

อาการวัยหมดระดูและความสัมพันธ์กับการสูญเสียผลิตภาพในการทำงานของพยาบาล ณ โรงพยาบาลแห่งหนึ่งในกรุงเทพมหานคร

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บทคัดย่อ

วัยหมดระดูเป็นช่วงชีวิตที่ผู้หญิงทุกคนต้องเผชิญ อาการวัยหมดระดูมีผลกระทบกับทั้งชีวิตประจำวันและชีวิตการทำงาน การศึกษานี้มีวัตถุประสงค์เพื่อศึกษาความสัมพันธ์ระหว่างอาการวัยหมดระดูกับการสูญเสียผลิตภาพในการทำงาน การศึกษาภาคตัดขวางเชิงวิเคราะห์นี้ทำสำมะโนครัวของพยาบาลอายุ 45 ถึง 60 ปี ณ โรงพยาบาลแห่งหนึ่งในกรุงเทพมหานคร โดยใช้แบบสอบถามประเมินอาการวัยหมดระดู (Menopause Rating Scale) โดยแบ่งเป็นกลุ่มที่ไม่มีอาการ/อาการเล็กน้อย อาการรุนแรงเล็กน้อย อาการรุนแรงปานกลาง และอาการรุนแรงมาก และประเมินการสูญเสียผลิตภาพในการทำงาน (Work Productivity and Activity Impairment: General Health) ใช้การวิเคราะห์การถดถอยโลจิสติกเพื่อวิเคราะห์ปัจจัยที่เกี่ยวข้องกับอาการวัยหมดระดูและการวิเคราะห์การถดถอยเชิงเส้นเพื่อวิเคราะห์ความสัมพันธ์ของอาการวัยหมดระดูกับการสูญเสียผลิตภาพในการทำงาน ในกลุ่มตัวอย่าง 182 คน พบความชุกของอาการวัยหมดระดูอยู่ที่ร้อยละ 74.2 แบ่งตามความรุนแรงเป็น ไม่มีอาการร้อยละ 25.8 รุนแรงเล็กน้อยร้อยละ 20.9 รุนแรงปานกลางร้อยละ 35.7 และรุนแรงมากร้อยละ 17.6 ตามลำดับ อาการวัยหมดระดู 3 อันดับแรก ได้แก่ อาการปวดกล้ามเนื้อหรือข้อต่อ อาการเหนื่อยล้าทางร่างกายและจิตใจ และเกี่ยวกับการนอนหลับ การศึกษาพบว่าความสัมพันธ์กับการมีอาการวัยหมดระดู โดยอัตราส่วนเติมต่ออยู่ที่ 3.65 (ความเชื่อมั่นร้อยละ 95: 1.03-12.94) พบค่าเฉลี่ยและส่วนเบี่ยงเบนมาตรฐานสัดส่วนของการลางานจากการเจ็บป่วย การมาทำงานแต่ไม่ได้งาน และการสูญเสียผลิตภาพในงานโดยรวมอยู่ที่ 1.13 (6.99), 28.52 (20.18) และ 29.00 (20.85) ตามลำดับ พบอาการวัยหมดระดูในระดับรุนแรงมากสัมพันธ์กับการมาทำงานแต่ไม่ได้งานโดยมีค่าเพิ่มขึ้นร้อยละ 20.84 (ความเชื่อมั่นร้อยละ 95: 11.10-30.59) และการสูญเสียผลิตภาพในงานโดยรวมโดยมีค่าเพิ่มขึ้นร้อยละ 20.49 (ความเชื่อมั่นร้อยละ 95: 10.39-30.58) เมื่อเทียบกับกลุ่มที่ไม่มีอาการหรืออาการเล็กน้อย ผลต่างค่าเฉลี่ยของร้อยละการมาทำงานแต่ไม่ได้งานและการสูญเสียผลิตภาพในงานโดยรวมมีแนวโน้มเพิ่มขึ้นตามระดับความรุนแรงของอาการวัยหมดระดู แต่แนวโน้มดังกล่าวไม่มีนัยสำคัญทางสถิติ จากการศึกษาเสนอแนะให้พยาบาลที่มีอาการวัยหมดระดูในระดับรุนแรงมากควรได้รับการวินิจฉัยสนับสนุนและมีกิจกรรมการช่วยเหลือที่เหมาะสม หรือการรักษา เพื่อป้องกันการสูญเสียผลิตภาพในการทำงานที่เกี่ยวข้องกับสุขภาพและการเกษียณอายุงานก่อนเวลา เพิ่มประสิทธิภาพในการทำงาน และรักษามาตรฐานการให้บริการของโรงพยาบาลต่อไปในอนาคต

