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# Sleep Quality of Patient Hypertension with Obstructive Sleep Apnea (OSA) in the Elderly

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**ABSTRACT**

*Background: Hypertension is a common chronic health problem in older adult and is often associated with sleep disorders, one of which is the risk of Obstructive Sleep Apnoea (OSA). OSA can cause sleep fragmentation and intermittent hypoxia, which can lead to a decline with hypertension, sleep disorders often go undetected early on requiring effective screening efforts. Purpose: This study aims to analyze the relationship between sleep quality and the risk of Obstructive Sleep Apnoea (OSA) in elderly people with hypertension. Methods: This study employed an analytical observational design with a cross-sectional approach. This study was conducted at the Neurology Clinic of RSI Jemursari Surabaya from May to August 2025 with a sample size of 30 elderly individuals selected using simple random sampling. Sleep quality was measured using the Pittsburgh Slee Quality Index (PSQI), while the risk of OSA was assessed using the Epworth Sleepiness Scale (ESS). The relationship between sleep quality and the risk of OSA was analysed usinhg Fisher's exact test with a significance level of 0.05. Result: The result showed that most elderly people with hypertension had poor sleep quality (PSQI > 5). Elderly people with a poor sleep quality were significantly more likely to have an ESS score ≥10, indicating an increased risk of Obstructive Sleep Apnoea, compared to elderly people with good sleep quality (p = 0.021). Conclusion: There is a significant relationship between sleep quality and the risk of Obstructive Sleep Apnoea in elderly people with hypertension. Screening for sleep quality and OSA risk using the PSQI and ESS is important as an early detection measure to support the prevention of cardiovascular complications improve the quality of life of elderly people.*

***Keywords: Epworth Sleepiness Scale; Hypertension; Obstructive Sleep Apnea; Pittsburgh Sleep Quality Index; Sleep Quality***

## 1. INTRODUCTION

Hypertension is on of the most prevalent chronic non-communicable diseases in the world and remains a global health problem, especially among the elderly. The World Health Organization (WHO) reports that more than 1.28 billion adults worldwide live with hypertension, with the highest prevalence found in the elderly, and relatively low levels of awareness, treatment, and blood pressure control in many countries (World Health Organisation [WHO], 2021; Zhou et al., 2021).

In the elderly, hypertension is closely related to the ageing process, which causes various physiological changes in the cardiovascular system. These changes include increased arterial stiffness, decreased blood vessel elasticity, and impaired regulation of the autonomic nerveous system and baroreceptor sensitivity. These conditions contribute to an increase in systolic blood pressure variability,

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and an increased risk of cardiovascular complications such as coronary heart disease and stroke (Benetos et al., 2019; Laurent et al., 2020; Mills et al., 2020).

In recent decades, sleep disorders have been identified as an important risk factor contributing to the onset and worsening of hypertension. One of the sleep disorders most commonly associated with hypertension is Obstructive Sleep Apnoea (OSA). OSA is a sleep related breathing disorder characterized by recurrent episodes of breathing cessation or reduced airflow due to upper airway obstruction, accompanied by intermittent hypoxia and sleep fragmentation (Jordan et al., 2014; Gottlieb & Punjabi, 2020).

The relationship between OSA and hypertension while approximately 50% of individuals with OSA are reported to have hypertension, while approximately 30-40% of hypertensive patients are known to have undiagnosed OSA (Benjafield et al., 2019; Peppard et al., 2013). Recent evidence also suggest that OSA contributes to resistant hypertension and non-dipping blood pressure patterns at at night, with a dose–response relationship between the severity of OSA and an increased risk of hypertension (Bouloukaki et al., 2020; Fava et al., 2018; Pedrosa et al., 2016; Shiina et al., 2024).

Pathophysiologically, intermittent hypoxia and sleep fragmentation in OSA trigger repeated activation of the sympathetic nervous system, increasing oxidative stress and causing systemic inflammatory responses. This mechanism contributes to endothelial dysfunction, increased vascular stiffness, and impaired blood pressure regulation both during the day and at night (Bangash et al., 2020; Javaheri et al., 2018; Somers et al., 2008). In the elderly, the effects of these mechanisms are exacerbated by age-related vascular changes, thereby increasing the risk of uncontrolled hypertension.

