Turk J Fam Pract 2025;29(3):118-126
DOI: 10.54308/TJFP.2025.832

Research Article

Evaluation of sleep quality and general health conditions in hypertension patients who apply to the family medicine outpatient clinic in Ordu

Seyyit Kaçmaz[1], Bestegül Çoruh Akyol[1]

[1]Department of Family Medicine, Faculty of Medicine, Ordu University, Ordu, Türkiye

ABSTRACT

Objective: Our study aims to evaluate sleep quality in individuals aged 18 and older with and without hypertension, and to examine the relationship between sleep quality and the General Health Questionnaire-12 (GHQ-12), which is used to assess mental health status.

Materials and Methods: This cross-sectional study included a total of 190 participants, consisting of 95 hypertensive patients and 95 controls without hypertension, who applied to the Family Medicine outpatient clinic at Ordu Training and Research Hospital between February and July 2024. The Pittsburgh Sleep Quality Index (PSQI) and GHQ-12 questionnaires were used in the study. Data were analyzed using IBM SPSS v23 and R software, with a significance level set at $p<0.050$.

Results: Significant differences were observed between the hypertension group and the control group in the PSQI components of subjective sleep quality, sleep latency, habitual sleep efficiency, and sleep disturbances. A statistically significant relationship was found between hypertension, the control group, and GHQ-12 scores ($p=0.001$). In the hypertension group, 56.8% of participants exhibited poor mental health, compared to 33.7% in the control group. Among individuals in the hypertension group with GHQ-12 scores of 2 or higher, notable differences were detected in the components of subjective sleep quality, sleep latency, sleep disturbances, and daytime dysfunction.

Conclusion: The findings of the study reveal interactions between hypertension, mental state and sleep quality. The study shows that these factors are in a cycle that feeds each other. As primary care physicians, considering the prevalence, chronicization rates, possible complications and consequences of these diseases in the society, preventing the emergence of many related new clinics or managing the complications that may occur in related conditions when they cannot be prevented is in line with the philosophy of Family Medicine Specialization.

Keywords: Hypertension, sleep quality, sleep wake disorders, mental health, primary health care

Introduction

Sleep is a critical part of human life and has been widely studied. Research shows that sleep duration and quality significantly impact memory, learning, performance, metabolism, and the endocrine system. Additionally, reduced sleep duration has been found to disrupt neurohormonal balance, potentially leading to weight gain, obesity, and hypertension (HT).[1]

✉ Seyyit Kaçmaz ▪ seyyit5595@outlook.com
Received: 01.02.2025 **Accepted:** 18.08.2025 **Published:** 30.09.2025

Humans are a whole, encompassing physical, mental, and social aspects. Therefore, mental health should be evaluated in inseparable connection with physical health. This holistic approach is a vital part of primary healthcare, and mental health services hold great significance in this context. The holistic approach implemented in primary healthcare can contribute to preventing mental disorders and, consequently, reducing their prevalence.[2]

Hypertension is one of the most prevalent chronic diseases in our country.[3] Disruptions in sleep rhythm can lead to various problems within a biopsychosocial framework. For this reason, the impact of sleep on health and its relationship with hypertension has become a significant area of research in the healthcare field. This study aims to evaluate sleep quality in HT patients aged 18 years and older, and to examine the relationship between sleep quality and GHQ-12, which is used for screening mental health, in order to guide the diagnosis and treatment of HT patients within a biopsychosocial framework.

Material and Methods

In this cross-sectional study, participants were recruited using a consecutive sampling method from individuals aged 18 and over who visited the Family Medicine Clinic of Ordu Training and Research Hospital between February and July 2024. A total of 3,300 patients were informed about the study and volunteered to participate, and eligible individuals were selected. The study included a total of 190 participants, comprising 95 hypertensive patients aged 18 and above and a control group of 95 individuals without a diagnosis of hypertension.

This study was prepared as a Family Medicine residency thesis. Ethical approval for the study was obtained from the Clinical Research Ethics Committee of Ordu University on December 8, 2023, under decision number 317. Following this approval, data were collected from individuals who met the research criteria and provided both written and verbal informed consent. Data were gathered through face-to-face interviews. The questionnaire included items regarding the participants' sociodemographic characteristics, and the Pittsburgh Sleep Quality Index (PSQI) and the 12-Item General Health Questionnaire (GHQ-12) scales were utilized.

