

# Influence of Weight Loss on Quality Of Life, Biochemical & Clinical Parameters among Obese Postmenopausal Women



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**Submission:** February 02, 2017; **Published:** February 22, 2017

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## Abstract

**Background:** Although obesity is common among postmenopausal, to date no study has evaluated the influence of weight loss on quality of life (QOL), biochemical & clinical parameters among obese postmenopausal women.

**Objective:** This study designed to detect the effects of weight reduction on biochemical & clinical parameters and QOL among obese postmenopausal women.

**Material and Methods:** Two-hundred Saudi postmenopausal obese women enrolled in this study, their age will be ranged from 50- 58 years and their body mass index (BMI) ranged from 30-35 kg/m<sup>2</sup>. All participants were divided into two equal groups: group (A) received weight reduction program (aerobic exercise and diet regimen) for 3 months and group (B) received no exercise training or diet regimen.

**Results:** The mean values of Health-related quality of life (SF-36 HRQL) subscale scores, serum calcium, high density lipoprotein cholesterol (HDL-cholesterol), hand grip strength and Six Minute Walk Test (6MWT) were significantly improved in group (A). While the mean values of serum parathyroid hormone (PTH), plasma leptin, triglycerides, total cholesterol, low density lipoprotein cholesterol (LDL-cholesterol), total cholesterol (TC), triglycerides and BMI were reduced significantly in group (A). In addition, differences between both groups were significant at the end of the study.

**Conclusion:** The current study provides evidence that weight reduction program improves QOL, biochemical and clinical parameters among obese postmenopausal women.

**Keywords:** Obesity; Menopause; Quality of Life; Weight Reduction

**Abbreviations:** QOL: Quality of Life; BMI: Body Mass Index; HRQL: Health Related Quality of Life; HDL-Cholesterol: High Density Lipoprotein Cholesterol; 6MWT: Six Minute Walk Test; PTH: Para Thyroid Hormone; LDL-Cholesterol: Low Density Lipoprotein Cholesterol; TC: Total Cholesterol.

## Introduction

Obesity among postmenopausal women is usually associated with poor health-related quality of life (HRQOL) [1]. In USA, about 70% of adults are either obese or overweight [2,3] and globally, 1.5 billion adult are either obese or overweight [4] in addition to about 2.8 million subjects die of obesity related co-morbidities as cardiovascular disorders and diabetes [5]. Moreover, researches proved that all measures of quality of life (QOL) are adversely affected by obesity in addition to depression, low self-esteem poor general health [6,7]. Blood lipid profile and glucose homeostasis are abnormal that induce cardiovascular disorders 2-fold among obese subjects more than

normal body weight subjects [8]. However, life style modification can modulate all cardiovascular disorders risk factors associated with obesity [9-13]. Weight reducing programs that combine both exercise training and diet regimen are superior to either exercise or diet regimen [14-17].

Some previous studies proved that weight reduction improves blood lipid profile [18-20] and HRQOL [21-23]. However, others believe that HRQOL could be improved without anthropometric changes [24]. Therefore, the aim of this study was to examine the effects of weight reduction program on biochemical & clinical parameters and quality of life for obese postmenopausal women in kingdom of Saudi Arabia.

Patients and methods

Subjects

Two-hundred postmenopausal obese women enrolled in this study, the mean of their age was 54.67±5.28 year, the mean of their BMI was 33.94±4.27 kg/m<sup>2</sup> and menopause since at least 5 years. Exclusion criteria included smoking, endocrine disorders, musculoskeletal disorders, renal disorders, liver disorders, cardiac disorders, respiratory disorders and diabetes. All Subjects were randomly enrolled into two equal groups: group (A) received weight reduction program (aerobic exercise and diet regimen) for 3 months and group (B) received no exercise training or diet regimen.

