Klinik: Jurnal Ilmiah Kedokteran dan Kesehatan
Volume. 5, Nomor. 3 September 2026
e-ISSN: 2809-2090; p-ISSN: 2809-235X, Hal. 251-260
DOI: https://doi.org/10.55606/klinik.v5i3.7317
Tersedia: https://journalcenter.org/index.php/KLINIK

Determinants of Somatic Symptoms in Menopausal Women: The Role of Body Mass Index, Hemoglobin Levels, and Age

Sumarni Sumarni[1]*, Dyah Puji Astuti[2], Fitria Prabandari[3], Ossie Happinasari[4]
[1-4]Porgram Studi Sarjana Kebidanan,Universitas Muhammadiyah Gombong, Indonesia
**Penulis Korespondensi: sumarni2880@gmail.com*

Abstract. Background: Menopause is a physiological condition characterized by the permanent cessation of ovarian function and is often accompanied by somatic symptoms that may impair women's quality of life. Biological factors, including hemoglobin (Hb) levels, nutritional status, and age, may contribute to the occurrence of somatic symptoms among menopausal women. Objective: To analyze the association of hemoglobin levels, mid-upper arm circumference (MUAC), and age with somatic symptoms among menopausal women in Pasir Lor Village, Karanglewas District, Banyumas. Methods: This quantitative study employed an observational analytic design with a cross-sectional approach. A total of 67 menopausal women were recruited using total sampling. Hemoglobin levels were measured using a digital hemoglobinometer, MUAC was assessed using a measuring tape, age was obtained through interviews, and somatic symptoms were evaluated using the somatic domain of the Menopause Rating Scale (MRS). Data were analyzed using Spearman correlation and multiple linear regression tests. Results: The mean Hb level was 13.05±1.27 g/dL, MUAC was 26.97±3.38 cm, age was 54 (43–70) years, and the somatic symptom score was 3 (0–12). Hb (r=-0.341; p=0.005) and MUAC (r=-0.277; p=0.023) were significantly and negatively correlated with somatic symptoms. Age was not significantly associated with somatic symptoms (r=0.064; p=0.609). Multiple linear regression identified Hb as the most dominant factor associated with somatic symptoms (β=-0.290; p=0.016). Conclusion: Hemoglobin levels and MUAC were significantly associated with somatic symptoms among menopausal women, whereas age was not. Hemoglobin level was the strongest predictor of somatic symptoms.

Keywords: Age; Hemoglobin; Menopause; Mid-Upper Arm Circumference; Somatic Symptoms.

1. INTRODUCTION

Menopause is a natural physiological process experienced by women, characterized by the permanent cessation of ovarian function after 12 consecutive months without menstruation. The decline in estrogen levels during menopause causes various physical, psychological, and social changes that can affect women's quality of life. Common symptoms include somatic complaints such as joint and muscle pain, sleep disturbances, fatigue, hot flashes, and other physical discomforts (Putri et al., 2026). These changes occur due to the decline in ovarian follicular function, which reduces estrogen production and results in vasomotor, musculoskeletal, psychological, and sleep-related symptoms that may persist for several years after menopause (Duralde et al., 2023;Jan & Rosie, 2023).

Globally, the number of menopausal women continues to increase alongside rising life expectancy. Consequently, menopausal health issues have become an important public health concern, particularly in developing countries, including Indonesia. Menopausal symptoms can persist for extended periods and adversely affect daily activities, productivity, and psychosocial well-being. Previous studies have shown that somatic symptoms are among the most prevalent complaints reported by menopausal women, compared with psychological and urogenital symptoms (Putri et al., 2026). It is estimated that the number of postmenopausal women worldwide will continue to increase, reaching approximately 1.65 billion by 2050, making menopause-related health issues a major challenge for global health systems (Duralde et al., 2023).

Various biological factors and individual characteristics influence somatic symptoms in menopausal women. One factor that has been suggested to be associated with these symptoms is Body Mass Index (BMI). Hormonal changes during menopause lead to alterations in metabolism and increased body fat accumulation, which may exacerbate menopausal symptoms. Studies examining the relationship between BMI and menopausal symptoms have produced inconsistent findings. Some studies have reported that a higher BMI is associated

Naskah Masuk: 10 Maret 2026 ; Revisi: 12 April 2026; Diterima: 15 Mei 2026; Tesedia: 22 Juni 2026

with more severe somatic complaints, whereas others have found conflicting results (Surmiasih et al., 2025). Zulfi et al., (2021) reported that BMI was associated with menopausal symptoms, particularly physical and somatic symptoms experienced during menopause. Similarly, Wang et al., (2021) found that nutritional status and physical characteristics contribute to the severity of menopausal symptoms.

