

Clinical Study of Sports Training to Improve the Adolescent Myopia Naked Eye Vision Study

Yunqing Han

Beijing Sport University, Beijing, China

Hanyunqing@bsu.edu.cn

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Abstract: To study and analyze the effect of physical training on improving the naked eye vision of juvenile myopia in clinical research, and to provide data reference for the vision treatment in clinical work. On the one hand, colleges and universities of a provincial sports college were randomly selected as survey schools, and 300 students were randomly checked in each grade of freshman, sophomore, junior and senior for questionnaire survey, to understand the weekly times of physical training, the time of each physical training and their amount of exercise. Meanwhile, 60 students were randomly divided into experimental group and control group, with 30 students in each group. This paper mainly studies the effects of physical training on the eyesight of teenagers and the effects of different physical training items on the naked eye eyesight of teenagers. The questionnaire survey showed that among the 1012 students in the effective survey, 544 students spent more than one hour in each physical training, and the proportion of those who had more than three hours of physical training per week also reached 54.3%. In the survey on the physical activity of teenagers, the proportion of physical activity from large to medium to small was 13%, 21% and 66% respectively. In the comparison between the experimental group and the control group, 19 students in the control group who did not receive physical training had visual impairment over the past year, with a proportion of 63.3%, while only 9 students in the experimental group had visual impairment, with a proportion of 30.0%. The difference between the two groups was significant ($P < 0.05$). In addition, the effects of different physical training programs on the improvement of vision were also different, and the differences in gender, weight and other aspects between the two groups were not statistically significant ($P > 0.05$). In the field of medical clinical research, physical training has a positive effect on improving the naked eye vision of myopia in adolescents.

1. Introduction

With the acceleration of the pace of life and the change of The Times, people are gradually bound by the study, office and inseparable electronic products [1]. People's vision, especially for teenagers, is overused due to the huge pressure from study and work, and their vision is gradually reduced, which gradually attracts people's attention, especially for teenagers and parents with children [2]. After decades of development, China's medical level and medical environment have been significantly improved, and considerable progress has been made in the treatment of nearsighted naked eye vision, but there is still a certain gap with developed countries [3].

According to statistics, by 2019, the detection rate of poor vision in high school students was as high as 79.2 percent and that of college students was 84.7 percent. The continuous decline of the eyesight of teenagers brings unnecessary troubles to their study, life and work, and even teenagers with severe vision loss have been haunted by multiple troubles [4]. It is possible to understand the health status of a person or even a country through vision, so it has become one of the important tasks of current education to strengthen the improvement of myopia and naked eye vision in teenagers [5]. The physical quality, eye hygiene and habits, family inheritance and other factors of adolescents may lead to the decline of near-sighted naked eye vision [6]. This decline may be the inevitable result of social development. At present, the increasing pressure of teenagers' study and the fierce competition for jobs will make this downward trend continue. In order to slow down or even stop this downward trend, we must make a breakthrough in the theory and practice of medical clinical research. Physical training is a very positive and effective way to improve vision [7]. Physical training can not only improve physical fitness and immunity, but also bring about a pleasant mood. Through targeted and active physical training, it is conducive to the improvement and even recovery of vision [8]. This paper intends to explore the mystery of myopia naked eye vision in adolescents in medical clinical research by taking physical training as a breakthrough.

Based on the principle of data segmentation, this paper mainly adopts questionnaire survey method, experimental method and statistical method, supplemented by grey correlation analysis and literature data method for a control study [9]. On the one hand, this paper will comprehensively review and sort out the research results of "medical clinical research", "sports training" and "nearsighted naked eye vision" at home and abroad, as well as the links among the three, and make a summary of relevant data to lay a theoretical foundation for this study [10]. On the other hand, colleges and universities of a provincial sports college were randomly selected as survey schools, and 300 students were randomly checked in each grade of freshman, sophomore, junior and senior for questionnaire survey, so as to understand the weekly times of physical training, the time of each physical training and their amount of exercise. At the same time, 60 exercise-loving students with strong desire to improve their eyesight were randomly divided into experimental group and control group, with 30 students in each group. Mainly for the sports training on the vision effect of teenagers and different sports training project of adolescent myopia glasses eyesight to study the influence of different, adopt statistical method and grey relation analysis, research and analysis in medical clinical research the influence of the sports training to improve the adolescent myopia glasses eyesight, thereby provide reference data for clinical study vision treatment and promote the development of the field [11].

