

## The Sleep Quality of Breast Cancer Patients

**Devita Alifyanti, Yanti Hermayanti, Dyah Setyorini**

Faculty of Nursing, Universitas Padjadjaran

*Email: devitalifyanti@gmail.com*

### Abstract

The quality of sleep is required by breast cancer patients to regenerate and repair the body cells. When patients' sleep is disturbed, it may be affected to the physiological conditions, such as decreased appetite, weight loss, anxiety, irritability, and changes in natural and cellular immune functions. Breast cancer therapies can affect the quality of sleep. This study aimed to determine the sleep quality of breast cancer patients that had treatments in a public hospital in Bandung. This research used the quantitative descriptive approach. The sample was selected using the consecutive sampling technique ( $n = 31$ ). Data were collected using the Pittsburgh Sleep Quality Index (PSQI) questionnaire. Sleep quality was categorized as good when the total score was  $\leq 5$ , and sleep quality was poor when the total score was  $> 5$ . The results of this study indicated that all respondents (100%) had poor sleep quality. The components that contributed to the assessment were sleep latency, sleep duration, sleep efficiency, and daytime dysfunction. The worst sleep quality with the highest score (18) occurred in respondents who had radiotherapy and mastectomy (2 persons), and respondents in advanced stage (3 persons). This study concludes that the pharmacological therapies and the stages of cancer contributed to the sleep quality of breast cancer patients. It is expected that health professionals and hospitals notice the patient's sleeping needs during treatment at the hospital.

**Keywords:** Breast to cancer patients, cancer therapy, sleep quality.

## Introduction

Breast cancer is the second most common cancer after lung cancer and the highest cause of women mortality in the world. The International Agency for Research on Cancer (IARC) 2012, estimated the number of new cases of breast cancer was around 1.67 million (25% of all cancers) and increased 13.75% in 2008. According to Riset Kesehatan Dasar, Badan Litbangkes Kementerian Kesehatan RI dan Pusdatin, Indonesia there were 347,792 patients (1.4% of the total population) in 2013, it estimated 6,701 cases in West Java. According to medical records of a public hospital in Bandung, the number of breast cancer patients were 1,592 from January 2016–January 2017; 273 patients had a mastectomy, 16 patients had radiotherapy, and 471 patients had chemotherapy.

Medical treatments for breast cancer patients include mastectomy, radiotherapy, and chemotherapy. The aimed of the treatment is to destroy cancer cells. Those treatments affect patients' physical conditions including bad sleep quality. According to Akman et al. (2015), poor sleep quality is a common effect of breast cancer patients undergoing treatment. This is also explained by some experts. According to Route et al. (2014), the surgical procedure such as mastectomy would produce pain and an inflammatory response that affected to the quality of sleep. Dhruva et al. (2012) study of 73 breast cancer patients with radiotherapy found 85% of them experienced sleep disorders. The sleep disorder that experienced by cancer patients were often awakened up to 15 times at night. In addition, Romito et al. (2014) study involved 252 breast cancer patients who had chemotherapy found that 67% of them had poor sleep quality, it because of fatigue, pain and psychological stress.

Sleeping problems were identified from four breast cancer patients who experienced mastectomy, radiotherapy, and chemotherapy in a public hospital in Bandung. Patients who had mastectomy four days ago mentioned that they still experience postoperative pain and often awaken during sleep at night. In patients with radiotherapy, they had difficulty to fall asleep especially post-therapy, whereas two patients who had chemotherapy experience,

they felt itchi in the area around their breast and other parts of the body. Another patient said she went to the toilet several times at night due to encouraging drinking water after chemotherapy. They got medicines to help them sleep during daytime. The poor quality of sleep affected to the physical condition of breast cancer patients.

Breast cancer could impact to physical, psychological, social, and spiritual conditions that can lead to decreasing the quality of life in breast cancer patients (Fatmadona, 2015). Sleep disorders are one of the physical problems experienced by breast cancer. Akman et al. (2015) stated that sleep disorders affected to the quality of life and psychological of cancer patients. Sleep disorders awaken a person from sleep normally, such as pain can prevent sleep, and contribute to energy loss or fatigue. Fatigue can lead to sleep during interruptions of the day and nighttime (Kwekkeboom, Abbott-anderson, & Wanta, 2010).

