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Sleep quality and associated factors in older outpatients with hypertension in Vietnam: A cross-sectional study

Le Thi Hong Tham, Luu Thi Thuy*

Faculty of Nursing, Da Nang University of Medical Technology and Pharmacy, Da Nang City, Vietnam

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Corresponding Author:
Luu Thi Thuy, Faculty of Nursing, Da Nang University of Medical Technology and Pharmacy, Da Nang City, Vietnam.
E-mail: luuthithuy@dhktyduocdn.edu.vn

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ABSTRACT

Background & Aim: Sleep plays a crucial role in controlling blood pressure. Older adults commonly suffer from poor sleep quality which results in several negative health outcomes, such as cognitive impairment, depression, and increased risk of falling. However, limited research exists on sleep quality in older Vietnamese adults. This study aimed to investigate sleep quality and its associated factors in older adults with hypertension in Central Vietnam.

Methods & Materials: A cross-sectional study was conducted at a tertiary hospital in Central Vietnam with 235 outpatients who were aged 60 years or older, diagnosed with hypertension, and without cognitive impairment. The Pittsburgh Sleep Quality Index was utilized to assess the participants' sleep quality. Multiple binary logistic regression was computed to identify factors associated with sleep quality with a P value less than 0.05.

Results: The mean sleep quality score was 8.2 (±3.9), with 71.9% of participants reporting poor sleep quality. Participants with a high school education or less were more likely to report poor sleep quality than those with higher education (OR = 1.91; 95% CI: 1.05 - 3.46; p= 0.034). Additionally, the presence of musculoskeletal disease increased the risk of poor sleep quality (OR= 2.26; 95% CI: 1.04 - 4.87; p= 0.038).

Conclusion: The majority of participants suffered from poor sleep quality, which was strongly associated with educational level and the presence of musculoskeletal diseases. Strategies for early detection, prevention, and treatment of poor sleep quality are essential for improving health outcomes in this population.

Introduction

Despite notable advancements in the prevention and management of hypertension, it persists as a significant public health concern, substantially contributing to cardiovascular mortality and morbidity (1). Globally, the prevalence of hypertension continues to rise, particularly in the Western Pacific region, including Vietnam (2). Hypertension is more common among older adults, attributable to age-associated changes in the vascular system (3). Over 65% of individuals aged 60 and above have been diagnosed with this condition (4). In Vietnam, approximately 62.2% of older adults are affected by hypertension (5).

Lifestyle interventions have emerged as a first-line strategy for preventing and managing hypertension. Among these interventions, sleep plays a crucial role in maintaining optimal blood pressure and overall cardiovascular health (6). It assists in regulating stress hormones and promoting a healthy functioning of the nervous system, thus contributing to blood pressure regulation. Additionally, sleep has a significant impact on body weight control, a key risk factor for hypertension (7). Poor sleep, characterized by insufficient duration, disturbances, and sleep disorders, is closely associated with an increased risk of hypertension and poorly controlled blood pressure (8,9).

Sleep is critically important for the health of older adults, who frequently encounter sleep problems that can lead to impaired cognition, disorientation, and an increased risk of falls (10). Poor sleep quality is commonly observed among individuals with hypertension and is further exacerbated by hypertension-related symptoms

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such as headaches, as well as by comorbidities and polypharmacy (10,11). In China, more than half of adults with hypertension reported poor sleep quality, which is approximately twice as high as the prevalence in healthy individuals (11). The incidence of poor sleep quality increases with advancing age. A study in Indonesia revealed that 89.2% of the elderly with hypertension experienced poor sleep quality (12). Several factors influence sleep quality, including age, gender, marital status, body mass index (BMI), hospitalization, the stage of hypertension, and the duration of hypertension (11,13,14).

