RESEARCH ARTICLE

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Journal of Ecophysiology and Occupational Health, *Vol 24(3), DOI: 10.18311/jeoh/2024/36301, 297-303, September 2024*

ISSN (Online) : 0972-4397
ISSN (Online) : 0974-0805

Efficacy of Circuit Training on Cardiorespiratory Fitness, Body Mass Index and Quality of Life in Menopausal Women

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Abstract

Aim: An adult female population that appeared to be in good health was included in this study to assess the effects of a six-week circuit training programme on cardiovascular endurance and quality of life. **Background:** People going through menopause are looking for ways to improve their quality of life and alleviate symptoms, and hormone medication has a lot of side effects, therefore people are looking towards non-pharmacological approaches. Several studies have shown that aerobic and resistance training have positive effects on women going through menopause. **Method:** The study included 44 menopausal women who were randomly allocated to either a group that trained using circuit training for six weeks or a control group that had regular physiotherapy for the same amount of time. We tracked BMI before and after the intervention, along with cardiorespiratory fitness indicators such as heart rate, oxygen saturation, blood pressure, and the distance covered in a six-minute walk test. Additionally, we administered the Menopause-Specific Quality of Life questionnaire. **Statistical Analysis Used**: We used INSTAT 3.06, a statistical programme, and an unpaired t-test to analyze the data. **Results:** The study found that menopausal women's cardiovascular endurance and quality of life were both greatly enhanced by the six-week circuit training programme. "There was no statistically significant change between the pre- and post-intervention values of the body mass index or the Menopause-Specific Quality of Life scores, however, there was a difference in the cardiorespiratory indicators and physical symptoms in quality of life. **Conclusion:** Circuit training has the potential to alleviate menopausal symptoms and improve the quality of life for women going through menopause. Physical therapists treating menopausal women might think about using circuit training as an intervention.

Keywords: Body Mass Index, Cardiorespiratory Fitness, Circuit Training, Menopause, Quality of Life (QOL)

1. Introduction

In order to keep the community healthy, it is essential to take care of women's health concerns because they are an integral part of both the family and society. A woman enters a new phase of her life when menopause occurs, the end of her reproductive years. One year following the start of the last menstrual cycle is considered the official start of menopause by the World Health Organisation[1]. During the menopausal transition, which begins with irregular bleeding and continues for an average of 3.8 years, the menstrual cycle ends after a 12-month irregular period. During menopause, a variety of symptoms manifest as a result of decreased estrogen and progesterone levels. The term "perimenopausal" describes a woman's condition when she is just entering menopause[1,2]. The postmenopausal condition is characterized by the persistence of menopausal symptoms in women beyond menopause[1,2]. A woman's life might be drastically altered by menopause symptoms. In both the perimenopausal and postmenopausal stages, the majority of women (85%)

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Article Received on: 19.01.2024 Revised on: 03.05.2024 Accepted on: 14.05.2024

report experiencing multiple menopausal symptoms[3]. Physical symptoms include pain in the joints and the need to urinate often; psychosocial symptoms include sadness, mood swings, and poor cognitive function; and sexual symptoms include a dry vagina and a decrease in desire for sex. Hot flashes and sweats are examples of vasomotor symptoms[4]. Several aspects of Quality of Life (QOL) may be diminished when menopausal symptoms are present[5].

Some women seek out alternative therapies to alleviate menopausal symptoms and improve their overall well-being. The present treatment options include Hormone Therapy (HT) and CAM (Complementary and Alternative Medicine)[5,6]. Alternative and complementary medicine encompasses a wide range of treatments, such as aromatherapy, massage, meditation, and movement awareness programmes. These treatments can supplement or even replace more conventional medical practices[6]. Many women are seeking alternative treatments for problematic symptoms because of the adverse effects of HT[7]. Examining the ways in which exercise alleviates menopausal symptoms is, thus, of paramount importance.