2. Questionnaire Survey

2.1. Survey Subjects

In order to reduce the interference of human factors as much as possible and improve the

scientificity, objectivity and accuracy of the investigation, the colleges and universities of a province were selected randomly. At the same time, 300 students were randomly selected from the freshmen, sophomores, juniors and seniors of the physical education university, and the total number of respondents was 1200.

2.2. Research Methods

First, the number of questionnaires: the total number of questionnaires issued is 1200. After the questionnaires are issued and filled out, the staff will take them back immediately to ensure the validity of the questionnaires. The final number of valid questionnaires was 1012, and the effective recovery rate was 84.3%, which met the basic requirements of the survey.

Second, the validity test of the questionnaire: this questionnaire mainly studies and analyzes the influence of physical exercise on improving the naked eye vision of myopia in teenagers. The validity test of questionnaire basically is to point to whether this questionnaire can reflect the influence of physical exercise to teenager myopia naked eye eyesight effectively, if have an effect, its influence degree by how much, it is what kind of way produces an effect. The design of the questionnaire is the most basic and important step in a survey. It first affects the validity of the questionnaire, then the process of filling in the questionnaire, and finally has a certain impact on the survey results. Therefore, the design of questionnaire is very important, and the high-quality questionnaire can make the survey get twice the result with half the effort. In the design process of questionnaire, the designer considers the question type, the number of questions and the key points of the questionnaire as much as possible. After the completion of the questionnaire design, dozens of experts in sports science and medicine were invited for professional evaluation, and the opinions and Suggestions of relevant experts were summarized. After many revisions, supplements, improvements and three rounds of expert evaluation, the questionnaire was finally finalized. The questionnaire has been affirmed and recognized by experts in related fields, which has a high validity, conforms to the general requirements of statistics, can stand the test, and the document design is highly scientific. It is preliminarily believed that the questionnaire can not only meet the needs of the survey, but also provide relevant data for the following experimental method, laying a good foundation.

Third, reliability test of the questionnaire, the questionnaire reliability is refers to the reliability of questionnaire, combined with the survey to be specific, is faced with 1200 different grade students using the same questionnaire as well as in the same student to take the same survey methods, not because of the different grade and gender differences lead to the final survey. The higher the reliability of the questionnaire, the more stable the final results will be and the higher the degree of consistency will be. In order to make the questionnaire survey more reliable, we randomly selected the surveyed schools and subjects, and the students involved in the survey included all grades, colleges and majors. At the same time, we selected a large survey base, the total number of questionnaires reached 1200, 1012 questionnaires were effectively recovered, and the effective recovery rate reached 84.3%. In addition, we will use the retest method to test the validity of the questionnaire. In other words, after the completion of the first round of large-scale questionnaire survey, some students from the first round of 1,200 students will be selected again for the second round of small-scale questionnaire survey, and the time interval between the two rounds of surveys is 14 days as stipulated by science. After the two rounds of questionnaire surveys were completed and compared, it was found that the relevant reliability coefficient of the questionnaire was 0.862, which was ≥ 0.75 , indicating good reliability, meeting the statistical requirements and having a high survey reliability.

