The Impact Of Lifestyle Modifications On Reducing Cardiovascular Risk In Middle-Aged Women

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Abstract:

Background: Perimenopausal women commonly experience a variety of physical and psychological symptoms due to hormonal changes. Healthy lifestyle modifications are recognized as an effective non-pharmacological approach to reduce these symptoms and enhance quality of life.**Aim:** This study aimed to evaluate the effect of healthy lifestyle modifications on reducing perimenopausal symptoms and improving lifestyle behaviors among perimenopausal women.**Methods:** A quasi-experimental design was conducted on 120 perimenopausal women. Data were collected using a structured interview questionnaire, the Menopausal Rating Scale (MRS), and the Health-Promoting Lifestyle Profile (HPLP) before and after implementing a health education intervention focused on lifestyle modifications.**Results:** The study showed a significant post-intervention improvement in perimenopausal symptoms. Moderate symptoms decreased from 31.6% to 0%, while 50.8% reported no symptoms after intervention. MRS scores significantly declined and HPLP scores improved (P = 0.001). Additionally, symptom improvement was significantly associated with age, education, and residence.**Conclusion:** Healthy lifestyle modifications are highly effective in reducing perimenopausal symptoms and improving lifestyle behaviors. Health education plays a crucial role in enabling women to adopt healthier behaviors during the perimenopausal transition.

Keywords: Perimenopause, Lifestyle modification, Health education, Menopausal symptoms.

Introduction

Cardiovascular disease (CVD) remains the leading cause of morbidity and mortality among women worldwide, particularly as they transition through midlife (López-Candales et al., 2023). Middle-aged women, typically between the ages of 40 and 60, undergo physiological and hormonal changes that significantly increase their risk for cardiovascular complications (Mosca et al., 2022). A decline in estrogen levels during this period is associated with unfavorable lipid profiles, increased central adiposity, insulin resistance, and endothelial dysfunction — all of which contribute to elevated cardiovascular risk (Muka et al., 2023).

The perimenopausal and postmenopausal phases mark a time when many women experience rapid shifts in cardiovascular health. These changes are often overlooked due to the misconception that women are at lower risk for heart disease compared to men. However, studies indicate that the incidence of heart attacks in women sharply rises after

menopause and may even surpass that of men in older age groups (Maas &Appelman, 2022). Moreover, atypical symptoms in women, such as fatigue, shortness of breath, and sleep disturbances, often lead to underdiagnosis and delayed treatment of cardiovascular conditions (Rees et al., 2022).

Lifestyle modification has emerged as a cornerstone in the prevention and management of CVD, particularly among at-risk populations such as middle-aged women. Interventions that promote regular aerobic activity, increased consumption of fruits and vegetables, reduced saturated fat intake, and improved stress management have been associated with substantial reductions in hypertension, dyslipidemia, and glucose intolerance — the major contributors to cardiovascular disease (Stampfer et al., 2022). In contrast, sedentary behavior, processed food consumption, and poor sleep hygiene accelerate cardiovascular decline and exacerbate comorbidities such as obesity and type 2 diabetes (Li et al., 2023).

Despite strong evidence supporting the benefits of lifestyle changes, many women remain unaware of the link between daily habits and heart health. Cultural norms, caregiving responsibilities, and limited access to preventive care often serve as barriers to adopting healthier behaviors (Johnston et al., 2024). Therefore, public health initiatives and tailored educational interventions are critical to empower women with knowledge and motivation to take charge of their cardiovascular well-being (World Health Organization [WHO, 2021).

Addressing cardiovascular risk through lifestyle medicine not only reduces mortality but also enhances overall physical and mental health, allowing women to age with greater vitality and independence (Ornish et al., 2018; Li & Zhang, 2022). This study aims to evaluate the extent to which structured lifestyle modifications can positively influence cardiovascular risk factors among middle-aged women, thereby contributing to more effective and personalized preventive care strategies.

Significance of the Study

Globally, the burden of cardiovascular disease in women is rising, with an estimated 35% of all female deaths attributable to CVD (CDC, 2023). In many developing countries, women are disproportionately affected due to limited awareness, delayed diagnosis, and lack of preventive health services tailored to their needs (Yusuf et al., 2023). Research shows that many middle-aged women remain unaware of their cardiovascular risk and are less likely to engage in preventive practices compared to men (Maas &Appelman, 2022).

