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Impact of lifestyle changes on quality of life among obese postmenopausal women

Saad S AlFawaz [1]*

[1] Department of Physical Therapy, Faculty of Medical Rehabilitation Sciences, King Abdulaziz University, Jeddah, SAUDI ARABIA
***Corresponding Author:** saadlfawaz@kau.edu.sa**

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ABSTRACT

Background: Postmenopausal obesity is a major health concern associated with impaired clinical parameters and reduced quality of life.

Objective: To evaluate the effects of a structured weight-loss program on clinical parameters and health-related quality of life in obese postmenopausal women.

Materials and methods: Two hundred postmenopausal women (50-58 years) with body mass index (BMI) between 30 and 35 kg/m² were randomly assigned to two groups. Group A followed a calorie-restricted diet combined with moderate-intensity aerobic treadmill training for three months, while group B received no intervention. BMI, hand grip strength, six-minute walk test (6MWT), and short form-36 (SF-36) scores were assessed before and after the intervention.

Results: Group A showed significant reductions in BMI and significant improvements in grip strength, 6MWT distance, and SF-36 subscale scores ($p < 0.05$), with significant differences compared to group B.

Conclusion: Combined dietary restriction and aerobic exercise significantly improve clinical outcomes and quality of life in obese postmenopausal women.

Keywords: lifestyle intervention, obesity, postmenopause, quality of life, aerobic exercise

INTRODUCTION

Postmenopausal women with a body mass index (BMI) higher than 30 kg/m² have lower health-related quality of life (HRQOL) in terms of physical function, energy, and vitality **compared to women of normal body weight** [1]. Overweight or obese adults make up over two-thirds of the USA population [2]. One of the biggest global public health issues at the moment is the obesity and overweight epidemic [3]. Over the past 30 years, the prevalence of overweight and obesity has dramatically increased, impacting 1.5 billion persons worldwide [4]. Type 2 diabetes mellitus (T2DM), cardiovascular disease, and metabolic syndrome are among the 2.8 million obesity-related disorders that claim the lives of individuals worldwide each year [5].

Excess body weight has been consistently linked to poorer self-perceived health and limitations in everyday physical activities [6, 7]. In postmenopausal women, obesity is also associated with reduced physical capacity and vitality, which may negatively influence daily functioning and perceived health status compared with women of normal body weight [1]. Evidence from previous reviews indicates that postmenopausal women with obesity tend to report lower scores in physical functioning and vitality than their normal-weight peers [1]. Several domains of quality of life are affected by obesity, including vitality, physical discomfort, and social functioning. Compared with normal-weight individuals, people with obesity generally report lower HRQL scores [6]. Obese patients also frequently report general health complaints, depressive symptoms, reduced self-esteem, and functional mobility limitations [7].

According to a recent meta-analysis, central obesity, low high density lipoprotein cholesterol (HDL-C), elevated low density lipoprotein cholesterol (LDL-C), insulin resistance, hyperinsulinemia, and hyperglycemia, along with hypertriglyceridemia, are linked to a 1.5-fold increase in death and a 2-fold increase in cardiovascular outcomes [8]. The positive effects of long-term lifestyle modifications on these metabolic and cardiovascular risk variables have been validated by recent research [9, 10]. Triglycerides, total cholesterol, LDL-C, and HDL-C are all higher in menopausal women than in premenopausal women [11].

Visceral obesity, insulin resistance, lipid problems, thrombotic risk, and an increased prevalence of T2DM are all possible outcomes of postmenopausal endocrine changes [12]. Regardless of age or other variables, menopause causes central obesity, a higher atherogenic lipid profile, and an overall rise in the metabolic syndrome [13]. In an effort to enhance wellbeing, clinical therapy of obese postmenopausal women should prioritize exercise and weight loss [1].

