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Original article

Investigating sleep quality and related factors of postoperative patients at Tay Nguyen Regional General Hospital, Dak Lak Province, Vietnam

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Abstract: ***Background:*** As we know, sleep is very important and necessary for every person. Especially, among patients undergoing surgery as an effective form of treatment, they also need a good quality of sleep to restore both physiological and psychological health. However, poor sleep quality is common in patients after surgery and produces harmful effects on postoperative recovery. ***Objectives:*** This study was conducted to investigate the quality of sleep and identify related factors among postoperative patients at the Department of General Surgery, Tay Nguyen Regional General Hospital, Dak Lak Province. ***Methods:*** A cross-sectional descriptive study was performed. 374 postoperative patients who meet the sampling criteria were recruited by simple random sampling between March and July 2021. General information data were collected through interviews with structured questionnaires, and the patient's sleep quality was assessed by using the Pittsburgh Sleep Quality Index (PSQI) Vietnamese version. Data analysis was performed via SPSS ver 20.0; $p < 0.05$ was statistically significant. ***Results:*** The average mean of PSQI score was 10.3 ± 3.27 (range = 0 -21, SD = 3.27). The percentage of postoperative patients who had poor sleep quality was 78.1%. Factors associated with poor sleep quality include old age ($p < 0.01$), education level ($p < 0.05$), level of postoperative pain ($p < 0.001$). ***Conclusions:*** The frequency of poor sleep quality among postoperative patients is high. The findings of this study also provide a better understanding of related factors that affect poor sleep quality. So, the nurses should develop an appropriate care plan to improve sleep quality in these patients by controlling the above factors. It will help these patients recover fastest and most comprehensively in the postoperative period, enhancing the quality of care.

Keywords: Sleep; sleep quality; surgery; related factors.

1. INTRODUCTION

Sleep is a normal physiological state, a basic need for human existence. Without sleep, life cannot go on for several days [1], and humans spend about a third of their lives sleeping [2]. A normal sleep cycle is so important for the human body to maintain the normal function of physiological and mental health. This is even more important for post-operative patients. They need good sleep to restore both physiological and psychological health, it will have a positive impact on the process of restoring damaged tissues, earlier wounds healing, preventing postoperative complications, shortening hospital stay, and reducing treatment costs.

However, poor sleep quality is one of the common complaints of patients in the early days after surgery. A study published in 2019 by Prakrithi et al. showed that up to 67% of patients after surgery had poor sleep quality [3]. General features of poor sleep quality include: difficulty falling asleep, prolonged sleep onset, increased time to wake up, increased number of awakenings during sleep, poor sleep efficiency, decreased total sleep time, waking up exhausted, or sleep

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during the day. Poor sleep quality increases stress response, decreases immune function, impairs cell synthesis [1, 4], and increases the risk of infection [5]. Several other studies have reported that poor sleep quality also increases pain sensitivity, susceptibility to pain, and interferes with pain control [6, 7], and it was associated with significant impairment ability to perform activities of daily living [8]. Furthermore, Krenk et al. (2014) also reported that patients with sleep disturbance had reduced mobility early after surgery due to increased daytime sleep [9]. Thus, it has much reduced the effectiveness of the quality of care and treatment.

On the other hand, factors related to poor sleep quality in postoperative patients have been pointed out by previous studies, including demographic factors, level of postoperative pain, characteristics of patients, types of surgery, previous surgical history, hospital admission history, environmental factors, etc [3, 10-12]. Currently, there are many studies on the quality of sleep in Vietnam. However, most of the research focused on the sleep quality of patients with chronic diseases or the elderly. There are limited studies on the sleep quality in patients after surgery. In Dak Lak Province, Tay Nguyen Regional General Hospital is the biggest hospital in the Central Highlands of Vietnam. Thousands of patients undergo surgery each year in its general surgical ward. This study was conducted to investigate sleep quality; and identify related factors among postoperative patients at Tay Nguyen Regional General Hospital, Dak Lak Province. From there, it is possible to propose a way which control-related factors to improve the patient's sleep quality, helping the patient recover the fastest and most comprehensive after surgery, enhancing the quality of care and treatment.

2. MATERIALS AND METHOD

2.1. Study design and setting

A cross-sectional descriptive study was conducted at the Tay Nguyen Regional General Hospital, Vietnam, from March to July 2021. The hospital has a total of nearly 12 hectares, located in Buon Ma Thuot city which seem to be the center of the Central Highlands region. Currently, this is the largest and most modern hospital in this area with nearly 1400 medical staff and high-technology medical equipment. It includes 26 clinical and subclinical departments, and around 1500 hospital beds serving people. This hospital is responsible for taking the health care needs of people in this area, also neighboring provinces such as Laos and Cambodia. Many patients are transferred from other provinces to the hospital for operative interventions and advanced care as well. The Checklist for Reporting of Survey Studies (CROSS) provides reporting guidelines for this manuscript [13].

