

The Relationship Between Pain and Sleep Quality in Postoperative Patients During Surgical Treatment at Dr. Tadjuddin Chalid General Hospital, Makassar

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Background: Pain is one of the most common complaints experienced by patients after surgery and can negatively affect sleep quality during the recovery period. Sleep disturbances caused by pain may delay the healing process, increase the risk of complications, and reduce patient comfort. **Objective:** This study aimed to analyze the relationship between pain intensity and sleep quality among postoperative patients in the surgical ward of Dr. Tadjuddin Chalid General Hospital, Makassar. **Methods:** This study employed a quantitative research design with a cross-sectional approach. A total of 74 postoperative patients were selected using the Slovin formula. Pain intensity was measured using the Numeric Rating Scale (NRS), while sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI). The data were analyzed using univariate and bivariate analyzes with the Chi-square test. **Results:** The majority of respondents experienced moderate pain (45.9%) and poor sleep quality (66.2%). The Chi-square test revealed a significant relationship between pain intensity and sleep quality among postoperative patients ($p = 0.001$). All respondents with severe pain had poor sleep quality, whereas most respondents with mild pain had good sleep quality. **Conclusion:** There was a significant relationship between pain intensity and sleep quality among postoperative patients. The higher the pain intensity experienced, the poorer the sleep quality. Optimal pain management is an essential component of nursing care to improve sleep quality and support faster recovery in postoperative patients.

Keywords: sleep quality, postoperative pain, Numeric Rating Scale, Pittsburgh Sleep Quality Index, surgical patients.

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1. Introduction

Surgery is a medical procedure aimed at treating various disease conditions through invasive procedures. While it offers significant clinical benefits, surgery also elicits physiological responses such as inflammation, stress, and pain, which can hinder the patient's recovery process. In the postoperative phase, patients often experience various problems, such as acute pain, limited mobility, anxiety, and sleep disturbances, which are interrelated and influence the success of recovery. Therefore, the success of postoperative care is measured not only by the success of the surgical procedure but also by the ability of healthcare professionals to manage various complications that arise during the recovery period, including pain and sleep disturbances (Acharya et al., 2024).

One of the main problems that often arises in the postoperative phase is pain. Postoperative pain is one of the most common complaints experienced by patients after undergoing surgery. This pain arises from tissue damage during the surgical procedure, which activates the inflammatory response and the release of pain mediators, thereby increasing nociceptor sensitivity. If pain is not optimally managed, this condition not only causes patient discomfort but also increases the risk of complications such as delayed mobilization, increased analgesic requirements, impaired respiratory function, psychological stress, and prolonged

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hospitalization. Although various pain management guidelines have been developed, postoperative pain remains a challenge in clinical practice because it is influenced by the type of surgery, patient characteristics, and the effectiveness of the analgesic therapy administered (Algaizi & Al-Ghabeesh 2024).

In addition to pain control, sleep quality is a crucial aspect determining the success of a patient's post-operative healing process. Sleep plays a role in tissue regeneration, immune system modulation, hormonal balance, and the recovery of physical and psychological functions. The importance of sleep quality is evident not only in patients but also in various other populations. Research by Syakirah et al. (2024) shows that good sleep quality is associated with cognitive function and daily activities, making it a crucial indicator of maintaining optimal health (Asrina et al., 2023).

However, patients treated in the operating room often experience sleep disturbances due to a combination of factors, such as pain, hospital noise, lighting, nighttime nursing activities, the effects of anesthesia, and emotional stress. A systematic review reported that surgical patients are at high risk for sleep disturbances during hospitalization, requiring special attention to factors that influence sleep quality during treatment (Acharya et al., 2024).

Furthermore, the relationship between pain and sleep quality is bidirectional. High pain can cause difficulty falling asleep, frequent nighttime awakenings, decreased sleep efficiency, and reduced restorative sleep. Conversely, poor sleep quality can increase sensitivity to pain through changes in neuroendocrine mechanisms, activation of the inflammatory system, and disruption of central nervous system regulation. A recent meta-analysis showed that pre- and postoperative sleep disturbances are associated with increased acute postoperative pain intensity and higher analgesic requirements. This situation suggests that pain control and improved sleep quality are two inseparable components in efforts to accelerate postoperative patient recovery (Niklasson et al., 2025).

