



## ORIGINAL ARTICLE

# Sleep quality and its relationship with climacteric symptoms and quality of life in women on menopausal transition

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## Abstract

**Background:** Climacteric syndrome, occurring during menopausal transition, plays a key role in the alteration of women's quality of life. **Aims:** This study investigated the relationship between perimenopausal symptoms, sleep quality, quality of life, and food behavior in women on menopausal transition in western Algeria. **Subjects and Methods:** The study included 131 perimenopausal women (Mean age = 48 ± 3 years). The climacteric syndrome and quality of life were assessed by the menopause rating scale (MRS) questionnaire. The quality of sleep was evaluated by the Pittsburgh sleep quality index (PSQI) and food consumption by the 24h recall method. **Results:** The mean score of psychological (9.63 ± 2.93) and somatic (10.74 ± 3.43) symptoms were significantly higher (p= 0.000) and the total score of MRS was 24 ± 6, which means that women have an impaired quality of life. A high significance (p= 0.000) was also noted in subscales scores of sleep components; sleep disturbances (1.69± 0.62), subjective sleep quality (1.55± 0.93), and sleep latency (1.40 ± 1.23), compared to other sleep components. Poor sleep quality was explained by a high score of PSQI (8 ± 4). The MRS subscale scores showed a significant correlation with total PSQI score (r =0.600, p=0.01). A positive energy balance was also recorded with a high protein (13% of TEI) and polyunsaturated fatty acids intake (33%) and low lipids (23% of TEI), monounsaturated fatty acids (41%), and animal protein intake (26%). **Conclusions:** Perimenopause is a difficult period in a woman's life, disrupting her quality of life and sleep quality leading to disturbances in eating behavior and body weight gain.

**Keywords:** Climacteric symptoms, menopausal transition, quality of life, sleep quality, food behavior.

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## 1 Introduction

Menopausal transition is defined as the period during which the first biological, endocrine, and clinical characteristics of menopause appear around the final menstrual period <sup>1</sup>. Perimenopause is the stage after menarche but before entering menopausal stages with normal fertility function during this phase <sup>2</sup>. During the transition to menopause, women may experience vasomotor, urogenital, psychosomatic, psychological as well as sexual dysfunction <sup>3</sup>.

Several symptoms including hot flashes, night sweats, vaginal dryness, depression, irritability, headaches, sleep disorders, and cognitive impairment may occur more frequently in this period <sup>4</sup>. Sleep disturbances are common during the menopausal transition and have many health consequences, including reduced quality of life, impaired mental health, and increased physical health morbidity <sup>5</sup>.

Insomnia affects around 50% of middle-aged women and is characterized by nocturnal symptoms of difficulty initiating or maintaining sleep and daytime symptoms that affect professional and social life <sup>6</sup>.

Sleep quality is defined as one's satisfaction of the sleep experience, integrating aspects of sleep initiation, sleep maintenance, sleep quantity, and refreshment upon awakening <sup>7</sup>. The severity of these symptoms and the degree to which they interfere with the activity and quality of life varies among

women. Symptoms of menopause have a negative impact on the quality of life, especially in women on menopausal transition <sup>8,9</sup>.

Quality of life (QOL) is defined by the World Health Organization as 'individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns <sup>10</sup>.

Quality of Life is a multidimensional concept that has been used in different fields of knowledge including sociology, occupational functioning, politics, marketing, climate, and healthcare <sup>11</sup>. Quality of life tends to decline in midlife women, and there is a need to determine what role, if any, the symptoms commonly associated with the transition to menopause and early postmenopausal play in this phenomenon <sup>12</sup>.

This study investigated the relationship between perimenopausal symptoms, sleep quality, quality of life, and food behavior in perimenopausal women in western Algeria.