In addition to BMI, hemoglobin (Hb) levels may also influence the occurrence of somatic symptoms in menopausal women. Low Hb levels can reduce oxygen delivery to body tissues, resulting in fatigue, weakness, headaches, and decreased physical fitness, symptoms that closely resemble menopausal somatic complaints. However, studies investigating the relationship between Hb levels and somatic symptoms in menopausal women remain limited and require further exploration. Physiologically, anemia or low hemoglobin levels reduce the oxygen-carrying capacity of the blood, leading to increased fatigue, physical weakness, and reduced quality of life, conditions that often overlap with menopausal symptoms (Jan & Rosie, 2023; Kimse et al., 2024).

Age is another important determinant of menopausal symptoms. Advancing age is associated with a gradual decline in physiological function, which may increase the severity of menopausal complaints. Older women tend to experience more musculoskeletal changes, sleep disturbances, and reductions in quality of life compared with younger menopausal women (Rahayu & Abror, 2024). Previous studies have demonstrated that increasing age is associated with a higher prevalence and greater severity of menopausal symptoms, particularly somatic symptoms and impaired quality of life (Espitia de la Hoz, 2024;Kochersberger et al., 2024).

Previous studies have primarily investigated menopausal symptoms in general without specifically focusing on the somatic symptom domain and have rarely examined BMI, hemoglobin levels, and age simultaneously within a single analytical model. Furthermore, research on the determinants of somatic symptoms among menopausal women in rural settings remains limited, particularly in Pasir Lor Village, Karanglewas District, Banyumas. Differences in social conditions, lifestyle, nutritional status, and access to healthcare services between rural and urban populations may contribute to variations in menopausal experiences. Recent studies have also shown that the severity of menopausal symptoms is influenced by a complex interaction of demographic, socioeconomic, and biological factors, highlighting the need for a multidimensional approach to identifying factors associated with menopausal symptoms (Kochersberger et al., 2024; Wang et al., 2021).

Based on the above rationale, this study is important to analyze the determinants of somatic symptoms among menopausal women based on Body Mass Index (BMI), hemoglobin (Hb) levels, and age in Pasir Lor Village, Karanglewas District, Banyumas. The findings of this study are expected to provide a basis for the development of promotive and preventive programs aimed at improving the health and quality of life of menopausal women in the community.

2. RESEARCH METHOD

This quantitative study employed an observational analytic design with a cross-sectional approach. The study was conducted in Pasir Lor Village, Karanglewas District, Banyumas Regency, Indonesia, from January to March 2026. The cross-sectional design was used to examine the associations between body mass index (BMI), hemoglobin (Hb) level, age, and somatic symptoms among menopausal women.

The study population comprised all menopausal women residing in Pasir Lor Village. A total of 67 respondents were recruited using a total sampling technique. Eligible participants were women who had experienced natural menopause, were aged 45–65 years, provided written informed consent, and were able to communicate effectively. Women with severe chronic diseases, mental disorders, or incomplete data were excluded from the study.

The independent variables were BMI, Hb level, and age, whereas the dependent variable was somatic symptoms. BMI was calculated by dividing body weight (kg) by the square of height (m^2). Hemoglobin levels were measured using a digital hemoglobinometer. Age was obtained through direct interviews. Somatic symptoms were assessed using the somatic domain of the Menopause Rating Scale (MRS), a validated instrument commonly used to evaluate menopausal symptoms.

Data collection was performed after obtaining research permission and informed consent from all participants. Anthropometric measurements, hemoglobin examinations, and questionnaire administration were conducted directly by the researcher.

Data were analyzed using IBM SPSS Statistics version 31. Univariate analysis was conducted to describe participant characteristics and study variables. Normally distributed variables were presented as mean ± standard deviation (SD), whereas non-normally distributed variables were presented as median and range. Categorical variables were presented as frequencies and percentages. The normality of the data was assessed using the Shapiro–Wilk test. Bivariate analysis was performed using Spearman's rank correlation test to determine the association between independent variables and somatic symptoms. Variables included in the bivariate analysis were subsequently entered into a multiple linear regression model to identify the dominant factors associated with somatic symptoms. Statistical significance was defined as $p < 0.05$.