In line with this mechanism, various studies in recent years have increasingly strengthened the evidence that the quality of pain management is closely related to the quality of sleep in postoperative patients. An integrative review involving 22 studies reported that patients with better pain control tend to have better sleep quality, higher levels of satisfaction, and a more optimal recovery process compared to patients with uncontrolled pain. Furthermore, various pharmacological and non-pharmacological interventions that successfully reduce pain intensity have also been reported to improve sleep quality in the early days after surgery. 2 However, research on the relationship between pain levels and sleep quality in postoperative patients in Indonesian hospitals, particularly at Dr. Tadjuddin Chalid General Hospital, Makassar, is still very limited, so research is needed to provide scientific evidence that can support improvements in the quality of surgical nursing services.

On the other hand, sleep disturbance is a common complication in patients after surgery. Decreased sleep quality is influenced not only by postoperative pain but also by other factors such as the inflammatory response, the effects of anesthesia, psychological stress, age, the type of surgery, and the treatment room environment. These conditions can hinder the recovery process because they are associated with increased fatigue, impaired physical function, decreased patient comfort, and the risk of complications during treatment. An observational study of 759 patients undergoing total hip arthroplasty showed that postoperative sleep disturbance is a common problem and is influenced by various clinical factors. Therefore, identifying factors related to sleep quality is crucial in optimizing postoperative patient care (Liu S. & Tang 2025).

In Indonesia, research on the relationship between pain and sleep quality in postoperative patients has also shown consistent results. A study by Syanif et al. (2025) found a significant relationship between pain levels and sleep quality, with patients with higher pain intensity tending to experience poorer sleep quality. These

results reinforce the belief that pain is a dominant factor affecting patient rest during recovery, thus ensuring continuous assessment of pain and sleep quality as part of comprehensive nursing care (Syarif et al., 2025).

These findings are supported by research by Halawa & Nasution (2025), which showed that the majority of respondents experienced moderate to severe pain accompanied by poor sleep quality. Bivariate analysis in this study demonstrated a significant relationship between pain levels and sleep quality, indicating that the higher the pain intensity experienced by patients, the greater the likelihood of sleep disturbances. These research findings further reinforce the idea that effective pain management not only aims to reduce pain but also contributes to improved sleep quality and accelerated postoperative healing in patients (Halawa & Nasution 2025).

Despite this, various studies have explained the relationship between pain and sleep quality in postoperative patients. Some studies were conducted on specific types of surgery or in different hospitals, resulting in significant variation in respondent characteristics, surgical procedures, pain measurement methods, and healthcare settings. Furthermore, recent research by Xu et al. (2024) suggests that the relationship between pain and sleep disturbance forms a vicious cycle: pain causes sleep disturbance, while sleep disturbance increases sensitivity to pain, thus worsening the patient's recovery process. This situation suggests that the relationship between these two variables still requires further evidence in various populations and healthcare settings, including referral hospitals in Indonesia (Xu W. et al., 2024).

Based on the description, Dr. Tadjuddin Chalid General Hospital Makassar is one of the referral hospitals that provides surgical services to patients with various types of surgical cases. Patients undergoing treatment in the operating room are at risk of experiencing acute pain and sleep quality disorders during the recovery period, but to date, scientific publications examining the relationship between these two variables at this hospital are still very limited. Based on these conditions, this study aims to analyze the relationship between pain levels and sleep quality in postoperative patients in the surgical treatment room of Dr. Tadjuddin Chalid General Hospital Makassar. The results of this study are expected to provide a scientific basis for nurses in developing more effective pain management interventions to improve sleep quality, accelerate the healing process, and improve the quality of perioperative nursing services.

2. Literature Review and Problem Statement

Postoperative Pain

Postoperative pain is an unpleasant sensory and emotional experience resulting from tissue damage that occurs during surgery. Pain is a common physiological response experienced by patients after surgery and can vary from mild to moderate to severe. The level of pain is influenced by various factors, such as the type of surgery, the extent of the surgical wound, the patient's physical condition, age, and the effectiveness of pain management. If not optimally managed, postoperative pain can lead to limited mobility, increased physiological stress, delayed wound healing, and reduced patient comfort during recovery.