Vietnam is currently undergoing rapid population aging in Southeast Asia. In 2019, individuals aged 60 years and older accounted for 11.9% of the national population. This percentage is projected to surpass 20% by 2039 (15). Hypertension is a significant health concern among older Vietnamese adults, and its management is closely linked to sleep quality. However, there is a noticeable lack of studies examining sleep quality within this population (16)-(18). Recognizing the occurrence of sleep issues and their influencing factors among older adults is essential for guiding health professionals in implementing effective interventions to enhance sleep quality in this population. Thus, this study aimed to contribute to the body of knowledge by investigating sleep quality and associated factors among older adults with hypertension in Central Vietnam.

Methods

Study design and population

We carried out a cross-sectional study at the outpatient department of Da Nang C Hospital, which is a tertiary hospital in Central Vietnam. The study targeted individuals aged 60 and above who had been diagnosed with hypertension and were currently undergoing outpatient treatment at the hospital. Cognitive function was assessed using the Six Item Cognitive Impairment Test (6-CIT) to ensure valid responses (19, 20). Those with cognitive impairment (scores above 7) were excluded from the study. Moreover, we excluded older individuals with severe health conditions, such as acute diseases or emergency conditions, that might hinder their participation in the study.

The sample size was determined using the formula for cross-sectional studies with a Z-value of 1.96, a proportion of older adults having poor sleep quality of 83.3% (21), and a precision of 5%. The estimated sample size was 214 people. An attrition rate of 10% was added to account for anticipated non-response. Therefore, the final sample size was rounded to 235 older adults. We applied convenient sampling to select the participants.

Measurements

Firstly, the 6-CIT was used to screen cognitive impairment in older adults. A Vietnamese version of this scale was readily available for use (20). The administration of this test was conducted by a nurse from the cardiology clinic who had received specialized training from the research team. The nurse systematically read each question to the participants, documented their responses, and subsequently scored the test.

Secondly, data were collected using a structured questionnaire consisting of two parts. The first part, developed by the researchers, focuses on demographic information, including age, gender, marital status, educational level, BMI, duration of hypertension, comorbidity, and type of comorbidity. BMI was categorized as underweight (BMI< 18.5 kg/m^2), normal (BMI 18.5–24.9 kg/m^2), and overweight (BMI > 25 kg/m^2) (22). According to the literature review, these variables were identified as factors influencing sleep quality in older individuals. Thus, they were selected to examine their association with sleep quality among the participants in this study.

The second part is the Pittsburgh Sleep Quality Index (PSQI) which was utilized to measure the sleep quality of the participants over the last month. It has 19 items covering 7 components of sleep quality, namely (1) subjective sleep quality, (2) sleep latency, (3) sleep duration, (4) sleep efficiency, (5) sleep disturbances, (6) use of sleeping medication, and (7) daytime dysfunction. Each component is scored on a 0-3 interval scale, resulting in a total score that ranges from 0 to 21 points. Higher scores indicate poorer sleep quality. Specifically, a total score of greater than 5 suggests poor sleep quality, while a score of 5 or less indicates good

sleep quality (23). The PSQI has been translated and validated in Vietnamese with a Cronbach's alpha coefficient of 0.79 (24).

Data collection

Data collection was conducted by a nurse and the principal investigator (PI) at a cardiology clinic in the outpatient department from March to June 2023. Outpatients with hypertension typically attended monthly follow-up appointments. During these visits, a nurse took the patients' vital signs before they consulted with the physician. Additionally, participants were assessed for cognitive function, and those scoring 7 or less were directed to a separate room after meeting with the physician.

In a separate room, the PI, who is a nursing lecturer, delivered an introduction to the study and obtained informed consent from the participants. Upon agreeing, participants signed an informed consent form and subsequently underwent an interview, which typically lasted about 15 minutes. Additionally, data regarding the duration of hypertension and comorbidities were retrieved from the patient's medical records. All eligible participants willingly consented to be part of the study.