Measurements

- I. Health-related quality of life (SF-36 HRQL): Quality of life was assessed using SF-36 HRQL that includes eight subscales: Bodily Pain, Vitality, Physical Functioning, Social Functioning, General Health, Emotional Role Functioning, Physical Role Functioning and Mental Health [21].
- II. Hand Grip Strength: Jamar hand dynamometer was used to measure the hand grip strength through applying 3 successive trials using Sammons Preston Roland, Cedarburg, WI, USA, the mean value of the three trials of measurements was recorded and used in the statistical analysis.
- III. Six Minute Walk Test (6MWT): All participants were asked to conduct 6MWT through fast walking around 2 cones that were placed 40 meters a part, each participants were asked to have 2 trials in two different days and the record walking distance of the second days was used in the statistical analysis [25-27].
- IV. Biochemical analyses: Overnight fasting venous blood sample was taken to measure serum calcium, high density lipoprotein cholesterol (HDL-cholesterol), plasma leptin, triglycerides, total cholesterol, low density lipoprotein cholesterol (LDL-cholesterol), total cholesterol (TC) and triglycerides through chromatography method using Beranger Mannheim kit. However, measurement of serum parathyroid hormone (PTH) was performed using the principle of Electro chemiluminescence’s immunoassay (Modular Analytics E170, Roche, Germany).

Procedures

Participants were randomly included into two equal groups as following:

**i. Group (A):** Received treadmill aerobic exercise training with a five minutes warming-up phase done on the treadmill (Track master 400E, gas fitness system, England) with low load, actual training time was thirty minutes with an intensity of 70–80% of HRmax and finally five minutes of cooling down that was done in the form of running or walking; 3 sessions / week for 3 months [28]. In addition, all participants were instructed to

follow diet regimen that provide 1200 kcal/day as recommended by WHO under close supervision of dietitian [18].

**ii. Group (B):** Was considered as a control group and received no training intervention for six months.

Statistical analysis

SPSS (Chicago, IL, USA) version 17 was used in statistical analysis, where the investigated parameters of both groups obtained before and at the end of the study were compared. However, comparison between the investigated parameters of both groups done using independent “t”. All data were expressed as the mean ± SD (P<0.05).

Results

The baseline characteristics of all participants are shown in (Table 1). None of the baseline characteristics differed significantly between the two groups. The mean values of SF-36 subscale scores, serum calcium, HDL cholesterol and 6MWT were significantly increased in group (A). While the mean values of serum PTH , plasma leptin, triglycerides, total cholesterol, LDL cholesterol, TC, TG and BMI were significantly decreased in group (A) (Tables 2 & 3), while results of group (B) showed no significant changes (Tables 4 & 5). However, the differences between mean values of the investigated parameters in both groups were significant at the end of the study (Tables 6 & 7).

Table 1: Baseline characteristics of study participants.

Characteristic	Group (A)	Group (B)	P value
Age (years)	55.13 ± 4.32	53.86 ± 5.74	0.317
Weight (kg)	89.72 ± 9.36	90.41 ± 9.22	0.298
Height (m)	1.63 ± 0.11	1.66 ± 0.14	0.121
BMI (kg/m <sup>2</sup> )	33.84 ± 4.12	34.15 ± 3.98	0.382
Waist (cm)	98.77 ± 10.67	100.35 ± 9.36	0.431
Hip (cm)	106.55 ± 9.82	109.4 ± 10.12	0.575
SBP (mmHg)	118.31 ± 12.63	120.19 ± 10.95	0.441
DBP (mmHg)	79.64 ± 8.14	80.91 ± 7.92	0.123
Glucose (mmol/L)	5.1 ± 0.71	5.3 ± 0.78	0.176
Insulin (mU/L)	8.92 ± 3.83	9.35 ± 4.16	0.215
ALT (U/L)	38.76 ± 8.91	41.11 ± 9.25	0.562
AST (U/L)	27.25 ± 6.34	28.86 ± 5.93	0.228

BMI: Body Mass Index; ALT: Almandine aminotransferases; AST: Aspartate aminotransferases; SBP: Systolic Blood Pressure; DBP: Diastolic Blood Pressure.

Table 2: Mean value and significance of measured variables of group (A) before and after treatment.

