Research Paper

The Relationship Between Sleep Quality and Quality of Life Among Postmenopausal Women

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ABSTRACT

Background: With increased life expectancy and changes in lifespan, now women spend more years after menopause. Women with menopausal symptoms may experience a lower quality of life (QoL) and complain about poor sleep quality. This study aimed to examine the relationship between QoL and sleep quality in postmenopausal women.

Methods: This research was a predictive correlational study. The study sample was 200 postmenopausal women referred to the healthcare centers affiliated with Mashhad University of Medical Sciences in Mashhad City, Iran, in 2021. The subjects were selected through multistage cluster sampling. To assess the quality of sleep and life quality, the Pittsburgh Sleep Quality Index (PSQI) and Menopause-Specific QoL questionnaire (MENQOL) were used. The obtained data were analyzed by the Pearson correlation coefficient and multiple linear regression in SPSS software, version 21. The significance level was set at $P<0.05$.

Results: The Mean±SD age of the subjects was 53.92±6.13 years. Their Mean±SD scores of sleep quality and QoL were 48.62±21.98 and 4.93±2.74, respectively, and 37% of women had sleep disorders. The multiple determination coefficient for the linear regression model was equal to 0.35, and there was a significant direct relationship between sleep quality and QoL (b=3.72, 95% CI =2.70-4.74, $P<0.001$). So for each unit change in sleep quality, the average QoL score increased by 3.72 units.

Conclusion: Considering the relationship between sleep quality and QoL in postmenopausal women, it is recommended that these women use appropriate methods to improve sleep quality. Also, health professionals should keep this issue in mind when examining the health status of this group of women.

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Highlights

- Sleep disturbance is one of the most common complications in postmenopausal women.
- At the same time as menopause, women's quality of life (QoL) may decrease.
- There was a direct and significant relationship between sleep quality and QoL and their domains in postmenopausal women.
- The lowest level of QoL was related to the sexual domain.

Plain Language Summary

Due to the increase in life expectancy, women live longer after menopause. Considering the decrease in the quality of sleep and QoL of women after menopause, paying attention to the quality of sleep and life of menopausal women can improve their health in more than a third of their life. The present study showed that the better the sleep quality of these women, the better the quality of their life. It is recommended that women use appropriate methods to improve sleep quality so that sleep problems do not decrease their QoL.

1. Introduction

Menopause is one of the most difficult times in a woman's life. Life expectancy and the population of postmenopausal women have increased in recent decades (Ornat et al., 2014; Berek, 2019). The world population of postmenopausal women is expected to reach 1.2 billion by 2030, with an annual rise of 47 million new cases. According to the Iranian census in 2016, the number of women aged 40-65 was 10 million, accounting for around 11.33% of the total population (Jamshidi Manesh et al., 2010; Lotfi et al., 2021). Women may experience many physical and mental problems during menopause, and sleep disturbance is one of the most common complications (Schaedel, et al., 2021). Sleep is one of the most important needs of an individual. People sleep for around one-third of their lives (Taibi et al., 2009). This sleep-wake is one of the most important circadian rhythm processes that plays a great role in maintaining mental, physical, and emotional health, especially in the elderly. Sleep quality is defined as restful when it meets sleep-related needs and enables proper daily functioning (Guastella and Moulds, 2007; Tartibian et al., 2021).

The structure and quality of sleep changes with age due to melatonin rhythm changes and circadian rhythm disturbances, which can lead to sleep problems. In addition, as estrogen levels decrease during menopause, magnesium levels drop, reducing sweating and muscle relaxation during the night (Nedrow et al., 2006; Gothe et al., 2020). Depending on the individual, sleep disorders can range from mild discomfort to severe and destructive symptoms. Menopause-related sleep disturbance may not always reduce sleep quantity, but it can significantly impact sleep quality. Insomnia, increased sleepiness during the day, multiple awakenings during the night, and strange movements are symptoms of poor sleep quality (Nedrow et al., 2006; Roth, 2007; Levenson, et al., 2015). Sleep problems are observed in 24%-50% of menopausal women in the form of insomnia, falling asleep late, waking up frequently, and staying awake in bed for more than half an hour (Eichling and Sahni, 2005; Nedrow et al., 2006). Good sleep quality stabilizes memory, improves immune system function, modulates molecular metabolic activity, and maintains catecholamine in the brain. In contrast, poor sleep quality is associated with functional impairment, decreased general health, cardiovascular events, memory problems, mental fatigue, perceptual changes, difficulty concentrating, decreased emotional control, poor judgment, and increased mortality (Medic, et al., 2017; Chattu et al., 2018; Tartibian et al., 2021).

