Int. J. Pharm. Investigation, 2026; 16(1):330-335.
https://www.jpionline.org

Original Article

Assessment of Sleep Quality Among Menopausal Women and its Relationship with Menopausal Symptoms

Twinkle M J S[1], Anjali Anand K[1], Nisha Rajesh[1], Jeslin Maria George[1], Bipin Shaji[1], Krishnapriya Radhakrishnan[2], Shraddha Shetty[3], Juno Jerold Joel[1,*]

[1]Department of Pharmacy Practice, NITTE (Deemed to be University), NGSM Institute of Pharmaceutical Sciences (NGSMIPS), Deralakatte, Mangaluru, Karnataka, INDIA.
[2]Department of Obstetrics and Gynecology, NITTE (Deemed to be University), KS Hegde Medical Academy (KSHEMA), Deralakatte, Mangaluru, Karnataka, INDIA.
[3]Department of Biostatistics, NITTE (Deemed to be University), KS Hegde Medical Academy (KSHEMA), Deralakatte, Mangaluru, Karnataka, INDIA.

ABSTRACT

Background: Menopause is the permanent cessation of menstruation, marked by fluctuating estrogen, irregular periods, sleep disturbances, and various physiological and psychological difficulties. The current study was carried out to assess the sleep quality among menopausal women and its relationship with menopausal symptoms. **Materials and Methods:** A cross-sectional study was conducted for six months in the Department of Obstetrics and Gynaecology of a tertiary care hospital. The Pitts Burgh Sleep Quality Index (PSQI) was used to assess sleep quality, and the Menopausal Rating Scale (MRS) was used to rate the severity of the menopausal symptoms. Statistical analysis was performed using SPSS software version 29.0. **Results:** The study assessed the sleep quality, severity of menopausal symptoms, and their associations among 105 subjects. Sleep quality was predominantly poor among the study subjects, with a moderate positive correlation between menopausal symptoms and sleep quality (R: 0.436, *p*:< 0.001). A weak positive correlation was observed between age and sleep quality (R=0.204, *p*=0.019). The findings suggest addressing menopausal symptoms and age-related factors is critical to improve sleep quality. **Conclusion:** Poor sleep quality was prevalent among menopausal women and strongly associated with the intensity of menopausal symptoms. This emphasizes the necessity of therapies to address menopausal symptoms to improve sleep quality and general well-being in this population.

Keywords: Menopause, Menopausal symptoms, Sleep, Sleep quality.

Correspondence:
Dr. Juno Jerold Joel, M Pharm, MBA, PhD
Associate Professor, Department of Pharmacy Practice, NGSM Institute of Pharmaceutical Sciences (NGSMIPS), NITTE (Deemed to be University), Mangalore-575018, Karnataka, INDIA.
Email: junojoel@nitte.edu.in
ORCID: 0000-0002-7047-379X

Received: 12-06-2025;
Revised: 29-08-2025;
Accepted: 07-10-2025.

INTRODUCTION

Menopause is the permanent cessation of menstruation. Perimenopause is the transitional period before menopause. As estrogen deficiency progresses, women may experience various physiological and psychological difficulties that can significantly impact their well-being. Some early somatic signs of estrogen deficiency include hot flushes, sweating, headaches, and sleep disturbances. Late symptoms may include mood swings, cardiac issues, osteoporosis, urogenital changes, exhaustion, decreased intimacy, irritability, concentrating issues, and memory challenges (Ahuja, 2016).

Sleep is essential for overall wellness, as it affects the physical, neurological, and psychological processes. Sleep disturbances are one of the most common and clinically significant symptoms observed in menopause. Sleep deprivation can negatively impact an individual's physical, psychological, cognitive, and social well-being (Abdelaziz *et al.*, 2022). Women in menopause may have difficulty falling asleep, wake up repeatedly throughout the night, or wake up earlier than usual in the morning; this is partly because high levels of the stress hormone cortisol can disrupt sleep. Moreover, declining estrogen levels can lead to hot flashes, which are sudden sensations of heat that can wake women up at night and make it hard to fall back asleep (Santos *et al.*, 2021).