The elderly are a group that is vulnerable to OSA. The ageing process causes a decrease in upper airway muscle tone, changes in craniofacial structure, and changes in sleep architecture that increase the risk of airway collapse during sleep (Franklin & Lindberg, 2015; Ghavami et al., 2023). In addition, elderly individuals with hypertension often have comorbidities such as cardiovascular disease, diabetes mellitus, and obesity, which further increase the risk of OSA (Liu et al., 2019; Senaratna et al., 2021).

Sleep disturbances in the elderly not only affect physical health but also reduce overall quality of life. Poor sleep quality is associated with excessive daytime sleepiness, cognitive impairment, decreased concentration, increased risk of falls, and reduced ability to perform daily activities (Crowley, 2019; Miner & Kryger, 2017). Additionally, OSA has been identified as an independent risk factor for cardiovascular disease, including coronary heart disease and stroke (Bonsignore et al., 2019; Tadic et al., 2021).

Sleep quality is an important indicator in assessing a person's sleep condition. The Pittsburgh Sleep Quality Index (PSQI) is a widely used instrument for assessing subjective sleep quality and has been proven to have good validity and reliability in various populations, including the elderly (Buysse et al., 1989; Mollayeva et al., 2016). Meanwhile, the Epworth Sleepiness Scale (ESS) is used as a screening tool to assess excessive daytime sleepiness, which is closely related to the risk of OSA (Johns, 1991; Kendzerska et al., 2014).

Although polysomnography is the gold standard for diagnosing OSA, limitations in cost, time, and resources make this examination difficult to implement widely, especially in outpatient and primary healthcare settings. Therefore, the use of simple screening instruments such as the PSQI and ESS is a practical and efficient alternative in nursing practice for the early detection of sleep disorders and the risk of OSA, especially in elderly people with hypertension (Javaheri & Redline, 2020; Kapur et al., 2017; Redeker et al., 2019).

In Indonesia, research on the relationship between OSA and hypertension in the elderly is still limited. However, several studies show that the risk of OSA in the adult and elderly populations is quite high and that there is a relationship between poor sleep quality and increased blood pressure (Handayani et al., 2023; Saputra et al., 2021; Wicaksono et al., 2018). The limited local evidence underscores the importance of further research as a basis for developing systematic sleep disorder screening policies in

the management of hypertension in the elderly. Therefore, this study aims to analyse the relationship between sleep quality and the risk of OSA in elderly individuals with hypertension.

## 2. METHODS

### Research Design

This study used an analytical observational with a cross-sectional approach. The aim of this study was to investigate the relationship between sleep quality and the risk of Obstructive Sleep Apnoea (OSA) in elderly people diagnosed with hypertension.

### Research Sample

This study was conducted at the Neurology Clinic of Jemursari Islamic Hospital in Surabaya during the period of May to August 2025. The Population of this study consisted of elderly patient aged 60-80 years who met the inclusion and exclusion criteria set out in the study. This study used a sample of 30 patients who met the criteria at the Neurology Clinic of RSI Jemursari Hospital in Surabaya. Population a sample of 30 respondents was selected using simple random sampling.

Inclusion Criteria are:

1. Respondent with aged 60-80 years
2. Diagnosed with hypertension by a doctor
3. Able to communicate verbally
4. Willing to participate and provide informed consent

Exclude criteria are:

1. Persence of major complications or acute illness
2. History of cardiovascular disease (coronary heart disease, stroke, or heart failure), Diabetes mellitus, or active smoking.
3. Conditions affecting the patency of the upper airway (e.g., tonsillar hypertrophy)

Participant who where hospitalized or withdrew during data collection were excluded from analysis.

### Research Variable

The independent is sleep quality, while the dependent variable is the risk of obstructive sleep apnoea (OSA). Blood pressure status is used as a participant characteristic, as all respondents had previously been diagnosed with hypertension.

### Research Instrument

Sleep quality is assessed using the Pittsburgh Sleep Quality Index (PSQI). The PSQI consist of seven components and produces a global score score ranging from 0 to 21. A global PSQI score > 5 indicates poor sleep quality.