Sleep makes the body and mind stronger, while sleep disorders worsen the quality of life (QoL). QoL is important for everyone, but it is especially important for people who have certain mental and physical conditions and have to deal with the resulting stress (Basu, 2004; Gholamalian et al., 2015; Worley, 2018; Mortazavi et al., 2021). Changes in the body and mind during menopause make the QoL very important (Barat et al., 2013; Khavandizadeh Aghdam, et al., 2018). Improving the QoL is important for increasing life expectancy and living longer, and it is one of the goals of "health for all in the 21st century" (Foroud, et al., 2014; Rajabi et al., 2017).

QoL is a multidimensional and dynamic concept related to mental, physical, and social health. World Health Organization (WHO) defines the QoL as people's perception of their position in life within the framework of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns (Lin, et al., 2013; Zaeri et al., 2014; Lee et al., 2019).

The increase in life expectancy and changes in life span has caused women to spend more years in menopause, and these changes have great effects on the health status of these women (Carr, et al., 2001; Makvandi et al., 2013). Therefore, due to the increase in the life span of women during menopause, their QoL becomes more important. Based on this and considering the increase in sleep problems in this period, the present research was conducted to examine the relationship between QoL and sleep in postmenopausal women in Mashhad Province, Iran.

2. Materials and Methods

This research was a predictive correlational study. The study subjects were 225 postmenopausal women referred to health centers affiliated with Mashhad University of Medical Sciences in Mashhad City, Iran, in 2021.

The subjects were recruited by multistage cluster sampling. For this purpose, health centers in 5 districts of Mashhad were considered clusters. Then, a health center was randomly selected from each cluster. The researcher spent 6 days visiting each center and selecting eligible women. If the required sample size was not reached, these centers were visited for more than 6 days. The inclusion criteria were as follows: being 40-65 years old Iranian woman living in Mashhad, having reading and writing skills, passing one year after menopause, not consuming alcohol, hookah, tobacco or opium, and drugs, not using sleeping pills (such as clonidine, antidepressants, tamoxifen, raloxifene, and anticonvulsants such as gabapentin, sedatives), and natural sleep aids (such as lavender, Dracucephalum, Valerina officinalis, basil tea), and have not had a stressful event in the past 6 months. The sample size was calculated using the sample size formula for mean estimation. Considering type I error of 0.05, power of 0.80, the standard deviation for the QoL variable of 15.34, and absolute error of 2, the sample size was estimated as 225 (Equation 1).

$$1.\ n=\frac{z^2s^2}{d^2}=\frac{1.96^2*14.34^2}{2^2}\approx 225$$

The data were collected using a demographic questionnaire, the Pittsburgh sleep quality index (PSQI), and the Menopause Specific QoL Questionnaire (MENQoL).

PSQI was designed and introduced by Buysse et al. (1989). It is a self-report questionnaire that assesses sleep quality and disturbances over 1 month and is scored on a 4-point Likert scale ranging from 0 (no difficulty) to 3 (severe difficulty). This questionnaire has 7 subscales: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. The sum of the scores for these 7 components gives a global score. The scores range from 0 to 21, with scores higher than 5 reflecting poor sleep quality. The validity, internal homogeneity, and consistency (test-retest reliability) of this scale are acceptable. A global score of more than 5 on this scale has a diagnostic sensitivity of 89.6% and specificity of 86.5% (kappa=0.75, P<0.001) in differentiating between good and poor sleepers (Buysse et al., 1989). The reliability and validity of the Persian version of PSQI have been assessed by Mohammad Gholi Mezerji et al. (2017). The content validity index, scale content validity index, and the Cronbach alpha coefficient were ≥0.78, ≥0.90, and 0.65, respectively, and factor analysis confirmed that the Persian version of the PSQI had legitimate validity and reliability.

