

# INFLUENCES OF BALANCE TRAINING ON MOTOR COORDINATION IN AEROBICS STUDENTS



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INFLUÊNCIAS DO TREINAMENTO DO EQUILÍBRIO NA COORDENAÇÃO MOTORA DOS ESTUDANTES DE AERÓBICA

INFLUENCIA DEL ENTRENAMIENTO DEL EQUILIBRIO EN LA COORDINACIÓN MOTORA DE ESTUDIANTES DE AERÓBIC

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## ABSTRACT

**Introduction:** The standardization of body movements is essential for aerobics gymnastic practitioners and motor coordination for the execution of consecutive movements of large amplitudes is strongly related to balance ability. Therefore, it is believed that balance training can positively impact motor coordination in aerobics students. **Objective:** Explore the influences of balance training on motor coordination in aerobics students. **Methods:** 100 volunteers were selected as aerobics students, divided into an experimental and a control group for a 6-week experiment. The experimental group was given a balance training protocol, while the control group maintained the traditional teaching protocol. Data on functional exercises and fitness indices were collected before and after the experiment for comparison and analysis. **Results:** The difference in the exercise in the unipodal orthostatic position with eyes closed was 6.45, the difference in the balance test in the swallow position was 4.04, the difference in the later-forward Y balance exercise was 1.88, the later-posterior was 2.09, and posterior Y balance was 2.53. The difference between all items in the control group was small, especially the three items of frontal, lateral, posterior, and mid-posterior Y balance. **Conclusion:** Balance training positively affected the motor coordination of aerobics students, resulting in a statistically significant increase in all analyzed postural balance indexes. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

**Keywords:** Postural Balance; Performance, Sensory Motor; Gymnastics.

## RESUMO

**Introdução:** A padronização dos movimentos corporais é essencial para os praticantes de ginástica aeróbica e a coordenação motora para a execução de movimentos consecutivos de grandes amplitudes está fortemente relacionada à capacidade de equilíbrio. Acredita-se, por isso, que o treino de equilíbrio possa impactar positivamente a coordenação motora dos estudantes de aeróbica. **Objetivo:** Explorar as influências do treinamento de equilíbrio na coordenação motora dos estudantes de aeróbica. **Métodos:** Foram selecionados 100 voluntários estudantes de aeróbica, divididos em grupo experimental e controle para um experimento de 6 semanas. Ao grupo experimental foi incrementado um protocolo de treinamento de equilíbrio, enquanto o grupo de controle manteve o protocolo de ensino tradicional. Os dados pertinentes aos exercícios funcionais e índices de aptidão física foram coletados antes e após o experimento para comparação e análise. **Resultados:** A diferença do exercício em posição ortostática unipodal de olhos fechados foi 6,45, a diferença no teste de equilíbrio em posição de andorinha foi 4,04, a diferença do exercício de equilíbrio latero-dianteiro em Y foi 1,88, latero-posterior foi 2,09, e posterior em Y foi 2,53. A diferença de todos os itens do grupo de controle foi pequena, especialmente os três itens de equilíbrio frontal, lateral, posterior e médio-posterior em Y. **Conclusão:** O treinamento de equilíbrio afetou positivamente a coordenação motora dos estudantes de aeróbica, resultando num incremento estatisticamente expressivo em todos os índices de balanço postural analisados. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

**Descritores:** Equilíbrio Postural; Desempenho Sensório-Motor; Ginástica.

## RESUMEN

**Introducción:** La estandarización de los movimientos corporales es esencial para los practicantes de gimnasia aeróbica y la coordinación motora para la ejecución de movimientos consecutivos de gran amplitud está fuertemente relacionada con la capacidad de equilibrio. Por lo tanto, se cree que el entrenamiento del equilibrio puede influir positivamente en la coordinación motora de los estudiantes de aeróbica. **Objetivo:** Explorar las influencias del entrenamiento del equilibrio en la coordinación motora de los estudiantes de aeróbica. **Métodos:** Se seleccionaron 100 voluntarios estudiantes de aeróbica, divididos en un grupo experimental y un grupo de control para un experimento de 6 semanas. Al grupo experimental se le incrementó un protocolo de entrenamiento del equilibrio, mientras que el grupo de control mantuvo el protocolo de enseñanza tradicional. Se recogieron datos relativos a ejercicios funcionales e índices de aptitud física antes y después del experimento para su comparación y análisis. **Resultados:** La diferencia en el ejercicio en posición ortostática unipodal con ojos cerrados fue de 6,45, la diferencia en la prueba de equilibrio en posición de deglución fue de 4,04, la diferencia en el ejercicio de equilibrio latero-direccional en Y fue de