In Circuit Training (CT), you'll use weight training equipment in between different cardio workouts. At each station, you're required to complete a workout for a specific duration. Once all stations have been finished, one circuit will be shown[8,9]. Evidence suggests that aerobic and resistance training can help women in both the pre- and post-menopausal stages of their bodies' life cycles[5,10,11]. CT can have varying degrees of intensity. Increasing cardiovascular endurance is more likely to be achieved through High-Intensity Interval Training (HIIT) rather than moderate-intensity exercise. Maximal oxygen consumption, maximal pulmonary ventilation, functional capacity, myocardial strength, power, and endurance are some of the cardiopulmonary metrics that are enhanced by[12,13] CT which includes endurance workouts, leading to higher cardiovascular endurance[14]. Enhanced hemodynamic measures, including mean arterial pressure, cardiac output, and heart rate, are the result of increased cardiorespiratory fitness[15].

Consequently, we set out to see whether postmenopausal women could enhance their cardiorespiratory fitness, Body Mass Index (BMI), and Quality of Life by participating in a circuit training programme for six weeks.

2. Method

2.1 Design

Pre- and post-design experimental investigation. Circuit training's effects on postmenopausal women's cardiorespiratory fitness, BMI, and Quality of Life were the focus of this research.

2.2 Sample Size and Randomization

A formula was used to determine the sample size, which is $n = Z2*P*Q/L^2$. We estimated a 0.5 standard deviation between the prevalence of menopausal symptoms and quality of life in India, and we found that a reasonable sample size of 44 was required for a 95% confidence range. Equal numbers of eligible individuals were assigned to each sample at random.

2.3 Subject Criteria

The selection process resulted in 44 participants meeting the inclusion and exclusion criteria. Sedentary middle-aged women (45-65 years old) were the subjects of the study. We excluded subjects who had a history of gynaecological surgery, or systemic diseases, were taking any medication (including antidepressants and antipsychotics), or were undergoing hormone replacement treatment.

2.4 Outcome Measures

i) Body Mass Index: Body Mass Index (BMI) was computed using the formula BMI= kg/m^2 after measuring height (with a height rod) and weight (using an electronic balance).

ii) Cardiorespiratory fitness: This term describes how well the respiratory and circulatory systems can provide oxygen to working muscles when they are subjected to prolonged physical exertion. Cardiovascular endurance is another name for it. The protocol's pre- and post-intervention measurements are based on a six-minute walk test. Effects on systolic and diastolic blood pressure, heart rate, oxygen saturation, and respiratory rate were used to estimate cardiorespiratory fitness. Using a stethoscope and sphygmomanometer, blood pressure was measured. In a six-minute walk test, the entire distance covered is called the six-minute walk distance. An oxygen saturation level, heart rate, and respiratory rate were

all measured with the use of a pulse oximeter and a stopwatch, respectively.

iii) Quality of Life: The MENQOL questionnaire, which is self-administered and has 29 Likert-scale items, is used for this measurement. You might think of the menopause symptoms on this scale as falling into four categories: vasomotor (items 1-3), psychosocial (items 4-10), physical (items 11-26), and sexual (items 27-29). in where 0 signifies "not bothered at all" and 6 "extremely bothered"[4].

2.5 Procedure

After the institutional ethics committee gave their mandate, participants were chosen using predetermined criteria for inclusion and exclusion. The subjects were informed of the purpose and process in their familiar language. Subject rights were safeguarded and the participant's informed consent was obtained voluntarily. The participant's demographic information was recorded. People were chosen for the sample according to the inclusion and exclusion criteria.

Each of the two groups (labelled A and B) consisted of 22 people who took part in the research. The participant's height, weight, cardiorespiratory fitness indices, and MENQOL scores were evaluated before the intervention began. Afterwards, the protocol was put into action according to the groups. People in the study (group A) did circuit training for 50 minutes three times a week for about six weeks, whereas those in the control group (group B) did traditional physiotherapy for 50 minutes until the end of the study. The aforementioned measures were used in the subsequent post-intervention evaluation. After keeping track of the numbers, we compared them between the two sets of data to see whether they were statistically significant.

For Group A: The circuit training programme began with a 5-minute warm-up that included activities like jogging, stretching, or marching in place. Then, participants moved on to a main class that included six workout stations. With a 30-second break in between, each exercise was performed 10-15 times. The activities that made up the high-intensity interval circuit training were squats, lunges, push-ups, belly crunches, and jumping jacks. The 5-minute cooldown was very much like the warm-up.