2.2. Sample and sampling criteria

The sample size was calculated following the formula:

$$n = Z^2_{(1-\alpha/2)} \frac{p(1-p)}{d^2}$$

In there:

- n: Sample size

- Z: With significance level α = 5%, then Z (1-α/2)= 1.96.

- p: Based on the previously published data, p = 0.67 was chosen [3].

- d: confidence interval of the true value of sensitivity, using d = 0.05.

In addition, this study added more than 10% number of patients to compensate for the dropout data. So, a sample of 374 patients who have undergone surgery was recruited using a simple random sampling technique. They had been hospitalized in the general surgical department in Tay Nguyen Regional General Hospital, Vietnam. All of the patients who were selected agreed to participate, and no one has drawn out of the study.

Inclusion criteria included 18 years of age or older; on the 3rd day of the postoperative period; agree to participate in the study; No history of chronic diseases (depression, cancer, rheumatoid arthritis).

Exclusion criteria were: (1) having undergone surgery at the local health; (2) inability to answer interviews such as mental disorders, dementia, mute, deaf, etc.

2.3. Outcome measures

The data collection tool was a set of structured questionnaires, consisting of two parts:

Part 1: Demographic characteristics and some factors affecting sleep quality (level of pain, characteristics of patient's bed, types of surgical, etc). Other information about pathological and surgical characteristics was obtained from medical records.

Part 2: Patient's sleep quality – using the Pittsburgh Sleep Quality Index (PSQI) the Vietnamese version validated in Vietnam[14, 15]. The researcher edited it to suit the patient's conditions and circumstances in the surgical department. The pilot study was conducted on 30 patients that meet the selection criteria of the research sample. These patients did not participate in the research sample later. The validity and reliability of instruments were confirmed by Cronbach's alpha coefficients of 0.83.

In the current study, the level of pain was measured by using the Numeric Pain Rating Scale. It is an 11-point scale ranging from "no pain" (0) to "worst possible pain" (10). Patients were asked to choose the number that best matched their average pain intensity during the postoperative period. Scores were interpreted as follows: 0 (no pain), 1- 3 (mild pain), 4 - 6 (moderate pain), 7 - 10 (severe pain). Quality of sleep was assessed through 19 items in the questionnaire including seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and day-time dysfunction. The scoring of responses was based on a Likert scale (from 0 to 3). The total PSQI score ranged from 0 to 21 points. A total PSQI score ≤ 5 was considered good sleep quality. A total PSQI score > 5 indicates poor sleep quality.

2.4. Data collection procedures

Firstly, the researcher collected the name list of patients who had undergone surgery and met the inclusion/ exclusion criteria on each day. Their name was assigned as numerical labels and written on slips of paper which were put in a box, mixed well, and then drawn out one at a time. To ensure the quality of collecting data, the researcher has selected just 4- 5

cases per day. Then, the researcher contacted and informed the participants clearly about the study and their rights. When they agreed to participate, the consent form was signed themselves. The researcher interviewed the patients to complete the structured questionnaires. It took about 40 minutes. Finally, the collected information was carefully remarked on the survey form which avoids confusion or missing. Also, data collection forms were stored in a place and prepared for analysis.

2.5. Data analysis

Data were coded and analyzed by using Statistical Package for Social Sciences (SPSS) version 20.0. The level of significance was set at the alpha level of .05.

Data had a normal distribution. Categorical variables were presented by frequency and percentages, and continuous variables by mean and standard deviation. The Chi-square tests were used to analyze the relationship between the factors with poor sleep quality. Fisher's exact tests were applied when testing the relationship between surgical history, surgical organs with poor sleep quality.

2.6. Ethical considerations

Before collecting data, the study protocol was approved by the Research Review Board, Faculty of Medicine and Pharmacy, Tay Nguyen University (No. 18/QĐ-ĐHTN). Also, the researcher asked permission to collect data from the Board of Directors, Tay Nguyen Regional General Hospital. Patients have clearly explained the aims of the study as well as the procedure of data collection. There was no risk of damages from this study and they have the right to refuse or withdraw from the study at any time without any penalty. All the forms were anonymous. No physical examination or interference was implemented to further investigate participant's situation.