Several factors have been linked to poor sleep quality, including aging, mood swings, hypertension, obesity, smoking, and physical inactivity (Zagalaz Anula *et al.*, 2019). Despite these findings, it may be challenging to determine which factors contribute to sleep disruption in menopausal women. Although hormonal changes during menopause might cause sleep-related issues, other variables also play a crucial role (Kim M *et al.*, 2018).

DOI: 10.5530/ijpi.20260487

Moreover, insufficient sleep and duration of sleep are both associated with detrimental health effects such as an increased risk of weight gain, diabetes, cardiovascular disease, osteoporosis, and poor quality of life. Therefore, postmenopausal health issues are a crucial public health concern for women experiencing this life transition (Abdelaziz *et al*., 2022; Kim M *et al*., 2018).

The manifestations of menopause are highly variable and influenced by psychological, social, and cultural aspects (Arar *et al*., 2023). Hot flushes, nocturnal sweats, genital symptoms (such as dryness in the vagina and dyspareunia), and mood and sleep disorders constitute the most common symptoms which have a significant impact on the quality of sleep. With this background, the current study aims to assess the quality of sleep in menopausal women and its association with menopausal symptoms (Ahmady *et al*., 2022).

MATERIALS AND METHODS

Study Design and Site

A cross-sectional study was conducted in the Outpatient Department of Obstetrics and Gynecology of a tertiary care hospital. All data for this study were collected from study subjects willing to participate after obtaining written consent.

Sample size

The sample size was calculated as 105 subjects, based on a 95% confidence level, a standard deviation of 4.17, and a margin of error of 0.8. The sample size was calculated by the formula:

$$n = \frac{Z^2_{\alpha/2}\sigma^2}{d^2}$$

Where 'n' is the required sample size, 'Z' is 1.96, the value corresponding to the confidence interval at 95%, 'σ' is the standard deviation, and 'd' is the margin of error.

Inclusion and Exclusion Criteria

Women aged 45 to 55 years who have attained menopause in the last five years, with or without comorbid conditions, and were willing to participate were included in the study. Participants using hormone replacement therapy or sleep-inducing medications, those with chronic medical conditions or psychiatric illness, and those unwilling to participate were excluded from the study

Ethical Considerations

The Ethical permission (Ref. No: NGSMIPS/IEC/0040/2023) was obtained from the Institutional Ethics Committee (IEC), NGSMIPS, Nitte (Deemed to be University), before initiating the study. The participants were enrolled to the study after obtaining written consent.

Study Procedure

The researchers visited the Department of Obstetrics and Gynecology, explained the study procedure to the participants, and enrolled them based on the inclusion and exclusion criteria after obtaining written consent. The data were collected from participant case sheets and through interviews. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI) (Buysse *et al*., 1989) and menopausal symptoms were assessed using the Menopause Rating Scale (MRS) (Hauser *et al*., 1994; Patthoff *et al*., 2000). A comprehensive data collection form was designed specifically for the study for data collection.

The PSQI evaluates seven critical aspects of sleep, including subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disruptions, use of sleep-inducing medication, and daytime dysfunction. Evaluation of each component is based on a four-point Likert scale from zero to 3. The total score is calculated by adding each component score, resulting in a range of zero to 21. A PSQI score of five or above indicates poor sleep. Values 0 to 4 indicate no sleep disorder, 5 to 10 suggest mild sleep disorder, 11 to 16 indicate moderate sleep disorder, and 17 to 21 indicate severe sleep disorder.

The MRS comprises 11 items divided into three categories: somatic, psychological, and urogenital symptoms. Each component is scored from 0 to 4 based on the perceived severity of the complaints reported by the women. Scores between 0 to 4 are classified as minimal or no symptoms, a score between 5 to 8 indicates mild symptoms, scores between 9 to 16 indicate moderate symptoms, and scores equal to or exceeding 17 indicate severe symptoms.