The risk of Obstructive Sleep Apnoea was assessed using the Epworth Sleepiness Scale (ESS). The ESS score ≥10 is categorized as an indication of increased risk of OSA. Blood pressure measurements were obtained using a calibrated manual sphygmamonometer following standart clinical procedures to confirm hypertension status. All data were collected directly from respondents through structured interview and questionnaire administration.

### Data Analysis

The research data was analysed using Fisher's exact test with a significance level of $p < 0.05$. Statistical analysis was performed using SPSS

### Ethical Considerations

This study has obtained ethical approval from the Chakra Brahmanda Lentera Research Ethics Committee with ethical letter number: No.050/16/VII/EC/KEP/LCBL/2025 on 16 July 2025. All

research producedures were carried out in accordance with the principles of health research ethics. Before data collection was conducted on all respondents, they were given an explanation of the objectives, procedures, benefits, and potential risks of the research. Participation in this research was voluntary, and respondents had the right to refuse or withdraw without any consequences for the health services they received. The confidentiality of respoendents' identities was maintained by using numerical codes or initials without mentioning the respondent' real names or personal identities. The data obtained will only be used research purposes and will be presented in aggregate form.

## 3. RESULT AND DISCUSSION

### RESULTS

This study aims to assess sleep quality and the risk of Obstructive Sleep Apnoea (OSA) in elderly people with hypertension using Pittsburgh Sleep Quality Index (PSQI) and Epworth Sleepiness Scale (ESS) instruments. The following data was collected:

**Research Results Table**

Table 1. Distribution of Elderly People Based on Age

| Age | n | % |
|---|---|---|
| 60-69 | 12 | 40.0 |
| 70-79 | 10 | 33.3 |
| ≥ 80 | 8 | 26.7 |
| Total | 30 | 100 |

Source: Primary data (2025)

Based on Table 1, most respondents were aged 60-69 years, namely 12 people (40.0%), followed by the 70-79 age group with 10 people (33.3%), and those aged ≥80 years with 8 people (26.7%). This distribution indicates that the majority of respondents were in the early to middle elderly age group.

**Table 2. Distribution of Elderly People Based on Gander**

| Gander | N | % |
|---|---|---|
| Male | 9 | 30.0 |
| Female | 21 | 70.0 |
| Total | 30 | 100 |

Source: Primary Data (2025)

Based on Table 2, female respondents dominated, numbering 21 (70.0%), while male respondents numbered 9 (30.0%). This illustrates that female elderly participation in this study was higher that male participation.

**Table 3. The Relationship between sleep quality (PSQI) and the risk obstructive sleep apnoea (ESS) in elderly with hypertension (n=30)**

| Sleep Quality (PSQI) | Normal ESS (<10) | ESS Increased risk of OSA | Total | P Value |
|---|---|---|---|---|
| Good Sleep Quality (≤5) | 6 (20.0%) | 2 (6.7%) | 8 (26.7%) | |
| Poor Sleep Quality (>5) | 6 (20.0%) | 16 (53.3%) | 22 (73.3%) | |
| Total | 12 (40%) | 18 (60%) | 30 (100%) | 0.021 |

*** Fisher's exact test, significance level p < 0.05**

The Relationship Between Sleep Quality and The Risk of Obstructive Sleep Apnoea

The result of the analysis of the relationship between sleep quality and the risk of obstructive sleep apnoea are presented in Table 3. Of the total 30 respondents, most elderly people had poor sleep quality (PSQI >5), namely 22 people (73.3%), while elderly people with good sleep quality (PSQI ≤5) numbered 8 people (26.7%). In the group of elderly individuals with poor sleep quality, 16 individuals (53.3%) had an ESS scores ≥10, indicating an increased risk of obstructive sleep apnoea, while 6

individuals (20.0%) were in the normal ESS category. Conversely, in the group of elderly people with good sleep quality, most respondents had normal ESS scores, namely 6 people (20.0%), and only 2 people (6.7%) showed an increased risk of OSA. Statistical testing using Fisher's Exact Test showed a p-value of 0.021 ($p < 0.05$), indicating a statistically significant relationship between sleep quality and the risk of obstructive sleep apnoea in elderly individuals with hypertension. Elderly individuals with poor quality (PSQI >5) were significantly more likely to have an increased risk of obstructive sleep apnoea compared to elderly individuals with good sleep quality.