PSQI asks individuals to evaluate their past month by answering 24 questions. Of these, 19 are self-reported by the individual, while the remaining 5 are directed to their bed or room partner. The questions aim to determine sleep duration, sleep latency, and the frequency and severity of sleep-related problems. However, only the responses provided by the individual themselves are included in the evaluation; answers given by the bed or room partner are not considered in the analysis.[4]

The GHQ-12 is a 12-question form used to assess the mental state of individuals over the last few weeks. Each question asks about the frequency of symptoms and offers four options: "not at all," "as often as usual," "more often than usual," and "very often." These options are scored by the subject as 0, 1, 2, and 3, or the answers are coded by the practitioner reading them aloud. A common scoring method is to give 0 points to the first two options and 1 point to the last two options to calculate the total score. This method was named GHQ-type scoring by David Goldberg. An alternative scoring method is Likert-type scoring. In validity studies using GHQ-type scoring, it was determined that the most appropriate cut-off point was between 1 and 2 points.[5] In our study, patients with GHQ-12 scores of 2 and above were accepted as "cases requiring psychiatric evaluation."

In our study, the sample size was calculated using the G*Power V.3.1.9.7 program. The power analysis indicated that, for two independent groups, a total

of 86 participants per group would be required to achieve 90% power with an effect size of 0.5 and a 5% margin of error. Anticipating a 10% data loss, it was planned to include 95 participants in each group.[6]

HT group was composed of individuals with a hypertension diagnosis recorded by a physician in the electronic health records and/or those using antihypertensive medications. The control group consisted of individuals without a prior history of physician-diagnosed hypertension and not using antihypertensive drugs. Additionally, only those with an office blood pressure of <140/90 mmHg at the index visit were accepted as controls; individuals with measurements ≥140/90 mmHg were excluded from the control group. The same inclusion and exclusion criteria were applied to both groups. Exclusion criteria included being under 18 years of age, being unable to complete the questionnaire, and having a diagnosis of primary sleep disorder.

The data were analyzed using IBM SPSS v23 and R software. Normal distribution was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests. For comparing normally distributed data with two categorical independent variables, an Independent Samples t-test was used, while the Mann-Whitney U test was applied for non-normally distributed data. For comparing data with three or more groups that did not follow a normal distribution, the Kruskal-Wallis H test was used, and multiple comparisons were examined with the Dunn test. To investigate the relationship between categorical variables, Pearson's chi-square, Yates correction, Fisher's Exact Test, and Fisher-Freeman-Halton Test were used. For comparing the association between categorical variables, the Bonferroni-corrected z-test was applied. The relationship between non-normally distributed quantitative data was assessed using Spearman's rho correlation. The results were presented as n (%), mean ± standard deviation, or median (minimum–maximum) for categorical and quantitative variables. A p-value of <0.05 was considered statistically significant.

Results

The study included 190 participants, consisting of 95 HT patients and 95 individuals without HT, all of whom met the inclusion criteria and sought care for various reasons at the Family Medicine Clinic of Ordu University.

The mean total GHQ-12 score in the hypertension group was 2.65 ± 2.64, while in the control group it was 1.83 ± 2.73. A statistically significant difference was observed between the GHQ-12 scores of the groups (p=0.001). It was determined that having hypertension negatively impacted mental health.

An analysis of GHQ-12 scores revealed that 56.8% (n=54) of individuals in the hypertension group scored 2 or above, whereas this rate was 33.7% (n=32) in the control group. A statistically significant association was found between the groups (hypertension vs. control) and the GHQ-12 score categories (p=0.001). The proportion of individuals scoring 2 or above was notably higher in the hypertension group compared to the control group. These findings indicate that more than half of the patients may require mental health screening and further evaluation.