คำสำคัญ: วัยหมดระดู; อาการวัยหมดระดู; การสูญเสียผลิตภาพในการทำงาน; พยาบาล

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Menopausal symptoms and work productivity loss among nurses in a hospital in Bangkok

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Abstract

Menopause is an inevitable phase in women's lives, often affecting daily routines and professional roles. This study examines the association of menopausal symptoms and work productivity loss among nurses in one of hospitals in Bangkok. This census-based, cross-sectional study examined nurses aged 45-60. Questionnaires were used to collect the Menopausal symptoms using the Menopausal Rating Scale (MRS), categorized into no/little, mild, moderate, and severe symptoms. While work productivity loss was measured using the Work Productivity and Activity Impairment: General Health (WPAI: GH) questionnaire. Multiple logistic regressions analyzed factors linked to menopausal symptoms, Multiple linear regressions assessed their relationship to work productivity loss. A total of 182 responses were collected. The overall prevalence of menopausal symptoms among nurses in this study was 74.2%. In terms of severity, the frequencies and percentages for no/little, mild, moderate, and severe symptoms were 25.8%, 20.9%, 35.7%, and 17.6%, respectively. The top three symptoms reported were muscle/joint discomfort, physical and mental exhaustion, and sleep problems. Alcohol use was found to be significantly associated with menopausal symptoms, aOR 3.65 (95% CI 1.03-12.94). The means and standard deviations for percentages of absenteeism, presenteeism, and overall work impairment were 1.13 (6.99), 28.52 (20.18), and 29.00 (20.85), respectively. Severe menopausal symptoms were significantly associated with percent presenteeism and overall work impairment, with adjusted mean differences of 20.84 percentage point (pp) (95% CI 11.10-30.59) and 20.49 pp (95% CI 10.39-30.58), compared to no/little symptoms (The associations of menopausal symptoms and work productivity loss, presenteeism and overall work impairment, found in this study were consistent with prior studies). Mean differences in percentage of presenteeism and overall work impairment increased with symptom severity; however, the results were not statistically significant. Findings in this study suggest that nurses with severe symptoms should be identified, supported, and provided with appropriate interventions or treatments to prevent costs from health-related productivity loss. And early retirement increase work productivity and hospital quality service in the future.

Keywords: menopause; menopausal symptoms; work productivity loss; nurses

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Introduction

The National Statistical Office of Thailand reported that the working population, aged 18 to 65, was 45 million, accounting for 68 percent of the Thai population in 2022¹. This demographic will soon transition into the aging population, as Thailand has already become an aging society. Therefore, the prevention and promotion of health and wellness should begin as early as possible to help the aging population maintain their health in the future.

The female population was reported to be 23 million, with half of them between the ages of 45 and 65. This group is experiencing the menopausal transition or entering the postmenopausal stage. The stages of menstruation in females can be divided into three phases: premenopausal, perimenopausal, and postmenopausal. The premenopausal stage begins with the onset of the menstrual cycle and lasts until the perimenopausal stage. The perimenopausal stage is characterized by irregular menstruation, with cycle variations of seven or more days. The postmenopausal stage is defined by the absence of menstruation for at least 12 consecutive months. During the menopausal transition, individuals may experience symptoms such as hot flashes, night sweats, fatigue, mood instability, anxiety, difficulty concentrating, and insomnia. Additionally, this population is reported to have a higher risk of osteoporosis, Alzheimer's disease, and cardiovascular diseases.

A high level of follicle-stimulating hormone (FSH) can aid in the diagnosis of

menopause; however, FSH levels can fluctuate. Therefore, diagnosis is primarily based on a patient's history, including symptoms and the absence of menstruation, while ruling out other potential conditions. Menopausal symptoms can be influenced by various factors, including body mass index (BMI), smoking, alcohol consumption, dieting behaviors, exercise habits, reproductive history, socioeconomic status, and work environment. Menopausal symptoms can inevitably impact both daily life and work life, as they may last for 10 to 15 years. This makes menopause one of the health conditions that significantly affects the female population aged 45 and older.

