

Effects of Outdoor Equipment Exercise and Walking Exercise on Fitness and Body Image in Middle-aged Women

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Abstract

Background/Objectives: The purpose of this study was to investigate the effects of outdoor equipment exercise and walking exercise on physical fitness and body image in middle-aged women. To this end, 30 middle-aged women were randomly assigned to 15 exercise and 15 control groups.

Methods/Statistical analysis: Research participants live in Seoul, Korea. The exercise program was conducted 60 minutes 4 times a week for 12 weeks. 10 minutes of warm-up and cool-down, and 40 minutes of exercise and walking using outdoor equipment. Descriptive statistics for each measurement variable were presented to verify the treatment effect of the exercise group and the control group. In addition, a 2-way ANOVA was conducted to verify the effect on outdoor group exercise and walking exercise. The significance level was verified at .05.

Findings: The results have shown significant interaction effects in physical fitness (Cardiorespiratory function, muscle endurance, strength, flexibility) and the body image (body decoration, health fitness evaluation, exercise effect influence, and overall appearance evaluation).

Improvements/Applications: Through this study, it was confirmed that outdoor equipment exercise and walking exercise had an overall positive effect on improving physical strength and body image. In the follow-up study, it would be more meaningful if the study effects related to dietary combination with exercise were verified.

Keywords: Outdoor equipment exercise, Walking exercise, Fitness, Body image, Middle-aged women

1. Introduction

Women are likely to be exposed to cardiovascular disease risk factors. Therefore, efforts are needed to significantly reduce the prevalence and morbidity of cardiovascular disease. It is important to improve lifestyle and continuously care and prevent risk factors of diabetes, hypertension, hyperlipidemia and blood pressure[1]. However, according to the Ministry of Culture, Sports and Tourism[2], about 56.2% of Korean women, and 34% of women in the whole world do not participate in physical activities.

On the other hand, women seem to have a strong tendency to place their own values and identity on their physical appearance[3]. Having negative thoughts or emotions about one's body can be called negative body image or distortion of body image[4]. These body image distortion and dissatisfaction cause cognitive, emotional, and behavioral confusion[5]. Physical inactivity has been repeatedly mentioned as a significant risk factor of disease, and also has a including direct association with diseases such as breast and colon cancer, cardiovascular disease, diabetes, and early mortality[6]. Physical inactivity is negatively related to age, but in order to maintain physical health in later years, it is very necessary to participate in regular physical activity in the elementary and middle age of adults[7]. In particular, for middle-aged women, complex and systematic health care program considering both physical and emotional aspects is strongly needed more than ever[8].

Physical activity and exercise promote body weight management, improve lean mass and muscle strength, while helping reduce the risk of chronic diseases (e.g. obesity, high blood pressure, hyperlipidemia, type 2 diabetes, osteoporosis, sarcopenia, and cardiovascular disease) Can be[9]. As more and more people are showing interest in leisure and health care, local governments also show new movements of installing outdoor exercise equipment. Outdoor exercise equipment in Korea is an expanded concept of neighborhood sports facilities in the past, and with simple exercise equipment such as iron bars and parallel bars, now reaching the current outdoor exercise equipment. It was mainly installed in parks, apartments, and promenades with good access, and had a positive effect of improving health and providing a place for communication for residents[10]. Regular park programs and community service activities are associated with high possibility of park users to participate in various outdoor physical activity[11].

Nowadays, outdoor exercise equipment(OEE) is gaining popularity as an inexpensive strategy to improve park amenities to

increase the physical activity of park users[12]. Studies have shown that physical activity prevents or improves metabolic syndrome[13], and walking is the most common physical activity not only in Korea but also in the whole world because it can be easily practiced in everyday life without restrictions on time and space[14]. Regular walking has a positive effect of increasing physical strength and thus reduces the risk of metabolic syndrome and mortality rates[15], It is also a lower-impact physical activity that is highly recommended for people with weak physical strength, such as obese people, senior citizens and women with less impact on the musculoskeletal system and joints compared to running[16]. In this way, cardiovascular exercise which helps to burn the fat stored in the body and resistance exercise which increases basal metabolism by bulking up the muscle mass are mainly considered to make up a combined exercise program to treat obesity. Therefore, this study proposes an combined exercise program using outdoor exercise equipment. It was intended to be applied by configuring it in the form of a complex exercise. Therefore, the purpose of this study is to investigate the effects of 12 weeks of outdoor exercise and walking exercise programs for middle-aged women on physical strength and body image, and would further use these as basic data for health promotion of middle-aged women.