Data analysis

Data were analyzed using the Statistical Package for Social Science version 23.0 (SPSS Inc., Chicago, Illinois, US). Descriptive statistics including frequency, percentage, mean, standard deviation, and range were calculated to summarize the variables. Single-factor binary logistic regression analysis was conducted to examine the relationship between sleep quality and independent variables. Variables with a probability of less than 25% ($p < 0.25$) in the single-factor binary logistic regression analysis (gender, educational level, BMI, comorbidity, and musculoskeletal disease) were selected for inclusion in the multifactor binary logistic regression model. The strength of associations was expressed using odds ratios (OR) with 95% confidence intervals. Variables with a p-value less than 0.05 were considered significant factors influencing sleep quality.

Ethics considerations

This study was approved by the Ethics Committee in Biomedical Research, Da Nang University of Medical Technology and Pharmacy, Vietnam (approval number: 37/CT-HĐĐĐ on January 12, 2023)

Results

Characteristics of the participants

A total of 235 older adults were included in the data analysis. The participants had a mean age of 71.6 (± 7.1) years, with 56.2% being male. The majority of patients were married (74.5%) and had a normal BMI (70.2%). About half of the participants had an educational level higher than high school (47.7%) and had been diagnosed with hypertension for more than 10 years (42.6%). Most participants had comorbidities (82.1%), with cardiovascular and musculoskeletal diseases accounting for 39.6% and 30.2%, respectively. Detailed characteristics of the participants are provided in Table 1.

Table 1. Characteristics of the participants (n=235)

Characteristics		n	%
Age (years)	Mean ± SD (range): 71.6 ± 7.1 (60 – 92)		
Gender	Male	132	56.2
	Female	103	43.8
Marital status	Married	175	74.5
	Single/divorced/widowed	60	25.5
Educational level	High school or lower	123	52.3
	Higher than high school	112	47.7
BMI	Underweight (<18.5 kg/m^2)	32	13.6
	Normal (18.5–24.9 kg/m^2)	165	70.2
	Overweight (> 25 kg/m^2)	38	16.2
Duration of hypertension	< 5 years	51	21.7
	5-10 years	84	35.7
	> 10 years	100	42.6
Comorbidity	Yes	193	82.1
	No	42	17.9
Type of comorbidity	Other cardiovascular disease	93	39.6
	Musculoskeletal disease	71	30.2
	Others	126	53.6

Table 2. Sleep quality of the participants (n=235)

Components of sleep quality	Mean ± SD	n (%)
Subjective sleep quality	1.3 ± 0.8	
Sleep latency	1.8 ± 1.1	
Sleep duration	2.0 ± 0.8	
Sleep efficiency	1.3 ± 1.2	
Sleep disturbances	1.2 ± 1.5	
Use of sleeping medication	0.3 ± 0.8	
Daytime dysfunction	0.3 ± 0.7	
Sleep quality	8.2 ± 3.9	
Poor sleep quality		169 (71.9)
Good sleep quality		66 (28.1)

Sleep quality of the participants

The mean scores of components related to sleep quality are detailed in Table 2. The overall mean score across these components was 8.2 (±3.9), and the prevalence of poor sleep quality was 71.9%.

As shown in Table 3, among all participants, 54.5% perceived their sleep quality as fairly good, while 34.9% experienced sleep latency exceeding 60 minutes. Approximately three-quarters reported a short sleep duration, defined as less than 6 hours per night.

Moreover, 24.3% of participants had low sleep efficiency, characterized by values below 65%. Additionally, 27.2% experienced sleep disturbances once or twice a week. Notably, 8.1% of the participants used sleeping medication three or more times per week.

