jurnal SAGO gizi dan kesehatan

SAGO: Gizi dan Kesehatan
2025, Vol. 6(2) 429-435

DOI: http://dx.doi.org/10.30867/gikes.v6i2.2659
https://ejournal.poltekkesaceh.ac.id/index.php/gikes
Poltekkes Kemenkes Aceh

The relationship between pain intensity and sleep quality in various type of elective postoperative patients at Prof. Dr. Chairuddin P. Lubis USU Medan Hospital

Hubungan antara tingkat nyeri dengan kualitas tidur pada pasien pasca berbagai jenis operasi elektif di RS Prof. Dr. Chairuddin P. Lubis USU Medan

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Abstract

Background: Postoperative pain arises after surgery and includes acute pain requiring immediate treatment. The postoperative phase must always be observed, because it is related to the patient's recovery process. The prevalence of postoperative pain varies widely worldwide, with 86% in the United States, 70% in Europe, and 48.7% in China. However, the prevalence of postoperative pain in Indonesia has not yet been studied.
Objectives: This study aimed to analyze the relationship between pain intensity and sleep quality in elective postoperative patients. Chairuddin P. Lubis USU Medan Hospital.
Methods: This study employed analytical observation using a cross-sectional approach with a consecutive sampling design. Respondents' data were collected only once and simultaneously using the Numeric Pain Rating Scale (NRS) and Pittsburgh Sleep Quality Index (PSQI). The data will be analyzed using the Statistical Package for the Social Sciences (SPSS), including Somers' test.
Results: Based on the analysis of data from 125 respondents, the highest pain intensity experienced by patients was moderate (49,6%, mild (38,4%, and severe (12%). Sleep quality was highest in the poor sleep quality group was the highest, with 54,4% and good sleep quality group 45,6%. The majority of respondents were aged 26–35 years (37 respondents). This analysis showed a significant relationship and a strong correlation between pain intensity and sleep quality (p-value <0,001 and r = 0,789).
Conclusion: There was a relationship between pain intensity and sleep quality in elective postoperative patients. Chairuddin P. Lubis USU Medan Hospital.

Keywords:
Postoperative pain, Sleep quality, NRS, PSQI, Cross-sectional, Postoperative care

Abstrak

Latar Belakang: Nyeri pascaoperasi muncul setelah pembedahan dan termasuk nyeri akut yang harus disembuhkan segera. Tahapan pascaoperasi harus selalu diperhatikan karena berhubungan dengan proses penyembuhan pasien. Prevalensi nyeri pascaoperasi sangat bervariasi di seluruh dunia, di Amerika Serikat sebesar 86%, Eropa sebesar 70%, dan China sebesar 48,7%. Untuk prevalensi nyeri pascaoperasi di Indonesia belum dilakukan penelitian secara keseluruhan.
Tujuan: Penelitian ini bertujuan untuk mengetahui hubungan tingkat nyeri dengan kualitas tidur pada pasien pascaoperasi elektif di RS Prof. dr. Chairuddin P. Lubis USU Medan.
Metode: Penelitian ini dilaksanakan dengan observasional analitik menggunakan pendekatan secara *cross-sectional* dengan teknik *consecutive sampling*. Data responden dikumpulkan hanya sekali dan secara bersamaan dengan

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Diterima: 19/06/2025 Revisi: 18/07/2025 Disetujui: 28/07/2025 Diterbitkan: 20/08/2025

menggunakan kuesioner *Numeric Pain Rating Scale* (NRS) dan *Pittsburgh Sleep Quality Index* (PSQI). Data yang diperoleh akan dianalisis menggunakan *Statistical Package for the Social Sciences* (SPSS) dengan uji *somers' d*.
Hasil: Berdasarkan hasil analisis dari 125 data responden penelitian, tingkat nyeri yang paling banyak dialami oleh responden adalah tingkat nyeri sedang dengan 62 responden (49,6%), tingkat nyeri ringan dengan 48 responden (38,4%), dan tingkat nyeri berat dengan 15 responden (12%). Pada kualitas tidur, kelompok kualitas tidur buruk paling banyak dialami oleh responden dengan 68 responden (54,4%) dan kelompok kualitas tidur baik dengan 57 responden (45,5%). Responden pada penelitian ini mayoritas berusia 26–35 tahun dengan 37 responden. Penelitian ini menunjukkan bahwa terdapat hubungan signifikan dan korelasi sangat kuat antara tingkat nyeri dengan kualitas tidur (nilai $p < 0,001$ dan nilai r = 0,789).
Kesimpulan: Terdapat hubungan antara tingkat nyeri dengan kualitas tidur pada pasien pascaoperasi elektif di RS Prof. dr. Chairuddin USU Medan.