A statistically significant difference was observed between the groups in terms of sleep latency and subjective sleep quality component scores (p=0.046, p=0.014). The mean rank score for subjective sleep quality was 102.23 in the HT group, compared to 88.77 in the control group. When examining the PSQI scores for sleep latency and subjective sleep quality, higher scores were noted in the HT group. A statistically significant difference was also identified between the groups for habitual sleep efficiency component scores (p=0.049). The mean rank score for habitual sleep efficiency was 101.78 in the HT group, while it

was 89.22 in the control group. Higher PSQI scores for habitual sleep efficiency were observed in the HT group. Moreover, a statistically significant difference was found between the groups in terms of sleep disorder component scores (p=0.001). The mean rank score for sleep disorders was 107.04 in the HT group, compared to 83.96 in the control group. Higher PSQI scores for sleep disorders were observed in the HT group compared to the control group. No statistically significant differences were found in the other component scores between the groups (p>0.050). A detailed comparison of PSQI component scores by group is presented in Table 1.

The total PSQI score was found to be 6.57 ± 3.37 in the hypertension group and 5.53 ± 3.49 in the control group. A statistically significant difference was found between the total PSQI scores of the groups (p = 0.008). Higher total PSQI scores were observed in the hypertension group. It was determined that the sleep quality of the hypertension group began to deteriorate compared to the control group.

There was no statistically significant correlation between the groups and PSQI sleep status (p=0.053). The analysis of the relationship between the groups and PSQI sleep status is shown in Table 2.

In the HT group, a statistically significant difference was observed in the median values of the Subjective Sleep Quality score based on GHQ-12 groups (p=0.006). Since the median values were equal, the mean ranks were analyzed, revealing scores of 40.33 for participants with a GHQ-12 score of less than 2 and 53.82 for those with a GHQ-12 score of 2 or higher. Participants with a GHQ-12 score of 2 or above had higher PSQI scores for subjective sleep quality. A statistically significant difference was also identified in the median values of the Sleep Latency score according to GHQ-12 groups (p=0.008), with those scoring 2 or above on GHQ-12 having higher sleep latency scores. Additionally, significant differences were found in the median values of the Sleep Disorder score between GHQ-12 groups (p=0.036). When examining the sleep disturbance component, higher PSQI scores were noted among those with a GHQ-12 score of 2 or above. Significant differences were also observed in the median values of the daytime dysfunction score according to GHQ-12 groups (p=0.005). Finally, a statistically significant difference was found in the median values of the total PSQI score based on GHQ-12 groups (p=0.001).

Table 1. Comparison of values of PSQI components according to groups

PSQI components	HT group	Control group	Test statistic	p*
Subjective Sleep Quality	1.28 ± 0.74	1.08 ± 0.69	3873.000	**0.046**
Sleep Latency	1.42 ± 1.04	1.05 ± 0.87	3616.500	**0.014**
Sleep Duration	0.89 ± 0.84	0.92 ± 0.79	4401.500	0.748
Habitual sleep efficiency	0.62 ± 0.98	0.37 ± 0.76	3915.500	**0.049**
Sleep disorder	1.47 ± 0.62	1.17 ± 0.6	3416.500	**0.001**
Sleep medication use	0.19 ± 0.69	0.19 ± 0.67	4511.500	0.996
Daytime Dysfunction	0.68 ± 0.91	0.75 ± 0.91	4286.500	0.510

*Mann Whitney U test; Mean±standart deviation; HT: Hypertension; PSQI: Pitssburg Sleep Quality Index.

Table 2. Examining the connection between groups and PSQI sleep states

	HT group	Control group	Test Statistic	p
Good Sleep (PSQI <5)	30 (31.6)	43 (45.3)	3.760	0.053
Poor sleep (PSQI ≥5)	65 (68.4)	52 (54.7)		