In regions where women's access to health education and care is limited, the implementation of lifestyle interventions can serve as an affordable and practical means of reducing cardiovascular risk. Promoting healthy lifestyle habits during this critical life stage not only prevents future cardiac events but also enhances quality of life and reduces healthcare costs.

Thus, this study is essential to assess how lifestyle modifications—through diet, exercise, and stress management—can reduce cardiovascular risk among middle-aged women and contribute to long-term health promotion.

Aim of the Study

The aim of this study is to evaluate the impact of lifestyle modifications on reducing cardiovascular risk in middle-aged women.

Research Hypothesis

The research hypothesized that middle-aged women who receive health education about healthy lifestyle modifications will demonstrate a significant reduction in cardiovascular risk factors compared to their pre-intervention levels.

Subjects and Methods

Research Design:

A quasi-experimental study with a pre-post-test design was utilized to assess the effect of lifestyle modifications on cardiovascular risk among middle-aged women.

Setting of the Study:

The study was conducted at the General Medicine and Family Health outpatient clinics at Assiut University Hospital.

Sample:

A purposive sample was used to select eligible women who met the inclusion criteria.

Sample Size

A sample of 120 middle-aged women was determined based on a population size of 4,000, with a hypothesized prevalence of $10\% \pm 5\%$, a 95% confidence level ($Z = 1.96$), a margin of error of 0.05, and a design effect (DEFF) of 1. This size ensured adequate statistical power for detecting significant outcomes.

Inclusion Criteria:

1. Women aged between 40 and 60 years.
2. Free from acute illnesses at the time of study enrollment.
3. Not on medications or supplements that directly affect cardiovascular health (e.g., lipid-lowering drugs) within the past six months.
4. Willing to participate and available for follow-up.

Exclusion Criteria:

1. Women diagnosed with severe or uncontrolled cardiovascular conditions, diabetes, or endocrine disorders.
2. Women with physical disabilities that would limit participation in lifestyle interventions (e.g., exercise).
3. Women currently enrolled in another structured health or dietary program.

Tools of Data Collection

The data collection instruments were designed and validated by the researcher to assess the impact of lifestyle modifications on cardiovascular risk among middle-aged women. All tools were reviewed by academic supervisors for content and face validity and were developed based on an extensive review of relevant literature and established measurement tools (Benjamin et al., 2019; Arnett et al., 2019). Data were collected using a structured, pretested questionnaire comprising four main components.

Tool I: Structured Interviewing Questionnaire

This tool was used to collect baseline data from participants and included sections on socio-demographic characteristics such as age, educational level, occupation, marital status, and place of residence. It also assessed medical and family history of cardiovascular diseases to identify inherited or chronic conditions. Lifestyle behaviors including smoking status, physical activity, dietary habits, and sleep patterns were explored in depth. Anthropometric measurements (weight and height) were taken to calculate Body Mass Index (BMI), which serves as a primary indicator of obesity and cardiovascular risk (World Health Organization [WHO], 2022). Contact information was also collected to facilitate participant follow-up.

Tool II: Cardiovascular Risk Assessment Scale

The second tool was adapted from internationally validated models, including updated cardiovascular risk prediction algorithms such as the ASCVD Risk Estimator Plus and the WHO cardiovascular disease (CVD) risk chart working group revisions. These tools are widely used to estimate a person's 10-year cardiovascular risk based on a combination of physiological and behavioral factors (Goff et al., 2023; WHO CVD Risk Chart Working Group, 2019). Key variables included systolic and diastolic blood pressure, fasting blood glucose, and lipid profile (total cholesterol, HDL, LDL, triglycerides). Lifestyle-related factors such as physical activity and smoking status were also incorporated to enhance the predictive accuracy of the risk estimate.