## 2 Subjects and Methods

### 2.1 Subjects

This cross-sectional study was carried between October 2019 and March 2020 among women in menopausal transition, recruited at

the Public Health Center (EPSP), Es Senia, Oran (Algeria). The diagnosis of perimenopause was confirmed by the gynecologist and the midwife. Perimenopausal women ( $n=131$ ) aged  $48\pm 3$  years gave their consent to participate in the study. The purpose of the study was explained to all subjects, and all women signed the informed consent. The clinical characteristics of women were mentioned in Table 1.

Among the 131 women, 47.5% had at least one condition and 33.75% of them were on medication. Arterial hypertension was the most common pathology in 20% of women, 11.25% of whom took antihypertensive (Calcium channel blockers, angiotensin II antagonist, angiotensin II antagonist + calcium channel blockers, beta-blockers, and diuretics).

**Table 1:** Clinical Characteristics of women

	Mean $\pm$ SD
<b>Weight (kg)</b>	76 $\pm$ 11
<b>Size (in meter)</b>	1.60 $\pm$ 0.05
<b>BMI (weight (kg) / size (m<sup>2</sup>))</b>	30 $\pm$ 4
<b>Waist (cm)</b>	105 $\pm$ 8
<b>Hip circumference (cm)</b>	110 $\pm$ 6
<b>Waist size/ hip circumference) (in meter)</b>	0.95 $\pm$ 0.05
<b>Menstrual cycle (days)</b>	75 $\pm$ 25
<b>Menstrual duration (days)</b>	6 $\pm$ 1

BMI: Body Mass Index = Weight (kg) / Size<sup>2</sup> (m<sup>2</sup>). The weight of women was weighed by a Person scale. The size of the women was taken by a stadiometer. Hip and waist were taken by a ribbon meter

Diabetes (type I and type II) and allergies accounted for 8.75%. Oral antidiabetics were taken by 7.5% of diabetic women (repaglinide, gliclazide, metformin hydrochloride) 2.5% were on insulin therapy. Antihistamines were taken by 2.5% of women with allergies. Thyroid disorders affected 7.5% of women and 6.25% took antithyroid drugs. Osteoarthritis and anemia accounted for 6.25%, and 1.25% of anemic women took iron and folic acid.

## 2.2 Methods

### 2.2.1 Quality life and sleep quality assessment

To achieve the goal of this work, a questionnaire was used to collect all the information needed to assess the socio-demographic profile, perimenopausal symptoms, quality of life, and sleep quality. Socio-demographic profile was evaluated by a questionnaire on the family status, number of children, level of study, professional activity, and type of transport.

Perimenopausal symptoms and quality of life were assessed by the menopause rating scale (MRS). The MRS was composed of 11 items assessing menopausal symptoms divided into three subscales: (a) somatic—hot flushes, heart discomfort, sleeping problems, and muscle and joint problems (items 1–3 and 11, respectively); (b) psychological—depressive mood, irritability, anxiety and physical and mental exhaustion (items 4–7, respectively); and (c) urogenital—sexual problems, bladder problems and dryness of the vagina (items 8–10, respectively). Each item can be graded from 0 (not present) to 4 (1 = mild; 2 =

moderate; 3 = severe; 4 = very severe). For a particular individual, the total score per each subscale is the sum of each graded item contained in that subscale. Total MRS Score is the sum of the scores obtained for each subscale; a high total MRS Score indicates poor quality of life <sup>13</sup>.

Sleep quality was assessed by the 19 items Pittsburgh Sleep Quality Index (PSQI) in the previous 4 weeks. It contained seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction during the previous month. Each component was scored on a scale of 0–3 (higher scores indicate worse sleep) and the global score ranged from 0 to 21 (a high PSQI indicates poor sleep quality). Poor sleepers were defined by a global PSQI of <5 and good sleepers were defined by scores  $\geq 5$  <sup>14</sup>.

### 2.2.2 Food behavior assessment

Energy expenditure was evaluated by a questionnaire on the various activities carried out during the day such as; professional activity, sleep, walking, grooming and clothing, household chores, nap, sports activity, and leisure.