3. RESULTS

From March to July 2021, data of 374 in-patients in the general surgical department were collected. They were selected from the study populations by a simple random sampling technique. 374 patients gave informed consent and complete the survey. The response rate was 100%.

3.1. General characteristics of participants

Out of 374 participating patients, the average age was 50.9 ± 16.54 years. After dividing into subgroups, the group under the age of 50 years accounted for 44.9%, and the group over the age of 50 was 55.1%. Kinh people are the majority ethnic group (68.7%). The proportion of males (61.2%) was much higher than females (38.8%), but not significantly. Education level was differentiated from low to high, 74.8% have a high school diploma or higher education.

Regarding surgical characteristics, most patients had no previous surgical history (95.7%). This was also highly relevant due to the original sampling criteria. 4.3% of the study subjects had a history of surgery, orthopedic surgery, or obstetric surgery. Surgical treatment was mainly performed on the appendix (24.3%), followed by surgery of the hepatobiliary system (19.3%) and thoracic (19%), gastrointestinal system (16%), colon - rectum (13.9%), and pancreas (7.5%). In which, 67.9% of patients applied the open surgery method. Most of the patients in the department were arranged on a single bed separately (90.1%). However, sometimes there was an increase in the number of patients, and patients have to share a bed with other patients. It was not much, accounting for only 9.9% of the participants. Assessing the average pain level of patients during the postoperative period by using the Numeric Pain Rating Scale, the results showed that most of the study subjects had moderate pain levels (Mean = 5.66; SD= ± 1.73).

Table 1. General characteristics of participants (n=374)

Variables	Value	Frequency	Percentage
Age	Mean = 50.9	SD = ± 16.54	
	≤ 50 years	168	44.9%
	> 50 years	206	55.1%
Ethnicity	Kinh people	257	68.7%
	Ethnic minority	117	31.3%
Gender	Female	145	38.8%
	Male	229	61.2%
Educational level	High school or higher education	280	74.8%
	Other (Primary/ Secondary education)	94	25.2%
Number of patients /bed	1 patient/bed	337	90.1%

	2 patients/bed	37	9.9%
Level of pain	Mean = 5.66	SD = 1.73	
	Mild pain	44	11.8%
	Moderate pain	196	52.4%
	Severe pain	134	35.8%

3.2. Quality of sleep among postoperative patients

The results in Table 2 showed that, the bed time of the participants was around 9:14 p.m (SD = 0.92; range: 8:00 pm - 11:00 pm) and the number of minutes that patients take to fall sleep per night was 55.86 (SD = 19.79; range: 20 - 90 minutes). Average getting up time was 4:55 a.m (SD = 0.78; range: 3 a.m - 6 a.m) and average sleep time was 4.93 hours (SD = 1.03; range: 3- 6 hours). In postoperative period, the global PSQI score was 10.3 ± 3.27 (range: 0- 21).

Most of the patients had a subjective assessment of sleep quality at fairly bad (27.8%) and very bad (41.7%). In terms of sleep performance, only 14.4% of patients have habitual sleep efficiency above 85%, and up to 45.5% of patients have sleep efficiency of less than 65%. In conclusion, most of the participants had poor sleep quality according to the PSQI scale (78.1%, n = 374) (table 3).

Table 2. Mean and standard deviation of sleep quality measurements

Variables	Mean ± SD	Range
Bed time	9:14 p.m ± 0.92	8:00 p.m - 11:00 p.m
Number of minutes (to fall asleep)	55.86 minutes ± 19.79	20 - 90 minutes
Getting up time	4:55 a.m ± 0.78	3 a.m - 6 a.m
Hours of sleep per night	4.93 hours ± 1.03	3- 6 hours
Global PSQI score	10.3 ± 3.27	0 - 21

Table 3. Characteristics of sleep quality among patients after surgery (n=374)

Variables	Frequency	Percentage
Subjective sleep quality		
Very good	19	5.1
Fairly good	95	25.4
Fairly bad	104	27.8
Very bad	156	41.7
Habitual sleep efficiency		
≥ 85%	54	14.4
75-84%	74	19.8
65-74%	76	20.3
< 65%	170	45.5
Quality of sleep		
Good	82	21.9
Poor	292	78.1

Table 4. Relationship between demographic factors and sleep quality after surgery (n=374)

Factors		Quality of sleep		p (CI: 95%)
		Good	Poor	
Age	≤ 50 years	38	130	p = 0.005 OR = 2.02 (1.23- 3.32).
	> 50 years	44	162	
Ethnic group	Kinh people	53	204	p = 0.81 OR = 1.26 (0.75- 2.12)
	Ethnic minority	29	88	
Gender	Female	37	108	p = 0.18 OR = 1.26 (0.85- 2.29)
	Male	45	184	
Educational level	High school or higher education	23	47	p < 0.05 OR = 2.03 (1.14 – 3.6)
	Other (Primary/ Secondary education)	59	245	

