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Original Article

Poor Sleep Quality and Associated Factors Among Community-Dwelling Older Adults in Vietnam

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ABSTRACT

Background/Purpose: Poor sleep quality increases with age, contributing to many problems such as falling, poor social functioning, and low quality of life. Our study aimed to evaluate the prevalence and associated factors of poor sleep quality among older Vietnamese adults.

Methods: In this cross-sectional study, we conducted face-to-face interviews among community-dwelling older people living in District Eight in Ho Chi Minh City. We used the Pittsburgh Sleep Quality Index (PSQI) to assess sleep quality. A total score ≥ 5 indicated poor sleep quality. Fried's criteria were used to identify frailty, and comorbid diseases were based on medical records.

Results: The data of 592 participants were collected (mean age 71.2±7.7, 67.4% female). The prevalence of poor sleep quality was 55.9%, with a mean PSQI score of 7.26±4.51. Factors independently associated with poor sleep quality including age (odds ratio [OR]=1.03, 95% confidence interval [CI]= 1.01–1.06 , p=0.047), low educational attainment (OR=1.98, 95% CI: 1.33–2.93, p=0.001), pain (OR=2.78, 95% CI: 1.81–4.28, p <0.001), osteoarthritis (OR=1.61, 95% CI: 1.03– 2.54, p=0.035) and frailty (OR=1.77, 95% CI: 1.09–2.86, p <0.019).

Conclusion: Poor sleep quality is highly common among community-dwelling older adults in Vietnam and relates to age, low educational attainment, frailty, pain, and osteoarthritis. Thus, evaluating and managing pain, osteoarthritis, and frailty is needed for sleep quality management in older adults with poor sleep quality.

1. INTRODUCTION

Sleep disorders increase as people get older,[1,2] resulting from aging, medical and psychological conditions, or medications.[3] In the USA, 65% of older adults reported sleep problems,[4] whereas in China 21% of the older population experienced poor sleep quality.[5] From 2006 to 2007, a multinational

study conducted across African and Asian countries showed a high prevalence of older adults suffering from sleep disorders; in particular, approximately 30% of Vietnamese older people reported poor sleep quality.[6]

Poor sleep quality in older adults contributes to several negative consequences, such as increasing the risk of falls, cognitive impairment, depression, and low quality of life.[7-10] In a previous study, older people with poor sleep quality had more than three times higher risk of falling than those with good sleep quality.[8] Moreover, depression symptoms were also three times higher in older people with poor sleep quality compared to good sleepers.[11]

Research has shown that sleep quality in older adults relates to many factors.[12,13] According to a study in Thailand, poor sleep quality was related to the female sex, a higher education, poor family relationships, and mild depression.[14] Another study in China showed that emotional status, physical functioning, and bodily pain were associated with sleep quality in older adults.[15]

Vietnam is a lower-middle-income country with a rapidly aging population in Southeast Asia.[16] The number of individuals aged ≥60 years was approximately 12 million in 2019 and is projected to increase to nearly 30 million in 2050.[17] However, in 2017 it was reported that the health status of Vietnamese people significantly decreased with aging.[18] A previous study in the North of Vietnam reported that the prevalence of poor sleep quality was 38.9% in older women and it was related to low body mass index and low physical function.[19] However, this study only focused on women, and available data on older adults in the South of Vietnam are limited. Hence, our study aimed to evaluate the prevalence and associated factors of poor sleep quality among community-dwelling older people in an urban area in the South of Vietnam. This will help health care teams and policymakers to realize the importance of sleep quality in older adults and the requirement for interventional strategies to improve their quality of life.

2. METHODS

2.1. Study Location

We conducted a cross-sectional study in District Eight in Ho Chi Minh City, and approximately 28,000 inhabitants lived there. The study was approved by the Institution Review Board of the University of Medicine and Pharmacy at Ho Chi Minh City (approval number: 128/ĐHYD-HĐ).