1,88, latero-posterior fue de 2,09, y posterior en Y fue de 2,53. La diferencia de todos los ítems en el grupo de control fue pequeña, especialmente los tres ítems de equilibrio frontal, lateral, posterior y medio-posterior en Y. Conclusión: El entrenamiento en equilibrio afectó positivamente a la coordinación motora de los estudiantes de aeróbic, resultando en un incremento estadísticamente expresivo en todos los índices de equilibrio postural analizados. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

**Descriptores:** Equilibrio Postural; Desempeño Motor Sensorial; Gimnasia.

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## INTRODUCTION

In recent years, aerobics has become a new item in the sports. Aerobics is becoming more and more popular.<sup>1</sup> This sport mainly focuses on the comprehensive and coordinated development of the body, integrating daily gymnastics, dance and music. The amount of exercise of aerobics is relatively large, and changes constantly with the sense of rhythm and rhythmic movements of music. In order to achieve a certain sense of beauty, it is necessary to have certain requirements for the physical coordination of athletes, which is also a feature of aerobics.<sup>2</sup> In order to make aerobics have a certain aesthetic feeling, in the daily training process, we should also strengthen the flexibility and body coordination of athletes. In all sports, physical coordination plays a very important role, which is the most complex and difficult to improve in physical quality.<sup>3</sup> In order to make the body language of aerobics meet certain requirements, it is necessary to further improve the students' strength balance and body coordination during the training process.

The so-called balance ability is an important psychological function in the human body, which plays a very important role in the function of the body.<sup>4</sup> It can not only coordinate its own sense organs and vision, but also maintain the stability of the body's center of gravity. There are also many classifications of balance forces, which are mainly represented by predictive balance control and active balance control. In daily training, we will also take a combination of dynamic balance and static balance for training.<sup>5</sup> No matter which way of balance, after the analysis of the nervous system, the skeletal adjustment of muscles will be transferred once, in order to maintain a stable posture, so that the human body can obtain the ability of stable state through independent movement. At the same time, some scholars carry out classified support training according to the support points of the human body to maintain balance.<sup>6</sup> If the balance ability can adjust its posture during the training process. This shows that the student has good balance ability and can maintain his own stability in the process of movement. For the sake of the healthy development of students, it is necessary to improve the coordination ability of the body and avoid injuries in aerobics.<sup>7</sup> In the process of research, this paper adopts the experimental method to further explore the influence of balance ability training on the physical coordination of aerobics students.

## METHOD

### Research object

In this study, 100 professional aerobics students were selected as the experimental subjects. These aerobics students have studied for more than 2 years, and the experimental period is 6 weeks. The study and all the participants were reviewed and approved by Ethics Committee of Hubei Engineering University (NO.HBEUF026). During the process of selecting the experimental subjects, their body indicators were tested, and the experimental subjects with no obvious differences in body indicators were selected as far as possible to reduce unnecessary data errors. Before the beginning of the experiment, all 100 subjects had any

training related to balance ability. The 100 aerobics special students were divided into two groups: the experimental group and the control group. During the experiment, the aerobics special students in the experimental group were given balance ability training and routine routine training, while the aerobics special students in the control group were only given routine training. During the six-week experimental period, all students participating in the experiment kept normal work and rest and healthy diet.

### Research methods

1. Literature research method: before the experiment, more than 30 relevant documents were finally obtained by searching the documents related to balance training and physical coordination, which provided rich theoretical guidance for the development of this experiment. After studying these relevant documents, the measurement methods of all the data required by the experiment have been basically mastered, and in-depth research has been carried out on how to correctly carry out the balance ability training to achieve the ideal training effect. At the same time, a series of reasonable training methods have been obtained according to the research documents to ensure that to a certain extent, excessive training can avoid unnecessary sports injury to aerobics students.

2. Experimental method: The physical condition of 100 aerobics special students was tested, and the measurement results met the research standard. In addition, the physical quality of the 100 subjects was tested, and the test results were good, and the physical quality difference of the 100 subjects was not obvious. In this experiment, the 100 aerobics students were divided into two groups: the experimental group and the control group. During the experiment, the experimental group was trained on the relevant balance ability, and the indexes of the aerobics students before and after the experiment were measured, including eye-closed single-leg standing, side-controlled leg balance, swallow balance, eight-level abdominal bridge score, one-minute sit-ups, Y-balance front, Y-balance rear lateral and Y-balance rear medial.