The energy expenditure was calculated by Black's equation <sup>15</sup>. Black's equation allows us to calculate energy expenditure at rest (DER) and basal metabolism (MB) as part of an energy needs assessment.

Food consumption was estimated using the 24-hour recall method. Women were asked about their food intake during the day preceding the interview. This section was used to evaluate quantitative and qualitative macro and micronutrient dietary intakes and their distribution during the day.

The conversion of foods into nutrients (total energy intake, proteins, carbohydrates, lipids, minerals, and fiber) was carried out from the food database CIQUAL <sup>16</sup>.

### 2.2.3 Statistical analysis

Data analysis was performed using the IMB SPSS 26 statistical package. Results were presented as means  $\pm$  standard deviations, number and percentages; test of MRS domains comparison and sleep components comparison was realized by Friedman Test,  $p$ -value <0.05 was taken to be statistically significant. Correlations were performed by Spearman test, (\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ ).

## 3 Results

### 3.1 Socio-demographic profile of women

Results showed that of 131 women interviewed, 81% were married and 62% had more than four children (Figure 1). Our results showed that 47% of women were family managers. The intellectual level of women differs from one woman to another, 11% were illiterate, 24% had a primary school level, 15% had a Lower secondary, 28% had a secondary level and finally 21% were university level. Furthermore, we found that only 29% had a professional activity and 71% were housewives.

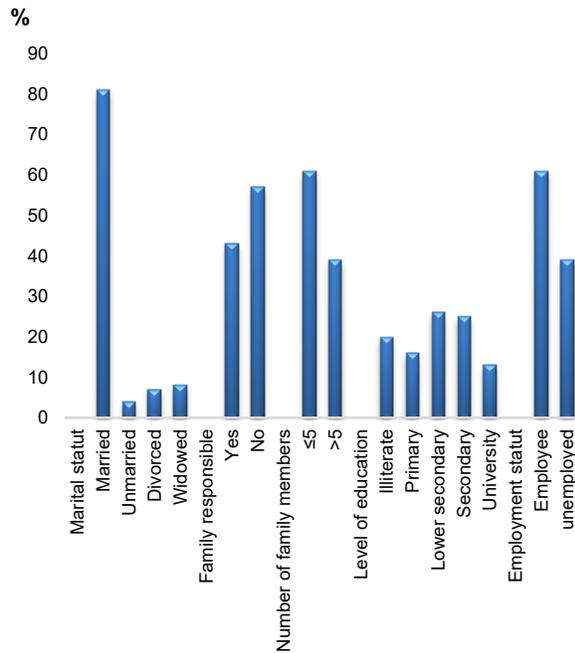


Figure 1: Socio-demographic profile of women

### 3.2 Frequency and severity of perimenopausal symptoms

The most common symptoms rated “very severe” were hot flushes and sweating (31.3%), heart discomfort (29%), sleeping problems (22.9%), depressive mood (35.1%), irritability (27.5%), anxiety (27.5%), physical and mental exhaustion (42.7%), and joint and muscular discomfort (38.2%). Contrary to sexual problems (17.6%), bladder problems (10.7%) and dryness of vagina (4.6%) were infrequently rated very severe (Table 2).

### 3.3 MRS score

The total score per each subscale is the sum of each graded item contained in that subscale (Table 3). Total MRS Score is the sum of the scores obtained for each subscale; a High total MRS Score indicates poor quality of life. The mean score of psychological (9.63 ± 2.93) and somatic (10.74 ± 3.43) domains were very significantly higher (p= 0.000) compared to the urogenital (3.51 ± 2.32) domain. The total score of MRS was 24 ± 6 which indicates that women had an altered quality of life.