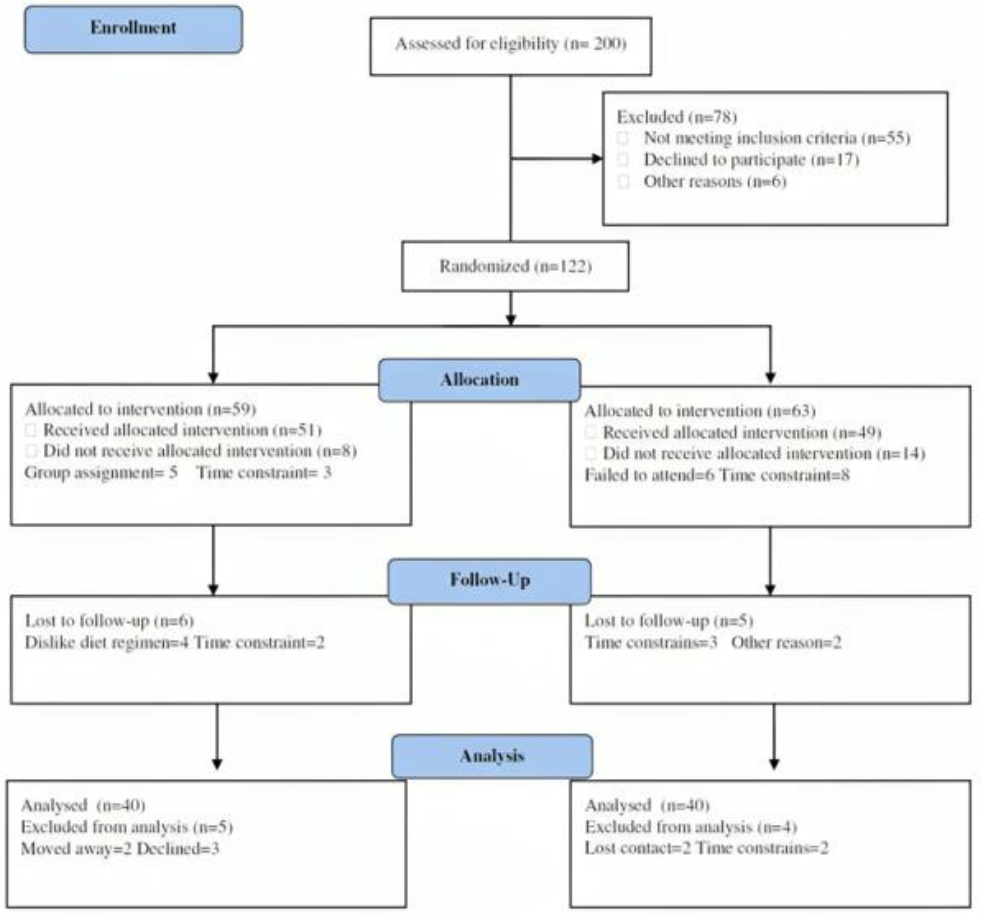

Figure 1. Subjects screening and recruitment CONSORT diagram (figure prepared by the author)

There is growing evidence that increasing physical activity can enhance a person's exercise capacity and lipid profile [14, 15]. Furthermore, in terms of weight loss, lipid profile improvement, and type 2 diabetes prevention, a diet and exercise combination may be more effective than either one alone [16, 17].

Diet and exercise are the two mainstays of treating obesity in healthy postmenopausal women [18]. Numerous studies have demonstrated that healthy postmenopausal overweight or obese females' body composition and lipid profiles are improved by calorie restriction and moderate physical activity [19, 20].

BMI is linked to a number of HRQOL outcomes, and losing weight may enhance HRQOL in menopausal women who are overweight or obese [21]. The mechanisms by which exercise and dietary weight loss programs enhance HRQOL are unclear, despite the fact that several of these interventions have shown favorable changes in HRQOL. Weight loss has been linked to better HRQOL in some intervention trials [22, 23], although other research has demonstrated that HRQOL can be enhanced with no altered anthropometrics [24]. Therefore, this study looked at how a weight-loss program affected the clinical parameters and quality of life of postmenopausal obese women. This study aimed to investigate the relationship between lifestyle modifications, including dietary restriction and aerobic exercise, and improvements in clinical parameters and HRQOL in obese postmenopausal women. It was hypothesized that a structured lifestyle intervention would lead to significant improvements in both physical health outcomes and quality of life measures in this population.

SUBJECTS AND METHODS

Subjects

A total of 200 postmenopausal women aged 50-58 years were assessed for eligibility. Of these, 122 met the inclusion criteria and were randomly assigned into two groups using a simple randomization method. All participants met the criteria for obesity, with BMI values between 30 and 35 kg/m^2. Prior to participation, all volunteers provided written informed consent. Smokers and women with endocrine, musculoskeletal, renal, hepatic, cardiac, diabetic, or chest conditions were excluded. All participants were postmenopausal, defined as the absence of menstruation for at least 12 consecutive months. Participants were recruited from Cairo University Teaching Hospital. The intervention group followed a lifestyle modification program consisting of a calorie-restricted diet and moderate-intensity aerobic treadmill exercise, while the control group did not receive any intervention. This study was approved by the Scientific Research Ethical Committee at the Faculty of Physical Therapy, Badr University in Cairo, Egypt (IRB registration number: IRB00014233-65). The CONSORT diagram outlining participant flow, including screening, eligibility, randomization, and exclusions, is presented in **Figure 1**.