**DISCUSSION**

The result of this study indicates that most elderly individuals with hypertension experience poor sleep quality (PSQI > 5) and have and increased risk of Obstructive Sleep Apnoea (OSA), as indicated bu an Epworth Sleepiness Scale (ESS) score ≥ 10. Bivariate analysis showed a significant association between poor quality and an increased risk of OSA in elderly people with hypertension ($p = 0.021$). These findings reinforce the hypothesis that sleep quality disturbances and OSA tendencies are interrelated problems in the elderly population with chronic cardiovascular disease, particularly hypertension.

Physiologically, the ageing process causes significant changes in sleep architecture, including a decrease in the proportion of slow-wave sleep, an increase in the frequency of night-time awakenings, and a decrease in overall sleep efficiency (Ohayon et al., 2017; Miner & Kryger, 2017). In addition, older adults experience a decrease in upper airway muscle tone, changes in pharyngeal protective reflexes, and impaired ventilation regulation, which increases susceptibility to airway collapse during sleep, there by increasing the risk of OSA (Eckert et al., 2013; Jordan et al., 2014). This condition may explain the high proportion of poor sleep quality among respondents in this study.

The association between poor sleep quality and increased risk of OSA found in this study is consistent with previous studies reporting that OSA contributes to chronic sleep disturbance through mechanisms of intermittent hypoxia and repeated micro-arousals during sleep (Punjabi, 2008; Lévy et al., 2015). This recurrent sleep fragmentation causes disruption to sleep continuity, a reduction in effective sleep duration, and an increase in complaints of poor sleep, as reflected in higher PSQI scores (Buysse et al., 1989; Suleiman et al., 2020). High ESS scores in respondents reflect excessive daytime sleepiness, which is one of the main clinical manifestations of OSA and an important indicator of clinically significant sleep disorders (Johns, 1991; Sateia, 2014).

In elderly individuals with hypertension, the presence of OSA has significant clinical implications. OSA is known to be associated with persistent activation of the sympathetic nervous system, increased oxidative stress, systemic inflammation, and Endothelial dysfunction, which collectively contribute to increased and unstable blood pressure (Somers et al., 2008; Pedrosa et al., 2011). Epidemiological and clinical studies indicate that OSA is an independent risk factor for the development of hypertension and plays a role in difficult-to-control hypertension, particularly in the elderly (Peppard et al., 2000; Parati et al., 2014; Whelton et al., 2018). Thus, the findings of this study reinforce the evidence that sleep disorders and OSA are important components that need to be considered in the management of hypertension in the elderly.

The Epworth Sleepiness Scale (ESS) is widely used as a screening tool to assess excessive daytime sleepiness and the risk of OSA, both in clinical practice and population-based research (Johns, 1991; Kendzerska et al., 2014). The ESS is considered practical easy to apply and has good validity in elderly populations. Meanwhile, the Pittsburgh Sleep Quality Index (PSQI) provides a comprehensive picture of subjective sleep quality, including sleep duration, sleep latency, sleep efficiency, night-time sleep disturbances, and the impact of sleep disturbances on daytime functioning (Buysse et al., 1989; Mollayeva et al., 2016). The combination of PSQI and ESS in this study allows for early identification of sleep quality disorders and OSA risk before further diagnostic examinations are conducted.

However, this study has several limitations. The cross-sectional design does not allow for casual conclusions to be drawn between poor sleep quality and an increased risk of OSA. In addition, OSA

risk assessment is based on screening instrument, so a definitive diagnosis of OSA still requires polysomnography as the gold standard (Berry et al., 2017). Nevertheless, the results of this study remain relevant as a basis for strengthening early screening strategies and early intervention for sleep disorders in elderly people with hypertension in primary and secondary health care services.

