physical quality and health in terms of their thinking, come to understand the importance and necessity of core strength exercise and improve their physical quality in a most effective means.

**Keywords:** Intellectuals in institutions of higher learning, Physical quality, Core strength

In the past few years, there have been quite a lot of studies on the physical condition of intellectuals in institutions of higher learning, and most studies have indicated so far that the physical quality of intellectuals in institutions of higher learning is presenting an obvious downtrend. There are also a lot of studies which have proposed suggestions to improve the physical quality of this group of people. However, why does the physical quality of intellectuals still present a downtrend with so many suggestions? Should our thinking mode leap over the original exercise modes? What is the relationship between physical quality of physical agility? Is there a better exercise means to be borrowed? With regard to this, on the basis of physical agility training practice and wide questionnaire survey and interview, this article made a careful reflection on these problems, and proposed thinking span to enhance the physical quality of intellectuals in institutions of higher learning with the purpose of providing scientific guidance for changing the exercise modes of intellectuals and improving the physical quality of intellectuals.

## 1. Research object and research method

### 1.1 Research object

This study took the physical quality of intellectuals in institutions of higher learning as the research object.

### 1.2 Research method

#### 1.2.1 Document literature method

This study took the literature about study of physical quality of intellectuals in institutions of higher learning and books related as the evidence of subject selection.

#### 1.2.2 Questionnaire survey method

This study made a questionnaire survey on 600 intellectuals in institutions of higher learning, including 216 national public servants with the educational background of master or above and 384 teachers in colleges and universities. Altogether, 580 effective questionnaires were taken back, and the efficiency rate was 96.7%.

The questionnaire was concerned with such aspects as the physical quality condition, reasons for declining physical condition and means of exercise, etc.

### 1.2.3 Interview method

This study made an interview with surrounding intellectuals in institutions of higher learning in terms of the physical quality and made record.

### 1.2.4 Logical analysis method

The author made a logical analysis in the questionnaire survey result and interview result and found out the working features of intellectuals in institutions of higher learning, the major reasons for declining physical condition and disadvantages of traditional exercise means as well as new types of exercise means to be borrowed.

### 1.2.5 Mathematical statistics method

This study used SPSS11.5 Software and Excel to make an analysis and statistics in data acquired from the questionnaire survey.

## 2. Research result and analysis

### 2.1 Physical condition of intellectuals in institutions of higher learning and reasons for a declining physical condition

In the process of development of each country, condition of its talents is an important manifest for its competitive strength. When China carries out the fundamental policy and strategy of “rejuvenating the country through science and technology”, intellectuals in institutions of higher learning are an important hard core. These intellectuals play an irreplaceable role in formulation of the national policy and strategy, development of science and technology, and cultivation and introduction of talents, etc.

However, figures about study on physical quality of intellectuals in institutions of higher learning are amazing and call for deep thought. For example, a survey on the health condition of intellectuals in Zhongguocun in Beijing indicated, their average life expectancy was only 53.34 and the average life expectancy of those intellectuals in automation institutes. In addition, other data indicated that, 60% of scientific researchers (including teachers) all over the country are lacking in physical exercise due to dedication to brainwork labor for a long time, and their mind and heart burden torture of diseases to different degrees. (Zhang Chuanfeng, 2000) Generally speaking, a declining changing tendency exists with a growing age in terms of such physical quality indicators as grip strength, sit-and-reach, vertical jump, standing on one foot, push-up, sit-up and response among college and university teachers in Hangzhou. In all the degrees of evaluation on physical quality of college and university teachers in Hangzhou, the rate of excellent accounted for 19.7%, the rate of good for 31.8%, the passing rate for 35.8% and the rejection rate accounted for 12.7%. (Fan Xiao, 2007) Indicators of the physical quality of college and university teachers (except for male teachers below the age of 30) in Ningbo were all lower than their contemporaries in the country. Except that several of the indicators of their physical condition were similar to those of their contemporaries, most of their indicators had obvious distinction with those of contemporaries in other areas in the country. (Yu Shijun & Li Jianyang, 2009) The morbidity rate of middle age intellectuals who suffered from a chronic disease was 52.4%, which was 45.3% higher than the group of common people. (He Hong & Chen Chao, 2009)

Through a questionnaire survey, this study concluded that there was 71.2% of this group who thought their own physical quality declined. Reasons for their declining physical condition included the following: lack of physical exercise due to working by bending over a table for a long time (63.5%), great working pressure (57.8%), a spiritual situation being in a tension state for a long time (49.1%), heavy living burden (38.6%) and other aspects (20.3%). In the high malady symbols, the proportion of chronic disease was large (54.7%) that was due to professional characteristics. Increase of lots of figures indicated, the physical quality of intellectuals in institutions of higher learning has great risk and presents a downtrend.