Previous studies reported a negative association between menopausal symptoms and work. Menopausal symptoms were found to be associated with decreased work productivity², decreased job satisfaction, decreased work engagement, greater intention to leave³, increased risk of absenteeism⁴, and increased presenteeism^{5,6}. Work productivity is the outcome of work efficiency, considering both input and output. From an organizational perspective, productivity loss represents an indirect cost resulting from workers' health problems, manifesting in two forms: absenteeism and presenteeism. Absenteeism occurs when workers do not report to work, while presenteeism refers to workers being present but not performing their tasks efficiently. Absenteeism can be influenced by factors such as health problems, family issues, and unsatisfactory work conditions. In contrast,

presenteeism can be affected by work-life balance, family socioeconomic status, health status, specialized job tasks, evaluation systems at work, rewards, and work-related stress.

Nurses are a vital part of hospital personnel and form the core of the hospital workforce. According to the 2023 annual report on health personnel data from the Strategy and Planning Division, Office of the Permanent Secretary, Ministry of Public Health, nurses represent the largest proportion of healthcare staff, accounting for 53.9%. They care for patients, perform medical procedures, and provide essential advice and information to both patients and their families. Nurses require a wide range of skills to fulfill their duties, as many are also involved in administrative, management, and academic responsibilities. The work performance of nurses can significantly influence the quality of care provided by the hospital. Productivity loss among nurses can lead to serious consequences, including medical errors and even patient death. Most nurses in Thailand are female, and therefore, they will undergo the menopausal transition and experience menopausal symptoms like other women in other jobs.

Previous studies have found that a higher proportion of nurses experience menopausal symptoms compared to the general population in China and the United States⁷. A cross-sectional study of nurses in Japan also reported an association between menopausal symptoms and increased job

stress⁸. Nurses experiencing menopausal symptoms also reported feelings of anxiety, lack of confidence, and indecision when performing medical procedures, which led to difficulty concentrating and interruptions in their work⁹. Despite prior research on menopausal symptoms and work productivity loss, variations in general and workplace culture may yield different findings. To address this issue and provide appropriate support, this study examines the association between menopausal symptoms and work productivity loss among nurses in a Thai hospital.

Materials and methods

This is a cross-sectional analytical study conducted in a hospital in Bangkok during April to November 2024. Ethical approval was granted by Nopparat Rajathanee hospital (COA 11/2567).

Participants in this study were registered nurses aged 45 to 60 years old, or those with a history of bilateral oophorectomy, radiation therapy, or chemotherapy. The exclusion criteria included those on leave at the time of data collection. This census-based study included a total of 210 registered nurses in this hospital. The Google Form link to the questionnaire was distributed by the head nurses of each department. Study details and informed consent were provided on the first page. The questionnaire used in this study was divided into three parts. The first part included questions about demographic information, obstetrics and gynecological history, and occupational information. The second part

consisted of the Thai version of Menopause Rating Scale (MRS) questionnaire. The third part featured the Thai version of Work Productivity and Activity Impairment: General Health (WPAI: GH) questionnaire.

The Menopause Rating Scale (MRS) is a questionnaire developed in the 1990s and validated by Heinemann et al. in 2004¹⁰. It assesses the severity of menopausal symptoms on a scale from 0 (no symptoms) to 4 (very severe symptoms) across three dimensions: psychological, vasomotor, and urogenital. The MRS questionnaire was translated and tested for content validity and reliability by Yotaka et al¹¹. The Thai version of the MRS achieved a Cronbach's alpha coefficient of 0.85. The results from the questionnaire are scores that can be categorized into four groups: 0-4 scores for no or minimal symptoms, 5-8 for mild symptoms, 9-16 for moderate symptoms, and 17 or higher for severe symptoms. In the analysis of the prevalence of nurses with menopausal symptoms and associated factors, participants will be grouped into two categories: those with no or minimal symptoms and those with mild, moderate, or severe symptoms combined. In the analysis of the association between menopausal symptoms and work productivity loss, participants will be categorized into the four original groups.

