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Abstract

Although menopause is a normal biological event, it does not cease to mark an important transition in women's lives, with many physical and psychological changes that can have a catalytic effect on their quality of life. The purpose of this study was to evaluate the quality of life in menopausal women and its correlation with climacteric symptoms and self-esteem, as well as to identify those determinants that may be associated with quality of life. This was a cross-sectional observational study. The final sample consisted of 278 cases, aged 45-65 years. A demographic questionnaire and the UTIAN Quality of Life, GREEN climacteric symptoms and Rosenberg self-esteem scales were used. Menopausal symptoms and self-esteem, were found to have a statistically significant effect on the overall QoL scale ($p<0.001$). Regarding the various determinants, only better self-assessment of health, as well as support from the family and social environment were related to better QoL. On the contrary, overweight/obese women had worse overall QoL. However, other factors played an important prognostic role, such as smoking, being married, exercise and healthy diet, regular visits to the gynecologist for check-up, satisfaction with the financial and living standards, information from the scientific community about menopause. Regarding the ways menopause was managed, the percentages of women who modified their lifestyle (exercise, diet) were small. In conclusion, there is a need for health promotion programs to empower and thoroughly inform women about the consequences of menopause, treatment options, but also the importance of adopting a healthier lifestyle.

JEL Classification: I10, I12, I18, I31

Keywords: menopause, climacteric symptoms, self-esteem, quality of life, hormone replacement therapy

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1 Introduction

Menopause is defined as the absence of menstruation for at least 12 consecutive months, caused by reduced secretion of ovarian steroid hormones, marking the end of a woman's reproductive life (Nelson, 2008). It can occur naturally due to the gradual decline in estrogen and progesterone levels with age, or it can be iatrogenic. Iatrogenic menopause may result from certain treatments, such as chemotherapy for breast cancer or hormone-suppressive drugs for endometriosis, as well as radiation therapy for malignancies, which can irreparably damage the ovaries (Panay & Fenton, 2016). The most common cause of iatrogenic menopause is surgical removal of both ovaries due to medical conditions. This abrupt loss of ovarian hormones often leads to more severe symptoms compared to natural menopause (Pillay & Manyonda, 2022).

Globally, the average age of menopause ranges from 49 to 52 years. Considering the increase in life expectancy to approximately 83 years, women now spend about one-third of their lives in this phase (Takahashi & Johnson, 2015). Several factors can influence the timing of menopause. Premature or early menopause is associated with a family history of early menopause, early menarche, never having given birth, smoking, being underweight, and certain genetic variants (Mishra et al., 2019).

Four out of five women experience multiple physical and psychological changes during the transition to menopause, with varying degrees of severity and impact on their quality of life (Gracia & Freeman, 2018).The most significant changes include vasomotor symptoms (hot flashes, night sweats), insomnia, headache-migraines, hair thinning, loss of skin elasticity, psychoemotional disorders (such as anxiety, depressing mood, irritability), loss of sexual desire, genitourinary syndrome of menopause-GSM, osteoporosis, cognitive function disorders, cardiovascular diseases (Portman et al.,2014; Soares,2014; Avis et al.,2015; MacGregor, 2018; Nair et al.,2021).

Although menopause is a natural biological process, it can negatively affect the quality of life (QoL) for many women due to the significant physical, psychological, and social changes it triggers, with impacts spanning societal, familial, and workplace domains (Monteleone et al., 2018). However, QoL is also influenced by other factors independent of hormonal changes. . Both the symptoms that appear during menopause, as well as specific socio-demographic characteristics, along with personality characteristics can be determining factors that affect QoL in postmenopausal women (Schneider & Birkhäuser, 2017). The aim of our study was to evaluate the quality of life in perimenopausal and postmenopausal women and further investigate other determining factors that may be associated with their QoL.

2 Literature review

2.1 Menopausal symptoms and QoL

The primary menopausal symptoms that significantly impact women's quality of life (QoL) and drive them to seek medical assistance are vasomotor symptoms (VMS). Women experiencing moderate to severe VMS often endure sleep disturbances, fatigue, anxiety, and depression, which can impair their ability to work, affect interpersonal relationships, and hinder daily activities (Whiteley et al., 2013). The landmark SWAN (Study of Women's Health Across the Nation), a prospective study involving 3,302 menopausal women followed over 10 years, demonstrated that the negative impact of VMS on QoL is more pronounced in those experiencing frequent and severe symptoms. These women often report lower QoL, negative psychological moods, and sleep issues (Thurston & Joffe, 2011).

In Greece, a study of 1,140 postmenopausal women aged 45–65 found that the presence and severity of climacteric symptoms negatively affected all aspects of QoL (Giannouli et al., 2012). Insomnia, a common symptom, further diminishes QoL by causing daytime sleepiness, reduced professional performance, cognitive dysfunction, and mood disorders (Baker et al., 2018).

Sexual dysfunction, resulting from vaginal dryness, reduced sexual desire, and genitourinary syndrome of menopause (GSM), also has a profound effect on QoL. GSM remains underdiagnosed and undertreated. The multicenter CLOSER study, involving 4,100 couples, found that vaginal atrophy due to GSM negatively impacted relationships in approximately 58% of women (Nappi et al., 2013). Menopause-related changes, including weight gain, sleep disturbances, mood disorders (anxiety and depression), vaginal dryness, and visible signs of aging, can also influence body image, self-esteem, and self-confidence, adversely affecting sexuality (Afshari et al., 2016).

Another significant concern is postmenopausal osteoporosis, which can severely impact QoL, particularly when osteoporotic fractures occur (Gao & Zhao, 2023). According to recent guidelines from the European Society for Clinical and Economic Aspects of Osteoporosis (ESCEO), the total health burden from osteoporosis in the EU was estimated at 1,180,000 quality-adjusted life years (QALYs) lost. Osteoporosis in Europe accounts for more disability-adjusted life years (DALYs) than conditions like rheumatoid arthritis, stroke, or chronic obstructive pulmonary disease. In 2010, the economic burden of osteoporosis, including pharmacological treatments, was estimated at €37 billion in the EU (Kanis et al., 2019; Borgström et al., 2020).

2.2 Sociodemographic-Psychological factors and QoL in menopause

Menopause is not solely a biological phenomenon; it is also influenced by a multitude of cultural, social, demographic, psychological, and individual factors. Cross-cultural differences in the prevalence of menopausal symptoms, as well as variations among women of the same ethnicity, demonstrate how these elements shape the menopausal experience and its impact on quality of life (QoL) (Greenblum et al., 2013).

