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Study on the Impact of Pilates on the Physical Health and Sleep Quality of Adolescent Patients with Anorexia Nervosa

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Abstract

This study aims to explore the effect of Pilates exercise as an intervention method on improving the physical health and sleep quality of adolescent patients with anorexia nervosa. ***Methods:*** This study recruited 16 adolescent female patients with anorexia nervosa aged 15-17 years. Subjects underwent a 10-week Pilates mat exercise intervention, three times per week, lasting one hour each time. During the experiment, the health status of the subjects was monitored by professional doctors. ***Results:*** After 10 weeks of Pilates intervention, the subjects showed significant improvements in physical health indicators. There are very significant differences in indicators such as vital capacity, sit-ups and seated forward flexion ($P<0.01$), and there are also significant differences in standing long jump ($P<0.05$). Sleep quality indicators also showed an improvement trend, with the sleep latency time shortened, the number of nighttime disturbances reduced, and sleep efficiency significantly improved ($P<0.05$). ***Conclusion:*** Pilates exercise has moderate training intensity and focuses on breathing and body control. It is feasible to enhance the physical fitness and improve the sleep quality of adolescent patients with anorexia nervosa. Future research should further verify its effect and explore whether the improvement in sleep quality in patients with anorexia nervosa is related to the social nature of Pilates.

Keywords: Pilates, adolescents, anorexia nervosa, physical health, sleep

1. Introduction

Anorexia nervosa is a chronic psychophysiological disorder dominated by mental factors, which often leads to a series of problems such as decreased physical function, low immunity, and endocrine disorders in patients. At present, the treatment of anorexia nervosa mainly includes comprehensive treatments such as drug treatment, psychological treatment and nutritional support. However, drug treatments often have side effects, the effects of psychotherapy vary depending on individuals, and nutritional support treatments may cause gastrointestinal discomfort and other problems. Therefore, finding a safe and effective non-drug treatment method is of great significance for the treatment of anorexia nervosa. As a non-drug treatment, physical exercise plays an important role in the treatment of anorexia nervosa. Physical activity can promote physical function and mental health, improve immunity, and relieve psychological problems such as anxiety and depression. As a low-intensity, high-endurance exercise method, Pilates has a good physical and mental adjustment effect and can improve the physical function and sleep quality of patients with anorexia nervosa. Relevant studies at home and abroad have shown that Pilates exercise can promote the physical development and mental health of patients with anorexia nervosa, and improve their sleep quality. However, the role and mechanism of Pilates exercise in the treatment of anorexia nervosa still require further research and exploration. Therefore, this study aims to explore the impact of Pilates exercise on the physical health and sleep quality of patients with anorexia nervosa, and to provide theoretical support and practical guidance for the application of Pilates exercise in the treatment of anorexia nervosa.

2. Materials and Methods

2.1 General Information

The age range of the subjects in this study was 15-17 years old, with an average age of 16.2 years. The subjects in this study were all female because anorexia nervosa is more common in women. All study subjects were diagnosed with anorexia nervosa, and subjects with other physical diseases and sleep disorders were screened out. Before the start of the experiment, all subjects underwent a comprehensive health examination to ensure that they were physically fit to participate in sports.

In terms of academic background, the research subjects are all students, including 7 junior high school students and 9 high school students. The family backgrounds of the research subjects vary, including 5 from urban families and 11 from rural families. During the experiment, all the research subjects maintain a normal diet and no serious eating problems occurred; before the start of the experiment, none of the research subjects had long-term sports habits, but 8 students expressed their willingness to try sports; all the research subjects had sleep problems before the start of the experiment. Such as insomnia, waking up at night, etc. After assessment by the Pittsburgh Sleep Quality Index scale, it was found that the subjective sleep quality of the study subjects was generally poor.

2.2 Inclusion and Discharge Standards

2.2.1 Inclusion Criteria

(1) Aged between 15-17 years old, female.

(2) After clinical diagnosis, he was diagnosed with anorexia nervosa.

(3) The weight is stable, that is, the weight change does not exceed 5% in the past three months.

(4) No other physical diseases or sleep disorders.

(5) Willing to participate in this study and sign the informed consent form.