Table 5. Relationship between surgical characteristics, pain level after surgery

Factors		Quality of sleep		p (CI: 95%)
		Good n (%)	Poor n (%)	
History of surgery	No	77 (21.5%)	281 (78.5%)	*p* = 0.35*
	Yes	5 (31.3%)	11 (68.7%)	
Types of surgery	Laparoscopic surgery	31 (25.8%)	89 (74.2%)	*p* = 0.2
	Open surgery	51 (20.1%)	203 (79.9%)	
Surgical organ	Upper gastro-intestinal tract	15 (25%)	45 (75%)	*p* = 0.56*
	Liver and biliary tract	14 (19.4%)	58 (80.6%)	
	Colon-rectum	13 (25%)	39 (75%)	
	Appendix	24 (26.4%)	67 (73.6%)	
	Thoracic	11 (15.5%)	60 (84.5%)	
	Pancreas	5 (17.9%)	23 (82.1%)	
Level of pain	Mild pain	19 (43.2%)	25 (56.8%)	*p* < 0.001
	Moderate pain	57 (29.1%)	139 (70.9%)	
	Severe pain	6 (4.5%)	128 (95.5%)	

*: Fisher's exact

3.3. Factors related to sleep quality among postoperative patients

Study results showed that the age group is one of the factors related to the sleep quality in this study population. There was a difference in sleep quality between the two age groups, the proportion of participants over 50 years old with poor sleep quality was 2.02 times higher than the group of participants under 50 years old, statistically significant with p < 0 .05. The difference in education level also has a statistically significant relationship with the sleep quality of patients with OR= 2.03 (1.14 - 3.6), p < 0.05. The difference in pain level after surgery was associated with poor sleep quality (p<0.05). There were no significant intergroup variations (i.e., among different surgical histories, types of surgery, or surgical organs) concerning changes in postoperative sleep quality in this study (p > 0.05).

4. DISCUSSION

Regarding the quality of sleep, this study's results reported that 78.1% of participants suffer from poor sleep quality. This result was higher than the study of Chi et al. (2020) performed on 140 spine surgery patients (70%); Prakrithi et al (67%)[3, 16]. However, it was lower than 83% in general postoperative patients reported by Buyukyilmaz et al. [17]. Performing a study on patients with breast cancer after surgery in 2020, Dung et al. announced that 100% of patients had sleep disturbances. In which, 5.8% of patients had mild sleep disturbance, 51.7% of patients had moderate sleep disturbance, and 42.5% of patients had severe sleep disturbance [18].

Moreover, 69.5% of patients had a subjective assessment of sleep quality as fairly bad (27.8%) and very bad (41.7%). Regarding habitual sleep efficiency, only 14.4% of patients have above 85%, and up to 45.5% of patients have sleep efficiency of less than 65%. Using the similarity research instrument, Chi et al. announced that just 28.6% of the patients had subjective sleep quality at fairly bad and very bad; 34.3% of patients reported sleep efficiency as less than 65%; 30.7% of the patients rated the sleep efficiency above 85%, and 34.3% of the patients rated the sleep efficiency less than 65%[16]. This can be explained by the difference in the study's population. Chi et al. (2020) conducted a study on a group of patients who were undergoing spine surgery with major surgical interventions such as open surgery, cement pumps accounted for 81.4%. Most of the patients participating in the study received surgical intervention in the lumbar spine position, accounting for 83.6%. The method of anesthesia used mainly accounted for 75.7% and 32.1% of patients used sleeping pills before sleep during the postoperative period [16].

In this study, the average age of participants was 50.9 (SD = 16.54). This age was lower than the experimental group of Chi et al. whose average age was 55.7; SD =15.1 [16]. However, the results are quite similar to the study of Kulpatcharapong with the mean of age 50.8 ± 16.7 [18]. In fact, as age increases, the human body gradually undergoes physiological and psychological changes such as hormonal reduction and increased risk of illness, etc. These changes lead to obvious effects on sleep quality. In 2012, Bihari et al. published that gender and age influence the sleep quality of patients in ICU with OR= 1.02(1.01- 1.03), p < 0.01 [20]. However, the study of Prakrithi et al. did not find a statistically significant difference between age groups [3]. Besides, the difference in education level also has a statistically significant relationship with the patient's sleep quality with OR= 2.03 (1.14 - 3.6), p < 0.05. This difference may be explained in the group of people who have a higher level of education, they seem to know lots of information about the disease and the treatment methods. Otherwise, sometimes it makes them concerned about risk factors, and the ability to recover from surgery which can also lead to a significant difference.