Measurements

Health-related quality of life

HRQOL was assessed using the short form-36 (SF-36), a widely validated instrument that evaluates eight domains of

physical and mental health. The SF-36 has been extensively used in clinical and research settings and provides a comprehensive assessment of perceived health status [21-23]. Domain scores were calculated according to standard scoring procedures, where item responses were summed and transformed into a scale ranging from 0 to 100, with higher scores indicating better health status.

Hand grip strength

Three consecutive repetitions utilizing a Jamar handheld dynamometer (Sammons Preston Rolyan, Cedarburg, WI, USA) were used to test the dominant hand's grip strength. The elbow was not permitted to contact any part of the body and was flexed at a 90° angle. Between measurements, there was a 30-second rest period. The studies were conducted using the mean value of the two best results.

Six-minute walk test

The subjects were instructed to walk as fast as possible around two cones spaced 40 meters apart without jogging or running. Participants were instructed to keep walking as soon as they were able to do so, but to stop if they were too exhausted. Participants were given two trials of the six-minute walk test (6MWT) on different days at baseline in order to account for practice effects; the data of trial two was handled. Researchers who tested the 6MWT validation discovered a substantial correlation between distances from the 6MWT and maximum oxygen utilized (VO_2) values via a cycle ergometer test ($r = 0.73$, $p = 001$) [27-29]. Every measurement was obtained both before the study began (pre-test) and three months later at the trial conclusion (post-test).

Procedures

This study followed a randomized controlled design without blinding due to the nature of the intervention. All participants were subdivided into two equal groups at random after the prior evaluation.

Group A

They received a lifestyle change program that comprised a diet and modest aerobic activity training.

The physical training: According to American College of Sport Medicine guidelines, group A participants underwent a 40-minute aerobic session on a treadmill (the first 5-minute warm-up phase was conducted on the treadmill (Enraf Nonium, model display panel standard, NR 1475.801, Holland) at a low load; each training session lasted 30 minutes and concluded with a 5-minute recovery and relaxation phase). They were then required to walk or run until their target heart rate (HR) was reached. Stretching for ten minutes kicked off the program, which was run by assessing the maximum HR (HR max), which was calculated by age. 60-70% of HR max is for the first two weeks, and 70-80% is for the third to the twelfth weeks. For three months, there were three sessions per week, each lasting thirty minutes [30].

The prescribed low calorie diet: To lose weight, members of group A were told to follow a personalized, energy-restricted, balanced meal plan. For promoting weight loss at a rate of 0.5-1.0 kg/week, a prescribed diet with a moderation of carbohydrates (55% of daily total energy), a high fiber amount, about 15% protein, and a fat of about 30%. The World Health Organization recommended a mean daily caloric intake of approximately 1,200 kcal/day [18]. Depending on the subject's activity level, the Harris-Benedict equation was multiplied by activity factor between 1.3 to 1.5 for estimating energy needs [31].

Weekly food diaries completed by the participants and composed by the dieticians at each session were used to gauge adherence to the diet plan. In addition to the food plan, the study program integrated behavioral interventions and dietary guiding with the goal of helping the participants stick to a healthy lifestyle throughout the trial. The sessions included teaching fundamental nutritional concepts and providing one-on-one counseling, mostly on nutrition-related topics. These courses covered weight management strategies, grocery shopping, cooking methods, and healthy eating menus and recipes. Participants were provided with written and verbal guidelines for keeping diet details, including how to weigh and measure their meals, during their first interview with a nutritionist.

The same dietician kept an eye on dietary consumption. The participants received weekly nutritional counseling in addition to keeping a thorough food journal. Obese patients were told to ingest more fresh fruits and vegetables, to replace common high-fat items with low-fat alternatives, and to replace any complex carbohydrates with whole-grain bread and cereals. Every two weeks, the dietician provided dietary assistance when anthropometric measurements were taken; also, each participant saw a doctor once a month for a clinical assessment, a standard ECG, and blood pressure and HR readings [32].

Group B

They did not receive any intervention and considered as a control group.

Statistical Analysis

Data are presented as mean (M) ± standard deviation (SD). Paired t-test was used to compare the mean values of the examined parameters before and after the intervention. The two groups were compared using the Independent t-test ($p < 0.05$). Statistical analysis was performed using SPSS software (IBM Corp., Armonk, NY, USA).

RESULTS

All baseline characteristics of the trial participants are displayed in **Table 1**. The two groups' baseline characteristics did not show a significant difference from one another.