A recent cross-sectional study involving 3,460 postmenopausal women from Europe, the USA, and Japan found that the prevalence of moderate to severe vasomotor symptoms (VMS) was 40%, 34%, and 16%, respectively. Resistance to hormone replacement therapy (HRT) was highest in Japan (79%), compared to Europe (56%) and the USA (54%) (Nappi et al., 2021). The SWAN study in the US, which included White, Japanese, African American, Chinese, and Hispanic women, revealed that Japanese women reported the fewest VMS, while African American women reported the most (Thurston et al., 2008). Cultural perceptions also play a role: in Japan, menopause (referred to as "Konenki") is seen as a time of renewal and rebirth, whereas in some Arabic cultures, menopause is viewed as a "desperate age" or a threat to female identity, symbolizing the end of reproductive capacity and attractiveness (Ayranci et al., 2010; Yazdkhasti et al., 2019).

Socioeconomic factors are another determinant of menopausal experiences. Low socioeconomic status has been linked to increase VMS, as evidenced by the SWAN study, which found that women with lower education and income levels were more likely to report VMS. This is partly due to associated factors like higher perceived stress, smoking, and higher BMI, which are more prevalent in some minority groups (Thurston & Joffe, 2011). In a multinational analysis of 13,874 postmenopausal women, Avis et al. (2004) identified sociodemographic characteristics such as marital status, self-perceived health, physical activity, smoking, and attitudes toward aging and menopause as key factors influencing QoL, with cultural nuances influencing these effects. For example, marital status and social support had a more significant impact on Chinese women than Hispanic women, reflecting cultural priorities (Avis et al., 2004).

The impact of menopausal stages on quality of life (QoL) has been explored with varying findings. Dennerstein et al. (1994) examined a sample of 2,000 postmenopausal Australian women and found no significant relationship between the menopausal stage and QoL. Conversely, a Greek cross-sectional observational study involving 1,025 women identified the menopausal stage—particularly the transition phase and the early postmenopausal years—as the most significant predictor of climacteric symptom severity (Grigoriou et al., 2013).

Another study, including 2,703 postmenopausal women, reported better QoL among older women aged 60–65 years, non-smokers, individuals with higher educational attainment, those with lower BMI, and those who engaged in daily exercise (Williams et al., 2009). The improved QoL among women in the 60–65 age group suggests that they may adapt more effectively to menopausal symptoms over time, aided by lifestyle adjustments and learned coping strategies (Mirhaghjou et al., 2016).Two cross-sectional studies from Brazil also emphasized that severe menopausal symptoms were more likely in women with low educational attainment, poor self-perceived health, those who smoked, were unemployed or housewives, and those in the transition phase of menopause (da Silva et al., 2013; Medeiros Capistrano et al., 2015).

In Greece, studies have reinforced the influence of socioeconomic and lifestyle factors on QoL during menopause. A cross-sectional study of 1,140 postmenopausal women found that married life, higher education, normal BMI, regular physical exercise, and financial stability positively influenced QoL, while the presence and severity of climacteric symptoms had a negative impact (Giannouli et al., 2012). Additionally, Koundi et al. (2006), in a study involving 216 women, noted better QoL among married women, those with children, and those with higher educational levels. More recently, Augoulea et al. (2019) observed that working women, married women, and women with university-level education reported less severe vasomotor symptoms (VMS) and coped more effectively with menopausal challenges.

Health behaviors and lifestyle choices, including diet, exercise, and smoking, significantly influence the prevalence and severity of vasomotor symptoms (VMS), subsequently impacting quality of life (QoL). Obesity is a major risk factor for VMS. Castelo-Branco et al. (2009) demonstrated that women with higher body mass index (BMI) and abdominal obesity experienced worse overall QoL and more severe menopausal symptoms. Physical activity, on the other hand, can have a dual positive impact on VMS by improving mood and aiding in weight management (Gold et al., 2006).

Smoking is another critical factor. Data from the SWAN study revealed that smokers were over 60% more likely to report VMS compared to non-smokers (Avis et al., 2018). A population-based study of 6,917 postmenopausal Swedish women identified a range of factors associated with poorer QoL, including unemployment, lack of physical activity, high BMI, a history of cancer, and heavy smoking (≥15 cigarettes per day) (Li et al., 2005).

An essential element in improving women's menopausal experiences is the provision of information and empowerment. Numerous studies indicate that postmenopausal women often lack adequate knowledge about menopausal symptoms and effective coping strategies. Educating and empowering

women to adopt healthier practices has the potential to significantly reduce the severity of menopausal symptoms (Mohamed & Lamadah, 2016; Munn et al., 2022).

These findings highlight the multifaceted nature of menopause, where biological stages interact with social, educational, and lifestyle factors to shape the experience and QoL outcomes for women.

2.3 Self-esteem and menopause

In the mid-1960s, Rosenberg defined self-esteem as the sum of self-confidence (a sense of personal competence) and self-respect (a sense of personal worth). Cultivating self-esteem enhances individuals' ability to face life's challenges, solve problems, be creative, and seek happiness and respect from others (Galanou et al., 2014). Menopause, with its accompanying physical and psychological changes, can negatively impact self-esteem. Conversely, women with low self-esteem tend to experience menopausal symptoms more intensely (Quiroga et al., 2017; Vincent et al., 2023).

The transition to menopause is often accompanied by weight gain, which contributes to a negative body image and lower self-esteem. However, physical exercise has been shown to reduce BMI, enhance body attractiveness, and consequently improve self-esteem (Dąbrowska-Galas & Dąbrowska, 2021). Regarding the relationship between self-esteem and quality of life (QoL), a cross-sectional study in Persia found a statistically significant association between postmenopausal women's body image and QoL (Nazarpour et al., 2022).Additionally, another cross-sectional study revealed that low self-esteem is linked to depression, lower educational status, higher BMI, a negative perception of menopause, lack of social support, and a history of mental illness (Satwik et al., 2024).

Based on the above-mentioned literature review, highlighting the multifaceted nature of menopause, we designed across-sectional observational study with the following research questions-hypotheses:

- Is there an association between climacteric symptoms and QoL?
- What is the role of self-esteem in the QoL of menopausal women and the intensity of climacteric symptoms?
- Are there other determining factors that may be associated with their QoL (socio-demographic, economic, and clinical)?
- What are the factors related to the use hormone replacement therapy (HRT)?

3 Materials and Method

3.1 Study sample and procedure

Three hundred (300) menopausal women aged 45-65 years participated in this study. The questionnaires were sent either via email or completed at the clinic. Out of the 300 questionnaires, 290 were completed adequately and returned. Twelve cases were excluded as they did not meet the criteria, so the final study sample consisted of 278 cases. The study was conducted at the gynecological clinic of the Athens Naval Hospital and in private gynecological clinics in Athens and rural areas (Larissa, Karpenissi, Salamina) between December 2023 and January 2024.The Scientific Committee of the Athens Naval Hospital approved the research protocol. Participants were asked to sign a consent form for voluntary participation in the study. The study design was cross-sectional.