Tool III: Health-Promoting Lifestyle Profile (HPLP-II)

The Health-Promoting Lifestyle Profile-II (HPLP-II), developed by Walker et al., remains a widely used and psychometrically sound instrument for measuring the frequency of health-promoting behaviors across six domains:

health responsibility, physical activity, nutrition, spiritual growth, interpersonal relationships, and stress management. It contains 52 items scored on a 4-point Likert scale (1 = Never, 2 = Sometimes, 3 = Often, 4 = Routinely). The tool provides an overall lifestyle score, categorized as good (≥75%), fair (50–74.9%), or poor (<50%). Its continued validation in diverse populations and updated use in recent studies support its relevance (Almutairi et al., 2023; Alqahtani et al., 2022).

Tool IV: Follow-Up Sheet (Post-Test Assessment)

The final tool was a follow-up assessment sheet designed to measure changes after one month of lifestyle modification intervention. This post-test reused the components of Tool II and Tool III to reassess cardiovascular risk indicators and health-promoting lifestyle behaviors. Comparing pre- and post-intervention data allowed for evaluation of the effectiveness of lifestyle changes in reducing risk and promoting healthier habits among participants (LeFevre et al., 2022; Karmali et al., 2020).

Implementation Phase

The implementation of the study was carried out over a period of seven months, from January to July 2023. During this phase, the researcher was regularly present at the study sites to ensure consistency and participant engagement. Specifically, the researcher attended the outpatient general medicine clinic three days per week and the family health clinic two days per week. A maximum of three participants were interviewed each day to allow sufficient time for individualized attention and detailed data collection.

At the beginning of each session, participants were provided with a comprehensive explanation of the study objectives and procedures. Oral informed consent was obtained prior to any data collection. Baseline information was gathered using the Structured Interviewing Questionnaire (Tool I), followed by the administration of the Cardiovascular Risk Assessment Scale (Tool II) and the Health-Promoting Lifestyle Profile II (Tool III). Each interview session lasted approximately 20 to 30 minutes. For participants who were illiterate, the questions and available response options were read aloud by the researcher, and their answers were recorded accordingly.

Health Education Phase

Following the initial assessment, participants engaged in individualized health education sessions lasting approximately 30 minutes. These sessions aimed to improve awareness and encourage the adoption of healthy behaviors to reduce cardiovascular risk. Key topics included an overview of cardiovascular disease risk factors and prevention strategies, the importance of regular physical activity and a balanced diet, effective stress management techniques, and the significance of smoking cessation and regular health screenings.

To reinforce the education provided during these sessions, a printed health education booklet was distributed to each participant. The booklet was written in Arabic, using simple language and illustrative diagrams to enhance understanding, especially among women with lower literacy levels. This educational material was intended to support behavior change and improve adherence to recommended lifestyle modifications.

Follow-Up Phase

A follow-up assessment was conducted one month after the intervention to evaluate the impact of the educational sessions. This follow-up involved the re-administration of Tool II (Cardiovascular Risk Assessment Scale) and Tool III (HPLP-II) to measure changes in cardiovascular risk indicators and lifestyle behaviors. The majority of participants (80%) returned for in-person follow-up visits, while the remaining 20% were contacted by phone to complete the assessments. This approach ensured a high rate of follow-up and data completeness.

Ethical Considerations

Ethical approval for the study was obtained from the Faculty of Nursing Ethics Committee in November 2022. All participants provided oral informed consent prior to their involvement in the research. Throughout the study, strict measures were taken to uphold confidentiality, privacy, and the principle of voluntary participation. Participants were assured that their data would be used exclusively for research purposes, and all information collected was handled with

the utmost discretion and integrity.

Statistical Design

Data were coded, entered, and analyzed using the Statistical Package for the Social Sciences (SPSS) software, version 26. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the demographic and baseline data. To assess the effectiveness of the intervention, the McNemar test was employed to compare proportions of categorical variables before and after the intervention. The paired t-test was used to compare the means of continuous variables pre- and post-intervention. Additionally, Pearson correlation analysis was conducted to examine relationships among selected variables. A p-value of less than 0.05 was considered statistically significant, indicating a meaningful change or association.