For Group B: Group B's control subjects participated in traditional aerobic exercises prescribed by physical therapists for 50 minutes, three times weekly. These exercises included walking, stretching, and breathing exercises.

2.6 Statistical Analysis

The initial process's Mean and Standard Deviation were computed by statistical analysis in Microsoft Excel. The disparities between the pre- and post-test values were then examined using the statistical software INSTAT, version 3.06. To go a step further with the calculations, we ran an unpaired t-test welch test.

3. Results

Interpretation:

i) Body Mass Index (BMI): The experimental group's mean Body Mass Index (BMI) dropped from 27.11 before intervention to 25.3 after, as shown in Table 1. There was no statistically significant relationship between the variables in the unpaired t-test ($t = 1.594$, $p = 0.1185$). There was a small but non-significant drop in body mass index. There was no change in Body Mass Index (BMI) following intervention in the control group (Table 2).

ii) Cardiorespiratory fitness: Table 1 shows that after the intervention, the experimental group's mean values of cardiorespiratory fitness indicators (SBP, DBP, 6MWTD, HR, SPO2, RR) improved. A statistically significant p-value of 0.0161, 0.0002, 0.0389, <0.0001, <0.0001, <0.0001 was produced by the unpaired t-test, which also produced t-values of 2.507, 4.031, 2.132, 4.662, 4.733, and 4.373. The results show that cardiorespiratory fitness improves with circuit training. Table 2 showed that the control group's mean cardiorespiratory fitness index values fell marginally, while the p-value was insignificant.

iii) Quality of Life: Table 1 shows that after the intervention, the mean values of the MENQOL score improved across the board, with the only exception of physical symptoms, where the improvement was statistically significant. The t-value for physical symptoms was 4.496 and the p-value was less than 0.0001, indicating statistical significance. The p values for the remaining symptoms, including vasomotor, psychological, and sexual, were more than 0.05, indicating that they were not statistically significant. After 6 weeks, there was no change in

Table 1. Comparison of pre- and post-intervention values in the experimental group

Experimental Group					
	MeanSD		P	P < 0.05	T
Outcome measures	Pre	Post			
BMI	27.113.66	25.33.59	0.1185	No	1.594
Cardiorespiratory Fitness Indices					
SBP	131.65.52	127.25.87	0.0161	Yes	2.507
DBP	854.77	78.954.95	0.0002	Yes	4.031
6MWTD	434.129.49	453.429.08	0.0389	Yes	2.132
HR	75.915.79	68.144.98	<0.0001	Yes	4.662
Spo2	97.550.89	98.680.57	<0.0001	Yes	4.733
RR	20.321.39	18.591.15	<0.0001	Yes	4.373
MENQOL					
Vasomotor	3.730.55	3.640.58	0.597	No	0.5327
Psychological	2.950.58	2.910.61	0.8006	No	0.2542
Physical	3.320.57	2.590.5	<0.0001	Yes	4.496
Sexual	2.270.55	2.230.53	0.7813	No	0.2794
Total	12.270.94	11.36	0.0016	Yes	3.378

Table 2. Comparison of pre- and post-intervention values in the control group

Control Group					
Outcome measures	MeanSD		P	P < 0.05	T
	Pre	Post			
BMI	27.513.78	27.513.78	>0.9999	No	0
Cardiorespiratory Fitness Indices					
SBP	1336.68	131.58.16	0.6321	No	0.6321
DBP	84.32 4.07	82.594.16	0.1813	No	1.359
6MWTD	431.834.46	43332.6	0.9131	No	0.1098
HR	75.26.27	73.276.65	0.3325	No	0.9804
Spo2	97.450.84	97.680.87	0.3944	No	0.8605
RR	20.231.35	19.911.44	0.4641	No	0.7388
MENQOL					
Vasomotor	3.680.57	3.680.57	>0.9999	No	0
Psychological	2.910.53	2.910.53	>0.9999	No	0
Physical	3.360.58	3.360.58	>0.9999	No	0
Sexual	2.230.53	2.230.53	>0.9999	No	0
Total	12.180.91	12.180.91	>0.9999	No	0

the control group's mean values of the MENQOL score (Table 2).