The inclusion criteria consisted of women experiencing menopause, who were classified into three categories based on the stage of menopause: a) Irregular menstruation, b) <12 months without period, c) >12 months without period. The exclusion criteria were women whose menopause was caused by medical interventions such as chemotherapy, radiation, or hysterectomy (due to menorrhagia or cancer) and women under treatment for psychiatric disorders.

3.2 Questionnaires used

A. Demographic questionnaire: demographic and social data of the participant, clinical (BMI, smoking, presence of chronic illness, medication use), as well as information regarding the use of hormonal treatment in menopause, the information received from health professionals, the support from the social environment.

B. Utian Quality of Life Scale - UQOL) (Utian et al., 2002). It includes 23 questions related to four domains of QoL: professional Quality of Life, physical health quality, sexual quality of life and emotional quality of life. Answers are given on a 5-point Likert scale from 1-5. It has been standardized in Greek as part of the doctoral dissertation of Giannouli (2012), from whom special permission was obtained for its use.

C. Greene Menopausal Symptom Scale. It includes 21 questions describing the physical and psychological symptoms of menopause (vasomotor symptoms, sexual dysfunction, anxiety depression) (Greene, 1998).The translation into Greek was done by Vlahou et al.(2013).

D. Rosenberg Self-Esteem Scale (RSES). Developed by Rosenberg in 1965, it assesses the concept of self-esteem with 10 questions. In Greece, it has been translated for the adolescent population by Galanou et al. (2014).

3.3 Statistical analysis methodology

The Kolmogorov-Smirnov test was used to assess the distributions of quantitative variables for normality. For variables that followed a normal distribution, mean values and standard deviations (SD) were utilized. For those that did not follow a normal distribution, medians and interquartile ranges (IQR) were additionally used. Absolute frequencies (N) and relative frequencies (%) were employed to describe qualitative variables. For the comparison of quantitative variables between two groups, the non-parametric Mann-Whitney test was used. For comparisons among more than two groups, the Kruskal-Wallis test was applied. The Spearman correlation coefficient was used to examine relationships between two quantitative variables. Linear regression analysis was performed to identify independent factors associated with quality of life (UTIAN) and menopausal symptoms (Green), yielding dependency coefficients (β) and standard errors (SE). When the dependent variable's distribution was non-normal, its logarithm was used. Subsequently, the stepwise method was used for selecting the optimal subset of independent variables. Logistic regression analysis was applied to determine independent factors associated with hormone therapy use, providing Odds Ratios (OR) with 95% confidence intervals (95% CI). Cronbach's alpha (Cronbach's reliability coefficient) was calculated for all of the questionnaires, as a validity test. Significance levels are two-sided, and statistical significance was set at 0.05.The statistical program SPSS 26.0 was used for the analysis.

4 Results

4.1 Demographic characteristics analysis

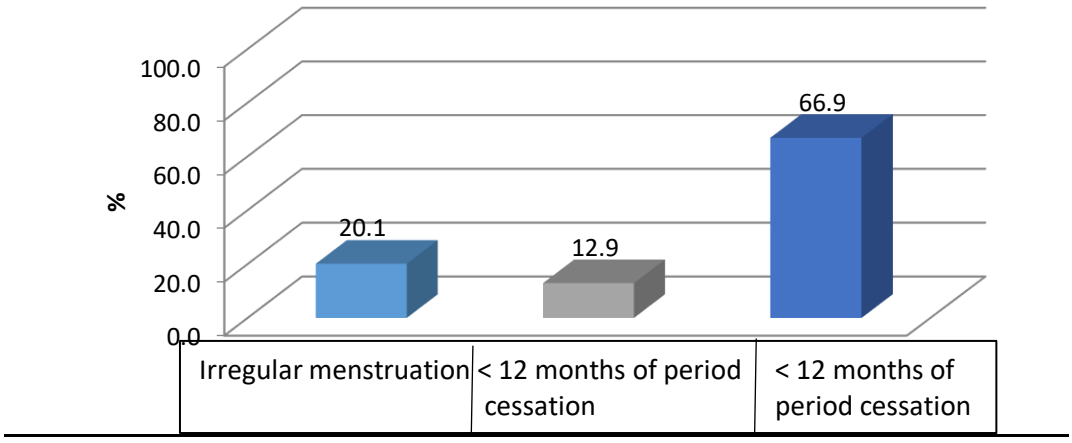
The sample consisted of 278 women with a mean age of 54.1 years (SD=4.2 years). The majority (74.8%) were living Athens. 39.1% were university graduates, 38.7% high school graduates and 13.1% had master degree. Also, 42.2% were working as civil servants, 24.5% as private, 15.9% were engaged in domestic work or were unemployed, 8.7% were self-employed and the same percentage were retired. Only 5% were very satisfied with their financial income, 25% were just satisfied and 55% were moderately satisfied. In terms of marital status, 61.2% were married with children, 14% married without children, 13.3% divorced and 7.9% single. Of those who had a partner, 25.3% were very satisfied with their relationship and 37.7% just satisfied. Only 6.2% were not at all satisfied. Clinical data about smoking habits, medical history and BMI are shown in Table 1.

Table 1: **Smoking, medical history and BMI**

		N	%
Smoking	No	155	55.8
	Yes	90	32.4
	Rarely	33	11.9
History of psychiatric illness and use of medication	No	278	100.0
	Yes	0	0.0
Physical illness	No	239	86.0
	Yes	39	14.0
BMI	Underweight	5	1.8
	Normal	110	40.1
	Overweight	98	35.8
	Obese	61	22.3

Regarding the stage of period, the majority (66,9%) of the sample was without period >12 months (Figure 1). The mean age at menopause was 49.8 years.

Figure 1: **Stages of menopause**



Regarding the attitude towards menopause, 39.2% had a positive attitude, 23.4% negative and 37.4% were indifferent. Furthermore, regarding the support they received from the social network and health professionals, 10.4% stated that they did not need support from their social network, while 25.5% had moderate support and 19.1% very great. Accordingly, 21.9% stated that they did not need help from a professional and only 9% resorted to them many times. The sources of information on menopause treatment options are given in Table 2.

Table 2: **Sources of information on menopause treatment**

	N	%
Health Professionals	212	76.3
Social network	86	30.9
Social media/Internet	70	25.2
TV/Advertisements	33	11.9
Pharmacies	32	11.5

Regarding hormone replacement therapy (HRT), only 13% answered that they had received it. Among them, the median time of treatment was 2 years (range: 1 – 4 years). Among those who did not take it, 61.3% felt it was unnecessary, 23.4% feared side effects, 21.8% preferred non-medical supplements, and 19% feared cancer from hormones. The results of the most important/annoying menopausal symptoms are given in Table 3.

