

EFFECT OF AEROBIC EXERCISE ASSOCIATED WITH RESISTANCE TRAINING ON BODY COMPOSITION OF MIDDLE-AGED AND ELDERLY WOMEN



ORIGINAL ARTICLE
ARTIGO ORIGINAL
ARTÍCULO ORIGINAL

EFEITO DO EXERCÍCIO AERÓBICO ASSOCIADO AO TREINAMENTO DE FORÇA SOBRE A COMPOSIÇÃO CORPORAL DE MULHERES DE MEIA-IDADE E IDOSAS

EFFECTO DEL EJERCICIO AERÓBICO ASOCIADO AL ENTRENAMIENTO DE FUERZA SOBRE LA COMPOSICIÓN CORPORAL DE MUJERES DE MEDIANA EDAD Y ANCIANAS

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ABSTRACT

Introduction: Lack of exercise negatively impacts physical condition and quality of life among middle-aged and elderly women. **Objective:** Study the effects of aerobic exercise combined with strength training on the body composition of middle-aged and elderly women. **Methods:** The exercise was performed once every other day from 5 pm to 6 pm. 20 middle-aged and elderly women formed an experimental group. The exercise consisted of aerobic exercise combined with strength training, while the control group practiced aerobic walking. The entire experiment lasted two months, having a total of 30 sessions. **Results:** Body fat percentage in the experimental group decreased from 35.10±3.436% to 30.07±3.104 %; BMI decreased from 24.98±2.870 kg/m² to 24.25±3.251 kg/m²; the mean bone mineral density increased from 1.20±0.284 g/cm³ to 1.21±0.278 g/cm³. **Conclusion:** Aerobic exercise and resistance training can improve physical function in middle-aged and elderly women. It may also improve bone density, optimize sports practice, and promote women's physical health. **Level of evidence II; Therapeutic studies - investigating treatment outcomes.**

Keywords: Aerobic exercise; Resistance Exercise; Body Composition; Middle Age; Elderly.

RESUMO

Introdução: A inobservância do exercício tem um impacto negativo sobre a condição física e a qualidade de vida entre as mulheres de meia-idade e idosas. **Objetivo:** Estudar os efeitos do exercício aeróbico combinado ao treinamento de força sobre a composição corporal de mulheres de meia-idade e idosas. **Métodos:** O exercício físico foi realizado uma vez a cada dois dias das 17h às 18h, 20 mulheres de meia-idade e idosas formaram um grupo experimental. O conteúdo do exercício consistia em exercício aeróbico combinado ao treinamento de força, enquanto o grupo de controle praticava caminhada aeróbica. Todo o experimento durou dois meses, com um total de 30 sessões. **Resultados:** A porcentagem de gordura corporal no grupo experimental diminuiu de 35,10±3,436% para 30,07±3,104%; o IMC reduziu de 24,98±2,870 kg/m² para 24,25±3,251 kg/m²; a densidade mineral óssea média aumentou de 1,20±0,284 g/cm³ para 1,21±0,278 g/cm³. **Conclusão:** O exercício aeróbico combinado com o treinamento de resistência pode melhorar a função física nas mulheres de meia-idade e idosas. Também pode melhorar a densidade óssea, otimizar a prática esportiva, promovendo a saúde física da mulher. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Exercício aeróbico; Treinamento de Força; Composição Corporal; Meia-idade; Idosos.

RESUMEN

Introducción: La inobservancia del ejercicio repercute negativamente en la condición física y la calidad de vida de las mujeres de mediana y avanzada edad. **Objetivo:** Estudiar los efectos del ejercicio aeróbico combinado con entrenamiento de fuerza sobre la composición corporal de mujeres de mediana edad y ancianas. **Métodos:** El ejercicio físico se realizó una vez cada dos días de 17:00 a 18:00, 20 mujeres de mediana edad y ancianas formaron un grupo experimental. El contenido del ejercicio consistió en ejercicio aeróbico combinado con entrenamiento de fuerza, mientras que el grupo de control practicó marcha aeróbica. El experimento duró dos meses, con un total de 30 sesiones. **Resultados:** El porcentaje de grasa corporal en el grupo experimental disminuyó de 35,10±3,436% a 30,07±3,104%; el IMC se redujo de 24,98±2,870 kg/m² a 24,25±3,251 kg/m²; la densidad mineral ósea media aumentó de 1,20±0,284 g/cm³ a 1,21±0,278 g/cm³. **Conclusión:** El ejercicio aeróbico combinado con el entrenamiento de resistencia puede mejorar la función física en mujeres de mediana y avanzada edad. También puede mejorar la densidad ósea, optimizar la práctica deportiva y promover la salud física de las mujeres. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptorios: Ejercicio Aeróbico; Entrenamiento de Fuerza; Composición Corporal; Mediana Edad; Ancianos.