MENQoL was developed and standardized by Hilditch et al. (1996). The questionnaire measures the QoL in the past month and consists of 29 items and four subscales: vasomotor (items 1-3), psychosocial (items 4-10), physical (items 11-26), and sexual (items 27-29). It is scored on a 7-point Likert scale from "0=not at all bothered" to "6=extremely bothered." A higher total QoL score, as well as a higher score in each domain, implies a poor QoL, whereas a lower score indicates a good QoL. Content validity was confirmed, and test-retest reliability measures, using intraclass correlation coefficients (ICC) were 0.37 for the vasomotor domain, 0.81 for the physical domain, 0.79 for the psychosocial domain, and 0.70 for the sexual domain. The validity and reliability of the Persian version of this scale have been confirmed (Abedzadeh Kalarhoudi et al., 2011). To compare the subscales of the QoL, each subscale mean was standardized to 100.

The data analysis was performed using SPSS version 21. Mean, standard deviation, number, and percentage were used to describe the quantitative and qualitative variables, respectively. To check the normality of the data, the Kolmogorov-Smirnov test was used. The results showed that the PSQI data was not normally

distributed (P=0.02), but the MENQoL data were normally distributed (P=750). Therefore, the Spearman correlation coefficient was used to assess the relationship between the QoL subscales and sleep quality. Backward linear regression was applied to check the relationship between QoL and sleep quality in the presence of the demographic variables.

3. Results

Of 225 questionnaires, 25 were removed because of uncompleted responses, and finally, 200 questionnaires were analyzed. The Mean±SD age of postmenopausal women and length of time since menopause was 53.92±6.13 and 6.16±5.50 years, respectively. Other demographic characteristics of the subjects are presented in Table 1. The results showed that the Mean±SD QoL score of postmenopausal women was 48.62±21.98. The average scores of the QoL subscales are shown in Table 2.

In the vasomotor subscale, hot flashes with a Mean±SD score of 2.15±1.51, in the psychosocial subscale, feeling anxious or nervous with a Mean±SD score of 1.67±1.46, in the physical subscale, aching in muscles and joints with a Mean±SD score of 2.09±1.48, and in sexual subscale, vaginal dryness with a Mean±SD score of 2.88±1.48 had the highest scores. The Mean±SD total sleep quality score in postmenopausal women was 4.93±2.74, and 37% of women had sleep disorders. The average scores of the sleep quality subscales are shown in Table 3.

The results of the Spearman correlation coefficient showed that some of the QoL and sleep quality subscales had a significant direct relationship (Table 4). Other results showed that in the linear regression model, the coefficient of multiple determination is 0.35, and there is a significant direct relationship between sleep quality and QoL (b=3.72, 95% CI =2.70-4.74, P<0.001). So that for every one unit change in sleep quality, the average QoL score increases by 3.72 units. (In this study, backward linear regression was used.) Considering that only one variable has to be presented in the Table, the result was reported in the text instead of the Table. There was no significant relationship between QoL and demographic variables, and these variables were removed from the regression model.

4. Discussion

This study aimed to examine the relationship between QoL and sleep quality in postmenopausal women. The study's results showed that the overall QoL of postmenopausal women was at an average level. Previous studies also found the same result in postmenopausal women (Abedzadeh, et al., 2009; Abdi and Solhi, 2014; Foroud, et al., 2014; Monshipour, et al., 2016).

In the present study, the lowest QoL was related to the sexual domain, followed by the vasomotor domain. In addition, the most common symptoms reported by the women were vaginal dryness during sexual intercourse and hot flashes. Poor sexual QoL also was confirmed in other studies (Sheikhan et al., 2010; Monshipour et al.,

Table 1. Demographic characteristics of the postmenopausal women

Variables	Categories	No. (%)/Mean±SD
Level of education	Under diploma	138(69)
	Diploma and higher	62(31)
Occupation	Employed or retired	32(16)
	Housewife	168(84)
Family income level (according to the subjects)	Sufficient and more than sufficient	177(88)
	Less than sufficient	23(12)
Age (y)		53.92±6.13
The length of time since menopause (y)		6.16±5.50
Parity		4.05±1.65

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Table 2. Description of quality of life subscales in postmenopausal women