### 3.4 Sleep disorders

For PSQI and subscale scores of sleep components (Table 4), each component was scored on a scale of 0–3 (higher scores indicate worse sleep) and the global score ranged from 0 to 21 (a high PSQI indicates poor sleep quality). Good sleepers were defined by a global PSQI <5 and poor sleepers were defined by scores ≥5, the subscales scores of sleep components were

significantly higher (p= 0.000) in sleep disturbances (1.69 ± 0.62), subjective sleep quality (1.55 ± 0.93), and sleep latency (1.40 ± 1.23) compared to other components of sleep. The total score of PSQI was 8 ± 4 which indicates that women had a poor sleep quality.

Table 2: Frequency and severity of perimenopausal symptoms assessed by MRS

Symptom (MRS)	Absent N. (%)	Mild N. (%)	Moderate N. (%)	Severe N. (%)	Very severe N. (%)
Hot flushes, sweating	12 (9.2)	21 (16)	34 (26)	23 (17.6)	41 (31.3)
Heart discomfort	21 (16)	22 (16.8)	32 (24.4)	38 (29)	18 (13.7)
Sleeping problems	29 (22.1)	20 (15.3)	24 (18.3)	28 (21.4)	30 (22.9)
Depressive mood	6 (4.6)	13 (9.9)	31 (23.7)	46 (35.1)	35 (26.1)
Irritability	7 (5.3)	12 (9.2)	28 (21.4)	40 (30.5)	44 (33.6)
Anxiety	22 (16.8)	16 (12.2)	26 (19.8)	31 (23.7)	36 (27.5)
Physical and mental exhaustion	3 (2.3)	15 (11.5)	24 (18.3)	33 (25.2)	56 (42.7)
Sexual problems	50 (38.2)	9 (6.9)	17 (13)	21 (16)	23 (17.6)
Bladder problems	70 (53.4)	14 (10.7)	19 (14.5)	14 (10.7)	14 (10.7)
Dryness of vagina	78 (59.5)	16 (12.2)	20 (15.3)	11 (8.4)	6 (4.6)
Joint and muscular discomfort	3 (2.3)	10 (7.6)	18 (13.7)	50 (38.2)	50 (38.2)

Data are expressed as number (%). MRS: Menopause Rating Scale.

### 3.5 Correlations between MRS (total and subscale scores) and PSQI (total and subscale scores)

Correlations between the Menopause rating scale subscale and Pittsburgh sleep quality index score (Table 5) showed that total MRS scores were significantly correlated with total PSQI scores (r=0.600, p=0.01). Somatic symptoms were positively correlated with all items on the PSQI except the use of sleep medication, the association was strongest with subjective sleep quality (r = 0.581, p=0.01). All PSQI items except the use of sleep medication were significantly associated with psychosocial symptoms. Daytime dysfunction component of PSQI was significantly associated with urogenital symptoms (r = 0.257, p=0.01).

Table 3: Mean scores of different MRS domains

MRS	Mean ± SD Score	p
Somatic	9.63 ± 2.93	0.001
Psychological	10.74 ± 3.43	
Urogenital	3.51 ± 2.32	
<b>Total MRS Score</b>	<b>24 ± 6</b>	

Data are expressed as mean ± standard deviation and compared by Friedman Test

**Table 4:** Sleep disorders assessed by PSQI

PSQI items	Mean (SD) subscale score	<i>p</i> value
Subjective sleep quality	1.55 ± 0.93	0.001
Sleep latency	1.40 ± 1.23	
Sleep duration	1.29 ± 0.94	
Habitual sleep efficiency	0.93 ± 1.01	
Sleep disturbances	1.69 ± 0.62	
Use of sleep medication	0.18 ± 0.33	
Daytime dysfunction	1.05 ± 0.84	
<b>Total PSQI score</b>	<b>8 ± 4</b>	

Data are expressed as means ± SD. PSQI: Pittsburgh Sleep Quality Index, test of signification realized by Friedman Test

