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ARTICLE

The relationship of a weight-efficacy lifestyle with anthropometric indices among middle-aged Iranian women

Mahbobeh Kianfar[a], Poorandokht Afshari[a,b*], Parvin Abedi[a] and Mohammadhossein Haghighizadeh[c]

[a]*Midwifery Department, Menopause Andropause Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran*
[b]*Midwifery Department, Nursing and Midwifery School, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran*
[c]*Biostatistics Department, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran*
**Correspondence: poafshari@gmail.com; parvinabedi@ymail.com*

Background: Overweight or obese middle-aged women are at a greater risk of chronic diseases. This study aimed to evaluate the relationship between a weight-efficacy lifestyle and anthropometric indices in middle-aged women.
Methods: In this study, 500 middle-aged women were recruited randomly from ten public health centres in Ahvaz. A sociodemographic questionnaire and weight-efficacy lifestyle (WEL) questionnaire were used to collect the data. Anthropometric indices including weight, height, waist and hip circumference, waist–hip ratio, body fat percentage, and mid-upper arm circumference were measured. The Pearson correlation coefficient and logistic regression were used to analyse the data.
Results: Women with higher negative emotions and those with a higher availability of food were 0.93 (OR 0.93, 95% CI 0.86–0.99, $p = 0.03$) and 0.89 (OR 0.89, 95% CI 0.82–0.96, $p = 0.003$) times more likely to have a higher BMI, respectively. Women with increased negative emotion (OR 0.92, 95% CI 0.85–0.99, $p = 0.04$), and lower positive activities (OR 1.15, CI 1.05–1.27, $p = 0.003$) were more likely to have a wider waist circumference.
Conclusion: A weight-efficacy lifestyle was found to have a significant relationship with body mass index, waist circumference, hip circumference, waist–hip ratio, body fat percentage, and upper mid-arm circumference. Middle-aged women should be specifically educated regarding a weight-efficacy lifestyle.

Keywords: weight-efficacy lifestyle, middle-aged women, anthropometric indices

Introduction

Middle-aged women are at a greater risk of chronic diseases if they remain overweight or obese. According to the World Health Organization (2018),[1] 650 million adults are obese worldwide. It is estimated that 42.5% of adults aged > 20 years are obese in the United States.[2] A recent study showed that the prevalence of overweight and obesity in the Iranian population is 60.3%, and the prevalence of obesity in women was 30.4%.[3] A multicentre study on 156,624 postmenopausal women in the United States showed that the hazard ratio for all causes of death was greater for overweight or obese women with central obesity.[4] According to a prospective cohort study on 6 197 individuals with a mean age of 62.79 years, there was a significant association between BMI = 30–35 and 34–40 kg/m^2 and all causes of death.[5] There is a significant association of overweight and obesity with diabetes and hypertension, with each one-unit decrease in BMI leading to 28 fewer cases with chronic diseases per 1 000 women.[6]

One of the most important factors in losing weight is self-efficacy.[7] As introduced by Bandura *et al*,. self-efficacy is a key concept defining an individual's belief in their capacity for sustained behaviour change.[8] Self-efficacy has been reported as a significant factor in doing exercise and weight control in other studies.[9–10] Studies assessing the effect of eating self-efficacy on weight loss have yielded positive results in terms of weight management.[11] In an interventional study on 100 overweight or obese women, Mirkarimi *et al*. found that using the intervention according to motivation sessions, the scores of a weight-efficacy lifestyle and all its subscales improved significantly in the intervention group compared with the control group.[12] A systematic review on 56 studies to investigate the effect of lifestyle change on anthropometric measures and lipid profile in class II and III obesity showed that anthropometric indices, as well as lipid profile, changed significantly in all studies with a better impact in long-term studies.[13]

Middle-aged women are at a greater risk of overweight and obesity worldwide, which results from a sedentary lifestyle, predisposing them to severe menopausal symptoms such as insomnia, and depression.[14–15] Therefore, this study aimed to evaluate the relationship between a weight-efficacy lifestyle and anthropometric indices among middle-aged Iranian women.