Table 3: Most important menopausal symptoms

	N	%
Hot Flashes	152	54.7
Vaginal dryness	115	41.4
Loss of sexual desire	75	27.0
Psychological transitions	103	37.1
Osteoporosis	51	18.3
Changes in metabolism	116	41.7
Insomnia	94	33.8
Headache-migraines	60	21.6
Urinary tract infections-Incontinence	21	7.6

Regarding the change in physical activity and diet, in order to cope with menopausal symptoms, only 21.1% made a lot of modifications and 29.3% none.

4.2 Correlation of variables

UTIAN quality of life scale

Below is the table with the descriptive statistics for the dimensions and the overall UTIAN quality of life scale (Table 4). The dimensions "Quality of Professional Life" and "Quality of Life for Health" range from 7 to 35 points, the dimension "Quality of Emotional Life" ranges from 6 to 30 points, and the dimension related to "Quality of Sexual Life" ranges from 3 to 15 points. Finally, the overall quality of life scale ranges from 23 to 115 points. Higher scores indicate better quality of life for each

corresponding subscale. The Cronbach's alpha reliability coefficient was greater than 0.7 for all dimensions and the overall scale, indicating acceptable reliability.

Table 4: Descriptive statistics for the dimensions and the overall UTIAN quality of life scale

Dimensions	Minimum Value	Maximum Value	Mean (SD)	Median (Range)	Cronbach's a
Quality of Professional Life	10.0	35.0	26.1 (5.5)	26 (22 – 30)	0.82
Quality of Life for Health	9.0	35.0	24 (5.4)	24 (21 – 28)	0.81
Quality of Emotional Life	9.0	29.0	22.3 (3.9)	23 (19 – 25)	0.71
Quality of Sexual Life	3.0	15.0	9.9 (3.5)	10 (7 – 13)	0.85
Overall Quality of Life Evaluation	46.0	112.0	83 (13.5)	84 (74 – 94)	0.88

Menopausal symptom scale (GREEN)

Table 5 presents the descriptive statistics for the menopausal symptom scale. The scale ranges from 0 to 63 points, and in this specific sample, it ranged from 0 to 41 points, with a mean of 17.3 points (SD = 8.5 points). Higher values indicate more intense menopausal symptoms. The Cronbach's alpha reliability coefficient was greater than 0.7, indicating acceptable reliability.

Table 5: **Descriptive statistics for the menopausal symptom scale**

	Minimum Value	Maximum Value	Mean (SD)	Median (Range)	Cronbach's a
Menopausal Symptom Scale	0.0	41.0	17.3 (8.5)	16 (11 – 23)	0.84

Rosenberg Self-Esteem Scale

Accordingly, below are the descriptive statistics for the self-esteem symptom scale (Table 6). The scale ranges from 10 to 40 points, and in this specific sample, it ranged from 19 to 40 points, with a mean of 32.4 points (SD = 4.8 points). Higher values indicate higher self-esteem. The Cronbach's alpha reliability coefficient was greater than 0.7, indicating acceptable reliability.

Table 6: Descriptive statistics for the self-esteem symptom scale

	Minimum Value	Maximum Value	Mean(SD)	Median (Range)	Cronbach's a
Self-esteem scale	19.0	40.0	32.4 (4.8)	32 (29 – 36)	0.85

Next, the Spearman correlation table for the quality of life (UTIAN), menopausal symptoms (GREEN) and self-esteem scales (Rosenberg) is presented. All dimensions and the overall quality of life scale were significantly and positively correlated with the self-esteem scale, such that higher self-esteem was associated with better quality of life. In contrast, they were significantly but negatively correlated with the menopausal symptom scale, such that more severe symptoms were associated with worse quality of life in each domain and overall. The correlation between menopausal symptoms and self-esteem was also negative, so more menopausal symptoms were associated with lower self-esteem (Table 7, Figures 2, 3, 4).

Table 7: Spearman's correlation table for QoL, menopausal symptoms and self-esteem scales

		Menopausal symptoms scale (GREEN)	Self-esteem scale (Rosenberg)
Occupational quality of life	rho	-0.26	0.58
	P	**<0.001**	**<0.001**
Physical health quality	rho	-0.42	0.43
	P	**<0.001**	**<0.001**
Quality of emotional life	rho	-0.58	0.56
	P	**<0.001**	**<0.001**
Quality of sexlife	rho	-0.32	0.41
	P	**<0.001**	**<0.001**
Overall quality of life assessment (UTIAN)	rho	-0.49	0.67
	P	**<0.001**	**<0.001**
Menopausal symptoms scale	rho	-	-0.33
	P		**<0.001**

Figure 2: Correlation graph of the self-esteem scale with the menopausal symptom scale

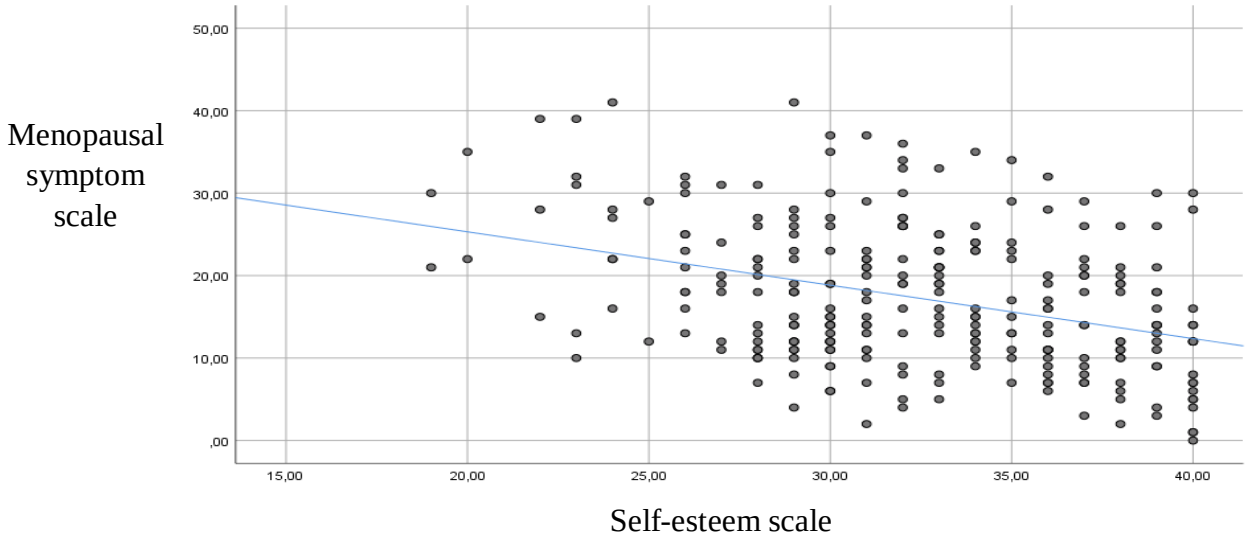


Figure 3: Correlation graph of the menopausal symptom scale with the total quality of life rating scale