2. Materials and Methods

2.1. Subject of study

The purpose of this study was to investigate the effects of outdoor equipment exercise and walking exercise on physical fitness and body image in middle-aged women. Research participants live in Seoul, Korea. To this end, 30 middle-aged women were randomly assigned to 15 exercise and 15 control groups. The exercise group(EG) carried out outdoor exercise and walking exercise in parallel, and the control group(CG) maintained the same life as usual <Table 1>.

Table1: Physical Characteristic of Subjects (M±SD)

Group	N	Age (yr)	Height (cm)	Weight (kg)	Fat (%)
EG	15	55.40±1.97	157.71±4.83	61.27±5.89	34.21±4.25
CG	15	57.37±1.45	156.12±4.98	60.86±5.30	33.10±5.78

2.2. Treatment program

The exercise program was conducted 60 minutes 4 times a week for 12 weeks. 10 minutes of warm-up and cool-down, a nd 40 minutes of exercise and walking using outdoor equipment.

The exercise intensity was set based on the RPE scale based on 12-14, and the outdoor equipment exercise was set the number of times to repeat 10-12 times once. The exercise group performed back exercise, leg exercise, warming arm, and twin twist of the outdoor equipment exercise, and also performed walking exercise. Participants were trained to proceed considering the intensity of exercise. If you feel any health problems during the exercise program, you can immediately stop exercising. The treatment program is shown in <Table 2>.

Table 2: Treatment Program

Division	Treatment Program	Intensity	Time(min)
Warm Up	Stretching		10
Outdoor Equipment Exercise/ Walking Exercise	back exercise, leg exercise, warming arm, twin twist (10-12rep./3set)	RPE:12-14	20
	Walking exercise (HRmax 60%)		20
Cool Down	Stretching		10

2.3. Measurement method

The exercise and control groups performed physical and body image tests before and after the 12-week treatment program. Cardiorespiratory function, muscle endurance, strength and flexibility were measured using a wireless heart rate (Polar System, Finland). To measure Cardiorespiratory function, muscle endurance was measured by measuring the number of 20m round trip repetitions and the number of sit-ups in 1 minute. I chose a good record by doing two long jumps (cm) to measure the strength. Flexibility measurements were performed in a sitting position with a forward bending. Body image was decorated with body, social dependence, health fitness evaluation, effect of exercise effect, and overall appearance evaluation. Body image measurement was used by revising and supplementing Rowe's[17] body image questionnaire.

2.4. Data analysis

SPSS 21.0 was used for the statistical program in this study. To verify the treatment effect of the exercise group and control group, descriptive statistics for each measurement variable were presented. In addition, a 2-way ANOVA was conducted to verify the effect on outdoor equipment exercise and walking exercise. The significance level was verified at .05.

3. Results

3.1. Physical Fitness

The exercise group(EG) and control group(CG) showed significant differences in muscle strength($p=.009$), endurance($p=.011$), flexibility($p=.003$), and cardiorespiratory function($p=.023$) <Table 3>.

Table 3: Physical Fitness

Factor	Group	Pre	Post	P
Muscle strength (cm)	EG	148.24±5.44	150.75±6.11	Group*period: .009 Group: .888 Period: .034
	CG	149.32±7.68	148.99±6.78	
Muscle endurance(times)	EG	27.47±8.17	31.33±7.79	Group*period: .011 Group: .566 Period: .037
	CG	27.88±9.46	27.07±7.80	
Flexibility(cm)	EG	9.89±6.72	13.69±5.45	Group*period: .003 Group: .789 Period: .025
	CG	10.22±5.68	11.08±7.26	
Cardiorespiratory function (Repetition)	EG	24.90±7.89	27.22±6.99	Group*period: .023 Group: .659 Period: .040
	CG	23.08±6.24	23.29±7.60	

3.2. Body Image

In the exercise group(EG) and the control group(CG), there were some significant differences in body decoration($p=.046$), social dependence($p=.052$), health fitness evaluation($p=.040$), exercise effect influence($p=.043$), and overall appearance evaluation($p=.039$) <Table 4>.