3. Experimental Method

3.1. Subjects

In this experiment, a total of 60 students, including 40 male students and 20 female students, were selected to participate in a provincial sports university. 60 people were randomly divided into two groups, one group was the experimental group, the other group was the control group, each group was 30 people. When choosing the experimental object, on the one hand, the randomly selected subjects, on the other hand consider the experiments for a long time, the process was complicated, difficult, some of these subjects students must have a strong will and strong interest in sport, recovery need to follow the arrangement of related experimental staff, which will be conducive to the experimental work with. If the students who do not obey the arrangement or follow the command in the experiment or the students who are absent from the training for a long time due to accidents will be excluded from the relevant experimental data in the final analysis and comparison of experimental results, and the statistics will not be collected.

3.2. Experimental Process

First, preparation before the experiment: to study the effect of physical training on improving the naked eye eyesight of teenagers' myopia, the students participating in the experiment should be tested for balance before the experiment, excluding other major factors that currently affect teenagers' myopia. These factors mainly include gender composition, genetic influence of parental vision, and the amount of time one spends in close contact with the eyes in daily life. In addition to the above major factors, the experiment can be guaranteed to the maximum extent that the variable of the experiment is the physical exercise factor, and the experiment is also guaranteed to be carried out in a consistent condition. It should be noted that before participating in the experiment, members of both groups should carry out actual testing and make relevant records for later comparative analysis.

Second, the specific operation in the experiment: in the experiment process, all the members of the experimental group and the control group should receive health education about visual protection, to avoid interference from other factors, thus affecting the experimental results, resulting in the unscientific experiment. The 30 students in the experimental group were given a certain amount and a certain amount of physical exercise each week. Physical exercise to table tennis and middle - and long-distance running. Table tennis training has the coach unified arrangement and guidance, each exercise time for 1.5 hours, every 45 minutes in the middle of the rest of 10 minutes, at least three times a week to arrange training, training time should reach at least 4.5 hours per week. Middle and long distance running exercises are mainly conducted on the playground by the coach, training 4 times a week, each time for 1 hour, every half an hour to rest for 10 minutes, in order to ensure the quality of the middle and long distance running and the effectiveness of the experiment. 4 hours of continuous training, if the weather such as wind and rain, can be moved to the gym to do the corresponding physical exercise, to maintain as much as possible uninterrupted exercise. Students in the control group had the same conditions as those in the experimental group, except that they did not take any or a small amount of planned and regular physical exercise. After four months, the visual acuity of 60 students in the experimental group and the control group were tested again and compared.

4. Experimental Results

4.1. Observation Indicators

The observational indicators of this study are mainly divided into two parts. Part of the study looked at indicators such as the number of times of physical training per week, the length of each session, and how much exercise the 1,012 participants did. On the other hand, the effects of physical training on the nearsighted naked eye vision of students in the experimental group and the control group were mainly observed, and the visual improvement of 30 students in the experimental group was compared vertically after 4 weeks, 8 weeks, 12 weeks and 16 weeks after physical training. At the same time, longitudinal observation of the effects of different sports training items on vision, in this experiment is mainly to compare the improvement of vision of table tennis training and middle and long distance training. This study tries its best to conduct comprehensive and multi-level observation and comparison, so as to obtain accurate and effective experimental results, so as to provide data support for medical clinical research and promote the rapid development of vision correction in medical clinical research.

4.2. Statistical Methods

Will be with the aid of SPSS software, this study collected in the study of all relevant data will be processed by the software, measurement data basically adopt the way of (mean±standard deviation) said describe them, at the same time by chi-square test, $P < 0.05$ showed statistically significant difference, $P > 0.05$ indicates no statistically significant difference between two groups.