The WPAI: GH questionnaire was translated into Thai by the Reilly Association¹². The first three questions assessed hours spent working, hours absent due to health problems, and hours absent for reasons other than health problems. The fourth and fifth questions used

an ordinal scale (0 to 10) to evaluate the impact of health problems on work life and daily life. This study assessed content validity using the Index of Item Objective Congruence (IOC), with each question yielding a score of over 0.5. Reliability was tested through a pilot study, resulting in an intraclass correlation coefficient (ICC) of 0.98. The results can be calculated and expressed as absenteeism, presenteeism, overall work impairment, and activity impairment. This study will focus on the first three values. The scores are converted into percentages by multiplying by 100.

- Absenteeism = $\frac{\text{Question 1}}{(\text{Question 1} + \text{Question 3})}$

- Presenteeism = $\frac{\text{Question 4}}{10}$

- Overall work impairment = $\frac{\text{Question 1}}{(\text{Question 1} + \text{Question 3})} + [(1 - (\frac{\text{Question 1}}{\text{Question 1} + \text{Question 3}})) \times (\frac{\text{Question 4}}{10})] = \text{Absenteeism} + [(1 - \text{Absenteeism}) \times \text{Presenteeism}]$

Participant data were collected and stored anonymously. Data analysis was conducted using STATA SE version 18.0 (STATA Corp. LLC, College Station, TX, USA). Descriptive statistics included frequencies and percentages for qualitative data, and means or medians with standard deviations or interquartile range for quantitative data. Monthly income was categorized into two groups based on records from the Office of the Civil Service Commission: normal (15,050 - 43,600 Bath) and above normal (> 43,600 Bath). Logistic regression assessed the bivariate relationship between menopausal symptoms and other factors; multiple logistic regression with backward

stepwise selection identified associated factors. An exploratory model was applied to multiple logistic regression. Factors with a p -value < 0.25 and those identified in the literature as associated with menopausal symptoms were included in the model. A sensitivity analysis was conducted to evaluate the potential misclassification of menopause. Linear regression analyzed bivariate relationships between work productivity loss and related

factors, while multiple linear regression, utilizing an explanatory model, explored the association of menopausal symptoms and productivity loss. Multicollinearity was assessed through correlation and variance inflation factors (VIF). Variables with a correlation higher than 0.7 or with VIF higher than 10 were considered high risk for multicollinearity and were removed from the model.

Table 1 Demographic characteristics (n=182)

Variables	Frequency (%)
Age (years), mean (SD)	55.03 (4.79)
BMI (kg/m ²), median (Quartile 1, Quartile 3)	25.04 (22.19, 27.34)
Marital status	
Married	109 (59.89)
Single/divorced/separated	73 (40.11)
Chronic disease	
Denied chronic disease	90 (49.45)
Having chronic diseases	92 (50.55)
Alcohol	
Denied alcohol use	153 (84.07)
Alcohol use	29 (15.93)
Smoking	
Denied smoking	182 (100.00)
Exercise	
No exercise	65 (35.71)
Occasionally/regularly exercise	117 (64.29)
Age of menarche (years), mean (SD)	13.70 (1.71)
Reproductive history	
Denied childbirth history	73 (40.11)
Childbirth history	109 (59.89)

Table 1 Continued

Variables	Frequency (%)
Hormone use history	
Denied hormone use	144 (79.12)
Hormone use	38 (20.88)
Bilateral oophorectomy history	
Denied	164 (90.11)
Bilateral oophorectomy	18 (9.89)
Chemotherapy or radiation treatment history	
Denied	181 (99.45)
Chemotherapy or radiation history	1 (0.55)
Menopausal stages	
Premenopause	94 (51.65)
Perimenopause	7 (3.85)
Postmenopause	81 (44.51)
Department	
Out-patient department (OPD)	88 (48.35)
In-patient department (IPD)	82 (45.05)
Management/academic	12 (6.59)
Shift work	
No	122 (67.03)
Yes	60 (32.97)
Weekly working hour (hours), mean (SD)	44.64 (18.65)
Income (Bath/month), mean (SD)	56,645.91 (27,941.33)
Workplace environment	
High temperature	23 (12.64)
Poor ventilation	88 (48.35)
Inefficient or inappropriate utilizations	44 (24.18)
Inflexible working hours	89 (48.90)
Working under stress	144 (79.12)

Results

Out of 210 nurses meeting the inclusion criteria, a total of 182 responses were

collected, resulting in a response rate of 86.7%. Participants with missing data were contacted for confirmation and completion

of the data. Participants' demographic information is presented in Table 1. The chronic diseases reported included dyslipidemia, hypertension, diabetes mellitus, allergic rhinitis, thyroid disease, cardiovascular disease, musculoskeletal disease, and depression; with dyslipidemia, hypertension, and diabetes mellitus ranking as the top three. Hormone use was history of hormone use in the past, for contraceptive purposes in both oral and intramuscular form (81.6%), treatment of menopausal symptoms in oral and gel form (15.8%), and treatment of other conditions in oral form (2.6%). A total of 49 out of 57 departments participated. The work characteristics of each department were categorized as outpatient, inpatient, or management/academic roles.