Clinically, these findings support the need to integrate sleep quality and Obstructive Sleep Apnoea (OSA) risk screening into the routine management of elderly people with hypertension. Non-pharmacological interventions such as sleep hygiene education, age-appropriate physical activity, relaxation therapy, and optimization of comorbid disease management have the potential to improve sleep quality and reduce the risk further cardiovascular complications (Kredlow et al., 2015; Reid et al., 2010). With a comprehensive approach, it is hoped that the quality of life of elderly individuals with hypertension can be suistanably improved.

a. Implication

The findings of this study indicate that sleep quality disturbances and an increased risk of Obstructive Sleep Apnoea (OSA) are common conditions among elderly people with hypertension. These result have important implications for nursing practice and healthcare services, particularly in primary care and outpatient settings, to integrate routine sleep quality screening as part of the management of hypertension in the elderly. The use of simple and validated instruments such as the Pittsburgh Sleep Quality Index (PSQI) and the Epworth Sleepiness Scale (ESS) enables healthcare professionals, particularly nurses, to detect sleep disorders and OSA risk early on in a practical and efficient manner. Implementing this screening has the potential to improve early identification of at-risk patients, expedite referrals for further examination, and support non-pharmacological interventions such as sleep hygiene education and lifestyle modification.

In addition, the finding of a significant association between poor sleep quality and an increased risk of OSA reinforces the importance of developing service policies that incorporate sleep health aspects into the management of hypertension in the elderly. This study may also serve as a basis for further studies with longitudinal or intervention designs to evaluate the impact of improving sleep quality on blood pressure control and cardiovascular outcomes

b. Limitation

This study has several limitations that should be considered in interpreting the result. The cross-sectional design used does not allow conclusions to be drawn about the casual relationship between sleep quality and the risk was based on subjective questionnaire instruments (PSQI and ESS), which could potentially lead to reporting bias and recall bias.

This study also did not use polysomnography as the gold standard for OSA diagnosis, so the results obtained reflect OSA risk, not a definitive diagnosis. The relatively small sample size and the fact that the study was conducted at a single healthcare facility may limit the generalizability and transferability of the findings to a wide elderly population. Furthermore, this study did not fully control for the confounding factors such as obesity, use of anti-hypertensive medication, and comorbidities that may affect sleep quality and OSA risk.

## CONCLUSION

This study show that most elderly people with hypertension experience poor sleep quality (PSQI > 5) and have an increased risk of developing Obstructive Sleep Apnoea (OSA), as indicated by an Epworth Sleepiness Scale (ESS) score ≥ 10. Bivariate analysis confirmed a significant association between sleep quality and OSA risk in elderly individuals with hypertension ($p = 0.021$). These findings confirm that sleep quality disturbaces and OSA tendencies are interrelated conditions in the elderly population with hypertension. Integration of screening using PSQI and ESS in health services in

recommended to support early detection, prevention of cardiovascular complications, and improvement in the quality of life of the elderly.

## ADVISE

Based on the findings of this study, several recommendations can be proposed for healthcare practise and future research. Healthcare professionals, particularly nurses and clinicians who manage elderly patients with hypertension, are encouraged to incorporate routine screening of sleep quality and the risk of obstruction sleep apnoea (OSA) as part of comprehensive hypertension management. The use of simple and validated instruments such as the Pittsburgh Sleep Quality Index (PSQI) and the Epworth Sleepiness Scale (ESS) can serve as practicial screening tools in clinical settings, especially in outpatient and primary healthcare services. Early identification of sleep disturbances may help healthcare providers recognise patients at risk OSA and enable timely referrals for further diagnostic evaluation and management.

In addition, health education regarding sleep hygiene, lifestyle modification, and the importance of maintaining healthy sleep patterns should be provided to elderly patients with hypertension. Improving sleep quality may contribute to better blood pressure control, reduce cardiovascular risk, and enhance overall quality of life among the elderly population. Considering that poor sleep quality was significantly associated with an increased risk of OSA in this study, early preventive strategies targeting sleep health are highly recommended.

Furthermore, future studies are recommended to involve larger sample sizes and multicentre settings to improve the generalisability of the findings. Longitudinal or interventional research designs are also needed to explore causal relationships and to evaluate the effectiveness of sleep-related intervensions in improving sleep quality, reducing OSA risk, and supporting better hypertension control among elderly individuals.

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