	Mean +SD		P-value
	Before	After	
BMI (kg/m <sup>2</sup> )	33.84 ± 4.12	27.28±4.43*	0.008
Lepton (Ng/ml)	41.65±7.33	37.11±6.26*	0.003
TC (mg/dl)	198.72±21.65	167.35±20.98*	0.004
HDL-c (mg/dl)	33.28±3.15	39.96±3.27*	0.008
LDL-c (mg/dl)	137.13±18.96	121.24±18.32*	0.002
TG (mg/dl)	161.26±20.71	128.35±20.35*	0.005
Calcium (ng/dl)	9.31 ± 1.62	11.23 ± 1.41*	0.008
Parathyroid Hormone (ng/dl)	13.87 ± 3.42	10.32 ± 3.15*	0.009
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

TC: Total Cholesterol; HDL-c: High Density Lipoprotein Cholesterol; LDL-c: Low Density Lipoprotein Cholesterol; TG: Triglyceride; (\*) indicates a significant difference between the two groups; P < 0.05.

**Table 3:** Mean value and significance of SF-36 subscale scores in group (A) before and at the end of the study.

SF-36 subscale variables	Mean +SD		P-value
	Before	After	
SF-36: Health transition	2.82 ± 0.65	1.78 ± 0.54*	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	85.34±10.96*	0.006
SF-36: Bodily pain	73.64±8.26	70.42±8.13*	0.008
SF-36: General health	73.25±12.11	78.93±11.95*	0.011
SF-36: Vitality	56.15±7.66	68.34±7.51*	0.001
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

(\*) indicates a significant difference between the two groups; P < 0.05.

**Table 4:** Mean value and significance of Mean value and significance

of measured variables of group (B) before and at the end of the study.

	Mean +SD		P-value
	Before	After	
BMI (kg/m <sup>2</sup> )	34.15 ± 3.98	34.42 ± 4.01	0.268
Lepton (Ng/ml)	42.32±6.78	42.51±6.67	0.196
TC (mg/dl)	196.86±20.37	198.22±19.92	0.088
HDL-c (mg/dl)	32.82±3.45	31.94±3.28	0.294
LDL-c (mg/dl)	140.24±17.22	143.16±17.45	0.098
TG (mg/dl)	162.12±20.16	164.88±19.51	0.085
Calcium (ng/dl)	9.28 ± 1.81	9.11 ± 1.66	0.454
Parathyroid Hormone (ng/dl)	13.15 ± 3.61	13.32 ± 3.87	0.387
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

TC: Total cholesterol; HDL-c: High density lipoprotein cholesterol; LDL-c: Low density lipoprotein cholesterol; TG: Triglyceride; (\*) indicates a significant difference between the two groups; P < 0.05

**Table 5:** Mean value and significance of SF-36 subscale scores in group (B) before and at the end of the study.

SF-36 subscale variables	Mean +SD		P-value
	Before	After	
SF-36: Health transition	2.69 ± 0.74	2.88 ± 0.75	0.814
SF-36: Physical functioning	73.58±9.83	73.37±9.80	0.722
SF-36: Role functioning: Physical	80.96±10.65	80.81±10.49	0.643
SF-36: Bodily pain	73.88±8.18	74.42±8.11	0.146
SF-36: General health	72.85±11.53	72.54±11.21	0.551
SF-36: Vitality	55.76±7.24	55.19±7.16	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 6:** Mean value and significance of Mean value and significance

of measured variables of group (A) and group (B) after treatment.

	Mean +SD		P-value
	Group (A)	Group (B)	
BMI (kg/m <sup>2</sup> )	27.28±4.43*	34.42 ± 4.01	0.006
Lepton (Ng/ml)	37.11±6.26*	42.51±6.67	0.001
TC (mg/dl)	167.35±20.98*	198.22±19.92	0.002
HDL-c (mg/dl)	39.96±3.27*	31.94±3.28	0.004
LDL-c (mg/dl)	121.24±18.32*	143.16±17.45	0.000
TG (mg/dl)	128.35±20.35*	164.88±19.51	0.003
Serum Calcium (ng/dl)	11.23 ± 1.41*	9.11 ± 1.66	0.007
Parathyroid Hormone (ng/dl)	10.32 ± 3.15*	13.32 ± 3.87	0.008
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

TC: Total Cholesterol; HDL-c: High Density Lipoprotein Cholesterol; LDL-c: Low Density Lipoprotein Cholesterol; TG: Triglyceride; (\*) indicates a significant difference between the two groups; P < 0.05.