The collected data were documented using Microsoft Excel 2019 and statistically analysed using SPSS version 29.

Statistical analysis

The demographic variables were expressed in descriptive statistics. The Pearson correlation was performed to analyse the correlation of sleep quality with menopausal symptoms, and age. A p-value <0.05 is considered statistically significant. Statistical analysis was performed using SPSS software, version 29.0 (Figure 1).

RESULTS

Sociodemographics of the study population

Among 105 study subjects, the majority of the study population (55.2%) were between 45 and 50 years of age (mean age: 50.24±3.51 years). The mean BMI was 22.42±3.19, with the majority of the study subjects (74.3%) having a normal BMI and 15.2% being overweight. Of 105 subjects, 44.9% were in the menopausal stage, and 58.1% were in their postmenopausal stage. The predominant portion of the study subjects were married (92.4%), with 54.3% homemakers and 45.7% working women. The educational status of the study subjects showed that 32.4% had a primary education,

followed by 31.4% with a graduate degree. The majority of the subjects (97.1%) had no social habits, while the least number of subjects (2.9%) had tobacco chewing habits. The majority of subjects did not have any (54.3%) comorbid conditions, while 13.3% had hypertension, 10.5% had Type 2 Diabetes Mellitus (T2DM), and 1.9% had both (Table 1).

Severity of Menopausal Symptoms

Moderate menopausal symptoms were found in the majority (69.5%) of the study subjects, whereas severe menopausal symptoms were found in 16.2% of the study subjects. The common symptoms found were irritability, sleep problems, joint and muscle discomfort, and low mood, all affecting over 90% of the study subjects. The majority of the study subjects had mild irritability (55.2%), moderate sleep problems (61.9%), moderate joint discomfort (53.3%), and moderate depressive mood (64.8%). The average MRS score was found to be 12.59 (Figure 2).

Sleep quality among the study subjects

Sleep quality was poor for most of the study population (81.0%), whereas 19% of the subjects had good sleep. PSQI (Pittsburgh Sleep Quality Index) interpretation found that 14.2% of the study subjects did not need medical assessment for sleep, 39% required medical assessment, and most of the study subjects (46.6%) required care and medical treatment for sleep. The average sleep quality score (PSQI) was found to be 7.17.