2.2. Sampling Procedures

The sample size was calculated using Open Epi version 3.01.[20] Based on a previous study, the prevalence of poor sleep quality in older adults was approximately 50%.[12] We applied the absolute precision of 5% and a confidence interval (CI) of 95%; hence, the primary sample size was 384. We multiplied this primary sample size by 1.5 to minimize the cluster sampling effect. Consequently, 600 participants would be included. Afterward, we applied the cluster sampling scheme and probability proportional to size (PPS) sampling to select participants. The total number of older adults in the district was 43,302 individuals, and a cluster was equal to a quarter. Thirty clusters were selected using PPS with 20 individuals per cluster.[21] We used the multistage sampling methodology, and at each stage, the probability of selection for each cluster was proportional to its size.[21]

The inclusion criteria included: older adults (aged ≥60 years) who had resided in this area for at least 1 year, were able to communicate and understand the study procedures, and were willing to participate in our study. The exclusion criteria were severe visual or auditory impairment, and severe dementia. The eligible participants were interviewed face-to-face and evaluated at home by three investigating teams. In each team, there was one geriatrician and two trained nurses. All participants gave their written consent forms for participation in the study.

2.3. Data Collection

We collected data from October 2016 to April 2017. Participants were interviewed using a structured questionnaire, and their weight, height, handgrip strength, and time for walking a 4.5 m distance were evaluated. We also collected the chronic conditions and medications of participants based on their medical records.

2.4. Measurements

2.4.1. Sleep quality

The Pittsburgh Sleep Quality Index (PSQI), a self-rated instrument evaluating sleep quality, was used to assess sleep quality during the previous month.[22] It includes 19 items examining seven subscores: sleep latency, sleep duration, subjective sleep quality, habitual sleep efficiency, sleep disturbance, use of sleep medication, and daytime dysfunction. Each subscore was scored equally on a 0 to 3 scale. The total PSQI score ranges from 0 to 21; a total score of ≥5 indicates poor sleep quality and a higher score indicates worse sleep quality.[22] We chose the PSQI cut-off of 5 because this point showed the diagnostic sensitivity and the specificity of approximately 90% in many previous studies.[22-24] The PSQI was translated into Vietnamese and validated in a previous study.[25]

2.4.2. Covariates

Frailty was assessed using Fried's phenotype,[26] including five criteria: exhaustion, unintentional weight loss, weakness, slowness, and low physical activity. Exhaustion was defined as a positive answer to either of two questions: "Did you feel that everything you did in the past month was an effort?" and "Were you exhausted without any reason last month?". Unintentional weight loss was defined as a decrease in weight of ≥4.5 kg or ≥5% within 1 year. The participant's self-reported estimation was acceptable in case objective measurements were not available since previous studies reported that self-reported weight is significantly correlated with measured weight in older adults.[27,28] Weakness was evaluated using grip strength measurements using a Jamar hydraulic hand dynamometer (model 5030J1). The average value was calculated based on three repetitions of the task. The cut-off values were stratified by sex and body mass index (BMI). Slowness was assessed using the participant's walking speed at a distance of 4.6 m. The cut-offs were stratified according to sex and height. Physical activity was evaluated using the kilocalories that an individual expended per week for the last 2 weeks. We adapted activities suited to Vietnamese culture, including walking, stair climbing, bicycling, dancing, running, weight lifting, swimming, tennis playing, bowling, volleyball, badminton, basketball, golf, sailing, rock or mountain climbing, gardening, painting, and doing housework. The energy calculation was based on the 2011 compendium of physical activities.[29] The cut-offs were stratified by sex. Individuals were classified as frail if they had ≥3 criteria, and non-frail if they had ≤2 criteria.

Functional status, including activities of daily living (ADLs) and instrumental ADLs (IADLs), was evaluated using the Katz[30] and Lawton scales,[31] respectively. ADL impairment was defined as a total score of <6 and IADL impairment was defined as a total score of <8. ADLs include bathing, dressing, toileting, transferring, continence, and feeding, whereas IADLs include telephoning, shopping, food preparation, housekeeping, laundry, using transportation, responsibility for own medications, and abilities to handle finances.[30,31]

Multimorbidity was defined as the number of concurrent chronic diseases of ≥2,[32] and polypharmacy was defined as the concurrence use of ≥5 types of drugs.[33] History of falls in the previous year and nocturia were recorded. We also assessed bodily pain lasting for at least 4 weeks using the Numeric Pain Rating Scale;[34] a score of ≥3 indicated a person suffering from pain. We also collected information regarding participants' demographics such as sex, age, BMI, education, and marital status.