In the control group, a statistically significant difference was found in the median values of Subjective Sleep Quality scores based on GHQ-12 groups (p=0.001). Since the median values were equal, the mean ranks were analyzed, showing scores of 42.21 for those with a GHQ-12 score of less than 2 and 59.41 for those with a score of 2 or higher. Participants with a GHQ-12 score of 2 or above had higher subjective sleep quality component scores. A statistically significant difference was also noted in the median values of Sleep Latency scores according to GHQ-12 groups (p=0), with higher sleep latency scores observed in participants with a GHQ-12 score of 2 or above. Additionally, a significant difference was identified in the median values of Sleep Medication Use scores between GHQ-12 groups (p=0.011). Since the median values were equal, the mean ranks were evaluated, revealing scores of 45.52 for participants with a GHQ-12 score of less than 2 and 52.88 for those with a score of 2 or above. The sleep medication use component scores were higher in individuals with a GHQ-12 score of 2 or above. Furthermore, a statistically significant difference was observed in the median values of Daytime Dysfunction scores based on GHQ-12 groups (p=0.001). Lastly, a significant difference was found in the median values of the total PSQI score according to GHQ-12 groups (p=0). The relationship between GHQ-12 groups, PSQI components, and the total score is detailed in Table 3.

Discussion

Sleep regulates blood pressure (BP). Short sleep duration at night can increase sympathetic nervous system activity the next day, which may

Table 3. Comparison of PSQI components and total score according to GHQ-12 groups

	GHQ-12 Score			
	<2	2 and above	Test Statistic	p*
	Mean± s.deviation	Mean± s.deviation		
HT Group				
Subjective Sleep Quality	1.05 ± 0.55	1.46 ± 0.82	792.500	**0.006**
Sleep Latency	1.1 ± 1	1.67 ± 1.01	767.500	**0.008**
Sleep Duration	0.93 ± 0.82	0.87 ± 0.87	1053.500	0.663
Habitual sleep efficiency	0.56 ± 1.03	0.67 ± 0.95	999.000	0.341
Sleep disorder	1.34 ± 0.57	1.57 ± 0.63	862.000	**0.036**
Sleep medication use	0.1 ± 0.49	0.26 ± 0.81	1037.000	0.275
Daytime Dysfunction	0.41 ± 0.81	0.89 ± 0.95	775.500	**0.005**
Total PSQI score	5.49 ± 3.21	7.39 ± 3.28	682.500	**0.001**
Control Group				
Subjective Sleep Quality	0.9 ± 0.59	1.44 ± 0.76	643.000	**0.001**
Sleep Latency	0.76 ± 0.78	1.63 ± 0.75	444.000	**<0.001**
Sleep Duration	0.83 ± 0.66	1.09 ± 1	900.000	0.342
Habitual sleep efficiency	0.24 ± 0.53	0.63 ± 1.04	853.500	0.099
Sleep disorder	1.08 ± 0.55	1.34 ± 0.65	821.500	0.073
Sleep medication use	0.08 ± 0.45	0.41 ± 0.95	852.000	**0.011**
Daytime Dysfunction	0.51 ± 0.74	1.22 ± 1.04	604.000	**0.001**
Total PSQI score	4.4 ± 2.64	7.75 ± 3.93	398.500	**<0.001**

*Mann Whitney U test, HT: Hypertension; PSQI: Pittsburg Sleep Quality Index; GHQ: General Health Questionnaire.

lead to an elevation in BP. Recent studies in the literature have shown that sleep disturbances disrupt the physiological decline of BP at night and could be associated with the development of HT.[7] Cappuccio et al. reported that shorter sleep duration (≤ 5 hours per night) is associated with a higher risk of HT.[8]

The significantly higher GHQ-12 scores observed in the hypertension group indicate poorer mental health among these individuals. This finding is consistent with the study conducted by Hamer et al. which emphasized the coexistence of hypertension and common mental disorders[9] Similarly, a cohort study by Roohafza et al. reported that individuals with high stress levels had a 38% increased risk of developing hypertension.[10] However, a study conducted in Nigeria by Oshodi et al. (2012) did not find a significant association between hypertension and mental health status.[11] These discrepancies may be explained by differences in sample characteristics, assessment tools, and cultural factors. Taken together, these findings highlight the critical importance of addressing mental health in the management of hypertension. Primary care physicians play a key role in controlling hypertension by adopting a holistic approach that encompasses both physical and mental health, ensuring early intervention and regular follow-up. Our study underscores the importance of evaluating mental health status in hypertensive individuals at the primary care level.