Postoperative Patient Sleep Quality

Sleep quality is a crucial indicator of a patient's recovery process after surgery. Quality sleep plays a role in accelerating tissue regeneration, boosting the immune system, reducing fatigue, and supporting physical and psychological balance. However, post-operative patients often experience sleep disturbances due to various factors, such as pain, anxiety, hospital noise, nursing procedures, and medication side effects. Persistent sleep disturbances can slow the healing process, increase the risk of complications, and prolong hospital stays.

Relationship between Pain and Sleep Quality in Postoperative Patients

Various studies have shown that pain is a major factor affecting sleep quality in post-operative patients. The higher the level of pain experienced, the more likely patients are to experience difficulty falling asleep, frequent nighttime awakenings, shorter sleep duration, and reduced overall sleep quality. Conversely, effective pain management can improve sleep quality, provide comfort, and accelerate the patient's recovery process. Therefore, optimal pain management is a crucial part of nursing care to support successful post-operative recovery.

3. Method

This study is a quantitative study with a descriptive correlational design using a cross-sectional approach. This approach is used to determine the relationship between pain levels as an independent variable and sleep quality as a dependent variable in postoperative patients. Data collection was conducted at a single observation point without any follow-up with respondents, thus allowing for the description of the relationship between variables over the same period. This study will be conducted at Dr. Tadjuddin Chalid General Hospital, a class B teaching hospital located in Makassar City, South Sulawesi, from November 2025 until completion.

The study population was all postoperative digestive surgery patients undergoing treatment in the Bougenville Ward of Dr. Tadjuddin Chalid General Hospital, Makassar, totaling 90 patients. The sample size was determined using the Slovin formula with an error rate (e) of 5%, resulting in a minimum sample size of 74 respondents. Respondents were selected based on predetermined inclusion and exclusion criteria until the sample size was met. Inclusion criteria included postoperative patients aged >18 years, fully conscious, undergoing treatment on the first postoperative day, communicative, willing to be respondents by signing an informed consent form, undergoing digestive surgery, and using BPJS.

Exclusion criteria included patients with communication disorders or physical limitations (speech impairment, deafness, or blindness), decreased level of consciousness, history of chronic sleep disorders before surgery, history of severe psychiatric disorders, long-term use of sedative or hypnotic medications, experiencing severe postoperative complications, and refusing or withdrawing during the study. Pain levels were measured using the Numeric Rating Scale (NRS), while sleep quality was measured using the Pittsburgh Sleep Quality Index (PSQI), which has been widely used as a valid and reliable instrument for assessing sleep quality in clinical populations.

Data analysis was performed using univariate and bivariate methods. Univariate analysis was conducted to describe the characteristics of respondents and the distribution of each research variable through the presentation of frequencies, percentages, average values, medians, and measures of data distribution, thus providing a general overview of the characteristics of the research data. Furthermore, bivariate analysis was conducted to determine the relationship between two research variables suspected of being related. In this study, bivariate analysis was used to determine the relationship between pain levels and sleep quality in postoperative patients using the Chi-square test with a significance level of 0.05 . $\alpha = 0.05$ (Kumar et al., 2023; Komariah et al., 2025).

4. Results and Discussion

Result

The results of this study are presented in two stages of analysis: univariate and bivariate analysis. Univariate analysis was used to describe the characteristics of respondents and the frequency distribution of pain level

and sleep quality variables. Furthermore, bivariate analysis was conducted to determine the relationship between pain level and sleep quality in postoperative patients in the Bougenville Ward, Dr. Tadjuddin Chalid General Hospital, Makassar. The results of the analysis are presented in the following tables:

Table 1. Distribution of Postoperative Patient Characteristics
at Dr. Tadjuddin Chalid General Hospital, Makassar

Variables	Category	N	%
Gender	Man	31	41.9
	Woman	43	58.1
	total	74	100.0
Age	18–30 years	15	20.3
	31–45 years	28	37.8
	46–60 years	22	29.7
	>60 years	9	12.2
	total	74	100.0
Types of Surgery	Major	47	63.5
	Minor	27	36.5
	total	74	100.0
Nutritional status	Not enough	17	23.0
	Normal	40	54.1
	More	17	23.0
	total	74	100.0
Types of Analgesics	Opioid	30	40.5
	Non-Opioid	44	59.5
	total	74	100.0

Source: Primary Data 2026

Based on Table 1, it is known that of the 74 post-operative patients at Dr. Tadjuddin Chalid General Hospital Makassar, the majority were female, namely 43 respondents (58.1%), while 31 respondents were male (41.9%). Based on age groups, the largest number of respondents were in the 31–45 years age range, namely 28 respondents (37.8%), followed by the 46–60 years age group with 22 respondents (29.7%), 18–30 years old with 15 respondents (20.3%), and 9 respondents over 60 years old with 12.2%.