2.5. Data Analysis

The data were analyzed using SPSS software (version 16.0; IBM Corp., Armonk, NY, USA). Categorical variables are presented as percentages and numbers. Continuous variables are presented as mean±standard deviation (*SD*) or median and interquartile range. We performed univariable and multivariable logistic regression analyses to determine the factors associated with poor sleep quality. The odds ratio and 95% CI were calculated. The variables were proven to have significant associations with poor sleep quality (age, marital status, and low educational attainment) based on literature (Model 1). The variables showed a probability of less than 20% (p <0.2) in the univariable logistic regression (pain, frailty, diabetes, and osteoarthritis) would be included in the multivariable logistic regression model (Model 2). Chi-square tests or Fisher's exact tests were used to compare proportions, and T-tests or Mann-Whitney U tests were used to compare means or medians. A probability of less than 5% (p <0.05) was considered statistically significant.

3. RESULTS

We invited 600 participants; however, 8 were excluded due to their inability to walk. None of the invited participants refused to participate in the study. Consequently, the data of 592 participants were collected; the mean age was 71.2±7.7. In our study, 54.6% of the participants had a history of falls during the previous year, 73.5% had nocturia, and the other characteristics of all participants are described in Table 1.

We found that the prevalence of poor sleep quality among older adults was 55.9% (331 individuals) and the mean PSQI score was 7.26±4.51. When using the PSQI cut-offs of ≥6 and ≥7, we found that the prevalence of poor sleep quality was 52.9% and 48.7%, respectively. The mean sleep duration of the participants was 5.7±1.8 h, whereas 99 individuals (16.7%) perceived their sleep to be adequate, and 6.8% used medication to help them sleep. The results showed that the number of participants aged ≥80 in the group with poor sleep quality was nearly double that of the group without poor sleep quality (22.4% vs. 12.3%). We also found that the individuals with poor sleep quality had higher rates of IADLs and ADLs impairment than those without poor sleep quality. Moreover, the rate of frailty was more than twice in individuals with poor sleep quality compared to those without poor sleep quality (39% vs. 16.5%, p <0.001) (Table 1).

Table 2 presents the scores of the seven components of the PSQI according to age group. The results showed that individuals aged ≥80 years had longer sleep latency (1.87±1.16 vs 1.45±1.19, p=0.001),

Table 1. Characteristics of the study participants (n=592) according to sleep quality