The relationship between sleep quality and hypertension has been demonstrated in various ways across different populations. A study conducted in China reported that hypertensive women had poorer subjective sleep quality compared to normotensive women, while in men, five components of the PSQI were found to be significantly associated with hypertension.[12] In another study conducted in Türkiye, only daytime dysfunction was found to be significantly associated with hypertension.[1] A study from Nigeria revealed that certain PSQI components were associated with both systolic and diastolic blood pressure,[13] whereas a study conducted in Germany demonstrated that hypertension was associated with poor sleep quality, increased sleep latency, and reduced sleep efficiency.[14] Similarly, in our study, significant differences were found between the hypertension and control groups in the PSQI subcomponents of subjective sleep quality, sleep latency, sleep disturbances, and habitual sleep efficiency. In this regard, our findings are consistent with those of Lu et al.[12] These results support the negative impact of hypertension on sleep quality. Overall, the findings emphasize that sleep quality assessment should not be overlooked in the management of hypertension.

Studies conducted in different countries have shown that sleep quality is often impaired in individuals with hypertension. In a study conducted in Nigeria, Alebiosu et al. reported a mean PSQI score of 5.03 ± 3.28 in the hypertensive group, compared to 3.10 ± 0.83 in the control group, with 42.4% of hypertensive individuals identified as having poor sleep quality.[13] Similarly, a study from the Eastern Black Sea region of Türkiye found a mean PSQI score of 5.63 ± 3.69, with 43.3% of hypertensive participants reporting poor sleep quality.[15] Another study conducted in Ethiopia reported this rate as 37.7%.[16] A study from China also showed a significant difference between groups, with the hypertensive group having a mean PSQI score of 5.01 ± 0.04 compared to 3.59 ± 0.04 in the control group.[17] In our study, the mean PSQI score was 6.57 ± 3.37 in the hypertensive group and 5.53 ± 3.49 in the control group, with a statistically significant difference between the groups. Although the proportion of individuals with poor sleep quality did not differ significantly between the groups, 68.4% of hypertensive individuals and 54.7% of the control group were found to have poor sleep quality (PSQI ≥ 5). This suggests a trend toward deteriorating sleep quality in the hypertensive

group. Although some studies in the literature have not established a direct relationship between sleep duration and hypertension, poor subjective sleep quality has been identified as a potential risk factor for hypertension.[18] Overall, the findings suggest that the prevalence of hypertension may be more closely associated with deteriorations in sleep quality than with sleep duration alone. This highlights the potential role of quality sleep in the prevention and management of hypertension. However, due to the multifactorial and complex nature of the relationship between sleep and hypertension, more large-scale and controlled studies are needed to clarify this connection.

In our study, individuals with higher GHQ-12 scores had significantly higher total PSQI scores in both the hypertension and control groups. This finding suggests a close association between sleep quality and mental health. Similarly, studies by Zhu et al. and Günaydın et al. reported a significant relationship between poor sleep quality and impaired mental well-being.[19],[20] Furthermore, Zhang et al. indicated that improvements in sleep quality were positively associated with better mental health outcomes.[21] In this regard, our findings are consistent with the existing literature and emphasize that sleep screening is as important as mental health evaluation.

In a study conducted with 1,000 individuals in Iran, sleep duration, sleep latency, sleep disturbances, daytime dysfunction, and sleep efficiency subcomponents were found to correlate with GHQ-12 scores.[22] Similarly, Liu, Y. and colleagues identified a significant link between depression and daytime dysfunction.[23] Research from Japan revealed that PSQI scores were associated with various conditions: in patients with primary insomnia, sleep delay and the use of sleep medication; in those with major depression, subjective sleep quality and habitual sleep efficiency; in individuals with generalized anxiety disorder, sleep duration, subjective sleep quality, and habitual sleep efficiency; and in patients with schizophrenia, subjective sleep quality and sleep latency.[24] In our study, significant relationships were observed between GHQ-12 groups and the subcomponents of subjective sleep quality, sleep disturbances, sleep latency, and daytime dysfunction in the HT group. Similarly, in the control group, notable associations were found between GHQ-12 groups and the subcomponents of subjective sleep quality, sleep medication use, sleep latency, and daytime dysfunction. Furthermore, higher PSQI scores were recorded for subjective sleep quality and sleep latency subcomponents in both groups, highlighting a strong connection with patients' mental health. Poor sleep quality may exacerbate psychiatric disorder symptoms, and these conditions can further lead to disruptions in sleep patterns. Primary care physicians should consider referring patients to sleep specialists for detailed assessments when necessary and take an active role in facilitating appropriate treatment strategies for managing psychiatric conditions. Such an approach may enhance the regulation of treatment processes and contribute to the improvement of patients' mental health. Our study makes a significant contribution to the literature as one of the few primary care-based investigations that simultaneously examines the relationship between sleep quality and mental health in individuals with hypertension. The findings highlight the importance of considering the psychosocial dimension in the management of chronic diseases and support the need for a holistic approach by family physicians in this process.