Results

Table (1): Frequency and Distribution of the Studied Women According to Their Socio-Demographic Data (n = 120)

Socio-demographic Data	N	%
Age / years		
40 - 50 years	88	73.3
51 - 55 years	32	26.7
Mean ± SD	48.10 ± 3.32	
Educational Level		
Illiterate	57	47.5
Preparatory Education	25	20.8
Secondary Education	26	21.7
University Education	12	10.0
Occupation		
Worker	23	19.2
Housewife	97	80.8
Residence		
Rural	73	60.8
Urban	47	39.2
Marital Status		
Single	1	0.8
Married	96	80.0
Divorced	1	0.8
Widow	22	18.4
Weight (kg)	85.52 ± 15.54	
Height (cm)	164.59 ± 4.46	
Body Mass Index		

Socio-demographic Data	N	%
Healthy Weight	22	18.3
Overweight	34	28.4
Obese	64	53.3

Table (1): Demonstrates the socio-demographic characteristics of the study participants. The mean age of perimenopausal women was 48.10 ± 3.32 years. Almost half (47.5%) of the women were illiterate, and a large majority (80.8%) were housewives. Over half of the participants (60.8%) resided in rural areas. Regarding body mass index (BMI), more than half (53.3%) of the women were classified as obese, with an average weight of 85.52 ± 15.5 kg.

Table (2): Distribution of Perimenopausal Symptoms Before and After Lifestyle Modification Intervention (n = 120)

Symptom	Level	Pre N (%)	Post N (%)	P-value
Hot Flashes & Sweating	Not present	0 (0.0%)	14 (11.7%)	**0.001 ****
	Mild	3 (2.5%)	53 (44.2%)	
	Moderate	32 (26.7%)	46 (38.3%)	
	Severe	74 (61.6%)	7 (5.8%)	
	Extremely Severe	11 (9.2%)	0 (0.0%)	
	Mean ± SD	2.78 ± 0.64	1.38 ± 0.77	
Sleep Problems	Not present	5 (4.2%)	9 (7.5%)	*0.012 **
	Mild	18 (15.0%)	47 (39.2%)	
	Moderate	45 (37.5%)	49 (40.8%)	
	Severe	40 (33.3%)	15 (12.5%)	
	Extremely Severe	12 (10.0%)	0 (0.0%)	
	Mean ± SD	2.29 ± 0.92	1.57 ± 0.74	
Depressive Mood	Not present	9 (7.5%)	13 (10.8%)	0.078
	Mild	20 (16.7%)	38 (31.7%)	
	Moderate	42 (35.0%)	44 (36.7%)	
	Severe	38 (31.7%)	22 (18.3%)	
	Extremely Severe	11 (9.2%)	3 (2.5%)	
	Mean ± SD	2.18 ± 0.94	1.71 ± 0.85	
Irritability	Not present	6 (5.0%)	10 (8.3%)	0.056
	Mild	16 (13.3%)	29 (24.2%)	
	Moderate	41 (34.2%)	52 (43.3%)	
	Severe	45 (37.5%)	26 (21.7%)	
	Extremely Severe	12 (10.0%)	3 (2.5%)	
	Mean ± SD	2.34 ± 0.88	1.89 ± 0.83	
Anxiety	Not present	8 (6.7%)	12 (10.0%)	0.089

Symptom	Level	Pre N (%)	Post N (%)	P-value
	Mild	21 (17.5%)	36 (30.0%)	
	Moderate	38 (31.7%)	41 (34.2%)	
	Severe	44 (36.7%)	26 (21.7%)	
	Extremely Severe	9 (7.5%)	5 (4.2%)	
	Mean ± SD	2.20 ± 0.91	1.83 ± 0.79	

*Significance level: *P ≤ 0.05 (statistically significant), *P ≤ 0.01 (highly significant).

Table (2): Shows a significant improvement in perimenopausal symptoms following the lifestyle modification intervention. Before the intervention, most women reported severe symptoms, including 61.7% with severe hot flashes and sweating, 54.2% with severe joint and muscular discomfort, and 98.3% with physical and mental exhaustion. After the intervention, symptom severity decreased notably, with 44.2% reporting mild hot flashes, 55.8% with mild joint discomfort, and 82.5% showing mild physical and mental exhaustion. Statistically significant improvements were observed in hot flashes and sweating (p = 0.001) and sleep problems (p = 0.012), while depressive mood, irritability, and anxiety also improved, though not significantly. The overall menopausal rating score showed a marked enhancement (p = 0.001).