Ethical approval was obtained from the Health Research Ethics Committee of Universitas Muhammadiyah Gombong (No. 008.6/II.3.AU/F/KEPK/I/2026). All procedures were conducted in accordance with ethical principles, including informed consent, confidentiality, anonymity, and beneficence.

3. RESULTS AND DISCUSSION

Univariate Analysis

Table 1. Descriptive Statistics of Study Variables in Menopausal Women (n=67)

Variable	Data Distribution	Value
Hemoglobin (Hb) (g/dL)	Mean ± SD	13.05 ± 1.27
Mid-Upper Arm Circumference (MUAC) (cm)	Mean ± SD	26.97 ± 3.38
Age (years)	Median (Min–Max)	54 (43–70)
Somatic Symptom Score	Median (Min–Max)	3 (0–12)

Based on Table 1, the mean hemoglobin (Hb) level of the respondents was 13.05 ± 1.27 g/dL, while the mean mid-upper arm circumference (MUAC) was 26.97 ± 3.38 cm. Variables that were not normally distributed were presented as median (minimum–maximum). The median age of the respondents was 54 years (43–70 years), and the median somatic symptom score was 3 (0–12). These findings indicate that the majority of respondents were in the middle to late menopausal period and generally experienced mild to moderate somatic symptoms.

Bivariate analysis

Normality test

Table 2. Results of the Shapiro–Wilk Normality Test (n = 67)

Variable	Shapiro–Wilk p-value	Distribution
Hemoglobin (Hb)	0.194	Normal
Mid-Upper Arm Circumference (MUAC)	0.146	Normal
Age	<0.001	Not normal
Somatic Symptom Score	<0.001	Not normal

Note: Data were considered normally distributed when the Shapiro–Wilk test yielded a p-value > 0.05. Variables with p-values < 0.05 were considered not normally distributed.

Based on the Shapiro–Wilk normality test, Hb level (p = 0.194) and MUAC (p = 0.146) were normally distributed, whereas age (p < 0.001) and somatic symptom score (p < 0.001) were not normally distributed. Consequently, bivariate analysis was performed using Spearman's rank correlation test.

Table 3. Results of Spearman Correlation Analysis Between Hemoglobin Level, Mid-Upper Arm Circumference (MUAC), Age, and Somatic Symptoms Among Menopausal Women (n = 67)

Variable	Correlation Coefficient (r)	p-value	Interpretation
Hemoglobin (Hb)	-0.341	0.005	Significant
Mid-Upper Arm Circumference (MUAC)	-0.277	0.023	Significant
Age	0.064	0.609	Not Significant

As presented in Table 3, Spearman correlation analysis revealed a significant negative correlation between hemoglobin (Hb) level and somatic symptoms among menopausal women (r = -0.341; p = 0.005). Similarly, MUAC was significantly and negatively correlated with somatic symptoms (r = -0.277; p = 0.023). In contrast, age was not significantly correlated with somatic symptoms (r = 0.064; p = 0.609).

These findings indicate that higher hemoglobin levels and better nutritional status, as reflected by MUAC, are associated with lower somatic symptom scores among menopausal women. However, age was not significantly associated with somatic symptoms in the study population.

Multivariate Analysis

Table 4. Results of Multiple Linear Regression Analysis of Factors Associated with Somatic Symptoms Among Menopausal Women (n = 67)

Variable	B	SE	β	t	p-value	95% CI
Constant	20.503	5.853	–	3.503	<0.001	8.806 to 32.200
Hemoglobin (Hb)	-0.738	0.297	-0.290	-2.487	0.016*	-1.332 to -0.145
Mid-Upper Arm Circumference (MUAC)	-0.247	0.111	-0.258	-2.221	0.030*	-0.470 to -0.025
Age	-0.007	0.064	-0.012	-0.106	0.916	-0.134 to 0.121

Note: β = Standardized Coefficient; SE = Standard Error; CI = Confidence Interval; *p < 0.05.

Table 5. Feasibility of Multiple Linear Regression Model

Parameter	Nilai
R	0,400
R Square	0,160
Adjusted R Square	0,120
Standard Error of Estimate	3,037
F hitung	3,998
p-value	0,011*
Durbin-Watson	1,781

Note: *p<0,05.

Multiple linear regression analysis showed that the overall model was statistically significant (F = 3.998; p = 0.011). The adjusted coefficient of determination (Adjusted R^2) was 0.120, indicating that hemoglobin (Hb), mid-upper arm circumference (MUAC), and age collectively explained 12.0% of the variation in somatic symptom scores among menopausal women, while the remaining 88.0% was attributable to other factors not included in the model.