INTRODUCTION

The current sports habits of the elderly vary. Some elderly people still maintain a relatively high frequency of sports and exercise by square dancing or hiking.¹ However, some elderly people, especially the middle-aged and elderly women, tend to neglect exercise due to family pressure, which will lead to a situation similar to physical decline, osteoporosis, and reduced resistance over time. The emergence of cardiovascular diseases and other problems has a negative impact on the improvement of the physical fitness and quality of life of middle-aged and elderly women.² According to literature research, a certain amount of resistance exercise for middle-aged and elderly people can improve their muscle strength, improve the stability of joints, increase bone density, and reduce injuries caused by falls.³ However, resistance exercise is difficult, and there are certain problems in promoting it in the community, which need to be improved. Literature research shows that the physical condition of middle-aged and elderly women can be improved by using certain aerobic exercise. Reduce the occurrence of obesity, which proves the importance of aerobic exercise in community sports for middle-aged and elderly women.⁴ Aerobic exercise is rich in variety, low in technical requirements, moderate in intensity, and can last for a long time, which is more suitable for middle-aged and elderly women without sports foundation.⁵ Therefore, this paper chooses to introduce some simple resistance training into the form of aerobic exercise, and uses aerobic exercise combined with resistance exercise to organize middle-aged and elderly women in the community to exercise.⁶ It studies the impact of aerobic exercise combined with resistance exercise on the physical function of middle-aged and elderly women, so as to propose strategies to improve the physical health of middle-aged and elderly people, and provide their own strength to alleviate the aging problem.⁷

METHOD

The goal of this paper is to introduce aerobic exercise combined with resistance exercise into community fitness, and study the impact of this exercise on the physical function of middle-aged and elderly women. The study and all the participants were reviewed and approved by Ethics Committee of Mudanjiang Normal University (NO.MDJNU-PT076).

RESULTS

Effect of aerobic exercise combined with resistance exercise on physical fitness of middle-aged and elderly women

Many middle-aged and old women have the problems of obesity and movement difficulty, which are related to aging and lack of exercise. Therefore, this section discusses the changes in the physical quality of middle-aged and old women.

Table 1 shows the effect of aerobic exercise on women's physical fitness in the control group. It can be seen from the table that after the exercise training, the weight of the women in the control group decreased, the muscle mass increased slightly, the fat free weight, the skeletal muscle content, and the percentage of body fat decreased, and

Table 1. The effect of aerobic exercise on the physical fitness of middle-aged and elderly women.

Control group	Before training	After training	Difference
Height (cm)	160.51±5.274	160.00±5.267	0.491
Weight (kg)	66.24±7.491	65.92±6.370	-0.325
Muscle volume (kg)	39.19±5.338	39.46±3.122	0.267
Fat free weight (kg)	42.20±4.454	42.14±3.336	-0.059
Skeletal muscle content (kg)	23.59±4.224	22.85±2.088	-0.742
Body fat percentage (%)	34.56±7.880	33.52±7.840	-1.041
BMI (kg/m ²)	25.48±3.185	24.78±3.018	-0.304

the BMI value decreased slightly. Table 2 shows the exercise effect of aerobic exercise combined with resistance exercise. It can be seen that the weight of middle-aged and elderly women in the experimental group decreased from (63.32 ± 8.390) kg to (62.94 ± 6.370) kg; The muscle mass increased from (37.96 ± 5.024) kg to (38.70 ± 3.381) kg; The fat free weight increased from (40.58 ± 4.773) kg to (43.91 ± 4.515) kg; The content of skeletal muscle increased from (21.73 ± 3.180) kg to (22.27 ± 2.138) kg; The percentage of body fat decreased from (35.10 ± 3.436)% to (30.07 ± 3.104)%; BMI is (24.98 ± 2.870) kg/m² Drop to (24.25 ± 3.251) kg/m².

By comparing the data of the two groups, it can be seen that the weight index of the control group decreased by 0.325kg after the experiment, less than 0.382kg of the experimental group, and the difference between the two groups was 0.057kg; The muscle mass index of the control group increased by 0.267 kg after the experiment, less than the increase of 0.741 kg in the experimental group, and the difference between the two was 0.474 kg; The fat free weight index of the control group decreased by -0.059 kg after the experiment, while the experimental group increased by 3.332 kg, the difference between the two was 3.391 kg; After the experiment, the content of skeletal muscle in the control group decreased by 0.742kg, while that in the experimental group increased by 0.548kg, with a difference of 1.29kg; The percentage of body fat in the control group decreased by 1.041% after the experiment, less than 5.032% in the experimental group, and the difference between the two was 3.991%; BMI index of the control group decreased by 0.304kg/m after the experiment², Higher than 0.266kg/m of experimental group², The difference between the two is 0.038kg/m². From the research comparison, it can be found that although the weight of the two groups of middle-aged and elderly women has decreased, their muscle mass and fat free weight have increased, and the percentage of body fat has decreased more. This shows that after two months of training, the muscle content of middle-aged and elderly women has increased, and their physique has been optimized to some extent, and the optimization effect of aerobic exercise combined with resistance exercise is better.