### 2.2 On physical quality, physical agility and core strength

#### 2.2.1 The concept of physical quality, evaluation indicators and its influential factors

Physical quality is the quality of human body and is a relatively stable feature that is gradually formed on the basis of congenital heredity and under the influence of acquired environment in the process of growth and caducity. (He Zhongkai, 2003) Physical quality not only reflects the level of the life activity of human body, but also reflects the level of physical activity of human body. The comprehensive indicators which are used to evaluate condition of physical quality include the following five aspects: 1) growth level of physical shape; 2) functional level of physiology and biochemistry; 3) physical quality and activity competence level; 4) developmental state of the psychology; 5) adaptation capacity. (Yu Kehong & Mu Shunbi, 2004)

## 2.2.2 Physical quality and exercise of the core strength

### 2.2.2.1 The concept of physical agility, its development and essence

“Physical agility” refers to the comprehensive sports ability of athletes in athletic competition and training and is the optimal sports ability that is in accordance with requirements of sports items with mutual integration and rational allocation of physical shape, physical function, activity quality and health level (disease). In one word, physical agility refers to the comprehensive sports ability required by a certain sports item and manifested by integration and mutual compensation of advantages of all sports. Physical shape is the basis of physical agility, physical function is the internal guarantee of physical agility, sports quality is the essence, external manifestation and evaluation indicator of physical agility and the condition of health level (disease) is the precondition whether the physical agility can be played in a normal way. (Yao Xuxia, 2010)

The history of training of physical agility can be traced back to 40s in the last century, in which a functionary recovery was made to wounded soldiers in the Second World War through exercise of strength. Study on physical agility in US takes a leading position in the world. It is relatively late in China to initiate study on physical agility and it is only recently that professional fitness coaches have come into being in sports teams in China.

### 2.2.2.2 Relationship between physical quality and physical agility

The essence of physical agility reflects the comprehensive sports ability of human body, while physical quality reflects the living activity level and sports level of human kind. Thus, the concept of physical quality is more extensive than the concept of physical agility, since physical agility is component of physical quality of human body. Among the multiple influential factors of physical quality, only planned scientific physical exercise with a definite purpose (or physical agility exercise) is able to effectively enhance the level of physical quality of human body.

### 2.2.3 Exercise of the core strength

Since sports quality is the essence, external manifestation and evaluation indicator, we improve our physical agility in training of physical agility mainly through training of sports quality. In training of physical agility, strength quality is an important force that can not be ignored. Strength quality is a functional ability of human body to withstand resistance or to confront both resistance and make limbs displaced. Improvement of this quality can not only enable us to run fast, jump high, throw far and have high efficiency of action, but can also reinforce the stability of the knuckle and effectively prevent joint injury. (Wang Weixing & Cai Youzhi, 2006)

In exercise of strength, what should be mentioned is the core strength exercise that has been paid attention in recent years. Since intellectuals sit before the computer for a long time, they have the professional characteristics of bending over the desk. Thus, their core muscles are extremely insufficient of exercise, which becomes the cause of root for several professional diseases and chronic diseases. According to requirement of this kind of exercise, it is quite necessary to intensify strength exercise of core muscles.