### Study site

The experiment was conducted in a professional aerobics training classroom. Before the experiment, the safety performance of various facilities in the aerobics classroom had been tested to avoid unnecessary injury to special students during the training process. At the same time, some relevant training measures were added according to the needs of the balance ability training program.

## RESULTS

Table 1 shows the data of various indicators measured in the aspect of body coordination between the experimental group and the control group before the experiment. The data difference between the experimental group and the control group is not significant. The eight indicators include closed eye standing with one leg, side leg control balance, swallow balance, grade 8 abdominal bridge score, one-minute sit-ups, front side of Y balance, rear side of Y balance, and rear side of Y balance.

**Table 1.** Basic information of the two groups of subjects before the experiment.

Option	Before the experiment in the control group	Before the experiment in the experimental group	P
Standing on one foot with eyes closed (s)	15.881±9.599	21.568±13.449	0.8596
Side leg control balance (s)	19.117±6.364	20.119±6.818	0.6966
Swallow balance (s)	22.834±6.124	22.735±5.194	0.8142
Grade 8 abdominal bridge score (points)	8.685±0.132	7.377±0.229	0.7978
One-minute Sit-ups (PCS)	42.277±1.587	40.703±1.747	0.7910
Y Balance front side (min)	64.209±7.971	64.021±6.289	0.8486
Y Balance rear outboard (min)	79.132±6.392	77.711±6.825	0.6337
Y Inside after balance (min)	74.988±6.956	74.171±8.010	0.8064

According to the P value > 0.05, there is no significant difference between the experimental group and the control group in the data before the experiment, and the P value is higher than 0.05. Therefore, it can be seen that there is no significant difference between the two groups of aerobics students' body coordination ability before the experiment, especially in the three aspects of standing with eyes closed and one foot, Y-balance front and swallow balance, which also greatly ensures the reliability of the experimental results.

Table 2 shows the data of various indicators measured in terms of physical coordination between the experimental group and the control group after the end of the experiment. The data difference between the experimental group and the control group is very obvious.

Three of the eight results of P value measurement were less than 0.05, with significant differences, namely, the length of standing with closed eyes and one foot, the number of sit-ups in one minute, and the score of the front side of Y balance. The other five results of P value measurement were more than 0.05, with no significant differences, namely, the length of side leg control balance, the length of swallow balance, the score of the eighth abdominal bridge, the score of the rear side of Y balance, and the score of the rear side of Y balance. Through further analysis of the data obtained, it can be concluded that increasing the training of balance ability of aerobics special students in daily training is of great help to their overall physical coordination. The changes of various data values in the experimental group after balance ability training are significantly greater than those in the control group without balance ability training. In addition, it can also be seen that the additional balance ability training for aerobics special students has a more obvious effect on their standing time with closed eyes and one foot, the number of sit-ups in one minute, and the score of the front side of Y balance. For the other five items, the improvement effect of the side leg balance time length, the swallow balance time length, the eight-level abdominal bridge score, the score of the rear side of Y balance, and the score of the rear side of Y balance is not very obvious, But it also has a certain effect, so the balance ability training has a good impact on the improvement of the physical coordination of aerobics students.

As shown in Table 3, the difference between the experimental group and the control group before and after the experiment is compared.

Through the comparison of the data difference between the two groups, it can be seen that the data difference of the control group is smaller than the data difference of the experimental group, which also shows that the aerobics students' abilities in all aspects have been improved faster and more effectively after the balance ability training, especially in the aspects of standing with eyes closed and one leg and the eight-level abdominal bridge score, the effect is significant, and the overall trend is increasing. Although the P value measurement between the data difference between the experimental group and the control group is mostly higher

than 0.05, the quantitative comparison of the difference still shows that the balance ability training is very useful and necessary for the improvement of physical coordination of aerobics students.

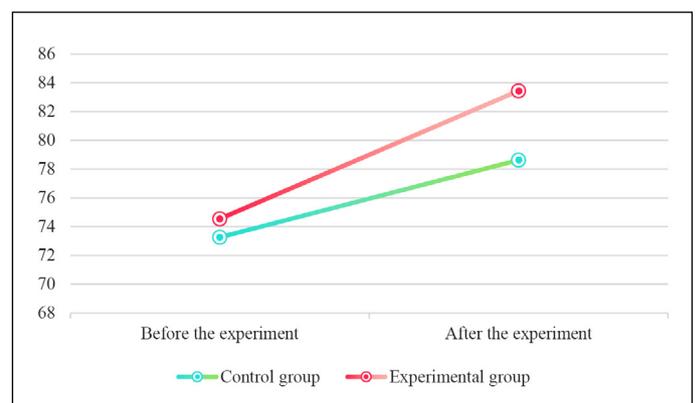
As shown in Figure 1, it is the impact of different training on the performance of aerobics special students. From the trend in the picture, we can see that the data of the experimental group has changed more obviously, and the trend of the overall data has become more intense, from higher than 74 before the experiment to close to 84 after the experiment, while the overall data of the control group without additional training has been flat compared with the experimental group, from lower than 74 before to higher than 78 after the experiment, There is also a certain gap between the two groups of data before and after the experiment. From this, we can also see that the training of balance ability not only enhances and improves the physical coordination ability of aerobics students, but also has a very good effect on the performance ability of aerobics special students. Therefore, it is very necessary to add additional balance ability training in the training process.