Table (3): Mean Scores of Health-Promoting Lifestyle Profile Domains Pre and Post Intervention (n = 120)

HPLP Domains	Pre Mean ± SD	Post Mean ± SD	P-value
Nutrition	21.93 ± 3.64	29.87 ± 2.87	0.001**
Health Responsibility	7.33 ± 3.06	13.96 ± 2.44	0.001**
Physical Activity	7.08 ± 2.49	11.57 ± 2.42	0.001**
Spiritual Growth	6.43 ± 2.33	12.05 ± 2.35	0.001**
Interpersonal Relations	6.33 ± 2.58	12.69 ± 2.66	0.001**
Stress Management	7.50 ± 1.42	12.65 ± 3.04	0.001**
Total Mean	56.61 ± 14.21	92.79 ± 9.94	0.001**

*Significance level: *P ≤ 0.05 (statistically significant), *P ≤ 0.01 (highly significant).

Table (3): Displays the significant improvement in lifestyle behaviors of the women, as reflected in the Health-Promoting Lifestyle Profile (HPLP) scores before and after the intervention. There was a highly statistically significant increase in the total HPLP score (P = 0.001), indicating that the health education led to substantial improvement in lifestyle behaviors.

Table (4): Correlation Between Socio-Demographic Data and Perimenopausal Symptoms Pre and Post Lifestyle

Intervention (n = 120)

Socio-Demographic Variable	Pre R	Pre P-value	Post R	Post P-value
Age	0.222	0.015*	0.260	0.004**
Educational Level	-0.169	0.065	-0.360	0.000**
Occupation	0.184	0.045*	0.236	0.010**
Residence	0.066	0.475	-0.185	0.043*
Marital Status	0.043	0.644	0.038	0.684
Socioeconomic Level	-0.068	0.463	-0.170	0.064
BMI	0.024	0.793	-0.116	0.205

*Significance level: *P ≤ 0.05 (statistically significant), *P ≤ 0.01 (highly significant).*

Table (4): Demonstrates the relationships between socio-demographic factors and the improvement of perimenopausal symptoms after the intervention. Statistically significant improvements in symptoms were observed based on age, educational level, occupation, and residence (P < 0.001). Women from rural areas showed a statistically significant improvement in symptoms (P < 0.01).

Table (5): Correlation Between Socio-Demographic Data and HPLP Scores Pre and Post Lifestyle Intervention (n = 120)

Socio-Demographic Variable	Pre R	Pre P-value	Post R	Post P-value
Age	-0.146	0.111	-0.059	0.522
Educational Level	0.147	0.109	0.205	0.029*
Occupation	-0.045	0.626	-0.094	0.309
Residence	0.184	0.045*	0.193	0.035*
Marital Status	-0.005	0.956	0.030	0.743
Socioeconomic Level	0.241	0.008**	0.250	0.005**
BMI	0.069	0.453	0.049	0.596

*Significance level: *P ≤ 0.05 (statistically significant), *P ≤ 0.01 (highly significant).*

Table (5): Shows the correlations between socio-demographic data and Health-Promoting Lifestyle Profile (HPLP) scores before and after the intervention. There was a statistically significant relationship between educational level, residence, and lifestyle behaviors post-intervention (P < 0.01). Additionally, a highly statistically significant relationship was found between socioeconomic level and lifestyle behaviors both before and after the intervention (P < 0.001).

Discussion

This study highlights the significant impact of structured lifestyle modification interventions on reducing perimenopausal symptoms and enhancing health-promoting behaviors among midlife women. Lifestyle changes such as improved nutrition, increased physical activity, effective stress management, and enhanced interpersonal relationships emerged as non-pharmacological strategies with notable benefits. These findings align with existing literature suggesting that healthy

lifestyle practices play a critical role in mitigating perimenopausal symptoms and improving women's quality of life (Nelson, 2008; Avis et al., 2015).