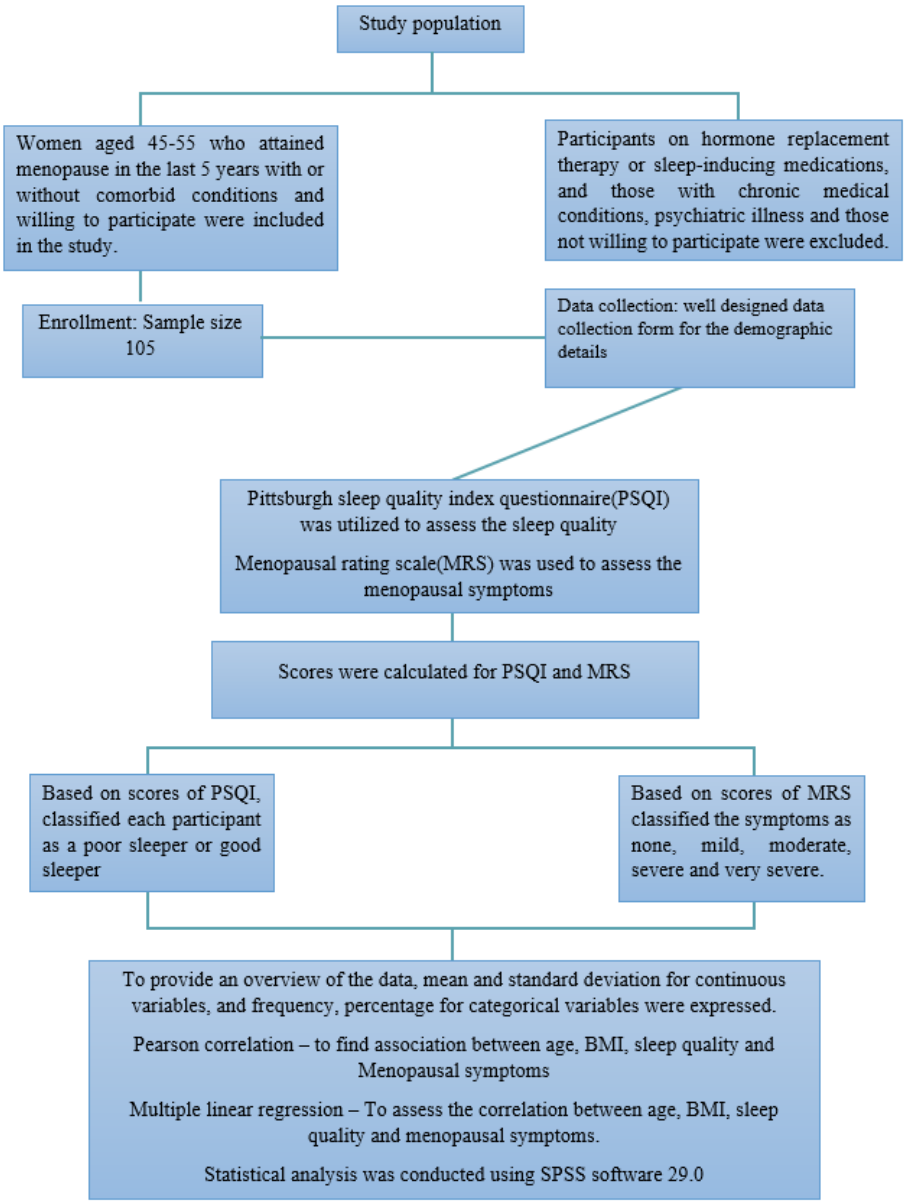

Figure 1: Flow chart of the methodology followed in the study.

Table 1: The baseline demographic characteristics of the study subjects.

Age	Frequency	Percentage (%)
45-50	58	38.6
51-55	47	31.3
BMI		
<18.5	10	9.5
18.5-24.9	78	74.3
25-29.9	16	15.2
≥30	1	1.0
Comorbidities		
None	57	54.3
Hypertension	14	13.3
Diabetes Mellitus	11	10.5
Thyroid	9	8.6
Asthma	9	8.6
Others	2	1.9
Hypertension and Diabetes mellitus	2	1.9
Hypertension, Diabetes mellitus and others	1	1.0
Social Habits		
No Habits	102	97.1
Tobacco	3	2.9
Marital Status		
Unmarried	8	7.6
Married	97	92.4
Menopausal Status		
Menopausal	44	41.9
Postmenopausal	61	58.1
Education		
Primary school	34	32.4
High school	17	16.2
Intermediate	21	20.0
Graduate	33	31.4
Occupation		
Housewife	57	54.3
Working women	48	45.7

Correlation of Menopausal Symptoms with Sleep Quality

Pearson correlation coefficient R is 0.436, indicating a moderate positive correlation between menopausal symptoms and sleep quality. This moderate positive correlation means that the PSQI score increases, indicating poor sleep quality, and the MRS score also increases, indicating severe menopausal symptoms. The majority of the study subjects had poor sleep, with increasing PSQI scores, and moderate menopausal symptoms, with increasing MRS scores; this is statistically significant at *p*-value <0.001.

Correlation of Age and Sleep Quality

Pearson correlation coefficient R is 0.204, indicating a weak positive correlation between age and sleep quality. This correlation suggests that, as age increases, the PSQI score slightly increases, indicating poor sleep; this is statistically significant at a *p*-value of 0.019.