	Total (n=592)	Poor sleep quality (n=379) (%)	Good sleep quality (n=213) (%)	*p*
Age group				
60–69	294 (49.7)	143 (43.2)	151 (57.8)	<0.001
70–79	192 (32.4)	114 (34.4)	78 (29.9)	
≥80	106 (17.9)	74 (22.4)	32 (12.3)	
Female	399 (67.4)	241 (72.8)	158 (60.5)	0.002
Low educational attainment (primary school or lower)	248 (41.9)	168 (50.8)	80 (30.6)	<0.001
Single/widowed	264 (44.6)	163 (49.2)	101 (38.7)	0.01
Living alone	27 (4.6)	19 (5.7)	8 (3.1)	0.121
BMI (kg/m^2)				
<18.5	57 (9.7)	29 (8.9)	28 (10.8)	0.63
18.5–24.9	305 (52.1)	166 (50.8)	139 (53.7)	
25–29.9	181 (30.9)	106 (32.4)	75 (29.0)	
≥30	43 (7.3)	26 (7.9)	17 (6.5)	
ADLs impairment	29 (4.9)	24 (7.3)	5 (1.9)	0.003
Bathing dependence	20 (3.4)	17 (5.1)	3 (1.2)	0.010*
Dressing dependence	17 (2.9)	14 (4.2)	3 (1.2)	0.027*
Toileting dependence	19 (3.2)	16 (4.8)	3 (1.2)	0.017*
Transferring dependence	11 (1.9)	9 (2.7)	2 (0.8)	0.124*
Incontinence	5 (0.8)	4 (1.2)	1 (0.4)	0.39*
Feeding dependence	15 (2.5)	12 (3.6)	3 (1.2)	0.067*
IADLs impairment	245 (41.4)	166 (50.2)	79 (30.3)	<0.001
Frailty (yes)	172 (29.1)	129 (39.0)	43 (16.5)	<0.001
Polypharmacy (yes)	172 (29.1)	117 (35.4)	55 (21.1)	0.001
Multimorbidity (yes)	231 (39)	152 (45.9)	79 (30.3)	<0.001
Chronic diseases				
Hypertension	349 (59.0)	205 (61.9)	144 (55.2)	0.09
Diabetes	120 (20.3)	74 (22.4)	46 (17.6)	0.15
Ischemic heart disease	129 (21.8)	83 (25.1)	46 (17.6)	0.029
Heart failure	25 (4.2)	17 (5.1)	8 (3.1)	0.21
Chronic lung disease (COPD, asthma)	22 (3.7)	15 (4.5)	7 (2.7)	0.24
Stroke	17 (2.9)	10 (3.0)	7 (2.7)	0.81
Dementia	132 (22.3)	92 (27.8)	40 (15.3)	<0.001
Osteoarthritis	224 (37.8)	153 (46.2)	71 (27.2)	<0.001
Parkinson's disease	4 (0.7)	3 (0.9)	1 (0.4)	0.63*
Depression	2 (0.3)	1 (0.3)	1 (0.4)	1*
Gastritis	68 (11.5)	48 (14.5)	20 (7.7)	0.01
Cancer	5 (0.8)	3 (0.9)	2 (0.8)	1*

*Fisher's exact tests were used
Abbreviations: BMI, body mass index; ADLs, activities of daily living; IADLs, instrumental activities of daily living; COPD, chronic obstructive pulmonary disease

Table 2. Scores of total PSQI and seven components in the study participants by age group (n=592)

	Total (n=592)		Age group (≥80) (n=106)		Age group (<80) (n=486)		*P*
	Mean	SD	Mean	SD	Mean	SD	
PSQI total score	7.26	4.51	8.69	4.48	6.95	4.46	<0.001
Sleep latency	1.53	1.20	1.87	1.16	1.45	1.19	0.001
Sleep duration	1.65	1.11	1.81	1.11	1.61	1.10	0.102
Sleep efficiency	0.97	1.21	1.40	1.24	0.88	1.19	<0.001
Sleep disturbances	0.71	1.33	0.99	1.57	0.64	1.27	0.015
Use of sleep medication	0.18	0.68	0.21	0.77	0.16	0.66	0.51
Daytime dysfunction	0.41	0.74	0.54	0.85	0.38	0.71	0.04
Subjective sleep quality	1.30	0.88	1.44	0.91	1.27	0.87	0.07

Independent sample T-tests were used to compare mean scores between females and males in the analysis.
Abbreviations: PSQI, Pittsburgh Sleep Quality Index; SD: standard deviation.

Table 3. Factors that might be associated with poor sleep quality

Variables	Unadjusted odds ratio	95% CI	*p*
Age (years)	1.01	0.98–1.05	0.363
Female	1.13	0.70–1.81	0.613
Low educational attainment (primary school or lower)	1.78	1.15–2.75	0.009
Single/widowed	0.93	0.60–1.44	0.752
Living alone	1.08	0.39–2.98	0.882
BMI ≥25 kg/m^2	0.81	0.54–1.24	0.347
Pain (yes)	2.68	1.68–4.27	<0.001
ADLs impairment (yes)	1.51	0.41–5.50	0.535
IADLs impairment (yes)	1.19	0.65–1.93	0.685
Frailty (yes)	1.66	0.98–2.83	0.061
Polypharmacy (yes)	1.33	0.77–2.31	0.311
Multimorbidity (yes)	1.27	0.65–2.46	0.482
Chronic diseases			
Hypertension	1.20	0.69–2.07	0.514
Diabetes	0.63	0.36–1.12	0.113
Ischemic heart disease	1.47	0.81–2.65	0.200
Heart failure	0.76	0.26–2.19	0.608
Chronic lung disease (COPD, asthma)	0.92	0.28–2.98	0.887
Stroke	1.51	0.39–5.74	0.550
Dementia	0.93	0.50–1.75	0.843
Osteoarthritis	0.63	0.38–1.04	0.072
Parkinson's disease	1.40	0.11–18.21	0.795
Depression	2.30	0.11–47.14	0.588
Gastritis	0.66	0.32–1.34	0.250
Cancer	1.49	0.19–11.63	0.698