In this study, the prevalence of nurses with menopausal symptoms was found to be 74.2%. The overall mean MRS score was 10.23 (SD = 7.57). When dividing menopausal severity into four groups, the frequencies and percentages for each group were 47 (25.8%), 38 (20.9%), 65 (35.7%), and 32 (17.6%). Means and standard deviations of each question in the MRS questionnaire are presented in Table 2, showing top three symptoms are muscle/joint discomfort, physical and mental exhaustion, and sleep problems. The highest overall mean for each dimension of menopausal symptoms was vasomotor symptoms (mean score 4.01, SD 2.89), followed by psychological (mean score 3.78, SD 3.24) and genitourinary symptoms (mean score 2.44, SD 2.73).

Table 2 Means and standard deviations of each menopausal symptoms score from MRS questionnaire

Menopausal symptoms	Mean score	Standard deviation	Max, Min score
Hot flashes, sweating	0.77	0.92	4, 0
Heart discomfort	0.51	0.73	3, 0
Sleep problems	1.25	1.17	4, 0
Depressive mood	0.81	0.93	4, 0
Irritability	1.00	0.96	4, 0
Anxiety	0.70	0.83	3, 0
Physical and mental exhaustion	1.27	0.96	4, 0
Sexual problems	0.88	1.11	4, 0
Bladder problems	0.72	1.00	4, 0
Dryness of vagina	0.84	1.08	4, 0
Muscle or joint discomfort	1.48	1.10	4, 0

The results of the analysis of factors associated with menopausal symptoms are presented in Table 3. In the bivariate analysis, BMI, presence of chronic diseases, alcohol use, exercise, postmenopausal status, working more than 40 hours per week, high workplace temperatures, and poor ventilation were found to be associated with menopausal symptoms (p -value < 0.25). In the multivariate analysis, which included BMI, presence of chronic diseases, alcohol use, exercise, history

of bilateral oophorectomy, menopausal stage, weekly working hours, monthly income, high temperature, poor ventilation, and working under stress, only alcohol use was significantly associated with menopausal symptoms. Participants with a history of alcohol use had 3.7 times higher odds of experiencing menopausal symptoms compared to those who did not use alcohol, adjusted odds ratio [aOR] = 3.649, 95% CI: 1.029-12.943, p -value < 0.05.

Table 3 Menopausal symptoms and associated factors

Demographic characteristics	Menopausal symptoms		Crude OR (95% CI)	Adjusted OR (95% CI)
	No (n=47), n (%)	Yes (n=135), n (%)		
Age (years), mean (SD)	55.43 (5.06)	54.89 (4.71)	0.976 (0.909-1.047)	-
Body mass index (BMI)				
Underweight and Normal ($<23.0 \text{ kg/m}^2$)	21 (44.68)	40 (29.63)	Ref	Ref
Overweight and obese ($\geq 23.0 \text{ kg/m}^2$)	26 (55.32)	95 (70.37)	1.918 (0.968, 3.799)	1.980 (0.979, 4.003)
Marital status				
Married	30 (63.83)	79 (58.52)	Ref	-
Single/divorced/separated	17 (36.17)	56 (41.48)	1.251 (0.629, 2.485)	
Chronic disease				
Denied chronic disease	27 (57.45)	63 (46.67)	Ref	-
Having chronic diseases	20 (42.55)	72 (53.33)	1.543 (0.789, 3.015)	
Alcohol				
Denied alcohol use	44 (93.62)	109 (80.74)	Ref	Ref
Alcohol use	3 (6.38)	26 (19.26)	3.498 (1.007, 12.154)	3.649 (1.029, 12.943)
Exercise				
No exercise	35 (74.47)	82 (60.74)	Ref	-
Occasionally/regularly exercise	12 (25.53)	53 (39.26)	1.885 (0.898, 3.955)	
Age of menarche (years), mean (SD)	13.57 (1.69)	13.74 (1.72)	1.059 (0.869, 1.291)	-