Partial regression analysis revealed that Hb level was significantly associated with somatic symptoms (B = -0.738; β = -0.290; p = 0.016). Similarly, MUAC was significantly associated with somatic symptoms (B = -0.247; β = -0.258; p = 0.030). In contrast, age was not significantly associated with somatic symptoms (B = -0.007; β = -0.012; p = 0.916).

The negative regression coefficients indicate that higher Hb levels and greater MUAC were associated with lower somatic symptom scores. Based on the standardized regression coefficients (β), Hb was identified as the most influential factor associated with somatic symptoms, followed by MUAC.

Regression Equation

The multiple linear regression model was expressed as follows:

$$\text{Somatic Symptom Score} = 20.503 - 0.738(\text{Hb}) - 0.247(\text{MUAC}) - 0.007(\text{Age})$$

where:

Hb = hemoglobin level (g/dL);

MUAC = mid-upper arm circumference (cm);

Age = respondent's age (years).

This equation indicates that an increase of 1 g/dL in Hb level is associated with a 0.738-point decrease in the somatic symptom score, while a 1 cm increase in MUAC is associated with a 0.247-point decrease in the somatic symptom score, after controlling for the other variables in the model. Age was not a significant predictor of somatic symptoms.

4. DISCUSSION

Relationship between Hemoglobin Levels and Somatic Symptoms in Menopausal Women

The present study demonstrated a significant negative association between hemoglobin (Hb) levels and somatic symptoms among menopausal women ($r = -0.341$; $p = 0.005$). Furthermore, multiple linear regression analysis identified Hb as the most dominant factor associated with somatic symptoms ($\beta = -0.290$; $p = 0.016$). These findings indicate that higher Hb levels are associated with lower somatic symptom scores in menopausal women.

Hemoglobin plays a crucial role in transporting oxygen to body tissues. Reduced Hb levels may impair oxygen delivery, leading to fatigue, weakness, headaches, decreased concentration, and reduced physical performance. These conditions may exacerbate physical complaints commonly experienced during menopause, including musculoskeletal discomfort, sleep disturbances, and persistent fatigue. Therefore, adequate Hb levels may contribute to maintaining physical function and reducing the severity of somatic symptoms during the menopausal transition.

The findings of this study are consistent with previous evidence indicating that poor physical health status and reduced physiological function are associated with increased menopausal symptom severity and lower quality of life among middle-aged women (de Santiago Nogueira et al., 2022). Women with better hematological status generally demonstrate greater physical resilience, which may help mitigate the impact of menopausal symptoms on daily activities and overall well-being.

Relationship between MUAC and Somatic Symptoms in Menopausal Women

This study also found a significant negative association between mid-upper arm circumference (MUAC) and somatic symptoms ($r = -0.277$; $p = 0.023$). The association remained significant in the multivariate model after adjustment for Hb levels and age ($\beta = -0.258$; $p = 0.030$). These findings suggest that menopausal women with better nutritional status tend to experience fewer somatic symptoms.

MUAC is a widely used anthropometric indicator of nutritional status that reflects body energy reserves and muscle mass. Adequate nutritional status supports metabolic processes, maintains muscle strength, and contributes to overall physical health. In contrast, poor nutritional status may increase susceptibility to fatigue, musculoskeletal pain, and reduced physical capacity, which are common manifestations of somatic symptoms during menopause.

The present findings are in agreement with the study by Zulfi et al., (2021), which reported a significant association between anthropometric status and the severity of menopausal symptoms. Women with poorer nutritional status were more likely to experience

severe menopausal complaints than those with normal nutritional status. Similar findings were reported by Liao et al., (2024), who demonstrated that nutritional status and anthropometric measurements were significantly associated with menopausal symptom severity. In addition, Rautenberg et al., (2023) highlighted the important contribution of physical health and lifestyle factors to menopausal symptoms, particularly somatic complaints that may negatively affect quality of life.

Taken together, these findings emphasize the importance of maintaining adequate nutritional status and optimal physical health among menopausal women. Strategies aimed at improving nutritional status and preventing anemia may help reduce somatic symptoms and enhance quality of life during the menopausal period.