Based on the type of surgical procedure, the majority of respondents underwent major surgery (47 respondents (63.5%)), while 27 respondents (36.5%) underwent minor surgery. Based on nutritional status, the majority of respondents had normal nutritional status, namely 40 respondents (54.1%), while respondents with undernutrition and overnutrition status each numbered 17 respondents (23.0%). Meanwhile, based on the type of analgesic used, the majority of respondents received non-opioid analgesics (44 respondents (59.5%)), while opioid analgesics were used by 30 respondents (40.5%).

Table 2. Distribution of Postoperative Patient Pain Levels
at Dr. Tadjuddin Chalid General Hospital, Makassar

Variables	Category	N	%
Pain Level	Light	24	32.4
	Currently	34	45.9
	Heavy	16	21.6
	Total	74	100.0

Source: Primary Data 2026

Based on Table 2, it is known that of the 74 postoperative patients at Dr. Tajuddin Chalid General Hospital in Makassar, the majority experienced moderate pain, namely 34 respondents (45.9%). Furthermore, 24 respondents (32.4%) experienced mild pain, while 16 respondents (21.6%) experienced severe pain. These results indicate that the majority of postoperative patients were in the moderate pain category during their treatment.

Table 3. Relationship between Pain Level and Postoperative Sleep Quality at Dr. Tajuddin Chalid General Hospital, Makassar

Pain Category	Sleep Quality				Total		P-Value
	Bad		Good				
	n	%	n	%	n	%	
Heavy	16	100.0	0	0.0	16	100.0	0.001
Currently	23	67.6	11	32.4	34	100.0	
Light	10	41.7	14	58.3	24	100.0	
Total	49	66.2	25	33.8	74	100.0	

Source: Primary Data 2026

Based on Table 3, it is known that all respondents experiencing severe pain had poor sleep quality, namely 16 respondents (100.0%), and there were no respondents with good sleep quality (0.0%). In the group of respondents with moderate pain, the majority had poor sleep quality, namely 23 respondents (67.6%), while 11 respondents (32.4%) had good sleep quality. Meanwhile, in the group of respondents with mild pain, the majority had good sleep quality, namely 14 respondents (58.3%), while 10 respondents (41.7%) had poor sleep quality.

Overall, of the 74 respondents, 49 respondents (66.2%) had poor sleep quality and 25 respondents (33.8%) had good sleep quality. The results of the statistical test showed a p value = 0.001 ($p < 0.05$), so there is a significant relationship between pain levels and sleep quality in postoperative patients at Dr. Tajuddin Chalid General Hospital, Makassar. Thus, the research hypothesis is accepted, which shows that pain levels are significantly related to sleep quality in postoperative patients.

Discussion

The results showed that the majority of respondents were female (58.1%), aged 31–45 years (37.8%), underwent major surgery (63.5%), had normal nutritional status (54.1%), and received non-opioid analgesics (59.5%). These characteristics indicate that the majority of patients were adults undergoing highly invasive surgery. Differences in patient characteristics, such as age, gender, type of surgery, and clinical condition, are factors that can influence pain experience and the recovery process after surgery.

The latest clinical practice guidelines presented in Chen et al. (2025) regarding postoperative pain management also emphasize that factors such as younger age, female gender, body mass index, type of surgery, sleep disturbances, and psychological conditions are important determinants that need to be considered in assessing postoperative pain risk. Therefore, identifying patient characteristics early is a crucial step in determining appropriate pain management strategies and supporting optimal recovery (Chen et al., 2025).

Regarding the characteristics of the respondents, the study results showed that almost half of the respondents experienced moderate pain (45.9%), followed by mild pain (32.4%) and severe pain (21.6%). These findings indicate that pain remains a dominant complaint in the early postoperative period even though most patients have received analgesic therapy. Postoperative pain arises in response to tissue damage caused by surgery, which triggers the release of inflammatory mediators, activating nociceptors and increasing pain perception. Uncontrolled pain intensity can hinder early mobilization, reduce patient

comfort, delay functional recovery, and increase the risk of postoperative complications. Therefore, systematic pain assessment using a valid instrument such as the Numeric Rating Scale (NRS) is crucial to monitor changes in pain intensity and evaluate the effectiveness of analgesic therapy so that pain management can be tailored to each patient's clinical condition (Choi et al., 2024).