Table 3 Continued

Demographic characteristics	Menopausal symptoms		Crude OR (95% CI)	Adjusted OR (95% CI)
	No (n=47), n (%)	Yes (n=135), n (%)		
Reproductive history				
Denied childbirth history	19 (40.43)	54 (40.00)	Ref	-
Childbirth history	28 (59.57)	81 (60.00)	1.017 (0.517, 2.002)	
Hormone use history				
Denied hormone use	39 (82.98)	105 (77.78)	Ref	-
Hormone use	8 (17.02)	30 (22.22)	1.393 (0.588, 3.298)	
Bilateral oophorectomy history				
Denied	41 (87.23)	123 (91.11)	Ref	-
Bilateral oophorectomy	6 (12.77)	12 (8.89)	0.666 (0.235, 1.889)	
Menopausal stages				
Premenopause	28 (59.57)	66 (48.89)	Ref	-
Perimenopause	2 (4.26)	5 (3.70)	1.061 (0.194, 5.796)	
Postmenopause	17 (36.17)	64 (47.41)	1.597 (0.798, 3.196)	
Department				
Out-patient department (OPD)	23 (48.94)	65 (48.15)	Ref	-
In-patient department (IPD)	22 (46.81)	60 (44.44)	0.965 (0.488, 1.908)	
Management/academic	2 (4.26)	10 (7.41)	1.769 (0.360, 8.684)	
Shift work				
No	33 (70.21)	89 (65.93)	Ref	-
Yes	14 (29.79)	46 (34.07)	1.218 (0.593, 2.501)	
Weekly working hours				
≤ 40 hours	30 (63.83)	73 (54.07)	Ref	-
> 40 hours	17 (36.17)	62 (45.93)	1.498 (0.755, 2.972)	
Monthly income (Baht)				
> 43,600	40 (85.11)	114 (84.44)	Ref	-
15,050 - 43,600	7 (14.89)	21 (15.56)	1.052 (0.416, 2.663)	

Table 3 Continued

Demographic characteristics	Menopausal symptoms		Crude OR (95% CI)	Adjusted OR (95% CI)
	No (n=47), n (%)	Yes (n=135), n (%)		
Workplace environment				
High temperature	2 (4.26)	21 (15.56)	4.145 (0.933, 18.406)	3.882 (0.859, 17.544)
Poor ventilation	17 (36.17)	71 (52.59)	1.957 (0.987, 3.881)	-
Inefficient or inappropriate utilizations	14 (29.79)	30 (22.22)	0.673 (0.319, 1.419)	-
Inflexible working hours	22 (46.81)	67 (49.63)	1.119 (0.575, 2.176)	-
Working under stress	32 (68.09)	112 (82.96)	2.282 (1.067, 4.880)	-

To evaluate a potential misclassification of menopause, a sensitivity analysis was conducted by adjusting the cutoff score for defining menopausal symptoms. Participants with scores of 4 or lower were initially classified as having no menopausal symptoms. The sensitivity analysis raised the cutoff to 6 or lower to minimize misclassification, aligning with MRS development findings, which reported a mean score of 7.2 (SD = 6.0) in Asian populations. The results of this sensitivity analysis identified several factors associated with menopausal symptoms, including alcohol use, postmenopausal stage, high-temperature work environments, and working under stress. The adjusted odds ratios (aOR) and 95% confidence intervals (CI) were as follows: alcohol use (n=29, aOR 4.638, 95% CI: 1.232, 17.467), postmenopausal stage (n=81, aOR 2.521, 95% CI: 1.218, 5.216), high temperature (n=23, aOR 6.184, 95% CI: 1.253, 30.530), and working under stress (n=144, aOR 2.923, 95% CI: 1.312, 6.508).

The means and standard deviations of percent absenteeism for participants with no/little symptoms, mild symptoms, moderate symptoms, and severe symptoms were 2.08% (SD = 12.51), 0.00% (SD = 0.00), 0.89% (SD = 4.09), and 1.56% (SD = 3.89), respectively. The means and standard deviations of percent presenteeism for these groups were 21.70% (SD = 18.45), 25.26% (SD = 18.56), 28.31% (SD = 17.64), and 42.81% (SD = 22.89), respectively. The means and standard deviations of percent overall work impairment were 22.45% (SD = 20.22), 25.26% (SD = 18.56), 28.81% (SD = 18.18), and 43.43% (SD = 23.27), respectively. The means of percent presenteeism and overall work impairment increased with the severity of menopausal symptoms; however, this trend was not observed for percent absenteeism.