Relationship Between Age and Somatic Symptoms in Menopausal Women

The present study found no significant association between age and somatic symptoms among menopausal women ($r = 0.064$; $p = 0.609$). Similarly, multiple linear regression analysis indicated that age was not a significant predictor of somatic symptoms ($\beta = -0.012$; $p = 0.916$).

The absence of a significant association may be attributed to the relatively homogeneous age distribution of the participants, with a mean age of 56.39 years. In addition, the occurrence and severity of menopausal symptoms are influenced not only by chronological age but also by several other factors, including nutritional status, health conditions, physical activity, psychological well-being, and social support.

These findings are consistent with those reported by Kochersberger et al., (2024), who found that menopausal symptom severity is not solely determined by age but is influenced by a complex interaction of biological, behavioral, and socioeconomic factors. Some women may experience reduced symptom severity as they adapt to hormonal changes following menopause. Similarly, Misiker et al., (2023) reported that variations in menopausal symptoms are more strongly associated with biological and socioeconomic factors than with age alone. Rautenberg et al., (2023) also demonstrated that menopausal symptoms may vary substantially among women within the same age group, indicating that age is not the sole determinant of symptom severity.

Therefore, age alone may not be an adequate indicator for predicting somatic symptoms in menopausal women. A comprehensive assessment that includes nutritional, physical, psychological, and social factors is necessary to better understand the occurrence of menopausal symptoms.

Dominant Factors Associated with Somatic Symptoms in Menopausal Women

The multiple linear regression model was statistically significant ($F = 3.998$; $p = 0.011$), indicating that the independent variables included in the model were collectively associated with somatic symptoms. The adjusted coefficient of determination (Adjusted R^2) was 0.120, suggesting that hemoglobin level, mid-upper arm circumference (MUAC), and age explained 12.0% of the variation in somatic symptom scores among menopausal women. The remaining 88.0% of the variation may be attributed to other factors not included in the present study.

Based on the standardized regression coefficients, hemoglobin level emerged as the most dominant factor associated with somatic symptoms ($\beta = -0.290$), followed by MUAC ($\beta = -0.258$). These findings indicate that physical health and nutritional status play important roles in the occurrence of somatic symptoms among menopausal women. Adequate hemoglobin levels and better nutritional status may contribute to improved physiological function and reduced physical complaints during menopause.

The relatively low coefficient of determination suggests that menopausal symptoms are multifactorial in nature. Factors such as physical activity, dietary patterns, hormonal status, sleep quality, psychological stress, and social support may also contribute to the severity of somatic symptoms. Previous studies have similarly reported that menopausal symptoms result from complex interactions among biological, lifestyle, and socioeconomic factors (Kochersberger et al., 2024).

Overall, the findings highlight the importance of maintaining adequate hemoglobin levels and nutritional status as part of strategies to reduce somatic symptoms in menopausal women. Health promotion and preventive interventions focusing on nutrition, anemia prevention, and physical health maintenance may help improve the quality of life of women during the menopausal period (Wu et al., 2023).

5. CONCLUSION

This study involving 67 menopausal women in Pasir Lor Village, Karanglewas District, Banyumas Regency found that the mean hemoglobin (Hb) level was 13.05 ± 1.27 g/dL, the mean mid-upper arm circumference (MUAC) was 26.97 ± 3.38 cm, the mean age was 56.39 ± 5.91 years, and the mean somatic symptom score was 3.82 ± 3.24. Bivariate analysis demonstrated that Hb level and MUAC were significantly and negatively associated with somatic symptoms, whereas age was not significantly associated with somatic symptoms. Multiple linear regression analysis indicated that the model was statistically significant ($p = 0.011$) and explained 12.0% of the variation in somatic symptom scores. Hb level was identified

as the most dominant factor associated with somatic symptoms (β = -0.290), followed by MUAC (β = -0.258). These findings suggest that hematological status and nutritional status are important factors associated with the occurrence of somatic symptoms among menopausal women.

Healthcare providers should strengthen promotive and preventive interventions through regular monitoring of hemoglobin levels and nutritional status among menopausal women. Health education programs focusing on balanced nutrition, anemia prevention, and healthy lifestyle practices are also recommended to help reduce somatic symptoms and improve quality of life. Future studies should investigate additional factors that may influence somatic symptoms, including physical activity, sleep quality, hormonal status, psychological conditions, and social support, using larger and more diverse study populations.