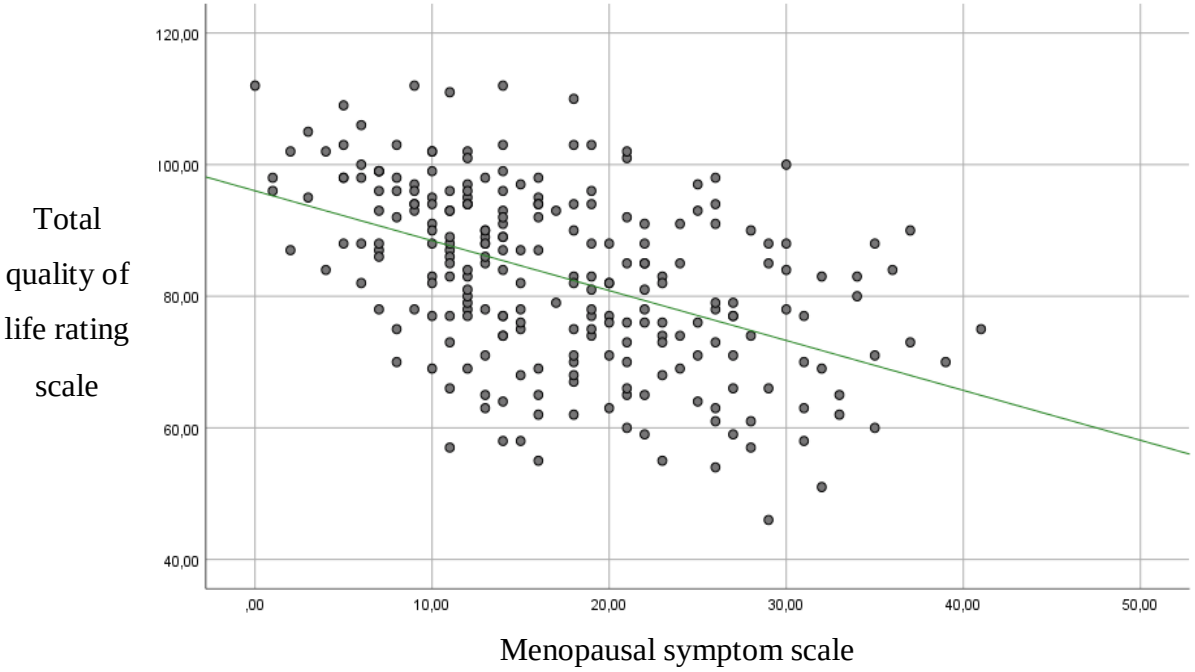
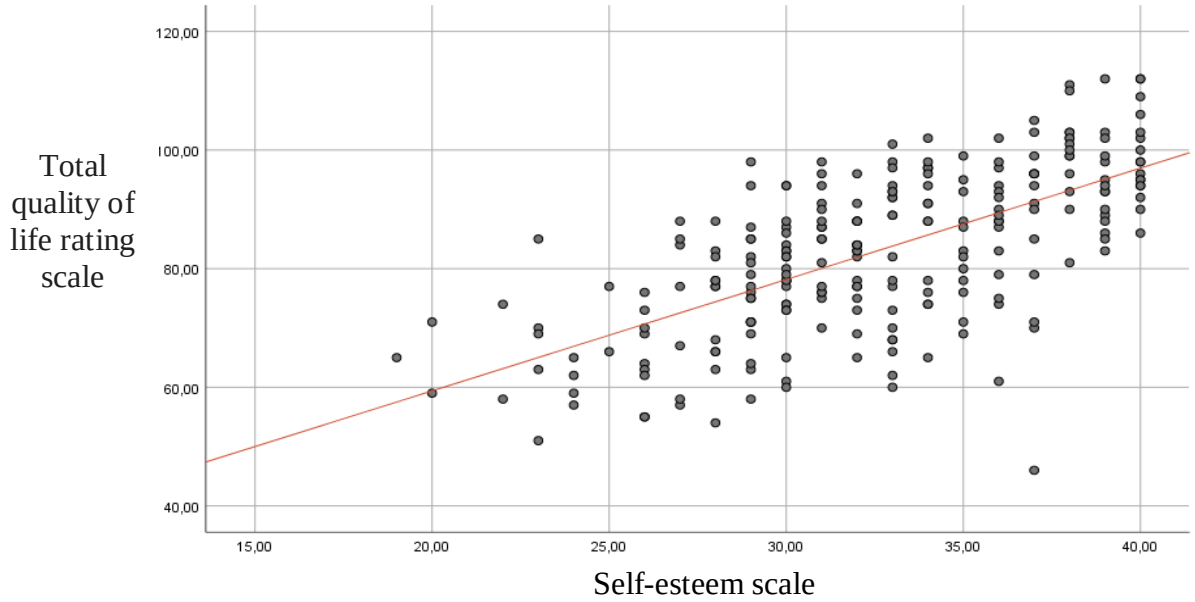


Figure 4: Correlation graph of the self-esteem scale with the total quality of life rating scale



Next, correlations between the overall quality of life scale and the demographic characteristics of the women, as well as health-related factors, were analyzed. The score on the overall quality of life

scale was found to differ based on body mass index (BMI), smoking, marital status, and regular visits to the gynecologist for preventive check-ups. Women who were overweight/obese generally had a worse quality of life compared to those with normal or low body weight. Additionally, after Bonferroni corrections, it was found that non-smokers had a better quality of life compared to smokers (p = 0.015). Finally, married women had a better quality of life than unmarried women, as well as those who regularly visited the gynecologist for check-ups, compared to those who did not have regular visits (Table 8).