In the bivariate analysis, the only variable showing a significant difference in absenteeism percentage was working under stress, with a mean difference of 1.422

percentage point (pp) (95% CI: 0.131, 2.713). Both presenteeism and overall work impairment were significantly associated with severe menopausal symptoms, with mean differences of 21.110 pp (95% CI: 12.496, 29.725) and 20.980 pp (95% CI: 12.044, 29.917), respectively, as well as with working under stress, with mean differences of 12.427 pp (95% CI: 5.378, 19.476) and 13.033 pp (95% CI: 5.756, 20.309), respectively. In the multivariate analysis, significant associations were observed between working under stress and percent presenteeism and overall work impairment, with adjusted mean differences of 8.841 pp (95% CI: 1.221, 16.462) and 9.255 pp (95% CI: 1.358, 17.152), respectively. Tables 4 present associations between menopausal symptoms and percentages of absenteeism, presenteeism, and overall work impairment. The explanatory model in the multivariate

analysis investigates the association between menopausal symptoms and percent absenteeism, presenteeism, and overall work impairment while adjusting for age, BMI, marital status, underlying diseases, alcohol use, exercise, reproductive history, department, shift work, weekly working hours, monthly income, high temperature, poor ventilation, inappropriate utilizations, inflexible working hours, and working under stress. This study found that severe menopausal symptoms were associated with higher mean percentages of presenteeism and overall work impairment compared to no/little symptoms, after adjusting for other factors. The mean differences and 95% confidence intervals for percent presenteeism and overall work impairment were 20.844 pp (95% CI: 11.098, 30.588) and 20.484 pp (95% CI: 10.386, 30.584), respectively, with both having a *p*-value of < 0.05.

Table 4 Associations of menopausal symptoms severity and percent absenteeism, presenteeism, and overall work impairment

Demographic characteristics	Adjusted mean difference in percent absenteeism (95% CI)	Adjusted mean difference in percent presenteeism (95% CI)	Adjusted mean difference in percent overall work impairment (95% CI)
No/little symptoms	Ref	Ref	Ref
Mild symptoms	-1.900 (-4.787, 0.986)	2.510 (-6.021, 11.042)	1.797 (-7.045, 10.638)
Moderate symptoms	-2.058 (-6.579, 2.463)	5.261 (-2.475, 12.997)	4.734 (-3.283, 12.752)
Severe symptoms	-1.007 (-5.422, 3.406)	20.844 (11.098, 30.588)	20.484 (10.386, 30.584)

Note: All units of adjusted mean difference are in percentage points.

Table 5 presents the associations between each dimension of menopausal symptoms and percent absenteeism, presenteeism, and overall work impairment. Higher scores in all three dimensions were associated with increased percent presenteeism

and overall work impairment, with vasomotor symptoms showing the highest mean difference, followed by psychological and urogenital symptoms. However, no association were observed in all three dimensions and percent absenteeism.

Table 5 Associations of menopausal symptoms dimensions and percent absenteeism, presenteeism, and overall work impairment

Dimensions	Adjusted mean difference in percent absenteeism ^a (95% CI)	Adjusted mean difference in percent presenteeism ^a (95% CI)	Adjusted mean difference in percent overall work impairment ^a (95% CI)
Psychological (Q4,5,6,7)	-0.032 (-0.358, 0.294)	2.569 (1.612, 3.527)	2.559 (1.565, 3.554)
Vasomotor (Q1,2,3,11)	-0.055 (-0.539, 0.429)	2.608 (1.499, 3.716)	2.598 (1.449, 3.747)
Urogenital (Q8,9,10)	0.033 (-0.268, 0.335)	1.824 (0.621, 3.027)	1.854 (0.611, 3.097)

Note: All units of adjusted mean difference are in percentage points.

Discussion

In this study, it was found that having severe menopausal symptoms and working under stress are significantly associated with higher percentage of presenteeism and overall work impairment. However, no association was observed between menopausal symptoms and percentage of absenteeism.