The sleep quality is required by breast cancer patients who hospitalization to regenerate and repair the body's cells. NREM sleep stimulates the production of growth hormone (Growth Hormone) which will help patients in repairing body tissues. REM sleep is necessary to maintain brain tissue and essential for cognitive recovery (Buysse, 1989; Potter & Perry, 2009: 177). Quality sleep serves to help optimize the cure of disease for breast cancer patients (Potter and Perry, 2009).

A study conducted by Krisdhiyanti (2016), in a public hospital in Bandung on the sleep quality in breast cancer of 83 patients who obtained chemotherapy found that 69 (83.13%) of patients had poor sleep quality. Some components were assessed including subjective sleep quality (44.58%), sleep latency > 60 minutes (53.01%), sleep disorders (63.86%), dan daytime dysfunction (53.01%). Pratiwi's study (2016), the type of sleep disorder that occurs in breast cancer patients who had chemotherapy, namely insomnia (66.67%) and circadian rhythm disturbance (57.33%). Perceived sleep disturbances were Restless Legs Syndrome (44.0%), sleep apnea (34.67%), and narcolepsy (23.33%). Sleep disorders can result in poor quality of sleep. Both

studies have only assessed the impact of one therapy which is chemotherapy to a sleep disorder. There was not a study in Indonesia that determine the quality of sleep on all cancer therapies especially breast cancer patients. This study aimed to determine the sleep quality of breast cancer patients treated in a public hospital in Bandung It is expected that the results of this study can provide a big picture of the difference in sleep quality of breast cancer patients with a variety of conditions of therapy. This study also provides an additional information for health workers in helping breast cancer patients who have poor sleep quality to meet the needs of sleep.

### Research Method

The study design used the quantitative descriptive method with cross-sectional time study approach. The population was breast cancer patients who admitted to a public hospital in Bandung, there were 210 patients from January 2017 to June 2017. The samples were selected using consecutive sampling technique for two months, 31 patients participated in this study.

The instrument in this study was the

Pittsburgh Sleep Quality Index (PSQI) questionnaire by Buysse et al. (1989); There are 10 questions, but only 9 questions applied in this study. The researcher eliminated question number 10 because the question no includes in the seven components of sleep quality assessment. The data categorised using the Likert scale on seven components, namely subjective sleep quality (question number 9), sleep latency (questions 2 and 5a), sleep duration (question number 4), sleep efficiency [question number 4/(question number 3–question number 1) x 100%], sleep disturbance (question number 5b-5j), need medication to sleep (question number 6), and daytime dysfunction (questions 7 and 8) (Buysse et al. 1989). Data analysis technique was a univariate analysis of the variables studied. Each sleep quality component has a response range of 0-3, with 0 = very good, 1 = good enough, 2 = rather bad, 3 = very bad. Total score range of all components 0-21. Sleep quality in a good category when the total score is ≤5, and sleep quality is poor if the total score is > 5 (Buysse, et al., 1989).

### Research Results

Table 1 present the characteristic of

**Table 1 Frequency Distribution of Respondent Characteristics (n = 31)**

	Characteristics	F	Percentage (%)
Age	26–35 years old	2	6.5
	36–45 years old	6	19.4
	46–55 years old	14	45.2
	56–65 years old	7	22.6
	66–75 years old	2	6.5
Marital status	Single	0	0
	Married	24	77.4
	Widow	7	22.6
Last education	Did not attend school	1	3.2
	Primary School	12	38.7
	Junior High School	6	19.4
	Senior High School	10	32.3
	College	2	6.5
Cancer Stages	Stage 1	0	0
	Stage 2	3	9.7
	Stage 3	21	67.7

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	Stage 4	7	22.6
Treatment	Single Mastectomy	11	35.5
	Radiotherapy + Mastectomy	3	9.7
	Chemotherapy + Mastectomy	17	54.8
		0	0
		0	0