Table 8: Correlation of the overall quality of life scale with demographic data and health and menopause-related information (stage, hormone therapy use)

		Overall quality of life assessment		
		Mean (SD)	Median (Range)	P value
Overweight/ Obese	No	85.3 (13.4)	86.5 (75.5 – 97)	**0.021+**
	Yes	81.3 (13.4)	82 (71 – 92)	
Living in Athens	No	84 (14.5)	88 (75 – 93)	0.395+
	Yes	82.7 (13.2)	83 (73.5 – 94)	
Smoking	No	85.1 (12.9)	85 (77 – 96)	**0.029++**
	Yes	80.5 (13.7)	82.5 (70 – 92.5)	
	Rarely	80 (14.4)	79.5 (67.5 – 89)	
Education Level	Up to high school graduate	82.4 (14.2)	83 (71 – 94)	0.653++
	Bachelor's degree	82.7 (12.5)	84 (75 – 93)	
	Master/ PhD	84.6 (14.4)	86.5 (75 – 97)	
Employed	No	82.4 (15.7)	87.5 (67.5 – 94.5)	0.931+
	Yes	83.1 (12.9)	83 (74 – 93)	
Marital Status	No	79.5 (14.6)	77 (66 – 93)	**0.038+**
	Yes	84 (13)	85 (75 – 94)	
Chronic Illness	No	83 (13.5)	84 (74 – 94)	0.845+
	Yes	83.1 (14)	77.5 (74 – 96)	
Regular visits to gynecologist for check-ups	No	76.9 (13.7)	77 (68 – 85)	**0.006+**
	Yes	83.9 (13.3)	85 (74.5 – 94)	
Menopausal Stage	Irregular menstruation	82.6 (11.5)	83.5 (73 – 91)	0.687++
	<12 months since last period	81.3 (15.9)	81.5 (70 – 96)	
	>12 months since last period	83.5 (13.6)	85 (74 – 94)	
Hormone Replacement Therapy (HRT)	No	82.9 (13.8)	83.5 (74 – 94)	0.895+
	Yes	83.6 (11.6)	85 (74 – 94)	

+Mann-Whitney test, ++Kruskal-Wallis test

It follows the Spearman correlation table for the dimensions and the overall quality-of-life scale with age, satisfaction with living standards, support during menopause, frequency of seeking help from healthcare professionals, the degree of exercise and diet adjustments, information received from

the scientific community, and general health evaluation. Satisfaction with financial and living standards was significantly and positively associated with all dimensions and overall quality of life. Similarly, greater support from the social/family environment during menopause was associated with better quality of life across all domains (except for the emotional dimension). In contrast, more frequent help-seeking from healthcare professionals for managing menopause symptoms was associated with poorer quality of professional and sexual life. Additionally, those who adjusted their exercise and diet routines experienced better quality of life across all domains (except for the emotional and sexual dimensions). Finally, greater satisfaction with the information provided by the scientific community about menopause, as well as better general health evaluations, were associated with improved quality of life (in all domains and overall) (Table 9).

Table 9: Spearman correlation table for the dimensions and the overall quality-of-life scale with age, satisfaction with living standards, support during menopause, frequency of seeking help from healthcare professionals, degree of exercise and diet adjustments, information received, and general health evaluation

Variable		Professional Quality of Life	Health-Related Quality of Life	Emotional Quality of Life	Sexual Quality of Life	Overall Quality of Life
Age	rho	0.10	0.04	0.01	0.01	0.09
	P	0.113	0.470	0.948	0.948	0.168
Satisfaction with financial income and living standards	rho	0.31	0.27	0.22	0.27	0.38
	P	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**
Support from social/family environment during menopause	rho	0.16	0.17	0.09	0.27	0.22
	P	**0.012**	**0.003**	0.166	**<0.001**	**0.001**
Seeking help from healthcare professionals for menopause symptoms	rho	-0.13	0.01	-0.02	-0.14	-0.09
	P	**0.034**	0.907	0.712	**0.020**	0.160
Changes in physical activity and diet to address menopause symptoms	rho	0.15	0.34	0.01	0.06	0.21
	P	**0.020**	**<0.001**	0.817	0.300	**0.001**
Satisfaction with the information received from the scientific community about menopause	rho	0.24	0.26	0.25	0.19	0.33
	P	**<0.001**	**<0.001**	**<0.001**	**0.002**	**<0.001**
General evaluation of overall health	rho	0.33	0.45	0.42	0.24	0.48
	P	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**

Subsequently, in order to find the factors independently related to the dimensions and the overall quality of life, multivariate linear regressions were performed. Dependent variables were the scores on the quality of life scale and independent variables were the demographic data of the participating women, data related to health and menopause status, support and help during that period, self-

assessment of health, self-esteem scale and menopause symptom scale. We used the stepwise method, for selecting the optimal subset of independent variables. Self-esteem scale, BMI, menopausal symptom scale, level of menopausal support and self-assessment of health were found to be independently related to the overall quality of life scale (Table 10).

Table 10: **Multiple linear regression model for the total quality of life scale**

	β+	**SE++**	**b÷**	**P**
Self-esteem scale	0.008	0.001	0.500	**<0.001**
Menopausal symptom scale	-0.002	0.000	-0.196	**<0.001**
Self-assessment of health	0.018	0.005	0.197	**<0.001**
Level of menopausal support from the social network	0.007	0.002	0.145	**0.001**
Overweight/Obese (Yes vs No)	-0.017	0.007	-0.111	**0.013**

+Dependency coefficient, ++ Standard error, ÷ Standardized coefficient. The logarithm of the dependent variable was used

Specifically:

• Higher self-esteem was associated with better quality of life.

• More intense menopausal symptoms were linked to worse quality of life.

• Better self-assessment of health was associated with better quality of life.

• Similarly, greater support from family and social environment was related to better QoL.

• Those that were overweight/obese had a worse QoL compared to those who were not.

Accordingly, multiple linear regressions were performed to find the factors independently associated with the menopausal symptom scale. The dependent variable was the score on this scale, while the independent variables included the demographic characteristics of the participating women, health-related information, menopausal details, the support and assistance received during that period, self-assessment of health, and the self-esteem scale. The results of the analysis, using the stepwise method, are presented in the table below. Self-esteem scale, body mass index, and self-assessment of health were found to be independently associated with the menopausal symptom scale (Table 11).

Table 11: Multiple linear regression model for the menopausal symptom scale

	β+	**SE++**	**b÷**	**P**
Overweight/Obese (Yes vs No)	0.057	0.027	0.116	**0.038**
Self-assessment of health	-0.071	0.017	-0.248	**<0.001**
Self-esteem scale	-0.014	0.003	-0.279	**<0.001**

+Dependency coefficient, ++ Standard error, ÷ Standardized coefficient. The logarithm of the dependent variable was used

Specifically:

• Women who were overweight/obese experienced more intense menopausal symptoms compared to those who were not.

• Higher self-esteem was associated with less intense menopausal symptoms.

• Similarly, better self-assessment of health was linked to less intense menopausal symptoms.

