






ORIGINAL ARTICLE

The relationship between sleep disturbances and quality of life in patients with hypertension

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ABSTRACT

Objective: This research aimed to examine the relationship between sleep disturbances and quality of life (QoL) among hypertensive patients.

Methods: The study employed a cross-sectional quantitative research design with a sample size of 100 hypertensive patients. Data collection included the Epworth Sleepiness Scale and the World Health Organization QOL-Brief questionnaires to collect sleep pattern data as well as QoL on the physical, psychological, social, and environmental domains.

Results: The results unveiled a substantial prevalence of sleep disturbance and insomnia within the participants, as well as shorter sleep duration denoting very poor QoL. Among other things were the negative associations recorded between sleep disturbances and physical QoL ($r = -0.290$, p -value = 0.003) and psychological QoL ($r = -0.253$, p -value = 0.011). These correlations were associated less strongly with social and environmental QoL. However, that trend gives evidence for some likely influence on general well-being.

Conclusion: The results herein underscore the urgent need for integrated healthcare approaches for the management of hypertension and sleep disorders. Effective interventions, such as sleep hygiene education and cognitive behavioral therapies, might improve sleep quality and QoL for hypertensive individuals.

Keywords: Hypertension, sleep disturbance, elderly patients, quality of life, Saudi Arabia.

Introduction

Hypertension, more popularly recognized as a high blood pressure disorder, is a chronic health issue that has prevalence in a large portion of individuals worldwide [1]. It increases the risk of developing cardiovascular diseases such as heart attacks, stroke, and kidney failure. According to the World Health Organization, globally, over 1.13 billion individuals are living with hypertension, and thus, it can be considered one of the prevalent chronic diseases. More often than not, hypertension is either unrecognized or poorly managed, and when left unchecked, it can lead to serious consequences in the long run. Hypertension occurs more frequently with advancing age and various conditions, which might include poor diet, lack of exercise, stress, and genetic background [2]. With the growing population of elderly individuals and consistently changing lifestyles, hypertension statistics are set to rise, exerting further pressure on healthcare facilities [3].

Sleep is well recognized as instrumental in maintaining the health of the body [4]; however, its importance is not widely appreciated when it comes to the prevention of hypertension. People suffering from hypertension experience sleep disorders such as insomnia, sleep apnea, and fragmented sleep, which are deemed to have considerable effects on their health [4,5]. There is a reciprocity between sleep and hypertension, whereby inadequate sleep promotes and worsens hypertension while hypertension induces sleep problems [6].

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Insomnia and other sleep disruptions have been demonstrated to cause an increase in sympathetic nervous system activity, to increase the levels of blood pressure, and even to obstruct the ability to regulate it during the night. These disruptions can form a cycle where hypertension leads to disruption in sleep and poor sleep quality further ensures poor control of hypertension [6,7].

The quality of life (QoL) of a person with a chronic condition such as hypertension is significantly diminished because of the physical and psychological effects of the disease. QOL is a complex construct that involves medical and psychological well-being and physical, social, and environmental functioning [8]. Hypertension can impact each of these domains, given that the condition is present. Psychologically, hypertension might cause such consequences as fatigue, dizziness, and headache that hinder overall functioning. Psychologically, hypertension is linked to stress, anxiety, and depression, which affect the total emotional health of an individual negatively [9].

In the social aspect, hypertensive individuals are often restricted in their activities, leading to seclusion socially and emotionally [10]. Environmentally, perceived capability might also be influenced as patients with hypertension were likely to perceive themselves as being unable to manage their environment fully due to physical challenges or stress [10,11].

Both sleep disturbances, when combined with hypertension, can lead to a further decline in QOL. Sleep disturbances pathologically have been associated with numerous adverse consequences such as fatigue, compromised thinking ability, mood disorders, and low energy levels [12]. But when hypertensives are also challenged by sleep disruptions, their QOL is further compromised. Physical health can be affected by sleep disturbances since it leads to fatigue and ultimately impairs the ability of the body to repair damage caused by daily stress. It might worsen psychological conditions due to shifts in mood, increased temper, and hopelessness [13]. Moreover, social interaction is affected by sleep disturbances; since lack of sleep deprives human beings of energy to engage in social activities, thus contributing to social isolation and lack of social support [14].