REFERENCES

de Santiago Nogueira, C. M. C., Silva, B. D. dos S., Costa, H. M. G. S., de Alcantara, J. R., Morais, F. R. R., Ferreira Barros, R. J. M. L., Feitosa de Melo Rabelo, S. M., Vieira Pereira, E., Lopes de Paiva Cavalcanti, J. R., Teixeira Fernandes, N., & de Melo Fialho, A. V. (2022). Clinical profile and quality of life in climacteric women. *BMC Nursing, 21*, Article 207. https://doi.org/10.1186/s12912-022-00954-7

Duralde, E. R., Sobel, T. H., & Manson, J. A. E. (2023). Management of perimenopausal and menopausal symptoms. *BMJ, 382*, e072612. https://doi.org/10.1136/bmj-2022-072612

Espitia de la Hoz, F. (2024). Prevalencia y severidad de los síntomas de la menopausia en mujeres mayores de 60 años. *Revista Colombiana de Endocrinología, Diabetes & Metabolismo, 11*. https://doi.org/10.53853/encr.11.1.853

Jan, R., & Rosie, A. (2023). Non-hormonal treatments of menopausal symptoms. *InnovAiT: Education and Inspiration for General Practice, 16*(3), 140–143. https://doi.org/10.1177/17557380231153677

Kimse, L., Reinis, A., Mikelsone-Jansone, L., Gintere, S., & Krumina, A. (2024). A narrative review of psychobiotics: Probiotics that influence the gut–brain axis. *Medicina, 60*(4), 601. https://doi.org/10.3390/medicina60040601

Kochersberger, A., Coakley, A., Millheiser, L., Morris, J. R., Manneh, C., Jackson, A., Garrison, J. L., & Hariton, E. (2024). The association of race, ethnicity, and socioeconomic status on the severity of menopause symptoms: A study of 68,864 women. *Menopause, 31*(5), 476–483. https://doi.org/10.1097/GME.0000000000002349

Liao, S., Zhao, L., Huang, C., Xiong, A., Xiong, W., He, Y., Huang, X., Hunter, V., & Luo, B. (2024). One-year trajectories of nutritional status in perimenopausal women: A community-based multi-centered prospective study. *BMC Public Health, 24*, Article 1374. https://doi.org/10.1186/s12889-024-18405-0

Misiker, B., Kashala, K., & Misker, D. (2023). The severity of menopause and associated factors among middle-aged women residing in Arba Minch, DHSS, Ethiopia, 2022. *BMC Women's Health, 23*, Article 264. https://doi.org/10.1186/s12905-023-02442-9

Putri, B. S. F., Supinganto, A., & Hendry, Z. (2026). Identifikasi gejala menopause pada perempuan usia 45–55 tahun berdasarkan menopause rating scale di komunitas. *Jurnal Keperawatan, 18*(1), 115–124.

Rahayu, I. G., & Abror, Y. K. (2024). Korelasi kadar trigliserida dengan usia pada wanita menopause. *Jurnal Riset Kesehatan Poltekkes Depkes Bandung, 16*(2), 466–472. https://doi.org/10.34011/juriskesbdg.v16i2.2398

Rautenberg, T. A., Ng, S. K. A., & Downes, M. (2023). A cross-sectional study of symptoms and health-related quality of life in menopausal-aged women in China. *BMC Women's Health, 23*, Article 576. https://doi.org/10.1186/s12905-023-02728-y

Surmiasih, S., Putri, R. H., & Ismanto, A. Y. (2025). Indeks massa tubuh dan keluhan menopause: Studi korelatif pada wanita di Desa Jati Agung Pringsewu. *Journal of Nursing Invention, 6*(2), 106–116.

Wang, L. R., Zhang, R., Yang, Y., Sun, X. Y., Zhang, B. L., Zhu, H. Y., Luo, X. R., Ma, X. L., & Zhang, X. H. (2021). Severity and factors of menopausal symptoms in middle-aged women in Gansu Province of China: A cross-sectional study. *BMC Women's Health, 21*, Article 424. https://doi.org/10.1186/s12905-021-01531-x

Wu, S. W., Shi, Y., Zhao, Q., & Men, K. (2023). The relationship between physical activity and the severity of menopausal symptoms: A cross-sectional study. *BMC Women's Health, 23*, Article 211. https://doi.org/10.1186/s12905-023-02347-7

Zulfi, O. E., Dwiningsih, S. R., & Krisnana, I. (2021). The body mass index (BMI) related to menopause symptoms. *Indonesian Midwifery and Health Sciences Journal, 5*(1), 73–87. https://doi.org/10.20473/imhsj.v5i1.2021.73-87