Subsequently, in order to find the factors independently related to the use of hormone replacement therapy (HRT), a multiple logarithmic regression was performed, with the dependent variable being the receipt of treatment, and independent variables including the demographic characteristics of the participating women, health-related information, menopausal details, the support and assistance received during that period, and self-assessment of health. The results of the analysis using the stepwise method are presented in the table below. Body mass index, area of residence and seeking help from health professionals to manage menopausal symptoms were found to be independently associated with HRT use (Table 12). Specifically:

• Overweight/obese women were 0.67 times less likely to receive HRT compared to those with normal or low body weight.

• Women residing in Athens were 15.98 times more likely to receive treatment compared to those living in rural areas.

• A higher frequency of seeking help from healthcare professionals for managing menopausal symptoms was associated with a greater likelihood of receiving HRT

Table 12: **Multiple logistic regression models for HRT uptake**

	OR (95%)	**P**
Overweight/Obese (Yes vs No)	0.33 (0.14 – 0.78)	**0.011**
Living in Athens (Yes vs No)	15.98 (2.06 – 124.11)	**0.008**
Seeking help from health professionals	2.87 (1.94 – 4.25)	**<0.001**

Finally, the descriptive statistics for the menopausal symptoms scale and the self-esteem scale based on the use of hormone replacement therapy are presented in Table 13. These did not show significant differences between the two groups.

Table 13: Effect of HRT on the Menopausal Symptoms Scale and Self-Esteem Scale

	Use of Hormone replacement therapy				
	No		Yes		
	Mean (SD)	Median (Range)	Mean (SD)	Median (Range)	P value
Menopausal Symptoms Scale	17.6 (8.8)	16.0 (11 – 23)	15.8 (6.1)	16.0 (11 – 21)	0.391+
Self-Esteem Scale	32.5 (4.9)	32.0 (29 – 36)	32.0 (4.2)	31.0 (29 – 35.5)	0.387+

+Mann-Whitney test

5 Conclusions

In conclusion, addressing the first two research questions of our study, we observed that menopausal symptoms and self-esteem significantly affect all dimensions and the overall quality of life (QoL) scale, both in univariate assessments and multivariate analyses. Specifically, QoL was positively correlated with the self-esteem scale ($p<0.001$) and negatively correlated with the menopausal symptom scale ($p<0.001$). Additionally, a negative correlation was found between menopausal symptoms and self-esteem, indicating that more severe menopausal symptoms were associated with lower self-esteem, and vice versa ($p<0.001$).

These findings align with numerous prospective and cross-sectional studies. The landmark US SWAN study, conducted on a sample of 3,302 postmenopausal women with a 10-year follow-up, demonstrated that the negative association between vasomotor symptoms (VMS) and QoL was more pronounced in women experiencing frequent and severe VMS (Avis et al., 2009; Thurston & Joffe, 2011). Similarly, in the Greek population, Giannouli et al. (2012) examined 1,140 postmenopausal women aged 45–65 using the UTIAN QoL questionnaire and the Greene Climacteric Scale, concluding that the presence and intensity of climacteric symptoms negatively impacted all aspects of QoL. Moreover, menopause has been shown to adversely affect self-esteem due to the physical and psychological changes it induces, while women with lower self-esteem tend to experience menopausal symptoms more intensely (Quiroga et al., 2017; Vincent et al., 2023).

Regarding our third research question about the role of sociodemographic characteristics on the quality of life scale, our initial findings in the univariate analysis, showed that women who were overweight or obese generally reported worse QoL than those who were normal weight or underweight. Non-smokers had better QoL than smokers, married women than single women, and those who regularly visited the gynecologist for check-ups reported better QoL than those who did not. Satisfaction with financial status was positively and significantly related to all dimensions of QoL. Similarly, greater support from the social and family environment during menopause was associated with better QoL. Additionally, women who modified their exercise and diet to manage

menopausal symptoms reported better QoL. Greater satisfaction with the information received from the scientific community about menopause and better self-assessment of general health were also linked to better QoL. However, in the multivariate linear regression analysis, only better self-rated health and support from the family and social environment remained significant predictors of better QoL. Conversely, those who were overweight or obese had worse QoL. Regarding the role of sociodemographic characteristics in menopausal symptoms, the multivariate analysis showed that overweight or obese women experienced more severe menopausal symptoms, while better self-rated health was associated with less severe symptoms.

It has been demonstrated in numerous studies that sociodemographic characteristics can influence the quality of life (QoL) of menopausal women, as well as the intensity and experience of climacteric symptoms. A U.S. study with a sample of 2,703 postmenopausal women found that older women (60-65 years), non-smokers, those with higher education, low BMI, and those who exercised reported better QoL (Williams et al., 2009). In the Greek population, Giannouli et al., in a cross-sectional study with a sample of 1,140 postmenopausal women, showed that QoL was positively related to being married, higher educational level, normal BMI, physical activity, and good financial status, while it was negatively related to the presence and intensity of climacteric symptoms (Giannouli et al., 2012). Castelo-Branco et al. also found that women with increased BMI and abdominal obesity had worse overall QoL and more intense menopausal symptoms (Castelo-Branco et al., 2009). Similarly, in our study, increased BMI (58.1% of participants were overweight/obese) was negatively associated with both QoL and the climacteric symptom scale, in both univariate and multivariate analysis.

Additionally, modifying exercise and diet was identified as an important predictor for improving overall QoL in the univariate analysis. However, in the multivariate analysis, it was found to affect the improvement of certain dimensions of QoL (such as occupational and health-related QoL), but not the overall QoL scale or the climacteric symptom scale. This can likely be attributed to the small proportion of women who actually modified their physical activity and diet—only 21% did so significantly, while 51.4% reported minimal or no changes.

Furthermore, the support a postmenopausal woman receives from her family and social environment was found to positively influence her QoL. In our study, the parameter of social/family support was statistically significant, both in univariate and multivariate analysis. In a study of 334 women from the Seattle Midlife Women's Health Study (assessed from 1997 to 2005), social support, the use of personal resources for self-management, and the number of negative life events were significant predictors of QoL (Smith-DiJulio et al., 2008). However, satisfaction with marital