In our study, it was found that more than half of both groups had poor sleep quality. Additionally, more than half of the HT group had a GHQ-12 score of 2 or higher, identifying them as cases that required mental health screening and assessment. From this, it was determined that the relationship between HT and mental health status may be directly linked to sleep problems. HT is not only a physical health issue but can also negatively affect

mental health. Similarly, impairments in sleep quality can worsen both mental health and HT-related clinical outcomes. Our study emphasizes that these factors are part of a mutually reinforcing cycle.

In conclusion, understanding the cause-and-effect relationship between these three factors and evaluating patients with these diseases within this framework is an important parameter for us, Family Medicine Specialists, who provide holistic services at all levels of the healthcare system. Considering the prevalence of these diseases in society, their chronicity rates, possible complications, and outcomes, preventing the emergence of many related new clinical conditions or, in cases where prevention is not possible, managing the potential complications related to these conditions aligns with the philosophy of Family Medicine specialization.

Ethical approval

This study has been approved by the Ordu University Clinical Research Ethics Committee (approval date 08.12.2023, number 317).

Author contribution

The authors declare contribution to the paper as follows: Study conception and design: SK, BÇA; data collection: SK; analysis and interpretation of results: SK; draft manuscript preparation: SK, BÇA. All authors reviewed the results and approved the final version of the article.

Source of funding

The authors declare the study received no funding.

Conflict of interest

The authors declare that there is no conflict of interest.

References

1. Demir K, Kaya Z, Kayrak M, Bacaksız A, Duman C. Orta yaş hipertansif bireylerde kan basıncı kontrolü ve uyku kalitesi arasındaki ilişkinin analizi [An analysis of the relation between blood pressure regulation and sleep quality in middle aged hypertensive subjects]. Selcuk Univ Tip Derg. 2011;27(2):83-87.
2. Elkin N, Barut AY. Bir aile sağlığı merkezine başvuran bireylerin Genel Sağlık Anketine göre ruhsal durumlarının değerlendirilmesi [According to the General Health Questionnaire assessment of mental health situations of individuals who applied to family health centers]. IGUSABDER. 2017;3:221-238.
3. Onat A. Tıp dünyasının kronik hastalıklara yaklaşımına öncülük. Ankara: Türk Dil Kurumu; 2017.
4. Buysse DJ, Reynolds CF, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. Psychiatry Res. 1989;28(2):193-213. **[Crossref]**
5. Kılıç C. Genel Sağlık Anketi: güvenilirlik ve geçerlilik çalışması [General Health Questionnaire: A validity and reliability study]. Turk Psikiyatri Derg. 1996;7(1):3-9.
6. Faul F, Erdfelder E, Buchner A, Lang AG. Statistical power analyses using G*Power 3.1: tests for correlation and regression analyses. Behav Res Methods. 2009;41(4):1149-1160. **[Crossref]**
7. Yamaki M, Sato T, Fujii H. Lower ankle-brachial index is associated with poor sleep quality in patients with essential hypertension. Am J Cardiovasc Dis. 2015;5(1):77-82.
8. Cappuccio FP, Stranges S, Kandala NB, et al. Gender-specific associations of short sleep duration with prevalent and incident hypertension: the Whitehall II Study. Hypertension. 2007;50(4):693-700. **[Crossref]**
9. Hamer M, Batty GD, Stamatakis E, Kivimaki M. The combined influence of hypertension and common mental disorder on all-cause and cardiovascular disease mortality. J Hypertens. 2010;28(12):2401-2406. **[Crossref]**
10. Roohafza H, Sattari N, Nouri F, et al. Do any kinds of perceived stressors lead to hypertension? a longitudinal cohort study. Hypertens Res. 2022;45(6):1058-1066. **[Crossref]**
11. Oshodi YO, Adeyemi JD, Oke DA, Seedat S. Psychiatric morbidity in hypertensives attending a cardiology outpatient clinic in West Africa. Niger J Clin Pract. 2012;15(1):84-88. **[Crossref]**