Material and method

This was a cross-sectional study in which 500 middle-aged women were recruited randomly. This study was approved by the Ethics Committee of Ahvaz Jundishapur University of Medical Sciences (Ref. No: AJUMS.1393.399). The data collection started in May 2014 and was completed in November 2014. The inclusion criteria were as follows: women aged between 40 and 60 years who were able to read and write. Women who had diabetes, thyroid or eating disorders, or psychological disorders, along with pregnant or breastfeeding women, and those losing one of their relatives in the past six months were excluded from the study. All women were asked to sign an informed consent form prior to data collection. A total of 10 public health centres (five centres from the west of Ahvaz and five from the east) were selected randomly from the 32 public health centres available in this city. From each centre, 50

middle-aged women were recruited randomly according to the last digit of their health records.

The following formula was used for sample size calculation:

$$n = \frac{(z_1 - \alpha/2 + z_1 - \beta)2(s_1^2 + s_2^2)}{(\mu_1 - \mu_2)^2}$$

$$n = \frac{(1.96 + .128)2(15.5^2 + 18.6^2)}{(58.8 - 52.6)2}$$

$$= \frac{1.5(240.20 + 345.96)}{(6.2)2} = 162 \quad \frac{162}{32.3\%} = 502$$

$$Z_{1-\alpha/2} = 1.96$$

$$Z_{1-\beta} = 1.28$$

$$\mu_1 = 58.8$$

$$\mu_2 = 52.6$$

$$S_1 = 1.55$$

$$S_2 = 19.6$$

The power of the study was set at 90% and confidence interval was set at 95%. We used the study by Navidian *et al*. for sample size. Since the study by Navidian *et al*. was on reproductive-aged women and because the number of middle-aged women with normal weight is smaller than at other ages, we divided 162 by 32.3% , which we adapted from the study by Navidian. (2012).[16]

Data collection

A socio-demographic questionnaire and the weight-efficacy lifestyle questionnaire were used to collect the data. The demographic questionnaire included items such as age, the age of menopause, occupation, educational attainment, economic status, the number of children and marital status. The weight-efficacy lifestyle (WEL) questionnaire has five subscales and 20 questions on eating behaviour self-efficacy. The subscales are as follows: negative emotions, availability of food, social pressure, physical discomfort, and positive activities (each including four questions). Each question is scored from 1 (not confident) to 5 (very confident). The validity and reliability of this questionnaire were checked and approved in two discrete clinical treatments with a total of 382 participants.[17] The validity and reliability of this questionnaire have been tested for the Iranian population by Navidian *et al*. (2009).[18] They used confirmatory factor analysis and convergent validity (with the Shere general self-efficacy questionnaire) for checking validity. The reliability of the questionnaire was assessed using test–retest and Cronbach's alpha.

Eligible participants were requested to attend the clinic and complete the demographic and WEL questionnaires. If they had difficulty in understanding the items, one of the researchers (MK) was available to help them.

Procedure

Anthropometric indices including weight, height, waist circumference, hip circumference, waist–hip ratio, body fat percentage and mid-upper arm circumference were measured by a trained midwife. The weight of the participants was measured while they were wearing light clothes and barefoot using a Beurer brand scale (with a maximum error of 0.5 kg; https://www.beurer.com). The height of the participants was measured while they were standing barefoot and looking forward using a Seca stadiometer (Seca, Hamburg, Germany). For measuring body fat percentage, the Omron fat analyzer (BF 306; Omron, Kyoto, Japan) was used. Body mass index (BMI) was calculated using the World Health Organization formula as follows: weight (kg)/height (m^2).[19]

The waist–hip ratio was determined by dividing waist circumference by hip circumference.[20] The mid-upper arm circumference was measured using standard techniques.[21] For measuring the waist circumference, the participants were requested to stand up to identify their upper hip bone and the top of the right iliac crest. The measuring tape was placed in a horizontal plane around the abdomen at the level of the iliac crest. The number was then read and recorded.[20] Hip circumference was measured at the widest part around the participant's buttocks, while they were standing.[20]

The midwife conducted 10 measurements, and to ensure validity of the measurements, a nutritionist (holding a master's degree in nutrition sciences) repeated them. The nutritionist randomly checked the measurements for accuracy during the study.

Statistical analysis

All data were analysed using SPSS version 20 (IBM Corp, Armonk, NY, USA). Descriptive statistics involved mean, SD, frequency and percentages. The Pearson correlation coefficient was used to assess the relationship between weight-efficacy lifestyle and anthropometric indices. Logistic regression was used to assess the relationship between self-efficacy and anthropometric measures after adjusting for confounding variables. $P < 0.05$ was considered statistically significant.