**Table 5:** Correlations between MRS (total and subscale scores) and PSQI (total and subscale scores)

PSQI items	MRS			
	Somatic	Psychological	Uro-genital	Total MRS score
Subjective sleep quality	0.581**	0.518**	0.031	0.501**
Sleep latency	0.390**	0.283**	0.180*	0.263**
Sleep duration	0.358**	0.408**	0.081	0.417**
Habitual sleep efficiency	0.328**	0.348**	0.080	0.327**
Sleep disturbances	0.466**	0.454**	0.187*	0.534**
Use of sleep medication	0.085	0.081	0.024	0.097
Daytime dysfunction	0.0510**	0.439**	0.257**	0.511**
<b>Total PSQI score</b>	<b>0.631**</b>	<b>0.581**</b>	<b>0.084</b>	<b>0.600**</b>

IRS: Menopause Rating Scale. PSQI: Pittsburgh Sleep Quality Index. Test of Correlation sessed by Correlations of spearman. \* *p* < 0.05, \*\* *p* < 0.01

### 3.6 Food consumption and energy expenditure

Table 6 shows the evaluation of food consumption and energy expenditure in perimenopausal women. Expressed in percentage of TEI, compared to the Mediterranean Diet (MD) (38), the results showed that the energy balance (total energy intake TEI / daily energy expenditure DEE) was unbalanced (TEI = 9 ± 2. MJ/d / DEE = 8.9 ± 0.4 MJ/d). A high protein intake (13% of TEI) was observed; with a decrease in animal protein intake (26%) and high vegetable protein consumption (74%) was noted. In contrast, carbohydrates intake (55% of TEI) was similar to the MD. A decrease in lipids intake (23% of TEI) was noted. Monounsaturated fatty acids (MUFA) (41%) intake was lower and polyunsaturated fatty acids (PUFA) (33%) intake was higher.

## 4 Discussion

The aim of this work was to evaluate the climacteric syndrome, quality of life, and sleep quality in women on menopausal transition. The mean age of women in this study was 48 ± 3 years, which is similar to the study conducted by Rui-xia *et al.* 17, and higher than the age of women in the study of Marya *et al.* 18. The

majority of women were married and have more than four children, more than half of women have a secondary or university intellectual level.

**Table 6:** Food intake and daily energy expenditure in perimenopausal

	Perimenopausal women		MD
	TEI (MJ/d)	DEE (MJ/d)	
<b>Energy balance</b>	9 ± 2	8.9 ± 0.4	TEI = DEE
<b>Proteins (% of TEI)</b>		13%	10%
<b>Proteins intake (g/d)</b>		70 ± 24	
<b>Animal proteins<sup>§</sup></b>		26%	40%
<b>Vegetable proteins<sup>§</sup></b>		74%	60%
<b>Carbohydrates (% of TEI)</b>		55%	55%
<b>Carbohydrates intake (g/d)</b>		368 ± 107	
<b>Complex carbohydrates<sup>§</sup></b>		74%	75%
<b>Simple carbohydrates<sup>§</sup></b>		26%	25%
<b>Lipids (% of TEI)</b>		23%	35%
<b>Lipids intake (g/d)</b>		121 ± 59	
<b>PUFA<sup>§</sup></b>		33%	25%
<b>MUFA<sup>§</sup></b>		41%	50%
<b>SFA<sup>§</sup></b>		26%	25%

MD: Mediterranean Diet (38); TEI: Total energy intake; §: Expressed in percentage of total macronutrient intake; PUFA: Polyunsaturated fatty acids; MUFA: Monounsaturated fatty acids; SFA: Saturated fatty acid.

In our study, we noted that the symptoms most commonly rated “very severe” were hot flushes and sweating, heart discomfort, sleeping problems, depressive mood, irritability, anxiety, physical and mental exhaustion, and joint and muscular discomfort. These results were similar to literature 9,19,20. Hypoestrogenism resulting from perimenopause was reported as the main cause of obesity, vasomotor, urogenital, and psychological symptoms, as well as for poorer sexual performance and the high profile of morbimortality in women after the age of 50 when associated with environmental, psychosocial, and cultural factors 21.