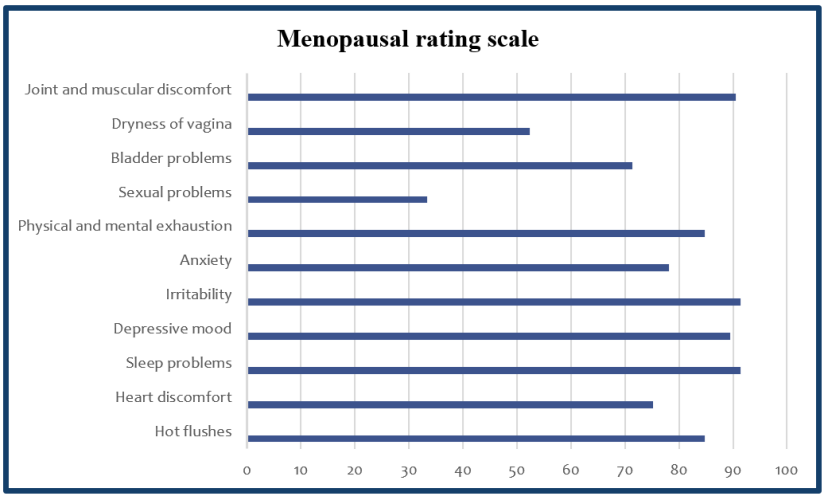

Figure 2: Distribution of menopausal symptoms among the study subjects.

Table 2: Linear regression analysis of factors influencing sleep disorders.

Predictors	R	R Square	Unstandardized coefficient		Standardized coefficient			95% Confidence interval	
			β	Standard error	β	t	*p* value	Lower Bound	Upper Bound
AGE (Independent variable)	0.204	0.041	0.136	0.065	0.204	2.111	0.037	0.008	0.264
MRS (Independent variable)	0.436	0.190	0.246	0.050	0.436	4.911	<0.001	0.147	0.345

Regression Analysis of Menopausal Symptoms and Age with Sleep Quality

The R Square value of 0.190 while comparing sleep quality with menopausal symptoms suggests that 19% of the variation in sleep quality was due to the severity of menopausal symptoms (*p*:<0.001).

The R Square value is 0.041, 190 while comparing sleep quality with age indicates that approximately 4.1% of the variation in sleep quality was due to age *p*:<0.001 (Table 2).

DISCUSSION

Menopause, being the permanent cessation of menstruation, is preceded by perimenopause, a transitional period marked by fluctuating estrogen levels. As estrogen deficiency progresses, women may experience menopausal symptoms in which sleep disturbances are the most common and significant symptoms during menopause. Lack of sleep can negatively affect physical health, psychological state, cognitive function, and social life.

The mean age of subjects in the current study was found to be 50.24±3.51 years; this aligns with a study conducted by Rahman *et al.*, (2010) where the calculated mean age was found to be 50.33±5.26; this contradicts the study conducted by Karmakar N *et al* (Karmakar *et al.*, 2010) where the mean age was 49.55±4.69. The most prevalent comorbid conditions among menopausal women were found to be hypertension (13.3%), Type 2 diabetes mellitus (10.5%), and 1.9% had both; this aligns with the study results of Ahmady *et al.*, (2022) where diabetes, cardiovascular disease, and other chronic conditions were reported by 24.1%, 9.6%, and 11.8% of participants, respectively.

Menopause is predicted to be affected by changes in behaviour and other biological functions, including irritability, anxiety, stress, amnesia, and sleep disruptions (Weber *et al.*, 2013; Twiss *et al.*, 2007; Jehan *et al.*, 2015). This runs parallel to our study results, where we found that the majority of the study subjects were found to have mild irritability (55.2%), moderate sleep problems (61.9%), moderate joint discomfort (53.3%), and moderate depressive mood (64.8%).

The current study also found that sleep quality was poor for most of the study subjects (81.0%), whereas 19% of the subjects were found to have a sound sleep; this result is supported by the review articles by Polo-Kantola *et al.*, (2011) and Guidozzi, (2013), which suggested that sleep disruptions may arise during the menopausal transition phase and post-menopause in association with primary sleep disorders.