Results

Table 1 lists the sociodemographic characteristics and anthropometric measures of all participants. The mean age of participants was 46.8 ± 5.3 years. Only 30 (6%) women had experienced menopause (data not shown in table) and the

Table 1: Sociodemographic characteristics and anthropometric measures of participants ($N = 500$)

Variables	*n* (%)
Marital status:	
Single	104 (20.8)
Married	353 (70.6)
Widow	43 (8.6)
Economic status:	
Good	211 (42.2)
Moderate	175 (35.0)
Weak	114 (22.8)
Job:	
Housewife	312 (62.4)
Employee	188 (37.6)
Education:	
High school	193 (38.6)
Secondary high school	108 (21.6)
University education	199 (39.8)
	Mean ± SD
Age (years)	46.8 ± 5.3
Menopause age (years)	48.7 ± 7.1

Table 2: Weight-efficacy lifestyle scores and anthropometric indices of participants ($N = 500$)

Variables	Mean ± SD
Negative emotion	15.1 ± 3.4
Positive activities	12.36 ± 3.01
Availability of food	11.3 ± 3.3
Social pressure	12.48 ± 3.04
Physical discomfort	14.6 ± 2.9
Total score of WEL	65.89 ± 10.7
Weight (kg)	67.6 ± 13.05
Height (cm)	161.65 ± 6.5
Body mass index (kg/m^2)	25.9 ± 4.9
Hip circumference (cm)	103.88 ± 10.9
Waist circumference (cm)	80.36 ± 12.6
Waist–hip ratio	0.77 ± 0.07
Body fat percentage	35.4 ± 6.9
Mid-upper arm circumference (cm)	29.7 ± 4.3

WEL = weight-efficiency lifestyle.

mean age of menopause in these women was 48.7 ± 7.1 years. Most of the participants were housewives and had a university degree.

Table 2 shows the mean weight-efficacy lifestyle scores in five sub-scales of the questionnaire and mean scores of anthropometric indices. The lowest mean score was related to the availability of food (11.3 ± 3.3), while the highest was related to negative emotions (15.1 ± 3.4). The mean body mass index (BMI) was 25.9 ± 4.9 (kg/m^2), and the mean body fat percentage was 35.4 ± 6.9.

As evident in Table 3, there was an inverse significant relationship between body mass index, mid-upper arm circumference, body fat percentage and negative emotions ($r = -0.1$, $r = -0.15$, $r = -0.13$, $p < 0.05$ respectively). There was a relationship between waist circumference, waist–hip ratio and positive activities ($r = 0.1$, $r = 0.15$, $p < 0.05$ and $p < 0.01$). There was also a significant relationship between hip circumference, waist–hip ratio, and availability of food ($r = -0.13$, $r = 0.14$, $p < 0.001$). Social pressure had a negative relationship with hip circumference ($r = -0.10$, $p < 0.05$). Only waist–hip ratio had a significant relationship with the total score of WEL ($r = 0.095$, $p < 0.05$).

Results of logistic regression (Table 4) showed that women with more negative emotions were 0.93 times more likely to have a greater BMI (OR 0.93, 95% CI 0.86–0.99, $p = 0.03$). Also, women with greater food availability were 0.89 times more likely to have a greater BMI (OR 0.89, 95% CI 0.82–0.96, $p = 0.003$). Women with increased negative emotions were 0.92 times more likely to have a wider waist circumference (OR 0.92, 95% CI 0.85–0.99, $p = 0.04$). Also, women who had lower positive activities were 1.15 times more likely to have a greater waist circumference (OR 1.15, CI 1.05–1.27, $p = 0.003$). Finally, women with lower positive activities were 1.14 times more likely to have a greater waist–hip ratio (OR 1.14, CI 1.05–1.24, $p = 0.001$).

Discussion

This study aimed to evaluate the relationship between a weight-efficacy lifestyle and anthropometric indices among middle-aged Iranian women. Our results showed that there was an inverse significant relationship between body mass index, mid-upper arm circumference, body fat percentage and negative emotions. We also found a positive relationship between waist circumference, waist–hip ratio and positive activities. Another relationship was observed between hip circumference, waist–hip ratio and availability of food. Social pressure had a negative relationship with hip circumference.