**Table 2 Component Of Sleep Quality Based On Cancer Stages and Treatments (n=31)**

No	Therapy	Stage	Component of Sleep Quality							Total score	Conclusion	
			1	2	3	4	5	6	7		Good	Bad
1		3	1	3	3	3	1	0	2	13	-	√
2		3	2	3	3	3	1	0	0	12	-	√
3		3	1	2	3	3	2	0	1	12	-	√
4		3	1	0	3	3	1	0	1	9	-	√
5		2	1	3	3	3	2	0	2	14	-	√
6	Single mastektomi	4	1	2	3	3	1	0	1	11	-	√
7		2	2	3	2	3	1	0	2	12	-	√
8		3	1	2	1	0	1	0	2	7	-	√
9		3	2	0	2	0	2	0	2	8	-	√
10		3	1	0	3	3	1	0	2	10	-	√
11		3	1	3	3	3	1	0	1	12	-	√
12		3	1	3	3	1	1	0	2	11	-	√
13	Radioterapi with mastektomi	4	1	3	3	3	2	3	3	18	-	√
14		4	3	3	3	3	2	3	1	18	-	√
15	Kemoterapi with mastektomi	3	1	3	3	3	1	0	1	12	-	√
16		3	1	3	3	0	2	0	3	12	-	√
17		3	1	2	3	3	2	0	2	13	-	√
18		3	1	0	3	3	1	0	1	9	-	√
19		3	1	0	3	3	2	0	3	12	-	√
20		3	1	0	3	0	1	0	1	6	-	√
21		3	1	1	3	3	1	0	1	10	-	√
22		2	1	0	3	3	1	0	2	10	-	√
23		3	1	2	1	2	2	0	2	10	-	√
24	Kemoterapi with mastektomi	3	1	0	2	1	1	0	2	7	-	√
25		4	1	3	3	3	2	0	2	14	-	√
26		4	1	3	3	3	2	3	3	18	-	√
27		4	3	3	3	3	1	0	0	13	-	√
28		3	1	0	3	3	2	0	2	11	-	√
29		3	1	2	3	3	2	0	3	14	-	√
30		3	1	3	3	3	1	0	1	12	-	√
31		4	1	1	2	0	1	0	1	6	-	√

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Information:

Component 1 : subjective sleep quality  
Component 2 : sleep latency  
Component 3 : sleep duration  
Component 4 : sleep efficiency  
Component 5 : sleep disturbance  
Component 6 : need medication to sleep  
Component 7 : daytime dysfunction

0 : very good  
1 : good enough  
2 : rather bad  
3 : very bad

Sleep quality is categorised in a good quality if the total score is  $\leq 5$ , and poor quality if the total score is  $> 5$

participants

Table 1 illustrated that the majority of the respondent (75%) were more than 45 years, all respondents were married, and 22.6% of them have been abandoned by their partner. The education status of the respondents varies, almost 40% of respondents attended elementary school education. The majority of respondents (90.3%) were in advanced stage of the breast: stage III and IV 54.8% of respondents had combination therapies such as chemotherapy and mastectomy.

The sleep quality of breast cancer patients illustrated in Table 2 The findings showed that all respondents (100%) had a poor quality of sleep. From the seven components of sleep quality, 26 respondents said that their quality of sleep was good enough. In the latency component of sleep, a half of the respondents (n=14) had a range of 5–6 score which means the time required respondents to start falling asleep was  $> 60$  minutes and it categorised the very bad. Components of sleep duration, the majority of respondents (n=25) had a duration of sleep at night  $< 5$  hours and categorized very bad.

For the efficiency component of sleep habits or the comparison between the duration of sleep and duration in bed found that more than half of respondents (n=23) had a percentage of  $< 65\%$  which means more time spent in bed than the time to fall asleep, and it categorized very badly. In the components of sleep disturbances, more than half of respondents (n=18) had a range of 1-9 scores which means that sleep disturbance

did not affect the quality of sleep and it categorized quite well. In the component of the use of sleeping pills, the majority of respondents (n=28) did not take medicines to help fall asleep and it categorized very well, and on the components of daytime dysfunction or disruption of activities during the day, 13 respondents had a score of 3-4 means disruption of activity, it indicated that the quality of sleep was in the category rather bad.

In the type of breast cancer treatment, all cancer treatments caused poor quality of sleep. The majority of respondents with single mastectomy, 5 out of 11 respondents had sleep disturbance in latency component  $> 60$  minutes. All respondents (100%) with radiotherapy and mastectomy experienced various sleep disturbances; in sleep latency  $> 60$  minutes, sleep duration  $< 5$  hours, and dysfunction during the day. The majority of chemotherapy respondents with mastectomy, 14 out of 17 respondents suffered sleep disorder on the component duration of sleep  $< 5$  hours. Respondents with the worst score: 18 occurred in respondents who had radiotherapy and mastectomy (2 persons) and respondents with cancer stage IV (3 persons).