Univariable logistic regression analysis was applied.
Abbreviations: BMI, body mass index; ADLs, activities of daily living; IADLs, instrumental activities of daily living; COPD, chronic obstructive pulmonary disease; CI, confidence interval.

lower sleep efficiency (1.40±1.24 vs 0.88±1.19, *p* <0.001), higher scores of sleep disturbances (0.99± 1.57 vs 0.64±1.27, *p*=0.015), and daytime dysfunction (0.54±0.85 vs 0.38±0.74, *p*=0.04) compared to those aged <80 years.

In the univariable logistic regression, poor sleep quality was significantly associated with low educational attainment and bodily pain (Table 3).

In Model 1, with covariates including age, marital status, and educational level, poor sleep quality was strongly associated with age and low educational attainment (Table 4). In Model 2, the results showed that poor sleep quality was independently associated with age, low educational attainment, frailty, pain, and osteoarthritis after adjusting for marital status and diabetes (Table 5).

Table 4. Model 1. Multivariable logistic regression of factors possibly associated with poor sleep quality with covariates including age, low educational attainment, and marital status

Significant variables	Adjusted odds ratio	95% CI	*p*
Age	1.83	1.01–1.06	0.003
Low educational attainment (Reference: yes)	2.27	1.56–3.31	<0.001
Marital status (Reference: single/ widowed)	0.91	0.71–1.47	0.909

Abbreviation: CI, confidence interval.

Table 5. Model 2: Multivariable logistic regression of factors possibly associated with poor sleep quality with covariates including age, low educational attainment, marital status, frailty, pain, diabetes, and osteoarthritis.

Significant variables	Adjusted odds ratio	95% CI	*p*
Age	1.03	1.01–1.06	0.047
Low educational attainment (Reference: yes)	1.98	1.33–2.93	0.001
Marital status (Reference: single/ widowed)	0.91	0.61–1.33	0.619
Frailty (Reference: yes)	1.77	1.09–2.86	0.019
Pain (Reference: yes)	2.78	1.81–4.28	<0.001
Diabetes (Reference: yes)	1.47	0.91–2.37	0.119
Osteoarthritis (Reference: yes)	1.61	1.03–2.54	0.035

Abbreviation: CI, confidence interval

4. DISCUSSION

This study addresses sleep quality and its associated factors among older people in an urban area in Vietnam. We found that the prevalence of poor sleep quality among older people was 55.9%, and it was significantly associated with age, low educational attainment, frailty, bodily pain, and osteoarthritis.

The results showed that a high proportion of community-dwelling older adults in Vietnam experienced poor sleep quality, which was significantly higher than those reported in several studies in other Asian countries such as Japan[35] (37.3%) and China[5] (21%). When using the same PSQI cut-off with the study in Japan (≥6) or with the study in China (≥7), the prevalence in our study remains higher (52.9% vs. 37.3% or 48.7% vs. 21%, respectively). Furthermore, compared to a study in Taiwan with the PSQI cut-off of 5,[36] our prevalence of poor sleep quality was also higher than the result reported in that study (49%), and the mean PSQI score in our study was higher than that of the study in Taiwan (7.26±4.51 vs 6.3±4.4). This may be explained by several factors. The first is the difference in socioeconomic status between lower-middle-income and high-income countries.[37] Previous studies found that low income was strongly associated with poor sleep quality, and people with lower income tended to have poorer sleep quality.[13,38] Moreover, older people in high-income countries tend to have a higher educational level than those in lower-middle-income countries; higher education is a protective factor against poor sleep quality.[13] Moreover, the discrepancies in managing chronic diseases and social support between high and low-middle income countries are significant. Older adults in high-income countries such as Japan or Taiwan have better chronic disease management and receive more social support than those in Vietnam. Therefore, they may have a lower poor sleep quality prevalence.[39,40] The high proportion of the subjects experiencing poor sleep quality in our study indicates that sleep disorder is a prominent problem among older Vietnamese people. Therefore, besides common chronic diseases, such as hypertension and diabetes, sleep quality needs to be evaluated in older people. This will help provide early management strategies for those with poor sleep quality and improve their mental health and quality of life.[15,41]