4.3. Results of the Questionnaire Survey

(1) Results of the survey on the frequency and time of physical training for teenagers

A total of 1200 students from a provincial physical education university were surveyed in this questionnaire. The survey subjects were distributed among freshmen, sophomores, juniors and seniors on average. The final number of questionnaires with statistical analysis value was 1012. Table 1 is the basic statistical table of the average time of each physical training for teenagers. It can be seen from table 1 that among the 1012 students effectively surveyed, 544 students spent more than one hour in each physical training, and the number of those who spent less than one hour also reached 46.2%. Similarly, in table 2, the proportion of people who have more than 3 times of physical training per week and those who have less than 3 times of physical training per week is 54.3% and 45.7% respectively. It can be seen that among teenagers, the difference between those who have regular physical exercise and those who do not is not large, only 7 or 8 percentage points. Further digging, we can find that each physical training more than 1 hour or adhere to physical training more than 3 times a week of adolescent vision is more normal, and physical training in an hour or less than 3 times a week of physical training compared with a significant difference. Therefore, we can be sure that regular long-term physical training can protect the eyes, prevent myopia and improve vision.

Table 1. Statistical table of basic information of each time of physical training for teenagers

Project	Myopia		Sighted		Total	
	(n)	(%)	(n)	(%)	(n)	(%)
Each physical training ≥ 1 hour	139	32.9	405	68.6	544	53.8
Each physical training < 1 hour	283	67.1	185	31.4	468	46.2

Table 2. Basic statistics of the number of physical training sessions per week for adolescents

Project	Myopia		Sighted		Total	
	(n)	(%)	(n)	(%)	(n)	(%)
The number of physical training ≥ 3 times per week	152	36	398	67.5	550	54.3
The number of physical training sessions per week is < 3	270	64	192	32.5	462	45.7

(2) Investigation results and analysis of physical training amount of teenagers

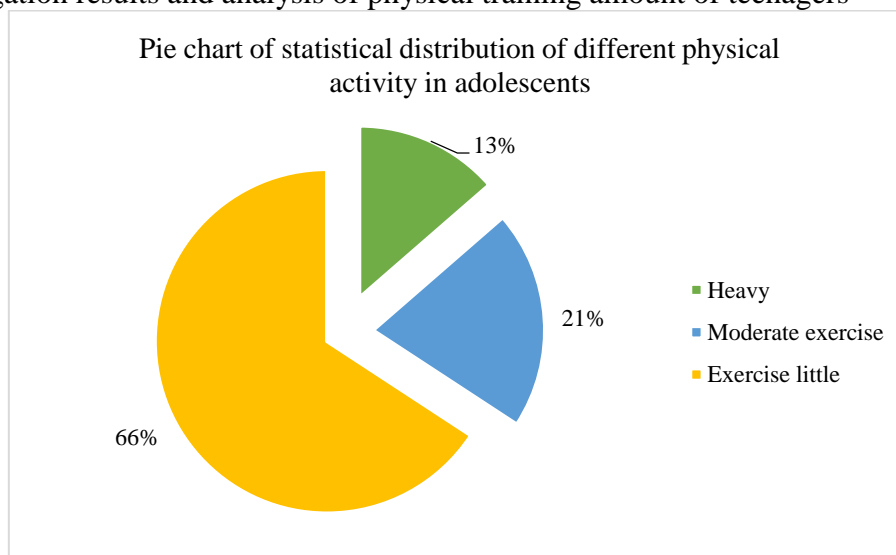


Figure 1. Pie chart of statistical distribution of different physical activity in adolescents

The amount of exercise is related to the three factors of exercise intensity, exercise time and exercise frequency, which are in direct proportion to the amount of exercise. The greater the index of these three factors is, the greater the amount of exercise is. PARS-3, namely, the physical activity rating scale, stipulates that the amount of physical activity is divided into three levels, namely the large amount of physical activity, the medium amount of physical activity and the small amount of physical activity. According to the rating, the amount of exercise less than 19 points is small, the amount of exercise greater than 43 points is large, and the amount of exercise between 20 and 40 points is medium. As shown in the pie chart of statistical distribution of different physical activity of teenagers in figure 1, we can clearly see that among the 1012 students effectively investigated, the proportion of physical activity from large to medium to small is 13%, 21% and 66%, respectively. The proportion of large amount of exercise and small amount of exercise was significantly different ($P < 0.05$). It is easy to understand the great physiological load of exercise training in sports more outdoors, small and medium-sized exercise exercise indoors, restricted by time and place is small, so the number of small amount of exercise and exercise medium is more, in 1012 there are about 880 effective respondents chose a small amount of exercise and exercise medium sports training, they are less exercise intensity, exercise time is shorter, exercise frequency is low. People who consistently exercised heavily outdoors had better vision than those who exercised lightly indoors.