Self-efficacy is an important factor in weight reduction and improvement of anthropometric measures, especially in obese women. Griffin (2012) studied 101 African American women and found that the only predictor of body mass index was the weight-efficacy lifestyle (estimate: −1.36, $p = 0.001$).[22]

In another study on 2 312 men and 2 674 women, Konttinen *et al*. reported that depressive mood and emotional eating had a positive correlation with BMI, waist circumference and body fat percentage, while physical activity had an inverse correlation with these indices.[23] Our results are similar to those of Konttinen et al.

Our results showed that women with higher negative emotions and higher availability of food were more likely to have a greater BMI. In a cohort study, researchers recruited 9 425 people aged between 35 and 55 years in 1985–1988 and followed them four times every three years. Results showed that people who experienced more negative emotions were 10% more likely to have a greater BMI (OR 1.08, 95% CI 1.02–1.14, $p = 0.007$) and waist circumference (OR 1.09, 95% CI 1.04–1.14, $p < 0.001$).[24] These results are also in line with ours.

Our results also indicated that women with increased negative emotions and lower positive activities were more likely to have a wider waist circumference. In addition, women with lower positive activities were 1.14 times more likely to have a larger waist–hip ratio. One study on 487 middle-aged women

Table 3: Correlation between weight-efficacy lifestyle dimensions and anthropometric measures

Variables	Negative emotion	Positive activities	Availability of food	Social pressure	Physical discomfort	Total score of WEL
Pearson correlation coefficient:						
Body mass index (kg/m^2)	−0.1*	0.02	−0.07	−0.07	−0.01	−0.07
Waist circumference (cm)	−0.05	0.10*	−0.001	−0.05	0.01	0.001
Hip circumference (cm)	−0.05	0.007	−0.13**	−0.10*	0.01	−0.08
Waist–hip ratio	−0.01	0.15**	0.14**	0.03	−0.002	0.095*
Mid-upper arm circumference (cm)	−0.15**	0.02	−0.03	−0.01	−0.01	−0.06
Body fat percentage	−0.13**	0.02	−0.02	0.009	0.01	−0.03

*$p < 0.05$; **$p < 0.01$.

Table 4: Logistic regression to detect relation between weight-efficacy lifestyle and high body mass index, waist circumference and waist–hip ratio

Independent variables	B	SE	Wald	*p*-value	OR	95% confidence interval	
Body mass index						Lower	Upper
Negative emotion	−0.072	0.035	40.24	0.039	0.93	0.86	0.99
Availability of food	−0.116	0.039	90.07	0.003	0.89	0.82	0.96
Waist circumference							
Negative emotion	−0.07	0.04	30.94	0.04	0.92	0.85	0.99
Positive activities	0.14	0.04	8.87	0.003	1.15	1.05	1.27
Waist–hip ratio							
Positive activities	0.13	0.04	10.61	0.001	1.14	1.05	1.24

showed that there is a significant relationship between waist–hip ratio and a higher level of anxiety, depression and reduced social support.[25] These results are consistent with ours.

In another study on 110 middle-aged women, Ansari *et al*. found that physical activity levels of premenopausal and post-menopausal women are different and there was a negative relationship between physical activity and BMI.[26] These results are in line with ours.

Women in our study were mostly in their perimenopausal period, and this can be an important factor contributing to increased weight and other anthropometric indices. Studies have shown that women aged between 40 and 50 years experience weight gain up to 0.6 kg per year, regardless of their menopause status.[27] Also, ageing can play a role in changing the body fat distribution from the subcutaneous area to the visceral area.[28] Although weight gain is usually observed in middle-aged women, studies have shown that being on a diet, performing exercise, or both, could significantly reduce weight and anthropometric indices among post-menopausal women.[29]

Strengths and limitations of study

Overweight and obesity are quite common in middle-aged women around the world. Obese middle-aged women may experience more severe menopausal complications such as sleep problems or depression. Therefore, the results of this study can help to improve the quality of life of these women. However, our study suffered from a number of limitations. First, we relied on participants' responses only to questions about their health status. Further, we did not use laboratory tests to check the medical disorders, and this is a shortcoming as laboratory tests may better identify medical disorders. Finally, our results should be interpreted in light of demographic characteristics such as age, educational attainment, economic status and marital status.

Conclusion

The results of this study showed that women with negative emotions had a higher BMI and waist circumference. Also, lower positive activity was associated with greater waist circumference and waist–hip ratio. Middle-aged women should be educated on a weight-efficacy lifestyle. Further interventional studies for evaluation of the effect of lifestyle change on anthropometric measures of middle-aged women are recommended.

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