The results also showed that there was no difference in sleep quality and previous surgical history (p > 0.05). This can be explained because the number of participants with a history of surgery accounted for a small number (4.3%). In addition, in different disease groups, the proportion of patients with poor sleep quality predominates. However, the researchers only performed classified surgical methods in the form of observations and medical records including laparoscopic surgery, and open surgery. We did not clarify the classification of the nature of the surgery, e.g minor/ major surgery, timing of surgery, types of anesthesia, etc. This is the limitation of our study. In further research, we should make clear the characteristics of surgery with major surgical interventions or minor surgical interventions, surgical timing, any incident intraoperative time, position treatment after surgery, method of anesthesia, and time to get out of anesthesia.

Regarding postoperative pain, patients had to deal with varying levels of pain after surgery. This study result was quite similar to the study of Xuan et al. in abdominal surgery patients with an average pain score of 5.81 ± 0.82 [11] and lower than the study result of Hai (2018) among patients undergoing orthopedic surgery with an average pain score of 6.01± 1.37 [10]. Postoperative pain occurs as a result of surgical stress with the presence of damage to muscle, nerve, vascular, and cellular. As a consequence, these painful stimuli affect the cerebral cortex by activating brain electrical waves that make fragment sleep and maintain alertness, leading to poor sleep quality. In a descriptive study by Buyukyilmaz et al. that examined 75 patients undergoing traumatic surgery, it was found that the sleep quality of 83% of patients has affected by pain in the postoperative period [17]. In addition, the level of postoperative pain related to the patient's sleep quality with statistical significance (p < 0.001). This result was similar to the study of Chi et al. (p < 0.05; OR = 2.83; 1.32-6.17); Xuan et al. (r = - 0.83, p < 0.001) ; Hai (r = - 0.63, p < 0.001) [10, 11, 16]. Dolan et al. (2016) also confirmed that patients with sleep disturbances complained that pain is the main cause of sleep disturbances[21]. In addition, a systematic review by Klemann et al. reported that the quality of sleep in postoperative patients was affected by many factors including the type of surgery (open or laparoscopic), level of pain, the administration of analgesics (epidural analgesia), and continuous wound infusion of analgesics [22]. The scientific publication of Su and Wang (2018) also reviewed the factors associated with the development of sleep disturbances among postoperative patients including old age, preoperative comorbidities, anesthetic/anesthetic methods, the severity of trauma requiring surgery, and pain after surgery [23].

This is the first study on sleep quality among postoperative patients in Dak Lak Province. It was also conducted in the biggest hospital of Central Highland in Vietnam. It provided useful material for other research related to surgical patients. The research design fits with the goals of the study. The researcher's efforts to control the errors. Data collection takes one by one patient at a time and no one was drawn out of the study.

The current study is still limited in determining the causal relationship between each factor and poor sleep quality. Regarding measuring the sleep quality through counting time, so got the difficulty in controlling recall bias. Also, assessing the sleep quality of patients in the postoperative period but collecting the data only once a time may not reflect patients' experiences exactly. The types of anesthesia, anesthetic dosage, and duration of time to wake up after an operation also influence the patient's condition and quality of sleep. The present study didn't classify these factors. So, the result might affect patients' perception of sleep quality. Further research should be done to clear the causes of poor sleep quality and/or effects of other factors (clinical characteristics, psychological, etc) on other groups of surgical patients (orthopedic surgery, spine surgery, etc).

Conclusion

Our study has shown a large number of patients with poor sleep quality after surgery. So, developing an appropriate care plan to control the above factors is essential which improves the patient's sleep quality, helping the patient recover fastest and most comprehensively in the postoperative period. Specifically, the health care system and medical teams need to have more appropriate treatment methods and postoperative pain management. In addition, it is necessary to pay attention to elderly patients with psychological and physiological changes - a trigger for changes in sleep quality. Propagating health education, improving patients' knowledge about the effectiveness of good sleep quality in the process of injury recovery, and enhancing the quality of treatment.

LIST OF ABBREVIATIONS

PSQI: Pittsburgh Sleep Quality Index; ICU: Intensive Care Unit; M: Mean; SD: Standard Deviation; OR: Odds Ratio; CI: Confidence Interval.

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CONFLICT OF INTEREST

There is no conflict of interest.

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