4. Discussion

Undoubtedly, our study's experimental group showed statistically significant improvements in the cardiorespiratory measures, including blood pressure, oxygen saturation, heart rate, and 6-minute walk test distance. The benefits of circuit exercise programmes for postmenopausal and perimenopausal women have been studied before, but no study has linked circuit training to all of those problems at once. A case-control research was carried out by Miszko and Cress[16] to determine the efficacy of aerobic and resistance training on women experiencing menopause and those just entering the

menopause. Both types of exercise were found to have statistical significance[16]. Asikaine *et al.*,[17] looked at the feasibility and physical advantages of circuit training for menopausal women and found that resistance training improved strength in the lower extremities. According to Kemmler *et al.*,[18] a four-year circuit training programme that tackled the osteoporotic risk of menopause included comprehensive physical assessments. This study provides more evidence that menopausal women can improve their cardiorespiratory fitness with a 6-week circuit training programme. There have been a limited number of research looking at the effects of circuit training on these parameters in postmenopausal women, compared to the number of studies looking at adults. Cardiorespiratory fitness measures have shown substantial gains in other populations that have used circuit training programmes[19-29]. The reduction in body mass index was not statistically significant as we did not prescribe any special diets for the participants in our study.

Furthermore, in terms of physical symptoms, the experimental group in our study showed a slight improvement in quality of life. Mastrangelo *et al.*,[30] found that the experimental group's quality of life significantly improved after participating in circuit training exercises, and Teoman *et al.*,[31] found that menopausal women undergoing hormone therapy who participated in a circuit training programme had a statistically significant improvement in their quality of life.

One out of six female deaths is caused by congestive heart disease, and most of those women aren't active enough to lower their risk[32-34]. This study placed a heavy emphasis on the MENQOL evaluation tool because of the importance of menopause symptoms and Quality of Life (QOL) throughout the menopausal transition. Some of the most common menopausal symptoms include night sweats, mood swings, depression, increased urination, joint discomfort, dry vagina, and decreased desire to have sexual relations. This study highlighted the importance of investigating the impact of this intervention on menopausal symptoms and quality of life as a potential future treatment option.

Improving cardiovascular endurance and quality of life may be possible with a six-week circuit training programme, according to our study's most important findings. In addition, the total training time in this study was just six weeks, which is not a very long time to see a change in body mass index. The lack of longitudinal follow-up and the small sample size were the main drawbacks of this investigation because of time restrictions. Future studies should incorporate longitudinal follow-up to examine the benefits of circuit training over the long run. To further validate the importance of these findings, an additional study with a bigger sample size is required.

5. Conclusion

Cardiorespiratory fitness and quality of life can be enhanced by a brief (6-week) circuit training programme for women going through menopause, according to the current study. Blood pressure, oxygen saturation, heart rate, and 6-minute walk time were all cardiorespiratory indices that showed statistically significant improvement. Although there was no change in the MENQOL scores for vasomotor, psychological, or sexual symptoms after the intervention, there was a significant improvement in physical symptoms. Afterwards, Body Mass Index (BMI) decreased, however the decline was not statistically significant. These results suggest that women going through menopause or just after menopause can benefit from circuit exercise as an intervention. It may take more time and a larger sample size to see whether this intervention makes a significant difference.

Abbreviations Used: Circuit Training (CT), Body Mass Index (BMI), Menopause Specific Quality of Life (MENQOL), Blood Pressure (BP), Heart Rate (HR), Oxygen Saturation (SPO2), 6 Minute Walk Test Distance (6MWTD)

6. Key Points

Findings: The circuit training program for menopausal women can improve cardiorespiratory fitness and Quality of Life.

Implications: These findings imply that circuit exercise might be effective for menopausal women.

Limitations: The study's limitations were the small sample size and the shorter period due to time constraints.

Caution: There is a lot of opportunity to obtain important insights and have more influence if this program is used more widely and over a longer length of time.

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