Furthermore, the predominance of patients with moderate pain in this study indicates that despite the administration of analgesic therapy, pain control is not yet fully optimal. Moderate pain can still affect patient comfort, inhibit physical activity, and disrupt the necessary rest during the recovery phase. In the Enhanced Recovery After Surgery (ERAS) concept, pain control is a key component because it is related to accelerating mobilization, restoring physiological function, and reducing postoperative complications. Therefore, a multimodal analgesic approach that combines pharmacological and nonpharmacological interventions is recommended to achieve more effective pain control without increasing the risk of drug side effects (Xu W. et al., 2024).

Furthermore, bivariate analysis results showed a significant relationship between pain levels and postoperative sleep quality in patients ($p=0.001$). All respondents experiencing severe pain reported poor sleep quality, while the majority of respondents with mild pain reported good sleep quality. These findings suggest a tendency for increased pain intensity to be accompanied by decreased sleep quality.

Physiologically, pain activates the sympathetic nervous system, increases stress hormone secretion, and increases alertness, leading to difficulty falling asleep, frequent nighttime awakenings, and reduced restorative sleep. Conversely, poor sleep quality can increase pain sensitivity through inflammatory mechanisms and altered central nervous system regulation, creating a reciprocal relationship that mutually worsens the patient's postoperative condition (Xu W. et al., 2024).

These findings align with various previous studies. The results of this study indicate that the higher the level of pain experienced by postoperative patients, the poorer their sleep quality. These findings are supported by research by Stoop et al. (2025), which reported that moderate to severe pain is one of the most common complaints experienced by surgical patients and is often accompanied by sleep disturbances during the perioperative period. The study also showed that sleep disturbances and pain are two conditions that often occur together and have the potential to slow the postoperative recovery process if not optimally managed. These similar results reinforce that pain control is not only aimed at reducing pain but also plays a vital role in maintaining sleep quality, increasing patient comfort, and supporting the healing process during treatment (Stoop JM et al., 2024).

The significant relationship between pain levels and sleep quality in this study can be explained by interrelated physiological mechanisms. Surgical trauma triggers the release of pro-inflammatory cytokines, activation of the sympathetic nervous system, and increased secretion of stress hormones such as cortisol, which cause patients to experience difficulty falling asleep, frequent nighttime awakenings, and reduced restorative sleep. Conversely, sleep disturbances can increase nociceptor sensitivity, amplify the inflammatory response, and lower the pain threshold, resulting in patients experiencing more severe pain. These mechanisms create a vicious cycle that causes pain and sleep disturbance to exacerbate each other during the post-operative recovery period. Therefore, simultaneous management of both conditions is necessary for optimal healing (Liu et al., 2026).

Consistent with this mechanism, the results of this study indicate that all patients with severe pain experienced poor sleep quality. These findings indicate that successful pain management is a crucial factor in maintaining patient sleep quality during treatment. Effective pain management not only reduces pain intensity but also improves sleep continuity, reduces the frequency of nighttime awakenings, and increases patient satisfaction with healthcare services. A study by Tsang et al. (2024) reported that a pain

management strategy combining pharmacological and nonpharmacological approaches yielded superior results compared to using one method alone, both in terms of pain reduction and sleep quality improvement in postoperative patients (Silva et al., 2024).

In addition to impacting patients' clinical conditions, the findings of this study offer important implications for healthcare providers, stating that pain management and sleep quality need to be integral parts of postoperative patient care. While successful patient recovery often focuses on wound healing and clinical stability, sleep quality also plays a crucial role in supporting tissue regeneration, immune system regulation, metabolic function, and physical and psychological recovery.

These findings align with research by Syakirah et al. (2024), which reported that sleep quality contributes to individual performance and function. Therefore, maintaining sleep quality is an important part of efforts to improve overall health status. Therefore, sleep quality evaluation should be conducted in conjunction with pain assessment as part of routine monitoring during treatment (Syakira, Alwi, MK, Mahmud NU & Yuliati 2024).