4.4. Results of the Experiment

(1) Longitudinal comparison of left and right eye vision before and after physical training in the experimental group

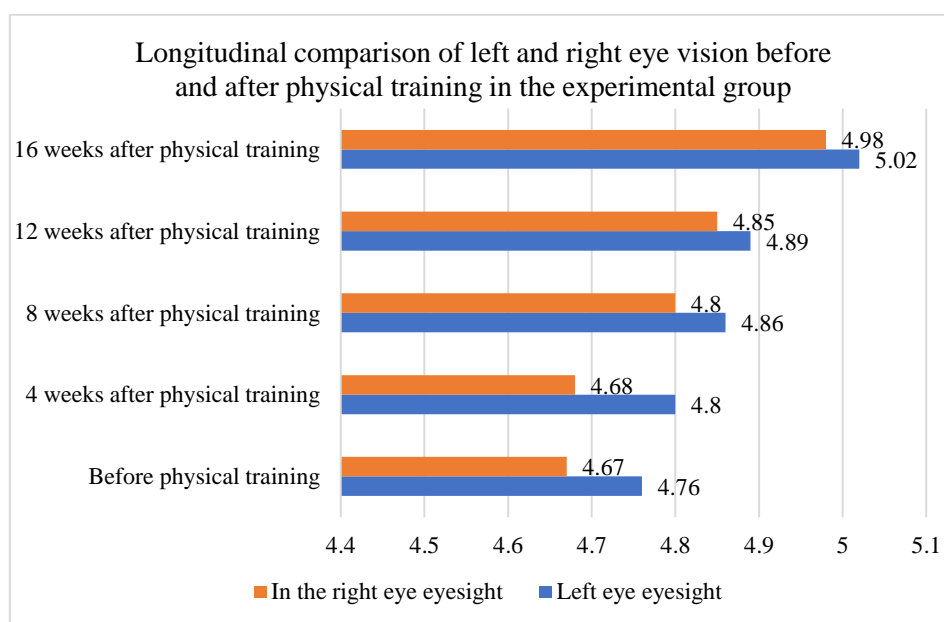


Figure 2. Longitudinal comparison of left and right eye vision before and after physical training in the experimental group

According to the longitudinal comparison of left and right eye vision before and after physical training in the experimental group in Figure 2, after 4 weeks of physical training, the visual acuity of the left eye changed from 4.76 to 4.8, and the visual acuity of the right eye changed from 4.67 to 4.68. After 8 weeks of physical training, the visual acuity of the experimental group increased from 4.76 to 4.86 in the left eye and from 4.67 to 4.8 in the right eye. After 16 weeks of physical training, the average visual acuity in the left eye of the experimental group was 5.02 and the average visual acuity in the right eye was 4.98, showing significant improvement in visual acuity ($P < 0.05$). Visible, athletic training has remarkable effect to teenager myopia naked eye eyesight, if insist for a long time athletic training, visual acuity forehead can get good improvement even restore.