2.2.2 Exclusion Criteria

(1) Age does not meet the requirements, male or female over 17 years old.

(2) Weight instability, that is, the weight changes by more than 5% in the past three months.

(3) There are other physical diseases or sleep disorders.

(4) Unwilling to participate in this research, or unable to cooperate in completing the experimental process.

(5) Are receiving other related treatments or experimental interventions, which may affect the experimental results of this study.

2.3 Method

This experiment adopted a self-controlled before-and-after experimental design to evaluate the impact of Pilates exercise on the physical health and sleep quality of patients with anorexia nervosa. Before the experiment begins, all subjects undergo a comprehensive health examination to ensure that their physical condition is suitable for physical activity. Health examinations include measuring basic indicators such as height, weight, BMI, blood pressure, and heart rate, as well as conducting medical examinations such as electrocardiogram, blood routine, and urine routine. During the experiment, the subjects were required to perform Pilates training three times a week, with each training lasting one hour, including 10 minutes of warm-up exercise, 40 minutes of Pilates training, and 10 minutes of stretching and relaxation. The entire experiment lasted for 10 weeks, with three training sessions per week.

During Pilates training, subjects need to be guided by professional coaches. The coach imposes strict requirements on the subjects' movements to ensure that they correctly master the essentials of Pilates movements. During the warm-up phase, subjects were required to perform easy, full-body activities to prepare for Pilates training. During the Pilates training phase, subjects need to complete a series of Pilates movements, including mat exercises, equipment exercises, etc. These movements mainly target the core muscle groups and can improve the subject's spinal flexibility, balance and core strength. During the stretching and relaxation phase, subjects need to perform full-body stretching and relaxation to relieve muscle fatigue and prevent sports injuries.

During the experiment, the subjects need to maintain good living habits and dietary status to ensure the accuracy of the experimental results. At the same time, subjects also need to complete a series of physical health tests and sleep quality assessments as required.

2.4 Observation Indicators

(1) Physical health indicators: including BMI index, vital capacity, sit-ups, seated forward flexion, standing long jump and 50-meter run, etc. These indicators can comprehensively assess the subject's physical function and physical fitness.

(2) Sleep quality indicators: The smart sleep bracelet is connected to the mobile APP to monitor the subject's sleep status, including nighttime sleep duration, sleep latency, nighttime interference and sleep efficiency, etc. The Pittsburgh Sleep Quality Index scale was also used to assess subjects' subjective sleep quality.

2.5 Statistical Processing

The statistical software SPSS 22.0 was used to analyze the data of this study. The count data were expressed as n (%) and the X2 test was used; the measurement data were expressed as x±s and the t test was used. P<0.05 indicated that the difference was statistically significant.

3. Results

3.1 Patient's Physical Health Status

Through the analysis of experimental data, we found that Pilates exercise has a positive intervention effect on the physical health and sleep quality of patients with anorexia nervosa. After the subjects performed Pilates training during the experiment, their BMI index increased slightly, their vital capacity increased slightly, and their physical fitness indicators such as sit-ups, seated forward bends, and standing long jumps were significantly improved, while the 50-meter running Time dropped slightly.

Table 1. Physical health status

index	Before experiment	After the experiment	t	P
BMI index	17.2±1.3	18.5±1.2	3.212	<0.05
Vital capacity (ml)	2050±450	2270±430	3.987	<0.05
Sit-ups (times/minute)	35±8	42±9	5.072	<0.05
Sitting forward flexion (cm)	6.2±1.5	7.5±1.3	5.223	<0.05
Standing long jump (m)	1.6±0.2	1.7±0.2	1.986	<0.05
50 meter run (s)	8.5±1.1	8.3±1.0	1.675	<0.05

3.2 Patient's Sleep Quality

In addition, the subjects' sleep time was significantly increased, sleep latency was significantly shortened, the number of nighttime disturbances was significantly reduced, and sleep efficiency was also significantly improved. These data suggest that Pilates exercise has a positive effect on physical function and sleep quality in patients with anorexia nervosa.