In a study on 67 menopausal women by Agan *et al.*, (2015), sleep quality was assessed using PSQI, and the results of PSQI showed 59.7% (*n*=40) of the women were found to have poor sleep quality. This supports the results of our study where PSQI

(Pittsburgh Sleep Quality Index) interpretation found that 14.2% of the study subjects did not need medical assessment for sleep, 39% required medical assessment, and the majority of the study subjects (46.6%) required care and medical treatment for sleep.

The results of cross-sectional surveys by Khatoon *et al.*, (2018) and Nisar *et al.*, (2010) on 121 and 3062 women showed that the prevalence of menopausal symptoms was high, but the severity was mild to moderate. These findings align with our study results, where we found a moderate positive correlation between menopausal symptoms and sleep quality; thus, most of the study subjects experienced moderate menopausal symptoms with increasing MRS scores.

A cross-sectional analytical study conducted by Ahamdy *et al.*, (2022) on 323 menopausal women found a significant correlation between PSQI and age, indicating poor sleep quality with an increase in age. Similarly, there was a substantial association between BMI and sleep quality. These results run parallel to our findings, where, as age increases, the PSQI score slightly increases, indicating poor sleep.

CONCLUSION

Poor quality of sleep is prevalent among menopausal women and is strongly associated with the intensity of menopausal symptoms, with age having a reduced impact. Improving menopausal sleep quality requires addressing menopausal symptoms and considering age-related factors. This emphasizes the necessity of therapies to address menopausal symptoms to enhance the quality of sleep and general well-being in this population.

ACKNOWLEDGEMENT

The researchers would like to thank the faculties of Department of Pharmacy Practice, NGSM Institute of Pharmaceutical Sciences, Nitte (Deemed to be University) and Department of Obstetrics and Gynecology, KS Hegde Medical Academy and Justice KS Hegde Charitable Hospital, Deralakatte for their support through out the study.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

PSQI: Pittsburgh Sleep Quality Index, **BMI:** Body Mass Index, **T2DM**: Type 2 Diabetes Mellitus, **MRS**: Menopause Rating Scale.

REFERENCES

Abdelaziz, E. M., Elsharkawy, N. B., & Mohamed, S. M. (2022). The relationship between sleep quality and menopausal symptoms among postmenopausal women in Saudi Arabia. Saudi Medical Journal, 43(4), 401–407. https://doi.org/10.15537/smj.2022.43.4.20210682.

Ağan, K., Özmerdivenli, R., Değirmenci, Y., Çağlar, M., Başbuğ, A., Balbay, E. G., & Sungur, M. A. (2015). Evaluation of sleep in women with menopause: Results of the Pittsburg Sleep Quality Index and polysomnography. Journal of the Turkish German Gynecological Association, 16(3), 149–152. https://doi.org/10.5152/jtgga.2015.15087.

Ahmady, F., Niknami, M., & Khalesi, Z. B. (2022). Quality of sleep in women with menopause and its related factors. Sleep Science, 15(Spec 1), 209–214. https://doi.org/10.5935/1984-0063.20220021.

Ahuja, M. (2016). Age of menopause and determinants of menopause age: A PAN India survey by IMS. Journal of Mid-Life Health, 7(3), 126–131. https://doi.org/10.4103/0976-7800.191012.

Arar, M. A., & Erbil, N. (2023). The effect of menopausal symptoms on women's daily life activities. Przeglad Menopauzalny = Menopause Review, 22(1), 6–15. https://doi.org/10.5114/pm.2023.126436

Buysse, D. J., Reynolds III, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. Psychiatry Research, 28(2), 193–213. https://doi.org/10.1016/0165-1781(89)90047-4

Guidozzi, F. (2013). Sleep and sleep disorders in menopausal women. Climacteric, 16(2), 214–219. https://doi.org/10.3109/13697137.2012.753873

Hauser, G. A., Huber, I. C., Keller, P. J., Lauritzen, C., & Schneider, H. P. (1994). Evaluation of climacteric symptoms (menopause rating scale). Zentralblatt für Gynäkologie, 116(1), 16–23.