Kata Kunci:
Nyeri pascaoperasi, Kualitas tidur, NRS, PSQI,Cross-sectional, Perawatan pascaoperasi

Introduction

Surgery is the diagnostic treatment for a disease that involves making an incision in the body to change its structure. Surgery can reduce the risk of death due to certain diseases (Sjamsuhidajat & De Jong, 2017). According to statistics from the World Health Organization (2016), 310 million surgical procedures were performed globally in 2012. According to statistics from the Indonesian Ministry of Health, in 2021, Indonesia reached 1.2 million surgical procedures. The surgical procedure that each patient will undergo consists of three stages: preoperative, intraoperative, and postoperative. Preoperative surgery involves overall patient preparation until the patient enters the operating room. The patient underwent surgery until completion and received care in the recovery room (Kazharo, 2020). The postoperative stage must be continually monitored as it is related to the patient's healing process. If this stage is not managed correctly, it can lead to various complications including postoperative pain (Sjamsuhidajat & De Jong, 2017).

Postoperative pain is the discomfort experienced by patients after surgery (Hidayatulloh et al., 2020). Postoperative pain increases due to a reduction in the effects of anesthesia on patients (Kazharo, 2020). The prevalence of postoperative pain varies worldwide, with 86% in the United States, 70% in Europe, and 48,7% in China (Liu et al., 2023). The prevalence of postoperative pain in Indonesia needs to be well-documented. Research conducted at Sanglah General Hospital in 2021 showed that postoperative patients undergoing lower abdominal surgery experienced a prevalence of pain of 4% with no pain, 71,7% with mild pain, 23,3% with moderate pain, and 1% with severe pain (Wiguna et al., 2021). According to data from The American Pain Society, postoperative pain is experienced by more than 80% of patients. In the first 24 hours after surgery, 75% of patients experience mild, moderate, or severe pain intensity (Chou et al., 2016;Wiguna et al., 2021)

Postoperative pain is considered acute pain that needs to be managed. If pain is not managed immediately, it will cause sleep disturbances, resulting in a longer healing process. Therefore, this study provides empirical evidence that the level of pain experienced by patients significantly affects their sleep quality, thus interfering with the recovery process. Sleep quality is the condition of resting well after waking up from sleep. Sleep disturbances can lead to poor quality. Sleep disturbances occur when patients experience postoperative pain that can affect the healing process (Su & Wang, 2018). The prevalence poor postoperative sleep quality in China is 67,3%, in Italy is 16,6%, in Poland is 31,2%, and in sub-Saharan Africa was 60,5% (Tegene & Alemnew, 2022). The prevalence of poor sleep quality post-surgery in Indonesia has not been well-documented. A study conducted in 2022 at Budi Asih Serang Hospital reported that 67.2% of postoperative patients experienced poor sleep quality (Hamdiah & Budiyanto, 2022).

Based on this introduction, it is evident that there are still many shortcomings in previous research, such as the limited types of postoperative pain that were investigated, the absence of national prevalence regarding the levels of pain after elective surgery in relation to

sleep quality, and the lack of follow-up studies on the relationship between postoperative pain levels and sleep quality in the city of Medan. Therefore, this study aimed to investigate the relationship between pain levels and sleep quality in postoperative patients. Lubis USU Hospital, Medan.

Methods

This study employed an analytical observational method utilizing a cross-sectional approach. A cross-sectional approach was chosen because this study aimed to determine the relationship between pain levels and sleep quality in postoperative patients at a specific point in time. The cross-sectional approach is also more efficient in terms of time, cost, and resources than other design approaches.

Non-probability sampling techniques were applied to the respondents who met the inclusion criteria of the study until the total sample was obtained. This technique was used because the exact population size is unknown. The Lameshow formula was used to determine the total number of research respondents when the overall population was unknown, resulting in 125 patients participating in the study. The respondents in this study met the inclusion and exclusion criteria. The inclusion criteria were patients aged 17–65 years, elective postoperative patients, and patients with full consciousness. The exclusion criteria were complications after surgery and physical limitations.