Core muscle group includes deep-seated small muscle group and superficial large muscle group. Deep-seated small muscle group includes transverse muscle of abdomen, multifidus muscles and part of internal oblique and quadratus lumborum, etc. This is the most important core muscle group that maintains stability of the spine, and its major function is to keep the stable ability of backbone centrum and keep backbone within the scope of the exactly central area. Superficial large muscle group includes rectus abdominis, musculus obliquus externus abdominis and a large part of muscle group of internal oblique, quadratus lumborum, erector spinae muscle and gluteus. The effect of superficial large muscle group can also not be ignored. When they shrink, they can enable the trunk to make actions of bending, unbending and rotating. These muscles are not directly attached to the backbone, but are connected to rib, thorax or the thigh joint from the pelvis, controlling the movement action of the backbone and balancing external force that attacks the backbone. (Wang Weixing & Li Haixiao, 2007) The core muscle group of human body burdens the tasks of stabilizing center of gravity, alleviating force of exertion and transmitting power, etc, in the process of movement. At the same time, the core muscle group of human body is the major aspect of the entire force of exertion and plays a pivotal role in the coordination of upper and lower limbs and integrated exertion of the force. (Wang Weixing & Li Haixiao, 2007)

Hence, core strength exercise is an important means for intellectuals to avoid occurrence of professional diseases and chronic diseases and improve their physical quality.

### *2.3 Exercise of core strength can effectively enhance the physical quality of intellectuals*

#### 2.3.1 Comparison of core strength exercise means and traditional exercise means

During the questionnaire survey, there were 84.2% of intellectuals who thought that a simple, convenient and effective exercise means was required. According to the characteristics that intellectuals bend over the table for a long time and are lacking in exercise of core muscles, we brought the core strength exercise in sports and training practice to exercise of physical quality of intellectuals. Compared with the exercise means of traditional citizen fitness purpose, this was not merely a leap in the thinking means, but also is more convenient and effective than the traditional exercise means in terms of exercise means, exercise occasion, exercise position, duration time and effect of each exercise. For details, please see Table 1.

#### **Insert Table 1 Here**

#### 2.3.2 Demonstrations of exercise means for core strength

##### 2.3.2.1 Bare-handed core strength exercise

##### 2.3.2.1.1 Bending over to the shape of "bridge"

Essentials of exercise: after prostration, one supports the body to become the shape of "bridge" by using the two forearms and two tiptoes, with two eyes looking directly in the front and below direction, a distance between the two forearms equal to the width of the shoulders and the shoulders, buttocks and ankles in a line. The body posture is kept for 10 seconds and relaxed. One should exercise 2 to 3 groups of this exercise, with each group 3 to 5 times.

The do's and don'ts: Muscle of the waist and belly is kept in tension and the waist should not sink.

##### 2.3.2.1.2 Stretching in bending over to the shape of "bridge"

Essentials of exercise: On the basis of exercising the above exercise of bending over to the shape of "bridge", the two forearms are respectively stretched forward. The body posture is kept for 10 seconds and relaxed. One should exercise 2 to 3 groups of this exercise, with each group 3 to 5 times. Then, the two legs are stretched backward. The body posture is kept for 10 seconds and relaxed. One should exercise 2 to 3 groups of this exercise, with each group 3 to 5 times.

The do's and don'ts: In the process of exercise, the fingertips, shoulders, buttocks and ankles should be kept in a line or the shoulders, buttocks and ankles should be kept in a line. An accurate posture is more importance than the duration of time of a movement.

##### 2.3.2.1.3 Bending over to the shape of a "leaned bridge" and stretching the arms

Essentials of exercise: One lies on the side of the ground. The elbow joint supports the body, with the hip joint held upwards to become the shape of a "leaned bridge", and the arm on the other side stretches upwards. The body posture is kept for 10 seconds and relaxed. One should exercise 2 to 3 groups of this exercise, with each group 3 to 5 times.

The do's and don'ts: Pay attention to the jack-up of the hip joint. The body is kept in balance after the arms are stretched.

##### 2.3.2.1.4 Exercise of contraction of rectus abdominis

Essentials of exercise: One lies on his back, with the two arms upward. The two arms and the upper body are upward 45 degrees or so and then put down. A completion of this exercise in a succession of 10 to 15 times is one group and one should exercise 2 to 3 groups.

The do's and don'ts: In the process of the movement, the two legs should be stretched and should not be bent. The two arms and the upper body should not be bended when they are help upward.