Table 4: Body Image

factor	group	Pre	Post	P
Body decoration	EG	2.96±.83	3.14±.74	Group*period: .046 Group: .242 Period: .044
	CG	2.89±.98	2.79±.1.01	
Social dependence	EG	2.43±.72	2.94±.80	Group*period: .052 Group: .325 Period: .065
	CG	2.55±.97	2.59±.87	
Health fitness	EG	3.09±.98	3.46±.96	Group*period: .040 Group: .253

	CG	3.02±.88	3.03±.91	Period:.035
Exercise effect	EG	3.49±.86	3.95±.73	Group*period:.043 Group:.311 Period:.042
	CG	3.20±.89	3.10±.78	
Appearance evaluation	EG	2.63±.65	3.03±.87	Group*period:.039 Group:.451 Period:.037
	CG	2.70±.84	2.68±.95	

4. Discussion

This study aims to investigate the effect of outdoor equipment exercise and walking exercise on the fitness and body image of middle-aged women. The program was conducted for 12 weeks and the final purpose of this study was to provide basic data for outdoor equipment exercise program. To achieve this purpose, middle-aged women participated in this combined exercise program using outdoor equipment for 60 minutes 4 times a week for 12 weeks. Physical strength and body image were mainly compared before and after the 12 weeks workout, and based on the results of this study, we will discuss as follows.

Looking at the prior study on physical strength through the exercise program using outdoor exercise equipment, Jang, Lee, Kim, & Jang[18] conducted the outdoor exercise program for the elderly for 24 weeks- for 70 minutes each, three times a week. The study showed that the program has brought a positive improvement in the participants' physical strength. In addition, the study by Yang & Kim[19] also reported a positive improvement in participants' stamina after conducting the outdoor exercise program three times a week for 70 minutes each. Yang & Park[20] also reported an improvement in health-related fitness as a result of conducting a combined exercise program using outdoor exercise equipment for 12 weeks - for 70 minutes each, three times a week. This result is thought to be able to increase the chances of physical activity and participation in exercise in daily life by increasing the healthy physical strength and cardiorespiratory strength due to participation in the exercise program of this study. As a result, it was confirmed that the exercise program and walking exercise using outdoor exercise equipment in this study were helpful in improving fitness. Therefore, by walking exercise and exercise program using outdoor exercise equipment might bring increase of muscles, and ultimately improve the fitness level of the middle-aged women. Furthermore, it is believed that regular physical activity also had a positive effect on physical strength and combined exercise through aerobic and resistance exercise also brought stamina improvement.

When delving into previous research on body image through exercise program, Lee & Hwang[21]'s study showed that 80-minute mat Pilates exercise program(twice a week, 80 minutes each) had a positive effect on body image. In addition, a study by Hong & Kim[22] also reported that participation in rhythmic exercise in middle-aged women affects the body image, and another study by Choi & Kim[23], showed that walking in the forest(80 minutes a time, three times a week, for 12 weeks) also had a positive effect on elderly women's health. It was reported that the body image was changed positively as a result of walking exercise. In addition, Lee[24] conducted a study applying a dance sports and strength cycling program to middle-aged women(three times a week, 75 minutes a time, for 12 weeks), and it had a positive effect on the body image. Few other work also taken into consideration where age was a factor [25-34] These results suggest that the higher the physical fitness level, the better the health-related body image appeared due to participation in the outdoor equipment exercise and walking exercise program of this study. It was confirmed that positive mind and confidence can be gained by actively participating in the outdoor equipment exercise and walking exercise program. Therefore, this study proposes that outdoor equipment exercise and walking exercise programs positively affect the physical strength and physical image of middle-aged women, and furthermore, these exercises were proved as effective methods for middle-aged women's health management, physical strength improvement, and positive changes in life.

5. Conclusion

The purpose of this study was to investigate the effect of outdoor exercise and walking exercise on physical fitness and body image in middle-aged women. To this end, 30 middle-aged women were randomly assigned to 15 exercise groups and 15 control groups for 60 minutes four times a week for 12 weeks. Through this, it was confirmed that outdoor equipment exercise and walking exercise had an overall positive effect on improving physical strength and body image. In the follow-up study, it would be more meaningful if the study effects related to dietary combination with exercise were verified.