Variables	Subscales	Mean±SD	Mean±SD to 100
Quality of life (0-140)	Vasomotor	5.67±4.12	37.79±27.47
	Psychosocial	9.85±6.78	28.16±19.38
	Physical	24.75±13.14	30.94±16.43
	Sexual	8.35±4.02	55.68±26.82
	Total	48.62±21.98	

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Table 3. Description of sleep quality subscales in postmenopausal women

Variables	Subscales	Mean±SD
Sleep quality (0-21)	Subjective sleep quality	1.11±0.70
	Sleep latency	1.16±0.97
	Sleep duration	0.58±0.87
	Sleep efficiency	0.26±0.66
	Sleep disturbances	1.47±0.61
	Use of sleep medication	0.21±0.61
	Daytime dysfunction	0.40±0.62
	Total	4.93±2.74

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Table 4. Relationship between QoL and sleep quality subscales in postmenopausal women

Subscales	Sleep Quality							
	Subjective Sleep Quality	Sleep Latency	Sleep Duration	Sleep Efficiency	Sleep Disturbances	Use of Sleep Medication	Daytime Dysfunction	Total
Vasomotor	0.12* (0.10 10)**	0.11 (0.15)	0.01 (0.87)	0.09 (0.25)	0.15 (0.04)	0.06 (0.42)	0.12 (0.11)	0.02 (0.80)
Psychosocial	0.46 (<0.001)	0.23 (0.004)	0.08 (0.28)	0.14 (0.07)	0.52 (<0.001)	0.32 (<0.001)	0.36 (<0.001)	0.44 (<0.001)
Physical	0.46 (<0.001)	0.26 (0.001)	0.04 (0.65)	0.08 (0.28)	0.62 (<0.001)	0.33 (≤0.001)	0.39 (<0.001)	0.48 (<0.001)
Sexual	0.31 (<0.001)	0.13 (0.09)	0.05 (0.53)	0.1 (0.18)	0.36 (<0.001)	0.09 (0.24)	0.6 (0.43)	0.23 (0.006)
Total	0.51 (<0.001)	0.24 (0.002)	0.5 (<0.001)	0.10 (0.19)	0.64 (<0.001)	0.32 (<0.001)	0.39 (<0.001)	0.49 (<0.001)

* The spearman correlation coefficient.
** P.

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2016). Some studies demonstrated that about 65.7% and 90% of postmenopausal women experience a decrease in sexual desire (Chen et al., 2007; Abdi and Solhi, 2014). Li, Holm, and Gulanick (2000) found that most perimenopause women in the USA had a good sexual QoL. Due to a lack of proper information services to advise and inform women on how to deal with the challenges of menopause, Iranian women have a poor sexual QoL. In addition, this difference could be related to factors such as cultural and social differences in different societies (Monshipour et al., 2016). Some studies found that the lowest QoL is related to the vasomotor domain (Fallahzade et al., 2011; Makvandi et al., 2013; Prajapati, etal., 2018), which is consistent with the present study results. A decrease in ovarian hormones, especially estrogen, during menopause can lead to many complications in women, which have detrimental effects on their QoL (Dalal and Agarwal, 2015; Golzareh et al., 2017).

Sexual performance has a great impact on the QoL of people and their sexual partners. Sexual problems during menopause can occur due to physiological changes and a decrease in the level of hormones or a negative attitude towards menopause (Heidari et al., 2019; Alirezaei, et al., 2020). Menopause, due to the decrease in estrogen and blood circulation in the genitourinary system, leads to atrophy of the genital system, resulting in dryness and fragility of the vagina, as well as dyspareunia. In addition, sexual problems in postmenopausal women can be associated with feelings of shame and mood disorders (Shapiro, et al., 2000; Nicolosi et al., 2005; Mac Bride, et al,, 2010; Berek, 2019). Hot flashes are one of the most prevalent problems experienced by postmenopausal women. Hot flashes affect around 80% of postmenopausal women in the United States. According to studies, hot flashes affect social activity, work, leisure time, concentration, sleep, mood, communication, sexual behaviors, living pleasure, and overall QoL (Abdi and Solhi 2014; Bansal and Aggarwal 2019).

The present study showed that 37% of the women had sleep disturbances. The important role of menopause in the structural changes of sleep and decreasing the quality of women's sleep has been confirmed. According to studies, the occurrence of sleep problems varies in society, and 12% to 79% of women worldwide suffer from it (Lee et al., 2019; Gürler, et al., 2020). Taavoni et al. (2011) and Santos et al. (2021) demonstrated that 70% and 67.8% of postmenopausal women had experienced sleep disturbances.