Table 3 shows the effect of aerobic exercise on bone mineral density of women in the control group. It can be seen that after training, there is a decline instead of an increase, which indicates that simple aerobic walking cannot improve the decline of bone mineral density in middle-aged and elderly women. Table 4 shows the bone mineral density of middle-aged and elderly women after aerobic exercise and resistance exercise. It can be seen that the ribs of women in the experimental group increased from (0.83 ±

Table 2. The Effect of Aerobic Exercise Combined with Resistance Exercise on the Physical Fitness of Middle aged and Old aged Women.

Experience group	Before training	After training	Difference
Height (cm)	157.81±6.187	157.26±6.179	0.449
Weight (kg)	63.32±8.390	62.94±6.370	-0.382
Muscle volume (kg)	37.96±5.024	38.70±3.381	0.741
Fat free weight (kg)	40.58±4.773	43.91±4.515	3.332
Skeletal muscle content (kg)	21.73±3.180	22.27±2.138	0.548
Body fat percentage (%)	35.10±3.436	30.07±3.104	-5.032
BMI (kg/m ²)	24.98±2.870	24.25±3.251	-0.266

Table 3. Effect of aerobic exercise on bone mineral density in middle-aged and elderly women.

Control group	Before training	After training	Difference
Ribs (g/cm ³)	0.80±0.053	0.78±0.057	-0.020
Pelvis (g/cm ³)	0.94±0.080	0.88±0.069	-0.061
Spine (g/cm ³)	1.01±0.082	0.94±0.092	-0.068
Limbs (g/cm ³)	0.87±0.298	0.76±0.128	-0.110
Torso (g/cm ³)	0.92±0.111	0.87±0.090	-0.046
Average body bone density (g/cm ³)	1.14±0.255	1.06±0.180	-0.086

0.064) g/cm³ to (0.83 ± 0.061) g/cm³, the pelvis from (0.97 ± 0.151) g/cm³ to (0.97 ± 0.116) g/cm³, the spine from (1.01 ± 0.116) g/cm³ to (0.99 ± 0.109) g/cm³, the limbs from (0.82 ± 0.144) g/cm³ to (0.84 ± 0.143) g/cm³, and the trunk from (0.93 ± 0.114) g/cm³ to (0.93 ± 0.102) g/cm³. The average bone mineral density increased from (1.20 ± 0.284) g/cm³ to (1.21 ± 0.278) g/cm³. This shows that the bone mineral density of middle-aged and elderly women in the experimental group has improved except for the spine and trunk.

It can be found after data comparison between the two groups. The index of rib bone mineral density in the control group decreased by 0.020g/cm³ after the experiment, while the index of rib bone mineral density in the experimental group increased by 0.002g/cm³, the difference between the two was 0.022g/cm³; The bone mineral density index of the control group decreased by 0.061g/cm³ after the experiment, while the bone mineral density index of the experimental group increased by 0.007g/cm³, the difference between the two was 0.068g/cm³; The bone mineral density index of the control group decreased by 0.068g/cm³ after the experiment, which was higher than the 0.025g/cm³ decrease of the bone mineral density index of the experimental group, and the difference between the two was 0.043g/cm³; After the experiment, the bone mineral density index of the control group decreased by 0.110g/cm³, while the bone mineral density index of the experimental group increased by 0.027g/cm³, the difference between the two was 0.137g/cm³; The bone mineral density of the trunk in the control group decreased by 0.046g/cm³ after the experiment, which was higher than 0.006g/cm³ in the experimental group. The difference between the two was 0.04g/cm³; The average BMD of the control group decreased by 0.086g/cm³ after the experiment, while the BMD of the experimental group increased by 0.016g/cm³, with a difference of 0.102g/cm³. This shows several problems. First of all, simple aerobic exercise is not good enough to improve the bone density of middle-aged and elderly women. Adding resistance exercise can effectively improve the average bone density of middle-aged and elderly women.

Effect of aerobic exercise combined with resistance exercise on sports quality of middle-aged and elderly women

Improving the sports quality of middle-aged and old women can improve their sports stability and physical quality, prevent falls and injuries caused by sports problems, and reduce accidents.

Table 5 shows the influence of ordinary aerobic training on the control group. Table 6 shows the effect of aerobic exercise combined with resistance exercise on the exercise quality of middle aged and old aged women.