##### 2.3.2.1.5 Bending and stretching the legs when one lies on his back

Essentials of exercise: One lies on his back, with the two arms placed on the two sides of the body. After the leg is bended, it is stretched upward and then put down. When the leg is 5cm from the ground, it is then bended and stretched upward, and then put down slowly. One should exercise 2 to 3 groups of this exercise, with each group 5 to 8 times.

The do's and don'ts: After the leg is bended, it should be stretched upward and the movement of putting down the leg should be as slow as possible. When the two legs are put down, they should not touch the ground.

### 2.3.2.2 Exercise of the Swiss Ball

#### 2.3.2.2.1 Exercise of balance

Essentials of exercise: One sits on the top of the Swiss ball, with two arms sideward and the two legs naturally separated. The body is kept in balance. One should exercise 2 to 3 groups of this exercise, with each group 5 to 8 times. Each time, one should try to keep the body in balance as long as they can.

The do's and don'ts: The upper body should be direct, with eyes looking in the front direction and the gravity is put in the center of the ball.

#### 2.3.2.2.2 Bow-and-arrow step to press the ball

Essentials of exercise: One stands behind the Swiss ball, with one foot on the top of the ball and the two legs keeping a posture of bow-and-arrow for ten seconds. Then, the other foot is put on the top of the ball. The two arms are held sideward or akimbo.

The do's and don'ts: The eyes look in the front direction and the body is kept in balance.

#### 2.3.2.2.3 Lying on the back, with two legs pressing the ball and stretching

Essentials of exercise: One lies on the back, with the two arms naturally placed at the two sides of the body and the two legs pressing the ball. The two legs are held upward and then put down slowly. When the legs are 5cm from the ground, they are again held upward. One should exercise 2 to 3 groups of this exercise, with each group 5 to 8 times.

The do's and don'ts: One should pay attention that when the legs should be put down quite slowly.

#### 2.3.2.2.4 Lying prostrate and pressing the ball, with the arms stretching

Essentials of exercise: One lies prostrate, with the ball placed under the shank and the two hands supporting the body. When the body is kept in balance, one arm is stretched forward. One keeps the posture for ten seconds. One should exercise 2 to 3 groups of this exercise, with each group 6 to 8 times.

The do's and don'ts: One should try to keep the body in balance when one arm is stretched forward.

#### 2.3.2.2.5 Ball pressed and one leg swinging upward

Essentials of exercise: One lies on side, with the ball placed under the feet. The arm on the ground is bent to support the body to become the shape of "bridge". After the body is kept in balance, one leg is put on the ball and the other leg swings upward. One should exercise 2 to 3 groups of this exercise, with each group 6 to 8 times.

The do's and don'ts: When the hip is pressed upward, the body should be in a line.

### 3. Conclusions

3.1 The physical condition of the particular group of intellectuals in institutions of higher learning is still exhibiting a downtrend, which deserves enough reflection and attention of people.

3.2 The concept of physical quality is more extensive than the concept of physical agility, and physical agility is component of physical quality of human body. A planned and scientific physical agility exercise with a definite purpose can effectively enhance the physical quality level of human body.

3.3 According to the characteristics that intellectuals bend over the table for a long time and are lacking in exercise of core muscles strength, we bring the core strength exercise in physical training into the exercise means. This is not only a leap in terms of the way of thinking, but is also more convenient and effective than the traditional exercise means in terms of exercise means, exercise occasion, exercise position and time of duration and effect of each exercise.

3.4 We have listed the core strength training methods that are suitable for intellectuals, including the two parts of bare-handed exercise and Swiss Ball exercise.

### 4. Suggestion

It is suggested that intellectuals pay attention to the problem of their physical quality and health in their way of thinking and deeply understand the importance and necessity of core strength exercise. They should put their change in the way of thinking into practice, start out from the most simple bare-handed exercise, experience and exercise core strength and improve their physical quality with the most convenient and effective means.

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Table 1. Comparison of the traditional exercise means and core strength exercise means

	Exercise means	Exercise occasion	Exercise position	Effect of the time duration of each exercise
Traditional exercise means	Stable or partially stable	Gymnasium, playground and empty place	Mostly, limbs	Unobvious effect with long time
Exercise means of core strength	Mostly, unstable	Both inside and outside	Central positions, such as waist and abdomen, etc.	Obvious effect with short time