6. References

1. Piepoli M. F., Hoes A. W., Agewall S., Albus C., Brotons C., & Catapano A. et al. (2016). 2016 European Guidelines on cardiovascular disease prevention in clinical practice: The Sixth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice(constituted by representatives of 10 societies and by invited experts) Developed with the special contribution of the European Association for Cardiovascular Prevention & Rehabilitation(EACPR). *European heart journal*, 37(29), 2315-2381. DOI: 10.1093/eurheartj/ehw106.

2. Ministry of Culture, Sports and Tourism (2016). 2016 Survey on Participation in Physical Activity in National Life.
3. Dittmar H. (2009). How do “body perfect” ideals in the media have a negative impact on body image and behaviors? Factors and processes related to self and identity. *Journal of Social and Clinical Psychology*, 28(1), 1-8. DOI:10.1521/jscp.2009.28.1.1.
4. Grogan S. (2016). *Body image: Understanding body dissatisfaction in men, women and children*. London: Routledge.
5. Wade T., George W. M., & Atkinson M. (2009). A randomized controlled trial of brief interventions for body dissatisfaction. *Journal of Consulting and Clinical Psychology*, 77(5), 845–854. DOI:10.1037/a0016879.
6. Lee I. M., Shiroma E. J., Lobelo F., Puska P., Blair S. N., & Katzmarzyk P. T. (2012). Lancet Physical Activity Series Working Group. Effect of physical inactivity on major non-communicable diseases worldwide: An analysis of burden of disease and life expectancy. *Lancet*, 380(9838), 219–229. DOI:10.1016/S0140-6736(12)61031-9.
7. Cooper R., Mishra G. D., & Kuh D. (2011). Physical activity across adulthood and physical performance in midlife: findings from a British birth cohort. *American Journal of Preventive Medicine*, 41(4), 376-384. DOI:10.1016/j.amepre.2011.06.035.
8. Schreiber D. R., & Dautovich N. D. (2017). Depressive symptoms and weight in midlife women: the role of stress eating and menopause status. *Menopause*. 24(10), 1190-1199. DOI: 10.1097/GME.0000000000000897.
9. Piercy K. L., Troiano R. P., Ballard R. M., Carlson S. A., Fulton J. E., Galuska D. A et al. (2018). The physical activity guidelines for Americans. *Journal of the American Medical Association*, 320(19), 2020-2028. DOI:10.1001/jama.2018.14854.
10. Hwang J. H. (2016). Safety standards for outdoor exercise equipment installation. Korea Sports Promotion Foundation, Korea Institute of Sport Science. Research Report.
11. Li J & Kim S. Y. (2019). On the Development Direction and Policy of Chinese School Physical Education under the Background of 'Healthy China 2030 Program'. *International Journal of Emerging Multidisciplinary Research*, 3(1), 21-27. DOI: 10.22662/IJEMR.2019.3.1.021.
12. Jansson A. K., Lubans D., Smith J., Duncan M. J., Haslam R., & Plotnikoff R. C. (2019). A systematic review of outdoor gym use: Current evidence and future directions. *Journal of Science and Medicine in Sport*, 22(12), 1335–1343. DOI:10.1016/j.jsams.2019.08.003.
13. Xu F., Cohen S. A., Lofgren I. E., Greene G. W., Delmonico M. J., & Greaney, M. L. (2019). The Association between Physical Activity and Metabolic Syndrome in Older Adults with Obesity. *The Journal of frailty & aging*, 8(1), 27-32. DOI:10.14283/jfa.2018.34.
14. Australia Bureau of Statistics. (2018). 2017-18 National Health Survey (NHS).
15. Anton S. D., Duncan G. E., Limacher M. C., Martin A. D., & Perri M. G. (2011). How much walking is needed to improve cardiorespiratory fitness? An examination of the 2008 Physical Activity Guidelines for Americans. *Research Quarterly Exercise and Sport*, 82(2), 365-370. DOI:10.1080/02701367.2011.10599766.
16. Nabkasorn C., Miyai N., Sootmongkol A., Junprasert S., Yamamoto H., & Arita M, et al. (2006). Effects of physical exercise on depression, neuroendocrine stress hormones and physiological fitness in adolescent females with depressive symptoms. *European Journal of Public Health*, 16(2), 179–184. DOI:10.1093/eurpub/cki159.
17. Rowe D. A. (1996). *Development and validation of a questionnaire to measure body image*. Unpublished dissertation. University of Georgia.
18. Jang H. Y., Lee Y. J., Kim E. Y., & Jang S. W. (2013). Effect of physical activity of the elderly using outdoor exercise equipment for 24 weeks on blood variables, health related fitness. *The Korean Society of Sports Science*, 22(4), 1113-1124.
19. Yang S. H. & Kim J. S. (2014). The Effects of Exercise Program Outdoor Exercise Equipment on Activity Fitness, Metabolic Syndrome Risk Factors and Inflammatory Factors in the Elderly. *Exercise Science*, 23(3), 229-240.
20. Yang D. J. & Park H. S. (2018). Effect of complex exercise program using outdoor exercise equipment on health-related physical strength, blood glucose and peripheral arteries of elderly women. *The Korea Journal of Sports Science*, 27(4), 979-991.
21. Lee S. J. & Hwang S. H. (2019). Effects of Mat Pilates Exercise, Stop Exercise and Re-exercise on Basic Physical Fitness and Body Image as Active Leisure Activity for the Blind. *Journal of Leisure Studies*, 17(2), 21-37.
22. Hong S. H. & Kim I. S. (2017). The Influence of Rhythm Exercise on Body Image and Psychological Factors of Middle Aged females. *Journal of Korean Society for Rhythmic Exercises*, 10(2), 1-11.
23. Choi J. H. & Kim H. J. (2017). The Effect of 12-Week Forest Walking on Functional Fitness and Body Image in the Elderly Women. *The Journal of Korean institute of Forest Recreation*, 21(3), 47-56.
24. Lee K. O. (2016). The effects of the dance sports and muscular strength circuit exercise on body image and life satisfaction in the middle-aged women. *The Korea Journal of Sports Science*, 25(1), 1201-1213.
25. Bhoi, A. K., Sherpa, K. S., & Khandelwal, B. (2015). Multidimensional analytical study of heart sounds: A review. *International Journal Bioautomation*, 19(3), 351-376.
26. Bhoi, A. K., & Sherpa, K. S. (2014). QRS Complex Detection and Analysis of Cardiovascular Abnormalities: A Review. *International Journal Bioautomation*, 18(3), 181-194.
27. Bhoi, A. K., Sherpa, K. S., & Khandelwal, B. (2018). Ischemia and Arrhythmia Classification Using Time-Frequency