Group A exhibited a substantial rise in the mean values of SF-36 subscale scores, grip strength, and 6MWT, as well as a significant decrease in the mean value of BMI (**Table 2**). In contrast, group B did not show any significant changes in its results (**Table 3**). Additionally, at the conclusion of the study, there were notable disparities between the mean levels of the parameters under investigation in group A and group B (**Table 4**).

DISCUSSION

The psychological well-being and HRQOL have been linked to obesity [31]. Physical functional restrictions [32], perceived physical ability limitations [33], and a decline in HRQOL following menopause [34] have all been linked to worse HRQOL

Table 1. Characteristics of all participants

Characteristic	Group A	Group B	p
Age (years)	57.76 ± 7.11	56.24 ± 8.13	0.437
Weight (kg)	85.15 ± 10.13	88.32 ± 11.27	0.321
Height (m)	1.53 ± 0.16	1.59 ± 0.12	0.241
BMI (kg/m^2)	32.19 ± 3.98	31.98 ± 2.87	0.415
Waist circumference (cm)	96.86 ± 7.23	97.21 ± 8.15	0.522
Hip circumference (cm)	104.14 ± 10.13	106.25 ± 11.28	0.654
SBP (mmHg)	115.26 ± 13.22	117.37 ± 15.17	0.528
DBP (mmHg)	76.32 ± 5.87	79.15 ± 6.59	0.265
Glucose (mmol/L)	5.13 ± 0.65	5.32 ± 0.82	0.217
Insulin (mU/L)	7.89 ± 2.37	8.46 ± 3.12	0.326
ALT (U/L)	36.32 ± 5.86	38.14 ± 7.14	0.467
AST (U/L)	25.68 ± 4.15	27.23 ± 3.96	0.321

Note. ALT: Alanine aminotransferase; AST: Aspartate aminotransferase; SBP: Systolic blood pressure; & DBP: Diastolic blood pressure

Table 2. Mean values of BMI, hand grip strength, 6MWT, and SF-36 subscale scores in group A before and after the study

	M ± SD		p
	Before	After	
BMI (kg/m^2)	32.19±3.98*	26.28±4.43	0.008*
Hand grip strength (mmHg)	145.88±17.54*	178.33±17.13	0.007*
Six minute walk test (meter)	322.76±28.58*	430.25±26.92	0.000**
SF-36 subscale variables			
SF-36: Health transition	3.12±0.85*	2.18±0.74	0.010**
SF-36: Physical functioning	73.62±10.21*	81.71±9.88	0.005**
SF-36: Role functioning: Physical	80.81±11.32*	84.34±9.96	0.006**
SF-36: Bodily pain	74.11±7.26*	70.25±7.13	0.008*
SF-36: General health	73.25±12.11*	78.93±11.95	0.011*
SF-36: Vitality	54.94±6.57*	65.22±7.21	0.002**
SF-36: Social functioning	88.72±13.82*	91.21±13.23	0.016*
SF-36: Role functioning: Emotional	91.14±16.55*	86.15±16.22	0.008*
SF-36: Mental health	83.85±12.66*	80.13±12.41	0.021*

Note. *a significant difference between the two groups; p < 0.05; **a highly significant difference; & ***a very high significant difference

Table 3. Mean values of BMI, hand grip strength, 6MWT, and SF-36 subscale scores in group B before and after the study

	M ± SD		p
	Before	After	
BMI (kg/m^2)	31.98±2.87	32.37±2.38	0.365
Hand grip strength (mmHg)	141.31±15.82	135.78±14.21	0.097
Six minute walk test (meter)	319.11±25.64	314.65±24.93	0.073
SF-36 subscale variables			
SF-36: Health transition	2.97±0.72	3.15±0.77	0.632
SF-36: Physical functioning	73.58±9.83	73.37±9.80	0.722
SF-36: Role functioning: Physical	80.96±10.65	81.41±9.49	0.643
SF-36: Bodily pain	73.88±7.18	75.13±7.21	0.146
SF-36: General health	72.85±11.53	72.54±11.21	0.551
SF-36: Vitality	55.26±6.24	54.78±6.13	0.182
SF-36: Social functioning	88.14±12.96	87.55±12.78	0.291
SF-36: Role functioning: Emotional	90.48±15.72	90.13±15.22	0.487
SF-36: Mental health	83.17±11.80	83.25±11.66	0.253

Table 4. Mean values of BMI, hand grip strength, 6MWT, and SF-36 subscale scores in both groups after the study