Jehan, S., Masters-Isarilov, A., Salifu, I., Zizi, F., Jean-Louis, G., Pandi-Perumal, S. R., Gupta, R., Brzezinski, A., & McFarlane, S. I. (2015). Sleep disorders in postmenopausal women. Journal of Sleep Disorders and Therapy, 4(5), 212.

Karmakar, N., Majumdar, S., Dasgupta, A., & Das, S. (2017). Quality of life among menopausal women: A community-based study in a rural area of West Bengal. Journal of Mid-Life Health, 8(1), 21–27. https://doi.org/10.4103/jmh.JMH_78_16

Khatoon, A., Husain, S., Husain, S., & Hussain, S. (2018). An overview of menopausal symptoms using the menopause rating scale in a tertiary care center. Journal of Mid-Life Health, 9(3), 150–154. https://doi.org/10.4103/jmh.JMH_31_18

Kim, M.-J., Yim, G., & Park, H.-Y. (2018). Vasomotor and physical menopausal symptoms are associated with sleep quality. PLOS One, 13(2), Article e0192934. https://doi.org/10.1371/journal.pone.0192934

Nisar, N., & Sohoo, N. A. (2010). Severity of Menopausal symptoms and the quality of life at different status of Menopause: A community based survey from rural Sindh, Pakistan. International Journal of Collaborative Research on Internal Medicine and Public Health, 2(5), 118.

Polo-Kantola, P. (2011). Sleep problems in midlife and beyond. Maturitas, 68(3), 224–232. https://doi.org/10.1016/j.maturitas.2010.12.009

Potthoff, P., Heinemann, L. A., Schneider, H. P., Rosemeier, H. P., & Hauser, G. A. (2000). The Menopause Rating Scale (MRS II): Methodological standardization in the German population. Zentralblatt für Gynäkologie, 122(5), 280–286.

Rahman, S. A. S. A., Zainudin, S. R., & Mun, V. L. K. (2010). Assessment of menopausal symptoms using modified Menopause Rating Scale (MRS) among middle age women in Kuching, Sarawak, Malaysia. Asia Pacific Family Medicine, 9(1), 5. https://doi.org/10.1186/1447-056X-9-5

Santos, M. A. D., Vilerá, A. N., Wysocki, A. D., Pereira, F. H., Oliveira, D. M. D., & Santos, V. B. (2021). Sleep quality and its association with menopausal and climacteric symptoms. Revista Brasileira de Enfermagem, 74Suppl(2)(Suppl. 2), Article e20201150. https://doi.org/10.1590/0034-7167-2020-1150

Twiss, J. J., Wegner, J., Hunter, M., Kelsay, M., Rathe-Hart, M., & Salado, W. (2007). Perimenopausal symptoms, quality of life, and health behaviors in users and nonusers of hormone therapy. Journal of the American Academy of Nurse Practitioners, 19(11), 602–613. https://doi.org/10.1111/j.1745-7599.2007.00260.x

Weber, M. T., Rubin, L. H., & Maki, P. M. (2013). Cognition in perimenopause: The effect of transition stage. Menopause, 20(5), 511–517. https://doi.org/10.1097/gme.0b013e31827655e5

Zagalaz-Anula, N., Hita-Contreras, F., Martínez-Amat, A., Cruz-Díaz, D., Aibar-Almazán, A., Barranco-Zafra, R. J., & Lomas-Vega, R. (2019). The associations between menopausal symptoms and sleep quality in Spanish postmenopausal women. Climacteric, 22(5), 511–517. https://doi.org/10.1080/13697137.2019.1609439

Cite this article: Twinkle MJS, Anand AK, Rajesh N, George JM, Shaji B, Radhakrishnan K, *et al.* Assessment of Sleep Quality Among Menopausal Women and its Relationship with Menopausal Symptoms. Int. J. Pharm. Investigation. 2026;16(1):330-5.