- Domain Features of QRS Complex. *Procedia computer science*, 132, 606-613.
28. Bhoi, A. K., Sherpa, K. S., & Khandelwal, B. (2018). Arrhythmia and ischemia classification and clustering using QRS-ST-T (QT) analysis of electrocardiogram. *Cluster Computing*, 21(1), 1033-1044.
 29. Reddy, A. V., Krishna, C. P., & Mallick, P. K. (2019). An image classification framework exploring the capabilities of extreme learning machines and artificial bee colony. *Neural Computing and Applications*, 1-21.
 30. Mallick, P. K., Mishra, D., Patnaik, S., & Shaw, K. (2016). A semi-supervised rough set and random forest approach for pattern classification of gene expression data. *International Journal of Reasoning-based Intelligent Systems*, 8(3-4), 155-167.
 31. Mishra, S., Mallick, P. K., Tripathy, H. K., Bhoi, A. K., & González-Briones, A. (2020). Performance Evaluation of a Proposed Machine Learning Model for Chronic Disease Datasets Using an Integrated Attribute Evaluator and an Improved Decision Tree Classifier. *Applied Sciences*, 10(22), 8137.
 32. Bhoi, A. K., Sherpa, K. S., & Mallick, P. K. (2014, April). A comparative analysis of neuropathic and healthy EMG signal using PSD. In *2014 International Conference on Communication and Signal Processing* (pp. 1375-1379). IEEE.
 33. Bhoi, A. K., Sherpa, K. S., Khandelwal, B., & Mallick, P. K. (2019). T Wave Analysis: Potential Marker of Arrhythmia and Ischemia Detection-A Review. In *Cognitive Informatics and Soft Computing* (pp. 121-130). Springer, Singapore.
 34. Mishra, S., Mallick, P. K., Jena, L., & Chae, G. S. (2020). Optimization of Skewed Data Using Sampling-Based Preprocessing Approach. *Frontiers in Public Health*, 8.