Health education and awareness regarding sleep and hypertension might mean people would seek treatment for both conditions, which can improve health and reduce expenditures [15]. Sleep hygiene education and cognitive-behavioral interventions-cognitive behavioural therapy-I-have been shown effective in enhancing sleep quality among the sleep-disturbed population [16]. Regarding medical interventions for sleep disorders, it should be noted that some of the patients might require the use of medications, including in cases when the patient suffers from sleep-related diseases like sleep apnea [17]. Hypertension treatment mainly involves reducing the blood pressure levels by using both medicinal and non-medicinal techniques [18]. However,

research has revealed that managing sleep disturbances has a significant impact on the control of hypertension and enhancing health outcomes [6,7].

Few studies have been conducted on the correlation between sleep disorders and QOL among patients with hypertension, despite the potential of these factors to influence each other [4,6]. However, research investigating the association between sleep disturbances and QOL in other chronic illnesses indicated that sleep disturbances might have a large negative impact on QOL in various domains [19]. For instance, individuals with sleep disturbances would have comparatively lower physical health status, higher psychological distress, and impaired social functioning than healthy persons [20,21]. These results implied that the impact of sleep disorders on QOL in hypertensive patients is also likely to be significant.

This study aimed to examine the relationship between sleep disturbances and QoL in patients with hypertension.

Subjects and Methods

A cross-sectional design was used to collect data from June 2024–December 2024, enabling the examination of the associations between sleep disturbances and different aspects of QOL in hypertensive patients. This research was carried out in one of the leading medical centers of Saudi Arabia where hypertensive patients came for treatment or advice. With regards to the setting, the hospital was considered suitable because patients with hypertension could be easily approached, as most of them were followed up for the condition.

The inclusion criteria for participants in this study were as follows: males and/or females who were 18 years and above, suffering from primary hypertension, defined as systolic blood pressure of 140 mmHg or above and/or diastolic blood pressure of 90 mmHg or above, capable of understanding the procedures involved in the study and agreeing to participate in it willingly, and participants who can interpret and answer the survey instruments in the language the survey was conducted (either English or Arabic).

Participants were excluded if they were in the secondary group with high blood pressure as a result of other diseases like kidney disease or hyperthyroidism, having a severe co-morbid condition for that would limit their ability to participate in the research, admitted for an acute medical condition, and using drugs that have a severe impact on sleep.

The participants were selected using a convenience sampling method from the hospital environment. These consisted of patients seen consecutively in outpatient clinics, primary care facilities, or during a routine check-up for hypertension.

The sample size was drawn using statistical power analysis to obtain a representative sample to get adequate data to analyze. The sample size included 100 patients.

The sample size was computed using the Raosoft online sample size calculator with the overall target population of 150 patients, a 95% confidence level, and a 5% margin error. The attrition rate was 5%.

The instruments used included a demographic questionnaire, the Epworth Sleepiness Scale (ESS), and the World Health Organization QOL-Brief (WHOQOL-BREF) questionnaire. Demographic details such as age, gender, education, and duration of high blood pressure were obtained.

The ESS is a widely used self-administered questionnaire designed to assess a person's general level of daytime sleepiness. It is widely used in medical practice for the identification of sleep disorders, for instance, sleep apnea, narcolepsy, insomnia, and studies of the sleep cycles and their quality [22]. The ESS is made up of eight questions that investigate the chance of a person dozing in various settings that include sitting and reading, watching TV, or being seated in a car stopped for a few minutes. Each question was rated on a scale from 0 to 3, where: 0 = no chance of dozing, 1 = slight chance of dozing, 2 = moderate chance of dozing, and 3 = high chance of dozing. The total score was the sum of the responses on all eight questions and ranged from 0 to 24 points. Interpretation of ESS scores: 0–10: normal, one can feel sleepy during the day; 11–12: mild, one can feel sleepy, but not severely; 13–15: moderate, one can feel extremely sleepy during the day; 16 and above: severe means that one can hardly stay awake during the day [22].

The WHOQOL-BREF is one of the most commonly used measures that aim to evaluate a person's QoL. It was designed by the World Health Organization (WHO) to measure QoL in various domains. The WHOQOL-BREF contained 26 questions that evaluated four key domains of life: The four areas included physical health, psychological health, social well-being, and environmental health. Furthermore, it has two optional global health questions to measure the QoL and general health of the patient. Each question was assigned a 5-point scale, and these raw scores were converted into scale scores with possible values ranging from 0 to 100, representing a higher QoL [23].