relationships was not significantly correlated with the QoL scale or the climacteric symptoms scale, contrary to findings from other studies. For example, a Turkish study with 886 postmenopausal women showed that poor marital relationships were associated with poorer QoL (Karaçam & Seker, 2007). In our study, while being married as a univariate factor was significantly associated with the total QoL scale, in the multivariate analysis, it was only significantly correlated with the sexual health dimension of QoL. In other Greek studies, marriage has been shown to be statistically related to overall QoL during menopause and an important predictor of smooth social functioning (Koukouli et al., 2002; Giannouli et al., 2012). Another significant parameter in our study was self-perceived health, which was positively related to both the QoL scale and the climacteric symptoms scale. Self-rated health is a multidimensional concept influenced by various factors, and it has been consistently shown to be a reliable predictor of health outcomes and QoL (Kawada, 2003). In our study, 37.4% rated their health as very satisfactory, 50% as fairly satisfactory, and only 12.6% as not at all or somewhat satisfactory. A Japanese study of menopausal women also reported very low rates of poor self-perceived health (10%), indicating that the experience of menopause itself did not affect their self-assessed health status (Suka et al., 2010).Regarding satisfaction with the level of information provided by health professionals about menopause, 45.9% of participants reported being very satisfied, while 23.1% were not at all or only slightly satisfied. This parameter was positively related to the total QoL scale in the univariate analysis. However, in the multivariate analysis, a statistical correlation was found with the QoL dimensions of occupational and emotional life, but not with the total QoL scale. Several studies have highlighted that postmenopausal women often suffer from a lack of information about menopause symptoms and coping strategies (Munn et al., 2022). A recent study from Spain found that knowledge about menopause was associated with better QoL (Larroy et al., 2020). Educating women from a young age is a crucial factor in improving their future experience of menopause. Therefore, it is essential to develop targeted educational programs to increase social support, preparation, and awareness (Patel et al., 2023).Equally important is the role of healthcare professionals, who unfortunately are often not sufficiently trained or aware of how to address menopause-related issues and treatment options (Macpherson & Quinton, 2022).

Finally, regarding our last research question about hormone replacement therapy (HRT) intake, only 13% of participants reported using HRT, and all of them were living in Athens. When HRT was evaluated as a univariate variable, no correlation was found with the self-esteem scale, nor was there a statistical improvement in QoL or climacteric symptoms. This may be explained by the study design, as women were asked to report their current symptoms without comparing them to their condition before starting HRT. In the multivariate analysis, it was found that a higher frequency of

seeking help from health professionals for menopause management was associated with a higher likelihood of using HRT. Additionally, women living in large urban centers (Athens) had a 15.98 times greater probability of using HRT. In contrast, overweight/obese women were 0.67 times less likely to receive treatment compared to those with a normal or underweight BMI.Many international studies have linked the use of HRT with improved QoL and alleviation of climacteric symptoms. However, its use remains limited, particularly following the publication of the Women's Health Initiative (WHI) study, which found an increased risk of breast cancer and thromboembolic events associated with HRT (Santoro et al., 2021). The recent ELISA study, which involved a sample of 5,004 French women, showed that only 6% used HRT. The main reasons for non-use were fear of hormones (35%) and concerns about side effects (25%). Interestingly, 62% of women reported that their decision not to take HRT was supported by their doctor (Trémollieres et al., 2022).In the Greek context, Vlachou et al.(2014), in a study involving 216 Greek postmenopausal women, compared the group of women who used HRT with those who did not. They concluded that HRT was positively associated with better QoL, as well as with living in urban centers and having a higher level of education.

In conclusion, our study, along with the existing literature, has demonstrated that menopause can have a negative impact on overall quality of life. However, it is important to acknowledge that some women experience a smooth transition into menopause, while others face more severe symptoms that significantly affect their QoL. Additionally, women with serious comorbidities, such as malignancies, psychiatric disorders, or those undergoing iatrogenic or premature menopause, tend to experience a more intense transition, both physically and psychologically. These women require special attention and further research to better understand their unique needs (Dibonaventura et al., 2012; Javadpour et al., 2021).

Additionally, it is crucial for menopausal women to receive appropriate support from society, the state, and the workplace. With 657 million women aged 45-59, and approximately half of them contributing to the workforce during their menopausal years, it is essential to create a supportive and safe working environment. The European Menopause and Andropause Society (EMAS) has recently issued guidelines and recommendations for employers, managers, healthcare professionals, and women to foster a more supportive workplace and improve the well-being of menopausal women, enabling them to remain in the workforce. Workplaces should cultivate an open, inclusive, and supportive culture around menopause, with the involvement of healthcare professionals and sensitized human resources managers. Women should not face discrimination or be dismissed due to menopausal symptoms (Rees et al., 2021).

Another important issue is the insufficient education of health professionals (not only gynecologists but also those in other specialties) on menopause. There is a need to include menopause in the basic educational curricula and adopt a multidisciplinary approach to the subject, so that health professionals can expand their knowledge on epidemiology, physiology, symptomatology, and available treatment options. This will also improve the approach to and empowerment of menopausal women (Voedisch et al., 2021; Macpherson & Quinton, 2022). The typical symptoms associated with menopause sometimes mimic cardiovascular, psychiatric conditions, or other physical problems. A study conducted in Taiwan on the help-seeking behavior of postmenopausal women showed that the most frequent visits were to gynecologists (37.0%), followed by general practitioners (28.2%), psychiatrists (16.0%), and cardiologists (11.6%) (Hsiao et al., 2009).

Furthermore, many studies show that women under the age of 40 have limited education and information about menopause, leaving them unprepared to cope with the physical and psychological changes associated with this stage of life (Tariq et al., 2023). Women under the age of 20 tend to be more passive in their approach to learning about menopause compared to those over 30, who are more proactive. Educational strategies about menopause should begin in schools and extend to all educational and social institutions, adopting a multifaceted approach. Social media, television, educational programs, and public health campaigns can be used to promote menopause education (Munn et al., 2022). Self-care educational interventions can also help postmenopausal women manage menopausal problems independently and enhance their self-esteem. New m-health and e-health applications could also support this effort (Rafati et al., 2023; Vollrath et al., 2024).

Regarding the management of menopause, our study revealed that the percentages of women who modified their lifestyle (e.g., exercise, diet), sought help from specialists, or received hormone replacement therapy were low. This highlights a gap in menopause management, both on the part of healthcare professionals and the women themselves. There is a need to empower women to seek answers and information about the consequences of menopause and available treatment options, as well as raise awareness about the importance of adopting a healthier lifestyle, modifying diet, and incorporating exercise into their daily routines (Sydora et al., 2020). All management options should be evaluated with a focus on personalization and “shared decision-making.”

There are clear limitations to our study due to its design. Being cross-sectional, causal relationships cannot be clearly established, nor can the direction of causality be determined. The effect of menopause itself on quality of life (QoL) cannot be isolated, as it is challenging to separate the influence of other contributing factors or their duration. Additionally, all parameters were assessed

using self-administered questionnaires, which may have introduced errors in understanding, inconsistencies, and recall bias.

As a future direction, it would be valuable to conduct a prospective study to explore factors that could improve menopause management, such as lifestyle changes, individualized hormone replacement therapy use, non-pharmaceutical interventions, information/awareness for women, awareness of healthcare professionals, and self-care practices.

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