(2) Horizontal comparison results of different sports training items

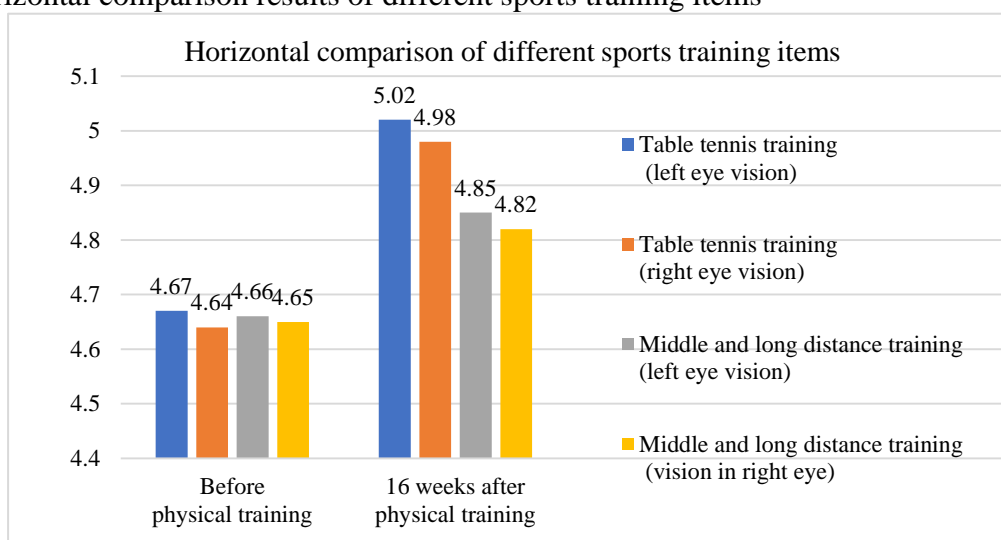


Figure 3. Horizontal comparison of different sports training items

In the experiment, we mainly carried out two kinds of sports training, one is table tennis training,

the other is middle and long distance training. As shown in figure 3, after training around ten, we found that both in table tennis training and distance training has obvious effect on the improvement of the vision, with significant difference ($P < 0.01$), of which around ten table tennis training, visual acuity increased from 4.67 to 5.02, in the right eye eyesight increased from 4.64 to 4.98, increased obviously due to middle-long-distance training, Ming difference ($P < 0.05$). This indicates that the improvement effect of the strength of the table tennis training team is better, so it can be confirmed that different sports training items have different effects on the improvement of vision.

(3) Results of visual acuity changes before and after physical training in the experimental group and the control group

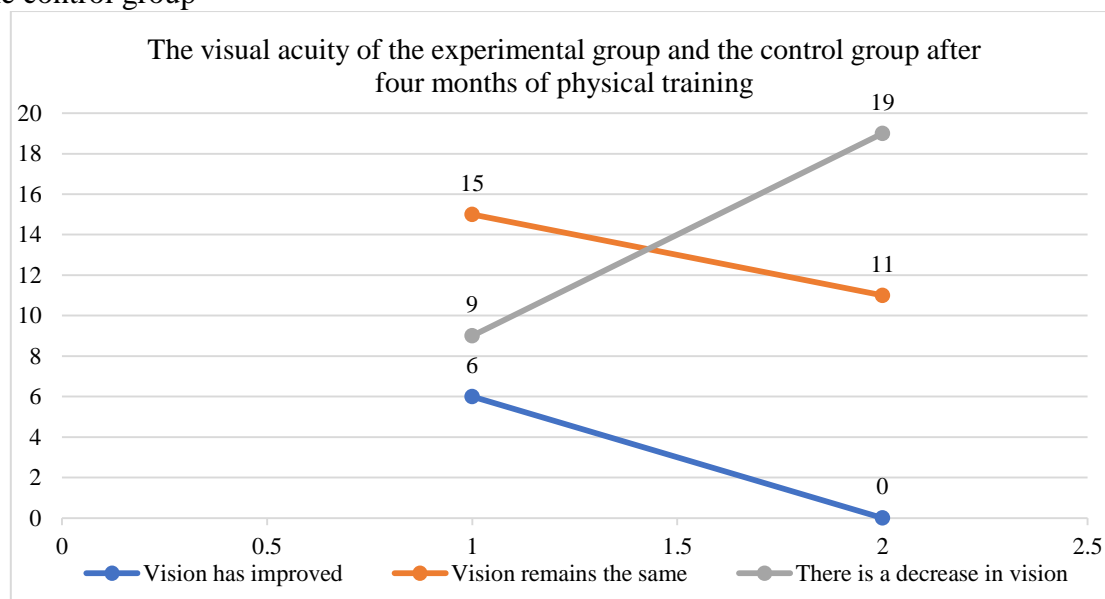


Figure 4. Statistical chart of visual acuity changes after 4 months of physical training in the experimental group and the control group