Table 3. Sleep characteristics of the participants (n=235)

	Sleep characteristics	n	%
Subjective sleep quality	Very good	31	13.2
	Fairly good	128	54.5
	Fairly bad	56	23.8
	Very bad	20	8.5
Sleep latency	< 15 mins + not during the past month	36	15.3
	16–30 mins + once or twice a week	52	22.1
	31–60 mins + twice a week	65	27.7
	> 60 mins + three or more times a week	82	34.9
Sleep duration	> 7 hours	10	4.3
	< 6 – 7 hours	47	20.0
	5 – 6 hours	114	48.5
	< 5 hours	64	27.2
Sleep efficiency	> 85%	87	37.0
	75–84%	50	21.3
	65–74%	41	17.4
	< 65%	57	24.3
Sleep disturbances	Not during the past month	11	4.7
	Less than once a week	160	68.1
	Once or twice a week	64	27.2
Using sleeping medication	Not during the past month	213	90.6
	Less than once a week	3	1.3
	Three or more times a week	19	8.1
Daytime dysfunction	No problem	180	76.6
	Slight problem	33	14.0
	Moderate problem	20	8.5
	Serious problem	2	0.9

Factors associated with sleep quality among older adults with hypertension

In the single-factor binary logistic regression analysis, the correlation between five independent variables (gender, educational level, BMI, comorbidity, and musculoskeletal disease) and sleep quality produced a p-value of less than 0.25. Consequently, these variables were included in the multifactor binary logistic regression analysis. As presented in Table 4, educational level and musculoskeletal disease were identified as significant factors associated with sleep quality.

Specifically, participants with a high school education or lower had 1.91 times higher odds of experiencing poor sleep quality compared to those with higher educational attainment ($p< 0.05$). Additionally, participants who had musculoskeletal diseases were significantly more likely to have poor sleep quality, with an odds ratio of 2.26 ($p< 0.05$), compared to those without such a condition.

Table 4. Factors associated with sleep quality among older adults with hypertension (n = 235)

Variables		Unadjusted OR (95% CI)		Adjusted OR (95% CI)	
		OR (95% CI)	P value	OR (95% CI)	P value
Age		1.02 (0.98 -1.07)	0.273		
Gender	Male	Reference	0.151	Reference	0.286
	Female	1.54 (0.85 - 2.76)		1.40 (0.75-2.62)	
Marital status	Married	Reference	0.538		
	Single/divorced/widowed	1.23 (0.63 - 2.41)			
Educational level	Higher than high school	Reference	0.014	Reference	0.034
	High school or lower	2.07 (1.16 - 3.70)		1.91 (1.05 - 3.46)	
BMI	Underweight	Reference		Reference	
	Normal	1.32 (0.59 - 2.94)	0.504	1.56 (0.66 -3.67)	0.312
	Overweight	1.96 (0.67 - 5.71)	0.215	2.27 (0.74 -7.01)	0.154
Hypertension duration	<5 years	Reference			
	5-10 years	1.10 (0.51 - 2.39)	0.799		
	> 10 years	1.07 (0.51- 2.25)	0.856		
Comorbidity	Yes*	2.27 (1.13- 4.53)	0.021	1.69 (0.81- 3.53)	0.162
Type of comorbidity	Other cardiovascular diseases*	1.33 (0.74 - 2.41)	0.338		
	Musculoskeletal disease*	2.75 (1.34 - 5.65)	0.006	2.26 (1.04 - 4.87)	0.038
	Others*	1.33 (0.75 - 2.35)	0.325		

*Reference: no

Discussion

Sleep quality of the participants

In this study, we found that 71.9% of participants experienced poor sleep quality. Our results show a significantly higher proportion compared to previous studies in Nigeria (64.0%) (9), China (52.6%) (11), and Ethiopia (37.7%) (14). Specifically, when compared to a prior study in Vietnam using the same PSQI cut-off, our study demonstrated a significantly greater prevalence of poor sleep quality (71.9% vs. 52.9%), as well as an elevated mean PSQI score (8.2 ± 3.9 vs. 7.3 ± 4.5) (25). The observed differences in results may be attributed to variations in participant characteristics across studies. Studies from other countries included not only older adults but also individuals under 60 years old, who typically report lower rates of poor sleep quality (9,11,14). Additionally, while some studies conducted in Vietnam focused exclusively on older adults, only 59.0% of them had hypertension. Previous research suggests a strong association between hypertension and poor sleep quality, exacerbated by symptoms such as pain and headaches (10,11). Consequently, older individuals with hypertension may have a higher prevalence of poor sleep quality compared to those without this condition.