Prior studies have similar findings, suggesting that menopausal symptoms are negatively associated with work ability^{4,13} and increases presenteeism and overall work impairment^{5,14}. One study found that having menopausal symptoms affect work motivation, commitment, and increase the intention to leave³. Discomfort at work, particularly hot flashes, can be difficult to cope with. Participants in a previous study reported that

hot flashes affected their self-confidence² and were challenging to manage. Insufficient or poor-quality sleep can also impair concentration and lead to physical or mental exhaustion, but may not be a sufficient reason to take leave⁹. This may explain the highest mean differences of vasomotor symptoms observed in percent presenteeism and overall work impairment in this study. Possible explanations for the association between menopausal symptoms and percent presenteeism and overall work impairment, but not absenteeism, include symptoms not being severe enough to warrant absence, misalignment between symptom occurrence and data collection, and the month-long work schedule of nurses, which makes it difficult to find suitable substitutes for leave. The

association between stress, menopausal symptoms, and work productivity loss remains unclear, as stress was significantly associated with percent presenteeism, overall work impairment, and menopausal symptoms in the sensitivity analysis, suggesting a potential confounding effect.

The differences found in sensitivity analysis strengthened the association between alcohol use and menopausal symptoms. Alcohol may increase the level of estradiol, leading to peripheral vasodilatation and core temperature alteration resulted in severe vasomotor symptoms, and disrupt hormonal balance. Alcohol depresses central nervous system, and therefore decreases sensitivity to touch, and reduce blood flow to genitalia, resulted in decreased libido and arousal. Heavy alcohol drinking also lead to sleep disturbance and exacerbate preexisting sleep disorders¹⁵. Other factors, working in high temperature and working under stress, were align with prior study¹⁶, which participants reported that these factors exacerbate their menopausal symptoms. High temperature can make hot flashes worse.

This study found the prevalence of menopausal symptoms among nurses to be 74.2%. In comparison, a study conducted in Bangkok reported a prevalence of menopausal symptoms to be 31.7%¹⁷, and a recent study in Japan using the MRS, with a cutoff score of 5 or higher for menopausal symptoms, reported a prevalence of 58.1%¹⁸. Studies in India, Ethiopia, and Nepal found prevalence rates of 75.60%, 89.9%, and 96.9%,

respectively¹⁹⁻²¹. This differs from the findings of this study, which may be explained by variations in regional and lifestyle factors, working culture, or workplace environment.

This study has several limitations. First, due to its cross-sectional design, it cannot establish a clear causal relationship between menopausal symptoms and work productivity loss. Recall bias was inevitable; however, the WPAI: GH, with a recall period of seven days, was selected to minimize it. A cohort study in the future would be valuable for clarifying this potential causal link. Second, the study was conducted in a single hospital, which limits the generalizability of the findings to other hospitals. Future research in a multi-center setting across different hospital levels could provide a more comprehensive view of menopausal symptoms and work productivity loss among nurses nationwide. Additionally, this study used only the MRS questionnaire to define menopausal symptoms, which cannot entirely rule out the presence of other illnesses. While menopausal diagnosis is generally based on menstrual history and symptom reporting, the potential for misclassification, though minimal, remains. In this study, mean differences in the percentages of presenteeism and overall work impairment increased with symptom severity; however, the results were not statistically significant, possibly due to the limited sample size. A future study with a larger sample may provide clearer insights. Fourth, some variables, such as high temperature and stress, were not assessed using validated tools, which may

introduce information bias. Future studies using validated tools to measure stress and accurate temperature measurements could help mitigate this bias. One strength of this study is its high response rate, making it a good representation of the studied hospital. Additionally, the tools used in this study, the MRS and WPAI: GH questionnaire, were validated and tested for reliability.

Nurses with severe menopausal symptoms should be identified, supported, and provided with appropriate interventions or treatments by physicians, supervisors, and colleagues to prevent indirect costs from health-related productivity loss. Developing programs or policies that offer accessible treatment options and support, such as stress management training or flexible working hours, could be highly beneficial. Such initiatives are essential for preventing productivity loss, enhancing work performance, reducing early retirement among experienced staff, and ensuring the hospital continues to provide high-quality care.

Conclusions

This study found that nurses with severe menopausal symptoms were significantly associated with higher percentage of presenteeism and overall work impairment. The prevalence of menopausal symptoms among nurses was 74.2%, with 17.6% experiencing severe symptoms. Alcohol use was found to be significantly associated with having menopausal symptoms.

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