As shown in figure 4, after four months of physical training, 6 of the 30 students in the experimental group had improved vision, which was better than that four months ago, while no one in the control group had improved vision. In addition, 19 students in the control group who did not receive physical training had visual impairment over the past year, with a proportion of 63.3%, while only 9 students in the experimental group had visual impairment, with a proportion of 30.0%. The difference between the two groups was significant ($P < 0.05$). In terms of visual acuity, the number of people in the experimental group and the control group was 15 and 11, respectively, with no significant difference, and there was no significant difference between the groups ($P > 0.05$).

5. Experimental Analysis

5.1. Results Analysis of the Questionnaire Survey

The results of questionnaire show that regular long-term physical training can protect eyes, prevent myopia and improve eyesight. Although there was no significant difference in the number and time of physical training among the 1,012 students surveyed, there was a significant difference in the amount of physical exercise they did. The degree of vision improvement varies with the amount of physical exercise. The more physical exercise, the better the recovery of vision, and the more physical exercise outdoors, the better the improvement of vision. This is because training outdoors, with plenty of natural light, gives your eyes the oxygen they need. In addition, in the

process of training, the eyes will unconsciously look at the distance, enhance the eye rotation, conducive to the improvement of strength. Other studies have shown that exposure to sunlight increases the release of dopamine, which can limit eye growth and reduce myopia.

5.2. Analysis of Experimental Results

We often say myopia, it is pseudomyopia actually, have changeability. Excessive with the eye even fatigue is the main factor that causes myopia, as a result of the adjustment ability of teenager's eye is stronger, make the eye gets sufficient rest through appropriate and reasonable way, can make eyesight gets improvement thereby even complete recovery. Physical training is a very active and effective way to rest. In the process of physical training, not only the students of the body of each part of the muscle group to strengthen the body, and the eyes will be seen according to the distance of the object will be adjusted by themselves, so that the ciliary muscle in the continuous expansion and contraction, which makes the original tired eyes get better, faster relaxation. Physical training improved the ciliary muscle contraction force and adjustment ability, the use of the eye more coordinated, help to eliminate the strain caused by the eye fatigue, thereby to a certain extent can protect the eye, prevent the occurrence of myopia, the effect of good words can also improve vision and even restore vision.

Different physical training items have different effects on the improvement of vision. In general, physical activity that causes the eyes to move back and forth and move faster is associated with better vision. As far as table tennis and long-distance running are concerned, table tennis has the characteristics of small size and fast speed. In order to achieve better results in the training process, we must concentrate on table tennis. As the eyes move back and forth with the ping-pong ball, the lens diopter needs to be constantly adjusted, in the state of contraction and relaxation between switching back and forth, so as to ease the tension of the ciliary muscle and its surrounding ligament, enhance the flexibility and elasticity of the eye muscle, to a certain extent to improve the role of vision. Middle and long distance training is generally carried out in the outdoors, bright sunshine and fresh air can provide the eyes with sufficient oxygen nutrition supply. In addition, in the middle and long distance running process, the eyeballs will also move with the body's swing, which is conducive to relieve eye fatigue and improve vision.