By comparing the data of the two groups, it can be found that the number of arm bends in the control group in 30 seconds increased by 0.105 times after the experiment, while the number of arm bends in the experimental group increased by 2.044 times, with a difference of 1.939 times between the two groups; The number of sitting and standing in the control group within 30 seconds decreased by 0.048 times after the experiment, while the number of sitting and standing in the experimental group increased by 2.392 times, with a difference of 2.44 times; The forward bending distance of the control group and the experimental group increased by 0.014cm and 0.185cm respectively after the experiment, with a difference of 0.171cm; The time of 8-foot standing walk in the control group was shortened by 0.052 seconds after the experiment, while the time of the experimental group was shortened by 1.574 seconds, the difference between the two was 1.522 seconds; The number of 2-minute steps in the control group increased by 1.684 after the experiment, while the number of steps in the experimental group increased by 4.481, with a difference of 2.797. This shows that the current sports mode has a low impact on the flexibility quality, which can only improve the strength quality and sensitivity quality of middle-aged and elderly women. In the follow-up process, the flexibility quality needs to be optimized.

Table 4. Effect of aerobic exercise combined with resistance exercise on bone mineral density of middle-aged and elderly women.

Experience group	Before training	After training	Difference
Ribs (g/cm ³)	0.83±0.064	0.83±0.061	0.002
Pelvis (g/cm ³)	0.97±0.151	0.97±0.116	0.007
Spine (g/cm ³)	1.01±0.116	0.99±0.109	-0.025
Limbs (g/cm ³)	0.82±0.144	0.84±0.143	0.027
Torso (g/cm ³)	0.93±0.114	0.93±0.102	-0.006
Average body bone density (g/cm ³)	1.20±0.284	1.21±0.278	0.016

Table 5. The effect of aerobic exercise on the exercise quality of middle-aged and elderly women.

Control group	Before training	After training	Difference
30 second arm curl (times)	12.13±1.529	12.24±1.054	0.105
30 second sitting (time)	12.91±2.446	12.87±2.257	-0.048
Forward bending of chair type sitting position (cm)	0.82±3.545	0.83±3.301	0.014
8 feet standing walk (s)	8.30±0.949	8.24±1.998	-0.052
2 minute step (PCS)	104.62±6.207	106.31±4.902	1.684

Table 6. The Effect of Aerobic Exercise Combined with Resistance Exercise on the Exercise Quality of Middle aged and Old aged Women.

Experience group	Before training	After training	Difference
30 second arm curl (times)	12.38±1.145	14.42±2.535	2.044
30 second sitting (time)	11.59±2.347	13.98±2.537	2.392
Forward bending of chair type sitting position (cm)	1.24±2.816	1.43±2.018	0.185
8 feet standing walk (s)	9.88±0.829	8.31±1.014	-1.574
2 minute step (PCS)	105.12±3.783	109.60±7.546	4.481

DISCUSSION

It can be seen from the experimental analysis that the physical health of middle-aged and elderly women is declining with the increase of age, which is the current trend. Therefore, certain exercises are needed to combat the decline of physical functions. To solve this problem, we should do the following: First of all, the community should actively organize sports and fitness activities for middle-aged and old women. We can establish square dance clubs, badminton clubs, walking clubs, etc., allocate special venues to promote the sports of middle-aged and old women. Secondly, we should also invite professional sports personnel and hospital doctors to provide scientific sports guidance in combination with the actual situation of middle-aged and elderly women, so as to promote the all-round development of middle-aged and elderly women. Finally, we should strengthen the propaganda to make the middle-aged and old women realize the importance of exercise to their health, cultivate the correct awareness of exercise and fitness, and improve their enthusiasm for exercise.

CONCLUSION

At present, the health of middle-aged and elderly women has always been a concern of all sectors of society. Improving the physical function of middle-aged and elderly women can not only improve women's quality of life, but also effectively relieve medical pressure, and improve residents' happiness and harmony. To solve these problems, this paper designed a special training of aerobic exercise combined with resistance exercise. The experimental results show that compared with aerobic walking, the aerobic exercise combined with resistance training method in this paper can better improve the physical function of middle-aged and elderly women, improve bone density, optimize sports literacy, and have a certain promotion effect on improving

women's physical health. However, there are still some omissions in the exercise mode in this paper, such as insufficient effect in the cultivation of flexibility quality, and there are also some problems in the optimization of bone mineral density of the spine and trunk, so further optimization and improvement are needed.

ACKNOWLEDGEMENTS

This paper was supported by (1) Humanities and Social Sciences Project of the Ministry of Education: the development of children's

basic motor skills scale and the establishment of norms (19YJC890061); (2) Education and teaching reform project in Heilongjiang Province: construction and implementation of the physical education curriculum system linking kindergarten and primary school from the perspective of action development (SJGY20210888). (3) Hubei Provincial Educational Science Planning General Project (2020GB054).

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

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. Youming Zhang and Gaohua Zhang: writing and execution.

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