Table 2. Sleep quality

index	Before experiment	After the experiment	t	P
Sleep time (h)	7.5±1.0	8.2±0.8	6.293	<0.05
Sleep latency (minutes)	15±5	12±4	5.937	<0.05
Number of disturbances at night (times)	2.8±1.3	1.6±0.9	5.023	<0.05
Sleep efficiency (%)	85±5	90±4	6.332	<0.05

4. Discussion

This study explored the impact of Pilates exercise on physical health and sleep quality in patients with anorexia nervosa. Experimental results show that Pilates exercise has a positive intervention effect on the physical health and sleep quality of patients with anorexia nervosa. Specifically, after the subjects performed Pilates training during the experiment, their BMI index increased slightly, their vital capacity increased slightly, and their physical fitness indicators such as sit-ups, seated forward bends, and standing long jumps were significantly improved. The 50-meter run time dropped slightly. In addition, the subjects' sleep time was significantly increased, sleep latency was significantly shortened, the number of nighttime disturbances was significantly reduced, and sleep efficiency was also significantly improved. These data suggest that Pilates exercise has a positive effect on physical function and sleep quality in patients with anorexia nervosa.

Anorexia nervosa is a chronic psychophysiological disorder dominated by mental factors, which often leads to a series of problems such as decreased physical function, low immunity, and endocrine disorders in patients. Therefore, treatment of anorexia nervosa requires a comprehensive consideration of both psychological and physiological factors. As a non-drug treatment, physical exercise plays an important role in the treatment of anorexia nervosa. As a low-intensity, high-endurance exercise method, Pilates has a good physical and mental adjustment effect and can improve the physical function and sleep quality of patients with anorexia nervosa.

The results of this experiment are basically consistent with the results of related research at home and abroad. Studies have shown that exercise can promote the physical development and mental health of patients with anorexia nervosa, and improve their sleep quality. As a comprehensive sport, Pilates can not only improve the stability and balance of the body through core muscle training, but also relieve psychological problems such as anxiety and depression through breathing and meditation. Therefore, Pilates exercise plays an important role in the treatment of anorexia nervosa.

In addition, this study also found that the subjects' BMI index increased slightly during the experiment, but overall it was still within the normal range. This may be related to the fact that the subjects' diet was relatively stable during the experiment, and exercise increased the subjects' energy consumption. Research shows that patients with anorexia nervosa often have problems such as endocrine disorders, which affects their physical development. Pilates exercise can promote physical development and health by stimulating the secretion of hormones in the body. Therefore, Pilates exercise has a positive effect on the physical development and health of patients with anorexia nervosa.

At the same time, this study also found that the subjects' lung capacity increased slightly during the experiment. This may be related to the subjects' aerobic exercise during the experiment. As a kind of aerobic exercise, Pilates can effectively improve cardiopulmonary and respiratory functions. Research shows that patients with anorexia nervosa often have problems such as shallow and rapid breathing and decreased lung function. Pilates exercises can improve the subject's lung function and respiratory function through deep breathing and correct breathing techniques. Therefore, Pilates exercise has a positive effect on the respiratory system and cardiopulmonary function of patients with anorexia nervosa.

In addition, this study also found that during the experiment, the subjects' physical fitness indicators such as sit-ups, seated forward bends, and standing long jumps were significantly improved. This may be related to the subjects' targeted strength training during the experiment. As a comprehensive form of exercise, Pilates can improve the body's stability and balance through core muscle training, while also increasing muscle strength and endurance. Research shows that patients with anorexia nervosa often have problems such as reduced physical function, insufficient muscle strength and endurance. Pilates exercise can improve the physical fitness and physical functions of subjects through targeted training. Therefore, Pilates exercise has a positive effect on the physical function and physical fitness of patients with anorexia nervosa.

5. Conclusion

The results of this study show that Pilates exercise has a positive intervention effect on the physical health status and sleep quality of patients with anorexia nervosa. These data provide strong support for the use of Pilates exercise in the treatment of anorexia nervosa. However, this study still has certain limitations, such as small sample size and short experimental time. Future research can further expand the sample size and extend the experimental time for in-depth research to better explore the role and mechanism of Pilates exercise in the treatment of anorexia nervosa. At the same time, for clinical practice, doctors can recommend Pilates exercise to patients as an auxiliary treatment method to help patients better restore their physical health.

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