**Table 2.** Influence of balance ability training on body coordination of aerobics students.

Option	After the experiment in the control group	After the experiment in the experimental group	p
Standing on one foot with eyes closed (s)	18.625±8.840	28.018±12.179	0.032
Side leg control balance (s)	21.244±6.145	24.784±6.645	0.061
Swallow balance (s)	24.300±5.826	26.775±5.012	0.059
Grade 8 abdominal bridge score (points)	13.281±0.346	13.615±0.549	0.073
One-minute Sit-ups (PCS)	44.272±2.351	45.536±2.620	0.037
Y Balance front side (min)	64.921±7.881	65.906±6.278	0.046
Y Balance rear outboard (min)	80.043±6.392	79.805±6.794	0.073
Y Inside after balance (min)	75.783±6.916	76.702±7.800	0.058

**Table 3.** Comparison of the effects of different training on body coordination of aerobics students.

Option	Difference of Control group	Difference of experimental group	P
Standing on one foot with eyes closed (s)	2.743	6.450	0.056
Side leg control balance (s)	2.126	4.665	0.090
Swallow balance (s)	1.465	4.040	0.080
Grade 8 abdominal bridge score (points)	4.596	6.238	0.088
One-minute Sit-ups (PCS)	1.995	4.833	0.043
Y Balance front side (min)	0.712	1.886	0.050
Y Balance rear outboard (min)	0.911	2.095	0.079
Y Inside after balance (min)	0.794	2.531	0.067



**Figure 1.** The Effect of Different Training on the Performance of Students Specialized in Aerobics.

## DISCUSSION

In order to make the body tissue develop harmoniously, it is necessary to exercise the skeletal muscles of the students in aerobics, so as to promote the flexibility and development of muscles, so as to achieve the effect of aerobics. In the aerobics competition, the coordination of the body plays a very important role. It can not only improve the technical level of athletes, but also make them achieve excellent results in the competition. The coordination of the body can also be used as an ability to improve the level of sports technology. In the process of sports, it is necessary to coordinate the upper limbs, lower limbs and body to further improve the coordination of the body. Of course, in order to exercise muscles, coordinated exercises should be carried out from simple to complex, from single to combination, so as to achieve a certain effect in muscle training.

Any movement of the human body needs to be carried out under the balance of the body, especially the activities of large muscles. For daily balance training, most aerobics students need to combine the central nervous system with the motor organs to better play the body's balance ability. In the body, most of the motor organs and vestibular organs need to be combined to play a greater role. In order to ensure that muscle tissue has a certain degree of coordination with internal organs in the process of aerobics, it is necessary to strengthen the students' ability to adapt to the environment in the process of training, so as to achieve the ability of self-protection, so as to train in dynamic and static balance.

The so-called static balance includes many kinds of balance methods such as standing and squatting. Dynamic balance means that the body can perform curve or obstacle running, standing long jump and other balance methods in a certain distance.

## CONCLUSION

Through the comparison and analysis of the experimental research data in this paper, we can draw the conclusion that increasing the training of balance ability in the process of aerobics training is conducive to further improving the physical coordination of aerobics special students, which is mainly reflected in the length of standing with eyes closed and one foot, the number of sit-ups in one minute, and the score of the front side of Y balance, while the data values of the other five aspects also have significant changes. In addition, the balance ability training also has an obvious improvement effect on the performance ability of aerobics special students, while the performance ability and body coordination are very important in the process of aerobics competition. Most of the champion winners of aerobics competition usually have strong performance ability, and their body coordination is also very high. Therefore, it is necessary to increase the training of students' balance ability in the process of aerobics training.

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All authors declare no potential conflict of interest related to this article

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**AUTHORS' CONTRIBUTIONS:** The author has completed the writing of the article or the critical review of its knowledge content. This paper can be used as the final draft of the manuscript. Every author has made an important contribution to this manuscript. Yuan Wei and Lin Li: writing and execution.

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