### Discussion

Overview of the quality of sleep based on cancer therapy

The most common sleep disorder in patients with a mastectomy was the length of time to

begin fall asleep. Mastectomy is a surgical removal of the entire breast. The effects that often seen after mastectomy surgery include nausea and vomiting, postoperative pain, stress and emotional disturbance (Black & Hawks, 2014). The pain and an inflammatory response after the mastectomy surgical procedure performed can affect to sleep quality (Routes et al., 2014).

Potter and Perry (2009) said any illness that causes pain, physical discomfort, or mood-like problems such as anxiety or depression often causes sleep problems. Someone with such changes often had problems to start or stay asleep. Sleep disorder in respondents who had radiotherapy and mastectomy was a prolongation of sleep latency, sleep duration < 5 hours and dysfunction during the day. This study results that the worst sleep quality occurred in breast cancer patients with radiotherapy and mastectomy. Radiotherapy is the use of high energy ion radiation to destroy the reproductive capacity of cancer cells by destroying DNA, slowing mitosis to correct DNA, and stimulating apoptosis (Black & Hawks, 2014). Patients who had radiotherapy faced lymphadema, jaundice, anemia, and pain (Irawan, Rahayuwati, Yani, 2017).

Demiralp et al. (2010) study found that sleep disorders occurred in 57% of 215 breast cancer patients with radiotherapy. Demiralp et al. study inline with Dhruva, et al. (2012) study that over 87% of 73 breast cancer patients who had radiotherapy, had a high amount of waking up at night, and it occurs for three or more nights a week. Other studies also found similar findings that radiation therapy decreased sleep efficiency, and more time spent waking to result in higher daytime dysfunction Miaskowski and Lee (1999) in Graci (2005). The sleep latency and the duration of sleep <5 hours makes the body unable to pass through four to six cycles a night for 6-8 hours, this is the normal cycle for a person has to go to sleep (Kozier, Erb, & Berman, 2010). Not achieving all the cycles makes a person feel less in his sleep, resulting in excessive sleepiness and requires a nap to meet their needs. Increasing the need for a nap indicated that breast cancer patients had a poor quality of night sleep.

The most common sleep disorder in

patients with chemotherapy and mastectomy was sleep duration < 5 hours. Chemotherapy is a cancer therapy by killing cancer cells by involving chemicals. The side effects of chemotherapy that may affect patient sleep quality include: pain, anxiety, fever, night sweats, indigestion (diarrhea, constipation, nausea, vomiting), respiratory disorders (a cough and dyspnea), and fatigue (Vena et al., 2004; Van Onselen et al., 2012). Budhrani et al. (2014) said that sleep disturbance caused by chemotherapy were sleep latency and awakened at night. Chemotherapy caused a person to take 34.8 minutes to start falling asleep and waking up 21-29 times at night. In addition, Roscoe et al., (2011) stated that breast cancer patients with chemotherapy experienced fatigue. This fatigue can delay the patient for drowsiness and the ability to sleep longer.

#### Overview of Respondents' Sleep Quality Components

There are several components that contribute to assessing the poor quality of respondents' sleep. These components are sleep latency, sleep duration, sleep efficiency efficiency, and daytime dysfunction. The sleep latency component or the time takes to start falling an asleep average of respondent took 60 minutes to start falling asleep. It categorized poorly because the normal duration required to start falling asleep in adults is about 20 minutes (Budhrani, et al., 2014). These study results were similar to Araújo et al. (2014) study that breast cancer patients took 38 minutes to begin falling asleep. Similarly, Roscoe et al. (2007) that involved 300 cancer patients with insomnia found 76% of respondents waking several times during the night, 44% of respondents having difficulty falling asleep, 35% of them getting up at midnight for a long time, and 33% getting up early. Sleep latency was influenced by the physiological of the body. Body's condition that is not optimal will decrease the body's ability to capture RAS stimulation, and reducing the body's ability to start sleeping immediately (Marliani, Lukman, & Hiidayati, 2013). This latency prolongation will affect sleep, both in quality and quantity of sleep.