This study was conducted by Prof. Dr. Chairuddin P. Lubis USU Medan Hospital between August and October 2024. The Pittsburgh Sleep Quality Index (PSQI) and Numeric Pain Rating Scale questionnaire, which have been adopted in the Indonesian context and successfully tested for validity and reliability, were used in the interviews to collect data. The Research Ethics Committee Universitas Sumatera Utara with no. This study was approved by 894/KEPK/USU/2024.

The collected data will be analyzed univariate to describe the characteristics of respondents, such as sex, education level, surgery, anesthesia, pain intensity, and sleep quality. In addition, the bivariate data will be analyzed for pain intensity and sleep quality using Somers' d test. As the research data are ordinal in scale, both research variables are clearly defined, which is better for measuring the directional association between variables.

Result

Table 1. Characteristic respondents

Characteristic	f	%
Age (years)		
17–25	15	12
26–35	37	29.6
36–45	33	26.4
46–55	18	14.4
56–65	22	17.6
Sex		
Male	33	26.4
Female	92	73.6
Latest education		
Primary school	6	4.8
Middle school	12	9.6
High school	50	40
Diploma	10	8
Bachelor	43	34.4
Master	4	3.2
Surgery		
Ob-gyn	48	38.4
Oral	13	10.4
Laparotomy	16	12.8
Incision excision	20	16
Urology	11	8.8
Oncology	2	1.6
Digestif	7	5.6
Plastic surgery	3	2.4
Orthopaedic	5	4
Anesthesia		
Regional spinal	80	64
General endotracheal tube	45	36
Pain Intensity		
Mild	47	37.6
Moderate	63	50.4
Severe	15	12
Sleep Quality		
Good	57	45.6
Poor	68	54.4

As shown in Table 1, most of the respondents were aged 26–35 years (29,6%). Female sex was the most common, with 92 patients (73,6%). Most respondents' most recent education was high school,

with 50 patients (40%). The most common type of surgical anesthesia received by the respondents was Regional Spinal anesthesia (80 patients, 64%). Obgyn surgery was the most frequent surgical procedure in this study, with 48 cases (38,4%). Next, it was found that the highest pain intensity experienced by the patients was moderate pain, with 63 patients (50,4%), mild pain in 47 patients (37,6%), and severe pain in 15 patients (12%). Lastly, most respondents had poor sleep quality (68 patients (54,4%) and good sleep quality (57 patients (45,6%).

In Table 2, represents the distribution of surgical procedures and pain intensity in patients after ob-gyn surgery, and the majority experienced moderate pain in 35 patients (28%). Postoral surgery was performed in 13 patients (10, 4%) experienced mild pain. After laparotomy, 13 patients (10, 4%) experienced moderate pain. After incision and excision surgery, 15 patients (12%) experienced mild pain. Six patients (4% and 8%) experienced moderate pain after urological surgery. Post-oncology surgery, most patients experienced moderate pain in two patients (1,6%). After digestive surgery, three patients (2,4%) experienced severe pain. Postplastic surgery experienced mild pain in three patients (2,4%). After orthopedic surgery, five patients (4%) experienced severe pain.

Next, it also represents the distribution Of the surgical procedures and sleep quality in patients post-ob-gyn surgery, most had poor sleep quality (42 patients (33,6%). After oral surgery, most patients had good sleep quality, with 13 patients (10,4%). After laparotomy surgery, most patients had poor sleep quality, with 11 patients (8,8%). After excisional incision surgery, 20 (16 %) patients had good sleep quality. Posturological surgery was associated with good sleep quality in seven patients (5,6%). After oncology surgery, most patients had poor sleep quality, with two people (1,6%). After digestive surgery, most patients had poor sleep quality, with four patients (3,2%). After plastic surgery, most patients had good sleep quality, with 3 patients (2,4%). After orthopaedic surgery, most patients had poor sleep quality, with 5 patients (4%).