Quantitative data analysis consisted of descriptive and inferential statistics. The quantitative data that was gathered during the study was analyzed using statistical software known as Statistical Package for the Social Sciences. The demographic and clinical data of the study sample were described using descriptive statistics. This involved the use of means, SDs, frequencies, and percentages, among others. Descriptive analysis was also conducted on the sleep disturbance scores obtained from the ESS and the QOL domain scores from the WHOQOL-BREF. Correlation analysis was performed to analyze the association between sleep disturbances and QOL. Pearson's correlation coefficients were used to determine the nature of the relationships and the degree of

associations between sleep disturbance variables (ESS scores) and QOL domain scores. The missing data was less than 5% of the total sample, so they were deleted from the sample. *p*-value was set at <0.05.

Results

The patient cohort revealed a predominantly older population with a slight male predominance. Patients exhibited diverse educational backgrounds, with a significant proportion having attained higher education levels. The duration of high blood pressure was relatively evenly split between shorter and longer durations, while sleep duration varies among individuals. These insights provide a foundational understanding of the patient population and can inform tailored approaches to healthcare delivery and interventions (Table 1).

In terms of sleep duration, an interesting pattern emerges. Individuals in the insomnia group were more likely to report sleeping less than 6 hours per night compared to those in the lack of insomnia group (44.10% vs. 14.60%, *p*-value = 0.007) (Tables 2 and 3).

Similarly, the negative correlation with psychological QOL ($r = -0.253$, *p*-value = 0.011) underscores the impact of sleepiness on mental well-being, while the correlation with environmental QOL ($r = -0.178$, *p*-value = 0.076). Although the correlation with social QOL was not statistically significant ($r = -0.151$, *p*-value = 0.133) (Table 2).

Table 1. Patients' demographics.

n = 100	Percentage (100%)
Age	
°Less than 30	13.0%
°31-40	18.0%
°>40 years	69.0%
Gender	
Male	57.0%
°Female	43.0%
Education	
°Primary	5.0%
°Intermediate	7.0%
°Secondary	19.0%
°University or diploma	47.0%
°Master or PhD	22.0%
How long have you had high blood pressure?	
°Less than 3 years	56.0%
°More than 3 years	44.0%
Sleeping hour	
°Less than 6 hours	32.0%
°6-8 hours	57.0%
°>8 hours	11.0%

Table 2. Correlations for sleep disturbances and QOL.

WHOQOL-BREF	ESS (Pearson correlation)	p-value	Insomnia group (Pearson correlation)	p value
PHYS	-0.290**	0.003	-0.443**	0
PSYCH	-0.253*	0.011	-0.287*	0.004
SOCIAL	-0.151	0.133	-0.229*	0.022
ENVIR	-0.178	0.076	-0.286**	0.004
QOL	-0.213	0.002	-0.127	0.035

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 3. Sociodemographic and clinical data of persons with and without drowsiness.

	Lack of insomnia (n = 41)	100%	Insomnia (n = 59)	100%	Total (n = 100) 100% / p-value
Age					0.043
°Less than 30	3	7.30%	10	16.90%	13 13.00%
°31-40	4	9.80%	14	23.70%	18 18.00%
°>40 years	34	82.90%	35	59.30%	69 69.00%
Gender					0.199
°Male	27	65.90%	30	50.80%	57 57.00%
°Female	14	34.10%	29	49.20%	43 43.00%
Education					0.1411
°Primary	2	4.90%	3	5.10%	5 5.00%
°Intermediate	3	7.30%	4	6.80%	7 7.00%
°Secondary	12	29.30%	7	11.90%	19 19.00%
°University or diploma	19	46.30%	28	47.50%	47 47.00%
°Master or PhD	5	12.20%	17	28.80%	22 22.00%
How long have you had high blood pressure?					0.55
°Less than 3 years	21	51.20%	35	59.30%	56 56.00%
°More than 3 years	20	48.80%	24	40.70%	44 44.00%
Sleeping hour					0.007
°Less than 6 hours	6	14.60%	26	44.10%	32 32.00%
°6-8 hours	30	73.20%	27	45.80%	57 57.00%
°>8 hours	5	12.20%	6	10.20%	11 11.00%

Discussion

The results of this study highlighted the important link between sleep disturbances and QOL of hypertensive patients. Through demographic and clinical data of the patients, and by measuring the QOL parameters using the WHOQOL-BREF scale, the study highlighted the impact of sleep disturbances such as insomnia and drowsiness on different aspects of the patients' lives. These findings pose clear implications for hypertensive patients and clinical practice and suggested approaches to addressing hypertension in population health.

The demographic analysis highlighted that the majority of participants were older people, slightly more men prevailed, and people with different levels of education were represented in the sample. This is because a good proportion of the participants reported higher educational levels, which might be reflective of health literacy that influences self-awareness and behaviors relating to hypertension. This is consistent with previous findings where the majority of participants with hypertension were older [6,24].