Thus, a comprehensive approach to both aspects is expected to improve patient comfort, reduce the risk of complications, accelerate the recovery process, and ultimately improve clinical outcomes for postoperative patients. Research by Silva et al. (2024) shows that postoperative sleep disturbances are associated with increased pain sensitivity, delayed recovery, and decreased quality of life. Therefore, efforts to maintain sleep quality are an important component in optimizing the recovery of surgical patients (Silva et al., 2024).

In addition to impacting patients' clinical conditions, the findings of this study offer important implications for healthcare providers, stating that pain management and sleep quality need to be integral parts of postoperative patient care. While successful patient recovery often focuses on wound healing and clinical stability, sleep quality also plays a crucial role in supporting tissue regeneration, immune system regulation, metabolic function, and physical and psychological recovery.

Beyond clinical aspects, the quality of hospital services also plays a role in creating a better care experience for patients. Research by Ali et al. (2024) showed that service quality and the physical environment (healthscape) significantly influence inpatient satisfaction. These findings indicate that pain management and sleep quality maintenance as part of a comprehensive service can support improved service quality and increase patient satisfaction during treatment (Ali, NRIS, Haeruddin & Yuliati 2024).

On the other hand, poor sleep quality not only impacts patient comfort but also impacts the success of postoperative recovery. Inadequate sleep can disrupt tissue regeneration, delay wound healing, reduce immune system function, and increase the risk of complications such as delirium and prolonged hospital stay. Therefore, evaluating sleep quality should be an integral part of nursing care for surgical patients, along with assessing vital signs and pain intensity. Optimizing sleep quality through effective pain management is expected to improve clinical outcomes and accelerate the postoperative recovery process (Pettit RJ et al., 2024).

Based on these findings, the results of this study indicate that pain control needs to be an important part of efforts to improve sleep quality and accelerate recovery in postoperative patients. Regular pain assessment and appropriate management are expected to improve patient comfort during treatment. This concept is in line with research by Asrina et al. (2023), which explains that identifying health determinants is an important basis for developing effective health interventions so that health services focus not only on disease management but also on various factors that influence the success of patient health outcomes. This is also in line with research by Musdalipah et al. (2025) that good quality health services influence the level

of patient satisfaction and patient interest in reusing health services (Asrina, A., et al., 2023; Wilson et al., 2025).

Furthermore, recent clinical practice guidelines recommend the implementation of standardized, individualized, and multimodal pain management to improve recovery quality, reduce complications, and enhance patient satisfaction after surgery. Therefore, optimal pain control is not only focused on reducing pain intensity but also supports better clinical outcomes for postoperative patients (Chen et al., 2025).

Overall, the results of this study confirm that pain levels are significantly associated with sleep quality in postoperative patients. The higher the pain intensity, the more likely patients are to experience decreased sleep quality during recovery. This finding aligns with research by Wilson et al. (2024), which showed that sleep disturbances and pain have a reciprocal relationship that can impact a patient's recovery process after surgery. Therefore, efforts to optimize pain control while maintaining sleep quality need to be an essential part of postoperative patient care to support optimal recovery (Wilson et al., 2025).

5. Conclusion

Based on the results of the study, the characteristics of post-operative patients at Dr. Tadjuddin Chalid General Hospital Makassar showed that most of the respondents were female (43 respondents (58.1%), were in the 31–45 years age group (28 respondents (37.8%), underwent major surgery (47 respondents (63.5%), had normal nutritional status (40 respondents (54.1%), and received non-opioid analgesic therapy (44 respondents (59.5%). Based on the level of pain, the majority of respondents experienced moderate pain (34 respondents (45.9%), followed by mild pain (24 respondents (32.4%), and severe pain (16 respondents (21.6%). Meanwhile, based on sleep quality, most respondents had poor sleep quality (49 respondents (66.2%), while respondents who had good sleep quality were 25 respondents (33.8%).

The results of bivariate analysis using the Chi-square test showed a significant relationship between pain levels and sleep quality in postoperative patients at Dr. Tadjuddin Chalid General Hospital, Makassar ($p = 0.001$). All respondents experiencing severe pain had poor sleep quality (100.0%), while the majority of respondents with mild pain had good sleep quality (58.3%). These findings indicate that increased pain levels are associated with decreased sleep quality during postoperative recovery. Therefore, optimal pain control is an important part of nursing care to improve sleep quality, provide patient comfort, and support a faster healing process.

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