In this study, we found that poor sleep quality was significantly associated with age, low educational attainment, frailty, bodily pain, and osteoarthritis. Age is strongly associated with poor sleep quality in older adults as proven in the literature and many previous studies.[42,43] It is due to physiologic changes related to age, such as decreasing sleep efficiency and time or increasing sleep latency and daytime napping.[42,43] Therefore, when people get older, they have more risk of poor sleep quality. Our results also showed that people aged ≥80 years had lower sleep efficiency, more sleep disturbances, and more daytime dysfunction than those aged <80 years. Participants with low educational attainment had a higher proportion of poor sleep quality than those with higher educational attainment (odds ratio [OR]=1.83, 95% CI: 1.27–2.63, *p*=0.001). This finding is in line with previous studies.[13,38] A study in China found that higher educational attainment was associated with decreased risk of poor sleep quality,[13] and a similar

finding was reported in another study in the USA.[38] This is because education is related to income and lifestyle, which significantly contribute to sleep quality.

We observed that participants with bodily pain had higher odds of poor sleep quality than those without pain. Similarly, individuals with osteoarthritis had 1.61 times higher odds of poor sleep quality than those without osteoarthritis. Previous studies recognized that pain and sleep quality had an interrelationship.[44,45] Moreover, more than one-third (37.8%) of participants in our study had osteoarthritis and were more likely to suffer from chronic pain. Hence, sleep quality should be included in assessing pain or osteoarthritis, and vice versa. Apart from pain, other factors contribute to poor sleep quality in individuals with osteoarthritis, including low physical activity, fatigue, or depression.[46] Poor sleep quality was observed in 70% of older adults with osteoarthritis in a previous study.[46] Another interesting finding in our study is that people with frailty had more than two times higher risk of having poor sleep quality than individuals without frailty (OR=2.17, 95% CI: 1.39–3.39, p=0.001). This result coincides with those of previous studies.[47,48] Fu et al. found that poor sleep quality was highly associated with frailty status.[48] A possible mechanism is that people with poor sleep quality are less likely to engage in physical activity,[49] which is a major risk factor for frailty. In contrast, low physical activity contributes factor to poor sleep quality.[50,51] Therefore, evaluating and managing frailty among older individuals with poor sleep quality is essential for physicians to improve sleep quality in older people.

Our study also has several limitations. First, this study was conducted in an urban area in Vietnam; therefore the data are not nationally representative. Second, we did not evaluate the effect of poor sleep quality in older people on mental health or quality of life. Moreover, this is a cross-sectional study; hence, we could not determine the cause-effect relationship between poor sleep quality and frailty. We cannot be sure if poor quality of sleep is increasing the risk of frailty or vice-versa. However, to the best of our knowledge, this is the first study addressing the prevalence and associated factors of poor sleep quality in older men and women in Vietnam, providing some implications for evaluating and managing sleep quality in older adults in Vietnam. Furthermore, it emphasizes the popularity of poor sleep quality among older Vietnamese people, which the healthcare system should pay more attention to improve their quality of life.

5. CONCLUSION

Poor sleep quality was highly prevalent among older Vietnamese people and it was strongly associated with age, low educational attainment, frailty, bodily pain, and osteoarthritis. Therefore, it is necessary to screen for sleep quality in older adults to have early interventional or preventive strategies. Furthermore, evaluating and managing pain, osteoarthritis, and frailty is needed for sleep quality management in older people with poor sleep quality.

CONFLICTS OF INTEREST

All authors declare that they have no conflicts of interest.

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