	M ± SD		p
	Before	After	
BMI (kg/m^2)	26.28±4.43*	32.37±2.38	0.006**
Hand grip strength (mmHg)	178.33±17.13*	135.78±14.21	0.003**
Six minute walk test (meter)	430.25±26.92*	314.65±24.93	0.000***
SF-36 subscale variables			
SF-36: Health transition	2.18±0.74*	3.15±0.77	0.018*
SF-36: Physical functioning	81.71±9.88*	73.37±9.80	0.004**
SF-36: Role functioning: Physical	84.34±9.96*	81.41±9.49	0.007*
SF-36: Bodily pain	70.25±7.13*	75.13±7.21	0.009*
SF-36: General health	78.93±11.95*	72.54±11.21	0.008*
SF-36: Vitality	65.22±7.21*	54.78±6.13	0.000***
SF-36: Social functioning	91.21±13.23*	87.55±12.78	0.006*
SF-36: Role functioning: Emotional	86.15±16.22*	90.13±15.22	0.005**
SF-36: Mental health	80.13±12.41*	83.25±11.66	0.023*

Note. *a significant difference between the two groups; p < 0.05; **a highly significant difference; & ***a very high significant difference

in obese people. This study looked at how dietary weight loss and aerobic exercise regimens affected sedentary, obese postmenopausal women's HRQOL and clinical markers.

Our findings demonstrated that combined dietary restriction and aerobic exercise significantly improved several domains of quality of life in obese postmenopausal women. According to numerous earlier studies, changing one's lifestyle, such as eating less or exercising, has been demonstrated to enhance HRQOL [37-42]. Our results were in line with earlier studies conducted in clinical populations, as participants with T2DM [41] or osteoarthritis [44]. The latter study found that an 18-month diet and exercise intervention increased all SF-36 subscales [4]. However, our combined diet plus exercise group's HRQOL ratings increased, which was in line with other weight reduction studies in general populations [25, 37].

However, 298 obese women (aged 50-75) enrolled in a 6-month weight loss experiment involving aerobic activity and a low-calorie diet. The women's physical functioning and vitality scores improved, and they dropped 9.4% of their starting weight [25]. A weight loss with a mean of 5.6 kg and improvements in SF-36 subscales were observed in 144 overweight/obese adults who participated in another 6-month weight loss trial [37]. According to [45], premenopausal and early postmenopausal obese women's physical and mental well-being as well as their quality of life appear to be improved by modest body weight and fat mass losses brought on by a 16-week aerobic exercise walking program that consists of three weekly 45-minute walking sessions at 60% of their HR reserve.

Additionally, based on the analysis of the 6MWT characteristics and hand grip strength, we discovered that patients' performance significantly improved after losing weight because there is evidence that being overweight can negatively affect physical activities [46]. Our results were in line with those of [47] discovered that patients who were reduced in weight had better distance forecasts for the 6MWT [47]. Additionally, a study conducted in [48] showed that the 6MWT characteristics improved in the late postoperative phase following bariatric surgery [48].

Additionally, it was demonstrated in [49] that a 3-week weight-loss program for 13 pre-menopausal and 27 post-menopausal obese females involved a daily meal plan of 1,400 +/- 200 kcal and six days of 110-minute endurance activity. In both groups, walking distance rose after weight loss, but BMI and fat mass dropped. After losing weight, both groups' SF-36 mental component scores rose, but only postmenopausal women's SF-36 physical component scores rose. Following weight loss in both groups, restriction rose while disinhibition and hunger sensitivity fell. Females with menopause lasting

between 5 to 9 years and more than 10 years had higher distance walked and SF-36 physical component scores following the weight loss, respectively [49].

Additionally, in line with our results, it was discovered a correlation between improvements in aerobic fitness across eight SF-36 subscales and BMI decreases in obese women undergoing a 6-month lifestyle intervention [25]. In a prior 12-month exercise trial, it was shown that 173 postmenopausal women had improved aerobic fitness [39]. A weight-management program increases aerobic fitness in overweight persons with T2DM, according to a study of the Look AHEAD study [26].

CONCLUSION

The results of the current study demonstrate that a lifestyle change program helps obese postmenopausal women's clinical parameters and quality of life. This trial's randomized controlled design and sizable sample size are among its advantages. Further research is required to better understand the cellular and molecular mechanisms underlying the relationship between weight loss and changes in SF-36 subscales.

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Ethical statement: This study was approved by the Scientific Research Ethical Committee at the Faculty of Physical Therapy, Badr University in Cairo, Egypt (IRB00014233-65). Written informed consent was obtained from all participants prior to enrollment. Participant confidentiality and privacy were maintained throughout the study. All collected data were anonymized and stored securely, and no personally identifiable information was included in the analysis or reporting of results.

AI statement: No generative artificial intelligence (AI) tools were used in the design, conduct, analysis, interpretation, or writing of this study.

Declaration of interest: No conflict of interest is declared by the author.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

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