The findings of this study on the relationship between hypertension, short sleep duration, and aging were strengthened by the observation that participants with

insomnia exhibited a skewed distribution of sleep duration, with more people reporting shorter durations of sleep. This is congruent with research findings suggesting that hypertension is associated with sleep disruption, especially among the elderly, due to factors such as autonomic dysfunction and elevated night-time blood pressure fluctuations [5,24]. Moreover, these findings are supported by the finding that insomnia and other related sleeping disorders were more likely to be witnessed among people who have less than 6 hours of sleep per night [25,26].

The results proved that there was a considerable relationship between drowsiness due to insomnia and reduced sleep duration, with only 44.1% of the insomnia group getting less than 6 hours of sleep every night, in contrast to 14.6% of the non-insomnia group (p -value = 0.007). This discovery sheds light on one mechanism whereby sleep loss amplifies the adverse consequences of hypertension, including its effects on QOL. This is consistent with previous studies, which confirmed that insomnia had negative effects on patients [27,28].

The WHOQOL-BREF questionnaire indicated that sleep disturbances were strongly and negatively associated with different aspects of QOL, specifically physical and psychological. These findings are consistent with prior research, thus supporting the idea that sleep quality significantly impacts overall well-being [9,28]. The strong negative relationship between sleepiness and physical QOL, where $r = -0.290$, p -value = 0.003, further underlines the intertwined elements of poor sleep quality, hypertension-induced fatigue, and poor physical well-being. Sleep abnormality has been found to upset the restorative and recuperative processes of the cardiovascular system, which is especially problematic for hypertensives [6].

Likewise, the inverse relationship with psychological QOL ($r = -0.253$, p -value = 0.011) showed the effect of disrupted sleep on an individual's well-being. Lack of sleep has been linked to increased stress, reduced efficiency in cognitive performance, and increased likelihood of developing stress-induced depression and anxiety in hypertensive persons [13,24]. Regarding the relationship between sleepiness and environmental QOL, though the statistical significance was not reached, it appeared that dissatisfaction with the physical environment or settings might be further exacerbated by the duration of hypertension and poor sleep quality.

Notably, social QOL was examined for correlation with sleepiness, it was found that the two were not significantly related ($r = -0.151$, p -value = 0.133). It might therefore be suggestive of the robustness of social networks and interpersonal relations in the face of health adversities [29,30]. However, it could also cause further questions as to whether social support could reduce the detrimental effects of sleep disturbances on other QOL domains.

The study emphasizes the significance of multifaceted approaches aimed at managing sleep disorders

in hypertensives to enhance their QOL. Using sleep health as a key intervention strategy in hypertension management programs could offer significant outcomes from a public health standpoint. Community-based sleep education interventions targeting hypertensive patients, especially the elderly, would help lower levels of hypertension and improve knowledge on sleep and cardiovascular health [16]. From the clinical perspective, these outcomes convey the message of the necessity to screen hypertensive patients for sleep problems regularly. Furthermore, these findings point toward the importance of individualized interventions that take into account the reciprocal nature of sleep and hypertension [6].

Some of the limitations include the following. The limitation of self-completed questionnaires increased the risk of recall bias, especially for the reporting of hours slept and QoL. Furthermore, the study targeted a specific population attending a single healthcare facility, and therefore, the findings cannot be generalized to other groups. They could further use multicenter studies to capture a more diverse mix of patient experiences. It should also be noted that due to the cross-sectional nature of the study, it was not possible to determine causes and effects. Although these findings demonstrated substantial correlations between sleep disturbances and multiple aspects of QOL, further research is required to identify the causal connections between these factors.

Conclusion

This study, therefore, emphasizes sleep disturbances as significant factors that determine the QoL of hypertensive patients, especially those in the older age bracket. In light of the substantial associations between sleep disturbances and QOL domains in this population, enhancing sleep health becomes crucial for hypertension management. Thus, incorporating sleep promotion interventions into clinical and public health care models can improve the health of individuals and their QoL. Future research should extend from these findings to design enhanced, effective intervention strategies and investigate the multiple pathways between sleep, hypertension, and QoL. As such, it would also be possible to enhance the general well-being and QoL of hypertensive patients through enhanced cardiovascular health.

List of Abbreviations:

ESS	Epworth Sleepiness Scale
QoL	quality of life
WHOQOL-BREF	World Health Organization Quality of Life-Brief

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Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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Consent to participate

Informed consent was obtained from all the participants.

Ethical approval

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