Table 2. Distribution surgery with pain intensity and sleep quality respondents

Surgery	Pain Intensity			Sleep Quality		Total
	Mild f (%)	Moderate f (%)	Severe f (%)	Good f (%)	Poor f (%)	f (%)
Oby-gyn	6 (4.8)	35 (28)	7 (5.6)	6 (4.8)	42 (33.6)	48 (38.4)
Oral	13 (10.4)	0 (0)	0 (0)	13 (10.4)	0 (0)	13 (10.4)
Laparotomy	3 (2.4)	13 (10.4)	0 (0)	5 (4)	11 (8.8)	16 (12.8)
Incision excision	15 (12)	5 (4)	0 (0)	20 (16)	0 (0)	20 (16)
Urology	5 (4)	6 (4.8)	0 (0)	7 (5.6)	4 (3.2)	11 (8.8)
Oncology	0 (0)	2 (1.6)	0 (0)	0 (0)	2 (1.6)	2 (1.6)
Digestive	2 (1.6)	2 (1.6)	3 (2.4)	3 (2.4)	4 (3.2)	7 (5.6)
Plastic surgery	3 (2.4)	0 (0)	0 (0)	3 (2.4)	0 (0)	3 (2.4)
Orthopaedic	0 (0)	0 (0)	5 (4)	0 (0)	5 (4)	5 (4)
Total	47 (37.6)	63 (50.4)	15 (12)	57 (45.6)	68 (54.4)	125 (100)

Table 3. Distribution of surgery to anesthesia type in patients

Surgery	Regional Spinal f (%)	General Endotracheal Tube f (%)	Total f (%)
Oby-gyn	44 (35.2)	4 (3.2)	48 (38.4)
Oral	0 (0)	13 (10.4)	13 (10.4)
Laparotomy	6 (4.8)	10 (8)	16 (12.8)
Incision excision	9 (7.2)	11 (8.8)	20 (16)
Urology	11 (8.8)	0 (0)	11 (8.8)
Oncology	0 (0)	2 (1.6)	2 (1.6)
Digestive	4 (3.2)	3 (2.4)	7 (5.6)
Plastic surgery	1 (0.8)	2 (1.6)	3 (2.4)
Orthopaedic	2 (1.6)	3 (2.4)	5 (4)
Total	77 (61.6)	48 (38.4)	125 (100)

Table 4. Association between pain intensity and sleep quality respondents

Pain Intensity	Sleep Quality		Total	p-value	r
	Good	Poor			
	f (%)	f (%)	f (%)		
Mild	47 (37.6)	0 (0)	47 (37.6)		
Moderate	10 (8)	53 (42.4)	63 (50.4)	<0.001	0.789
Severe	0 (0)	15 (12)	15 12)		

Table 3 shows the distribution of surgeries according to the type of anesthesia used. The majority of obstegyn surgeries used spinal regional anesthesia, with 44 patients (35,2%). Oral surgeries predominantly employed general anesthesia with an endotracheal tube, accounting for 13 patients (10,4%). Laparotomy operations mainly relied on general anesthesia with an endotracheal tube in 10 patients (8%). Incision excision surgeries predominantly used general anesthesia with an endotracheal tube and involved 11 patients (8,8%). Urology surgeries primarily utilized spinal regional anesthesia in 11 patients (8,8%). Oncology surgeries mostly used general anesthesia with an endotracheal tube in two patients (1,6%). Digestive surgeries predominantly utilized spinal regional anesthesia, with a total of 4 patients (3,2%). Plastic surgeries mainly employed general anesthesia with an endotracheal tube and involved two patients (1,6%). Orthopaedic surgeries predominantly used general anesthesia with an endotracheal tube, consisting of three patients (2,4%).

Table 4 shows the association between pain intensity and sleep quality in postoperative respondents. Postoperative patients with mild pain experienced good sleep quality, totaling47 respondents (37,6%). Patients with moderate pain also had good sleep quality, totaling 10 respondents (8%), while totaling 53 respondent (42,4%) reported poor sleep quality. Then, patients with severe pain had poor sleep quality, totaling 15 respondent (12%).

The obtained data were analyzed using the nonparametric Somers' d test, and the results indicated a significant (p <0,001) correlation between the two variables (r = 0,789). This very strong correlation of variables can be supported by several factors, such as anxiety factors in postoperative patients, a care environment that is less conducive to the recovery period, and the comorbid conditions experienced by the patients.

Discussion

In this study, most respondents were aged 26–35 years. Age can be a risk factor for each individual, as various health problems can arise with increasing age, including physical, biological, and mental health problems. Age can also impact sleep quality (Kazharo, 2020). With increasing age, tolerance to pain decreases. Therefore, the pain intensity has increased (Wijaya, 2018). In a study conducted by Purnawanti et al.(2023), the age group with the highest number of surgical procedures was 56–65 years (24 patients). In this study, female sex was the most frequent. Sex also serves as a risk factor for each individual, and women more often develop disorders due to physiological changes in the body, such as decreased levels of estrogen hormones, which affect psychological conditions, making them more anxious, emotional, and difficult to sleep (Fitri et al., 2022). Men have lower sensitivity to pain than women (Denisah, 2023). In a study by Kazharo et al. (2020), the female group had the highest number of patients who underwent surgery (43 patients).