**Table 7:** Mean value and significance of SF-36 subscale scores in group (A) and group (B) at the end of the study.

SF-36 subscale variables	Mean +SD		P-value
	Group (A)	Group (B)	
SF-36: Health transition	1.78 ± 0.54*	2.88 ± 0.75	0.018
SF-36: Physical functioning	81.71±9.88*	73.37±9.80	0.004
SF-36: Role functioning: Physical	85.34±10.96*	80.81±10.49	0.007
SF-36: Bodily pain	70.42±8.13*	74.42±8.11	0.009
SF-36: General health	78.93±11.95*	72.54±11.21	0.008
SF-36: Vitality	68.34±7.51*	55.19±7.16	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

(\*) indicates a significant difference between the two groups; P < 0.05.

## Discussion

Quality of life along with biochemical parameters were found to be adversely affected by obesity [29-38]. Therefore, this study was designed to detect the effects of weight reduction

on biochemical & clinical parameters and QOL among obese postmenopausal women. The principal finding in this study indicated that weight reducing program improved subscales of QOL among obese postmenopausal women. Many previous studies reported that weight loss improves HRQOL among obese subjects [33-38], type 2 diabetes mellitus [39] and osteoarthritis [40]. While, Ross et al. [23] reported that a six months weight reducing program among 298 obese women that resulted in 9.4% weight loss resulted improvement in vitality scores and physical functioning. However, Blissmer et al. [33] proved that improvements in subscales of SF-36 was obtained in 144 overweight/obese adults after six months of weight reducing program that resulted in 5.6 kg of weight loss. Moreover, Riesco and colleagues [41] stated that modest loss of body weight following 16-week of aerobic exercise training improved QOL, physical and mental well-being in obese women.

In our study blood lipids profile and leptin were significantly modulated as a result of weight reduction in obese postmenopausal women. Similarly, Shephard and Balady [42] noticed that regular practice of physical activities had a modulating effect on blood lipids profile by favoring the reduction of cholesterol, LDL-cholesterol and triglycerides in addition to increased HDL-cholesterol level. Also, García et al. [43] stated that an ambulatory physical exercise program for 12 weeks improves QOL and biochemical parameters through weight loss in obese postmenopausal women. However, Tran and Weltman [44] found that modulation of lipid profile correlated with weight loss. In addition, Sartorio and colleagues [45] mentioned that reduction of body weight reduced serum level of leptin. Moreover Volek and colleagues [46] reported that 2 months weight reducing program significantly modulated serum level of leptin.

Furthermore, on analyzing the parameters studied in the 6MWT and hand grip strength, our results showed a significant improvement in patients' performance as a result of weight reduction as there is evidence that excess weight may adversely interfere with physical activities [47]. Our findings were consistent with Enright and Sherrill [48] who founded that the distance forecast for the 6MWT was higher in subjects who lost weight. However, a study carried out by Maniscalco et al. [49] showed an improvement of the 6MWT parameters in the late postoperative period of bariatric surgery. Moreover, Lemoine and colleagues [50] proved that postmenopausal obese women had a significant improvement in measures of QOL and walking distance following three weeks of weight reducing program.

## Conclusion

The current study provides evidence that weight reduction program improves QOL, biochemical and clinical parameters among obese postmenopausal women.

## Acknowledgment



This project was funded by the Deanship of Scientific Research (DSR) at King Abdulaziz University, Jeddah, under grant no. (G-29-142-36). The authors, therefore, acknowledge with thanks DSR for technical and financial support.

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DOI: [10.19080/OAJGGM.2017.01.555553](https://doi.org/10.19080/OAJGGM.2017.01.555553)

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