Conversely, our findings were lower than those reported in studies conducted in Indonesia (89.2%) (12), and other parts of Vietnam (80-83.3%) (18,20). This discrepancy may stem from differences in participant selection criteria. Previous studies involved hospitalized patients while our study specifically focused on outpatients. Inpatients with hypertension are generally more prone to experiencing poor sleep quality than outpatients (11). Our findings emphasize the importance of identifying and addressing poor sleep quality in older individuals with hypertension, as improving sleep quality may potentially lead to better blood pressure management in this patient group.

Factors associated with sleep quality among older adults with hypertension

The current study found that participants with an educational level of high school or lower were 1.91 times more likely to have poor sleep quality compared to those with higher educational attainment. This finding is consistent with a study in Vietnam, which also reported that older adults with lower educational attainment had a higher

prevalence of poor sleep quality (OR= 1.83, 95% CI: 1.27–2.63, p = 0.001) (25). Additionally, a previous study in China also identified a correlation between higher education and a decreased risk of poor sleep quality (26). This association may be explained by the fact that individuals with higher education attainment are often more aware of hypertension and its management strategies. These strategies can include lifestyle modifications such as regular physical exercise, stress management techniques, and adopting good sleep hygiene practices, all of which are conducive to better sleep quality. Therefore, educational attainment may significantly influence sleep quality outcomes among older adults with hypertension.

Our study showed that older adults with musculoskeletal diseases had 2.26 times higher odds of poor sleep quality compared to those without these conditions. This finding is supported by research conducted in Southern Vietnam, which reported a significant relationship between musculoskeletal diseases and poor sleep quality among patients with hypertension (16). Another study in Vietnam specifically addressed the association between sleep quality and osteoarthritis, a prevalent musculoskeletal condition among older adults. It reported that participants with osteoarthritis had greater odds of poor sleep quality compared to those without the condition (OR = 1.61, 95% CI: 1.03–2.54, p= 0.035) (25). The increased likelihood of poor sleep quality among individuals with musculoskeletal diseases can be attributed to several factors. Chronic pain, a common symptom of musculoskeletal diseases like osteoarthritis, is known to significantly disrupt sleep (27). Additionally, limitations in physical activity resulting from these conditions may further contribute to sleep disturbances (28). Thus, addressing and managing symptoms associated with musculoskeletal diseases are crucial steps toward improving sleep quality in older adults with hypertension. This approach not only focuses on alleviating pain but also emphasizes strategies to enhance physical function and overall well-being, ultimately promoting better sleep outcomes.

This study has some limitations that should be taken into consideration. Firstly, it was conducted at a single hospital using convenience sampling, which may limit the generalizability of the findings to the broader older population in the country. Secondly, our analysis concentrated on selected factors influencing sleep quality, while other significant variables, such as the stage of hypertension, use of sleeping medications, and environmental factors, were not comprehensively examined. Additionally, the presence of psychiatric comorbidities in older adults with hypertension, which could substantially affect sleep quality, was not specifically emphasized in our study. Consequently, the potential moderating effects of psychiatric conditions on the observed relationships were not evaluated. These limitations highlight the necessity for future research to include a wider range of variables, encompass more diverse populations, and employ more rigorous sampling techniques to enhance the understanding of factors influencing sleep quality among older adults with hypertension.

Conclusion

Our study highlights the high prevalence of poor sleep quality among older adults with hypertension. Approximately three-quarters of the participants reported experiencing poor sleep quality. This condition was significantly associated with lower educational attainment and the presence of musculoskeletal diseases. It is crucial to develop and implement effective strategies for screening, preventing, and treating poor sleep quality in this population. Such interventions have the potential to enhance overall health outcomes for older people living with hypertension.

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Conflict of interest

There is no conflict of interest in this study

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