In this study, the majority of respondents had a high school education. A high level of education allows individuals to receive and understand all information, particularly the impact of surgery (Kazharo, 2020). A study conducted by (Ngestu et al. (2024) showed that the group with high school education as their highest education had the highest number of patients undergoing surgery (61 patients). In this study, most respondents received regional spinal anesthesia during the surgical procedure. Regional spinal anesthesia has a psychological impact on patients because during surgery, patients will remain conscious and listen to the surgical process. After the surgery is complete, patients may experience anxiety about their health postoperatively, so they may have difficulty sleeping (Husada, 2022). A study conducted by Husada showed that regional spinal anesthesia was most frequently received by 50 patients.

In this study, 63 patients experienced moderate postoperative pain intensity. Pain is subjective because each patient experiences different pain intensities (Purnawanti, 2023). Differences in pain levels among patients can be affected by sex, age, anesthesia, and type of surgery. Moderate and severe pain intensity are more common in major postoperative patients, such as general surgery, neurosurgery, ob-gyn, orthopedics, cardiothoracic surgery, and laparotomy (Ninashvili et al., 2023).

In a study conducted by (Kazharo, 2020), The postoperative moderate pain intensity group had the largest number of patients (33). In another Ngestu et al. (2024) reported that the postoperative moderate pain intensity group was the largest, with 85 patients. In this study, 68 patients had poor sleep quality after surgery. The decrease in sleep quality is caused by the effect of anesthesia, which slowly disappears after surgery; therefore, patients wake up more often at night on the first day after surgery (Purnawanti 2023). In a study conducted by Kazharo et al. (2020), the postoperative poor sleep quality group had the highest scores (55 patients). In another study by (Ngestu et al., 2024), the postoperative poor sleep quality group was also the highest, with 118 patients. Several studies in other developing countries, such as those in Sub-Saharan Africa and India, have also shown that limitations in resources and access to adequate pain management are common causes of disrupted sleep quality in postoperative patients (Tegene & Alemnew, 2022).

According to the findings from the analysis using Somers'd test, significant outcomes were observed ($p < 0{,}001$), and the relationship between the two variables was found to be very strong ($r = 0{,}789$). Therefore, it can be determined that the alternative hypothesis (H_a) is accepted while the null hypothesis (H_o) is rejected, indicating Connections between pain intensity and sleep quality in elective postoperative patients. These findings are consistent with those of a study conducted by Kazharo et al. (2020), which established a relationship between pain levels and sleep quality in postoperative patients at the Baladhika Husada Tingkat III Jember Hospital, with a significant ($p = 0{,}004$) and Spearman correlation ($r = 0{,}358$).

Therefore, the clinical implications of the research findings are crucial, particularly the need for routine evaluation of postoperative pain within the first 24-48 hours to avoid a decline in the quality of patient sleep, providing preoperative and postoperative education, and developing an integrated pain management protocol that considers the quality of sleep aspects. This study has limitations in data collection due to the relatively short and subjective time frame, resulting in the data being dependent on each patient's perspective in responding to pain levels and quality of sleep post-surgery. Since the study was conducted at only one hospital and employed a non-probability sampling technique, the findings cannot be generalized to the entire population of postoperative patients in Indonesia.

Conclusion

Based on the analysis and discussion of the research data, it can be concluded that the age group with the most surgical procedures is 26–35 years, the female gender is the most respondents', the highest latest education of respondents' is high school, the most type of anesthesia received by patients during surgery is regional spinal, and the most frequent surgical procedures performed are obgyn surgery with 48 cases. Most of the respondents in this study experienced moderate pain intensity and poor sleep quality postoperatively. Based on this study. Thus, there is a relationship between pain intensity and sleep quality in elective postoperative patients.

The results of this study are expected to form the basis for further research on the relationship between postoperative pain intensity and postoperative sleep quality, and it is expected that all postoperative patients will undergo routine pain screening and pain management to improve sleep quality. Further research can extend the study period to include more postoperative patients related to pain intensity and sleep quality.

Declaration of Conflict Interest

The result of this research do not have any conflicts of interest of the authors with all related parties and have been approved for publication by the authors.

Acknowledgments

We would like to thank the Faculty of Medicine Universitas Sumatera Utara for supporting this research, all participants in this study, and other authors.

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