Pseudo myopia, which is prone to fluctuations, is easily affected by the environment. If we create a good environment, vision can be improved or even restored. The experimental group of students in the physical training not only the eyes get more oxygen, so that the nutritional status of the eyes has been improved, the visual function has been enhanced, and the eye muscle has been strengthened, fatigue can be alleviated. In addition, physical training can make people feel happy, healthy, conducive to the improvement of immunity. The human body is a closely related system, the enhancement of the system will certainly have a good role in promoting the eyes. This goes a long way to explaining why those who kept up with physical training improved their eyesight, while none of the students in the control group did. The number of students with visual impairment in the control group is far more than that in the experimental group. This may be because the students without adequate physical training still work for a long time, their ciliary muscles are still relatively stiff, and they have not been well relieved and adjusted, and the pressure in the eye has not been released, so their vision declines. However, the difference in the number of students with unchanged vision between the two groups is not large, which may be related to family inheritance. Short-term physical training has little or no effect on vision. Therefore, the next experiment can extend the time of physical training and further study these students with little change. In order to improve the experiment, some follow-up investigations can be carried out later, which will make the research more scientific. In addition, research samples can be increased to conduct large-sample,

high-quality research, so as to provide data support for clinical trials.

6. Conclusion

The study was divided into two parts. Sports colleges and universities on the one hand, randomly selected from the province of a questionnaire survey was conducted among 1200 students, the effective investigation of 1012 students every time there are 544 students in sports training time a week for more than 1 hours, number of sports training in more than three times the number of 54.3%, thus it can be seen in adolescents, often take exercise in the gap between young people and people who do not often take part in physical exercise is not big, only separated by seven or eight percentage points. Further digging, we can find that each physical training more than 1 hour or adhere to physical training more than 3 times a week of adolescent vision is more normal, and physical training in an hour or less than 3 times a week of physical training compared with a significant difference. Therefore, we can be sure that regular long-term physical training can protect the eyes, prevent myopia and improve vision. Although there was no significant difference in the number and time of physical training among the 1,012 students surveyed, there was a significant difference in the amount of physical exercise they did. In the effective survey of 1012 students, the proportion of exercise from large to medium to small was 13%, 21% and 66%, respectively. The proportion of large amount of exercise and small amount of exercise was significantly different ($P < 0.05$).

On the other hand, 60 exercise-loving students with a strong desire to improve their eyesight were randomly divided into the experimental group and the control group, with 30 students in each group. Group of 30 students in physical training after 4 weeks, left and right eye eyesight change is not obvious, but since 8 weeks the experimental group students eyesight change has obvious increase, after 16 weeks of regular targeted training, from the left eye average visual acuity increased from 4.76 to 5.02, average visual acuity increased from 4.67 to 4.98, in the right eye eyesight improvement effect is obvious, with significant difference ($P < 0.05$). In different sports training project of vision to improve the effect of different experiments, we found that both in table tennis training and distance training has obvious effect on the improvement of the vision, with significant difference ($P < 0.01$), of which around ten table tennis training, visual acuity increased from 4.67 to 5.02, in the right eye eyesight increased from 4.64 to 4.98, increased obviously due to middle-long-distance training, Ming difference ($P < 0.05$). This shows that in medical clinical research, doctors should choose different physical training programs according to the specific needs and actual conditions of the rehabilitated patients, and the appropriate and reasonable physical training programs have the effect of twice the result with half the effort on the improvement of myopia naked eye vision in teenagers.

Also due to the number of valid questionnaire 1012, only small sample and sports training time only 4 months, experimental time is shorter, the research content is not comprehensive enough, another group of students may be influenced by other bad factors outside the experiment, which makes this experiment has certain limitations and shortcomings. About sports training in clinical research in the improvement of juvenile myopia glasses eyesight study space, there's still a lot of research in the late conditions allow, can expand the scope of investigation, sample, to extend the time of the experiment, for the investigation of the large sample, high quality, provide data support for clinical study.

To sum up, this article combines questionnaire method and experimental method, analysis the influence of sports training on juvenile myopia glasses eyesight, made a new breakthrough in a certain extent, the article explored a predominantly sports training eye protection, prevention of myopia and the way to improve your vision, thus to further improve the physical and mental health

of adolescents and to promote clinical research development in the field of vision therapy provides data support.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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