Sexual concerns, bladder problems and dryness of vagina were infrequently rated very severe in our study, which was similar to the study conducted by Blümel *et al.* 19.

The mean scores of different MRS domains indicated in our study that the mean score of psychological and somatic domains was very significantly higher compared to the urogenital domain. Our results were similar to the study conducted by Belešová *et al.* 22. The total score of MRS noted in our study was greater than that noted by Belešová *et al.* 22. The scale of the MRS total score was between 0 and 44, the higher the score, the worse the quality of life 12. These results indicated that women have an altered quality of life. Similarly, some recent studies observed altered quality of life of women during the menopausal transition 10,23. The transition through menopause is a life event that can profoundly affect the quality of life. More than 80% of women report physical and psychological symptoms that commonly accompany menopause, with varying degrees of severity and life disruption 24.

Good sleep is a key factor for maintaining the quality of life whereas sleep disturbance has been recognized as an important public health factor<sup>25</sup>. The total PSQI score noted in our study was  $8 \pm 4$ , this result indicated that women have a poor sleep quality; our results were similar to other works<sup>26,27</sup>. The prevalence of insomnia has been shown to increase in women at the age of transition from pre- to postmenopausal stages, and menopausal women are more than three times as likely to have a sleep disorder as those who were premenopausal<sup>28</sup>. The subscales scores of sleep components were significantly higher in sleep disturbances compared to other components of PSQI. Our results were similar to those observed in the study conducted by Monterrosa-Castro *et al.*<sup>29</sup>.

Our study found that women with higher MRS scores and subscale scores had higher PSQI scores, which was confirmed in previous studies<sup>30,31</sup>, indicating that women with more severe menopausal symptoms experienced poorer sleep quality. Vasomotor symptoms are common during menopause, where hot flashes are the most frequent and are described as the most troublesome<sup>31</sup>. Studies have generally shown that sleep disturbances during menopause may be associated with vasomotor symptoms<sup>32</sup>.

Of the two MRS domains, somatic and psychological symptoms showed the highest correlation with sleep quality. Our results were similar to the study conducted by Min-Ju *et al.*<sup>33</sup>.

Poor quality of life and impaired sleep had a long-term negative effect on the health of postmenopausal women; such as cardiovascular disease, osteoporosis, and cognitive impairment<sup>34</sup>.

Previous studies have identified that the incidence and severity of climacteric symptoms were associated with various factors, including lifestyle (diet, physical activity, smoking, and alcohol drinking)<sup>35,36</sup>. In the current study, perimenopausal women had unbalanced food intake. Total energy intake (TEI) was higher than daily energy expenditure (DEE), which was non-compliant with MD<sup>37</sup>. On the other hand, we recorded a decrease in animal protein intake and monounsaturated fatty acids (MUFA) intake and a high vegetable protein intake and polyunsaturated (PUFA) intake. Simple carbohydrate and saturated fatty acids were similar to the MD. The Study of Women's Health Across the Nation (SWAN) obtained negative results when looking at the effect of nutrients in general on vasomotor symptoms (VMS) in pre- and peri-menopausal women<sup>38</sup>, suggesting it is the broader dietary pattern rather than meeting nutrient requirements which affects VMS<sup>40</sup>. A cohort of over 6000 women who had passed through natural menopause in Australia found that adherence to MD decreased the risk of experiencing VMS by 20 %<sup>40</sup>.

## 5 Conclusions

Perimenopause is a difficult period in a woman's life, it disrupts her quality of life and sleep quality, to improve the latter, the woman had to follow a healthy lifestyle by practicing regular physical activities and adhere to the Mediterranean diet which is rich in fiber, vitamins, essential oils (omega 3, omega 9) and antioxidants.

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**Conflict of interest:** The authors declare no conflicts of interest.

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