A decrease in the level of sex hormones is one of the main causes of sleep problems after menopause. Estrogen and progesterone influence a variety of brain activities, including sleep. In addition, physical and psychological changes related to hormones can also cause sleep disturbances. Poor sleep quality leads to extreme daytime drowsiness, fatigue, lack of concentration, impatience, and more desire to rest during the daytime. People who get enough sleep have more energy to go about their everyday lives and are happier (Ameratunga, et al., 2012; Taavoni, et al., 2015; Medic, et al., 2017; Chattu et al., 2018; Lee et al., 2019). According to the present study, sleep disturbance and sleep latency were the most reported disorders in this order. Some studies have pointed to sleep latency as the most common complaint (Gold et al., 2000; Kravitz et al., 2008). According to Ohayon (2006), 26% of postmenopausal women have reported sleep disturbances, with difficulty sleeping being the most frequent complaint.

The present study indicated a direct and significant relationship between sleep quality and QoL, and also between their domains. Other studies also found a direct and significant relationship between sleep quality and QoL in older people, so people with poor sleep quality had a lower QoL (Safa, et al., 2015; Sharifi et al., 2019). Wu, Lai, and Hwang (2012) also showed a relationship between poor sleep quality, insomnia, the resulting psychological symptoms, and poor QoL in climacteric women. Seven years of research on 3045 women found that the odds ratio of sleeping problems (falling asleep, waking up during the night, and getting up early) was greater in postmenopausal women than in women with no menopausal symptoms (Kravitz et al., 2008). Vasomotor symptoms of menopause often interfere with sleep and aggravate sleep disorders and hot flashes. These results show that adequate sleep is vital for improving QoL and that people who sleep poorly have a low QoL (Baker et al., 2018). Sleep disturbances affect a person's physical and mental health and are associated with consequences such as daytime drowsiness, fatigue, low energy, depressed mood, psychomotor disorders, vulnerability, cognitive disorders, decreased concentration and attention, and cardiovascular diseases (Medic, Wille, and Hemels 2017; Baker et al., 2018; Chattu et al., 2018; Tartibian et al., 2021).

In general, there was a direct and significant relationship between sleep quality and QoL and also between their domains in postmenopausal women in this study. A decrease in the level of sex hormones in postmenopausal women affects their lives. The complications of menopause (physical, mental, and social) are closely related to the QoL of

women during menopause, and reducing these complications improves their QoL. For example, the results of studies showed that the reduction of hot flashes, especially at night, led to better sleep quality in postmenopausal women and, as a result, improved their overall QoL (Whiteley et al., 2013; Baker et al., 2018; Sharifi et al., 2020).

QoL and sleep can both be affected by various variables. This study only examined the relationship between these two variables in postmenopausal women. Therefore, this issue must be considered in using the results. In addition, the undiagnosed physical and mental illnesses of the participants may have affected the results of the study, which was beyond the control of the researchers.

5. Conclusion

The results of this study are useful for policymakers because identifying the state of sleep quality, and QoL of menopausal women can help meet the counseling, educational, and treatment needs that are necessary for the development and implementation of health promotion programs for menopausal women. Considering the relationship between sleep quality and QoL in postmenopausal women, it is recommended that these women use appropriate methods to improve sleep quality. Also, health professionals should keep this issue in mind when examining the health status of this group of women.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of Mashhad University of Medical Sciences, Mashhad, Iran (Code: IR.MUMS.REC.1399.638) The research objectives were explained to the participants, and they were assured that their information would be used only for the research and would remain confidential. Written informed consent was obtained from all participants.

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Authors' contributions

Conception and design: Seyedeh Fatemeh Nosrati Hadiabad and Fatemeh Zahra Karimi; Literature search, data acquisition, analysis and interpretation, drafting the manuscript, and critical revision of the manuscript: Seyedeh Fatemeh Nosrati Hadiabad, Mahbubeh Abdollahi, Sayyed Majid Sadrzadeh, and Fatemeh Zahra Karimi; Approval of the final version of the manuscript: All authors.

Conflict of interest

The authors declared no conflict of interest.

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