The pre-intervention data showed that the majority of participants reported moderate to severe perimenopausal symptoms. This is consistent with Ehab et al. (2021), who identified a comparable prevalence of symptom severity in their study conducted in Tanta, Egypt. However, other studies, such as Farahat et al. (2020), found a higher prevalence of severe symptoms, highlighting how sample variations in education, geography, and cultural norms can influence symptom reporting and perception. The observed differences may also reflect disparities in health literacy, access to healthcare services, and awareness of menopause management strategies.

Socio-demographic data in the current study revealed that a substantial proportion of participants were illiterate, unemployed (housewives), and resided in rural areas. These factors are known to influence health behavior, symptom management, and access to information and care. AlDughaither et al. (2015) noted that low socioeconomic status, cultural taboos, and lack of education are significant barriers to managing menopausal symptoms. The strong association between these socio-demographic variables and symptom severity in our study further supports the need for tailored health education that considers women's backgrounds and living environments.

Post-intervention results demonstrated a highly significant improvement across all domains of the Menopause Rating Scale (MRS), particularly in vasomotor symptoms (hot flashes), sleep disturbances, and physical exhaustion. These findings are supported by Li et al. (2023), who reported improved symptom scores following a multidisciplinary health education program. Similarly, Kafaei-Atrian et al. (2020) found that structured interventions led to better outcomes across psychological and somatic symptom domains. The positive change suggests that even simple interventions, when consistently applied, can yield substantial health improvements.

Equally important, the study observed a significant enhancement in Health-Promoting Lifestyle Profile (HPLP) scores after the intervention. Initially, a majority of participants scored poorly, reflecting limited engagement in healthy behaviors. This supports previous findings by Yoshany et al. (2022), who reported similar baseline HPLP scores among Iranian postmenopausal women. Factors such as lack of time, poor motivation, insufficient knowledge, and cultural restrictions may have contributed to this trend. However, following the intervention, there was a notable shift: over two-thirds of women adopted good lifestyle practices. This aligns with Elkheshen et al. (2022), who demonstrated long-term improvements in lifestyle behaviors post-education.

The correlation analysis added further insight. Educational level, residence, and socioeconomic status were found to be significant predictors of both symptom improvement and lifestyle changes. Women with higher educational levels and better socioeconomic conditions were more likely to engage in health-promoting behaviors post-intervention. This finding is in agreement with the results of El Tahry et al. (2022), emphasizing how education and income levels can empower women to make informed health decisions.

These results underline the importance of designing context-specific interventions that consider women's educational and socioeconomic contexts. Health education programs tailored to rural and low-literacy populations can bridge knowledge gaps and promote sustained behavioral change. Moreover, involving community health workers or nurses in delivering these interventions could enhance access and cultural acceptability.

The study's findings also reinforce the hypothesis that lifestyle modifications can significantly reduce perimenopausal

symptom severity and improve quality of life. Interventions based on behavior change theories, when reinforced with follow-up support and culturally sensitive materials, may offer lasting benefits. These results advocate for the integration of lifestyle education into primary healthcare and community outreach programs targeting midlife women.

Conclusion

Lifestyle modification significantly reduces perimenopausal symptoms and enhances health-promoting behaviors, as evidenced by improvements in MRS and HPLP scores. These changes not only alleviate vasomotor, psychological, and somatic symptoms but also contribute to long-term health benefits, including reduced cardiovascular risk.

Recommendations

Based on our findings, the following recommendations are proposed to enhance the management of perimenopausal symptoms through lifestyle modification:

1. Incorporate lifestyle education into routine nursing care to empower women in managing perimenopausal symptoms effectively.
2. Utilize the Menopausal Rating Scale (MRS) and Health-Promoting Lifestyle Profile (HPLP) as standard tools to assess and monitor symptom severity and behavioral changes over time.
3. Promote individualized, multidisciplinary interventions, involving nurses, nutritionists, and physical activity specialists to address the diverse needs of women.
4. Leverage digital platforms and social media to deliver accessible and engaging educational content tailored to perimenopausal women.
5. Raise community awareness through targeted public health campaigns emphasizing the role of lifestyle in improving quality of life during the menopausal transition.
6. Conduct longitudinal studies with larger, more diverse samples to confirm the long-term benefits of lifestyle modification interventions.
7. Strengthen nursing capacity through continuous education and practical workshops on perimenopausal care and lifestyle counseling.

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