12. Lu K, Ding R, Tang Q, et al. Association between self-reported global sleep status and prevalence of hypertension in Chinese adults: data from the Kailuan community. Int J Environ Res Public Health. 2015;12(1):488-503. **[Crossref]**

13. Alebiosu OC, Ogunsemi OO, Familoni OB, Adebayo PB, Ayodele OE. Quality of sleep among hypertensive patients in a semi-urban Nigerian community: a prospective study. Postgrad Med. 2009;121(1):166-172. **[Crossref]**

14. Bruno RM, Palagini L, Gemignani A, et al. Poor sleep quality and resistant hypertension. Sleep Med. 2013;14(11):1157-1163. **[Crossref]**

15. Yılmaz Y, Aşılar RH. Hipertansiyon hastalarında uyku kalitesinin öz bakım gücü ve kan basıncı kontrolüne etkisi [Effect of sleep quality on self care agency and blood pressure control in hypertensive patients]. J Turk Sleep Med. 2022;9(3):278-287. **[Crossref]**

16. Ayanaw T, Temesgen M, Azagew AW, Ferede YM. Sleep quality and associated factors among adult hypertensive patients attending a chronic follow up care clinic in northwest Amhara regional state referral hospitals, Northwest Ethiopia. PLoS One. 2022;17(7):e0271072. **[Crossref]**

17. Liu RQ, Qian Z, Trevathan E, et al. Poor sleep quality associated with high risk of hypertension and elevated blood pressure in China: results from a large population-based study. Hypertens Res. 2016;39(1):54-59. **[Crossref]**

18. Lo K, Woo B, Wong M, Tam W. Subjective sleep quality, blood pressure, and hypertension: a meta-analysis. J Clin Hypertens (Greenwich). 2018;20(3):592-605. **[Crossref]**

19. Zhu Q, Xu L, Chen Y, Shi D, Huang H, Cai Y. Sleep quality and mental health among asymptomatic COVID-19 carriers from Fangcang shelter hospitals: the moderating role of social support. Research Square [Preprint]. 2022. **[Crossref]**

20. Günaydın N. Bir devlet hastanesinde çalışan hemşirelerin uyku kalitesi ve genel ruhsal durumlarına etkisi [The quality of sleep and effects on general mental health of nurses who works in a state hospital]. J Psychiatr Nurs. 2014;5(1):33-40. **[Crossref]**

21. Zhang B, Wang X, Liu S, et al. The relationship between self-assessment living standard and mental health among the older in rural China: the mediating role of sleep quality. BMC Public Health. 2023;23(1):449. **[Crossref]**

22. Akhlagh AAK, Ghalebandi MF. Sleep quality and its correlation with general health in pre-university students of Karaj, Iran. Iran J Psychiatry Behav Sci. 2009;3(1):44-49.

23. Liu Y, Li T, Guo L, Zhang R, Feng X, Liu K. The mediating role of sleep quality on the relationship between perceived stress and depression among the elderly in urban communities: a cross-sectional study. Public Health. 2017;149:21-27. **[Crossref]**

24. Doi Y, Minowa M, Uchiyama M, et al. Psychometric assessment of subjective sleep quality using the Japanese version of the Pittsburgh Sleep Quality Index (PSQI-J) in psychiatric disordered and control subjects. Psychiatry Res. 2000;97(2-3):165-172. **[Crossref]**