The results of this study on the component



of sleep duration or the length of time a person sleeps at night stated that the majority of respondents had a duration of sleep at night < 5 hours. This finding inline with Liu et al. (2012) study that breast cancer patients spend 2 hours to fall asleep again when awakened at night, and an average total sleep time < 7 hours. Too much time to wake up and not enough time to sleep were signals of an inadequate sleep.

According to Lowery et al. (2014), the most common symptom of insomnia in breast cancer patients is waking several times in the night and hard to fall asleep again. There are several factors that influence this conditions including medical factors (eg illness, cancer treatment and medication), physical symptoms (eg pain, fatigue, hot flashes), emotional reactions (eg depression, anxiety, or worry), and influence environment (eg noise, light, and hospital stay). In addition, Araújo et al. (2014) that did a study of 52 breast cancer patients indicatedt factors affecting sleep quality were going to the toilet at night (67.3%) and waking up midnight or early (59.6%).

The study results related to the components of daytime dysfunction or disruption of activities during the day found that most of the respondents had a range of 3-4 scores means that the interruption of activities at night caused by poor quality of night sleep. This result is similar to Araújo et al. (2014), that 88.5% of 52 breast cancer patients occurred daytime sleep. Drowsiness during the day and weakness were several complains that results from the poor quality of night sleep.

There are two important neurotransmitters for sleep-wake regulation, histamine which is a neurotransmitter that affects awake, and GABA (Gamma aminobutyric Acid) influencing neurotransmitters. When a person experiences insomnia, the body produces more histamine and does not produce enough GABA. However, during the day, the body produces too much GABA and does not produce enough histamine to cause excessive sleepiness (James, 2012).

This study found that respondents with the stage IV of breast cancer had a poor quality score with the highest score was 18. All respondents had a poor quality of sleep. Cancer stage can lead to respondents' sleep

disorders, the higher of the cancer stages, the patients' quality of sleep was getting worse. According to Akman et al. (2015), higher sleep quality scores were detected among those with poor general conditions, for example women with metastasis breast cancer have more sleep disorder.

Kashani et al. (2014) study found 60% of 21 breast cancer patients with metastases have been reported to have more than one type of sleep disorder, increased depression and negative changes in sleep patterns. In addition, similar findings reported by Budhrani et al. (2014) study that patients with breast cancer with mestastase, 15 times woke up at night and falling asleep after 71 minutes. Some other factors were depression, pain and stress of life. Patients with high levels of depression had major problems associated with being awake at night, waking up in the morning, and daytime sleepiness (Gronskaya et al., 2007).

The common depression in breast cancer patients with metastases affected the production of ketokolamine and serotonin in the body. Ketokolamin (norephinephrine and dopamine), glutamate, histamine, hypocreatin (orexin), and acetylcholine are neurotransmitters which result in awake. Katokolamin will be much in production when a person is depressed, so will often experience awake (James, 2012). Depression stimulated the serotonin production in the body is reduced or not produced, as a result patients keep awake (James, 2012).

Patients with metastatic breast cancer also experienced high levels of pain, and sleep problems such as waking at night. Pain that occurs in patients with advanced breast cancer can inhibit the fibers of the nuclei raphe in secreting serotonin. Serotonin is a neurotransmitter that causes sleep, inhibition of its will lead to awake (Stephen, 2011). Opioids are drugs that are often prescribed to relieve pain in cancer patients. Opioids, however, cause a decrease in the number of slow-wave NREM sleeps in opioid-treated individuals, in breast cancer patients who have given opioid drugs experience changes in the sleep cycle and can cause sleep disorders (James, 2012).

The environment of hospitals also significantly affects the ability to start and

stay asleep. The noises of the hospital are often to make the patient easy to wake up. This causes the patient increased experience of wake time, frequent waking, and decreased REM sleep time from total sleep time (Potter and Perry, 2009).

Environmental factors of a public hospital in Bandung may contribute to poor sleep quality of respondents, it may because of the density of the number of patients in one room, and different types and conditions of diseases. However, the hospital policies stated that the patients rest hours set at 21.00, this is an effort to meet the patient's rest needs, and there are 4–5 nurses on duty. Maximum intervention or treatment is done at 24.00 and there is rarely health interventions taken more than that hour, unless the patient requires special care and needs monitoring at all times.

## Conclusion

The conclusion of this study that all (100%) of respondents had a poor quality of sleep. According to the seven components of sleep quality in PSQI, the components of sleep latency, sleep duration, sleep efficiency, and daytime dysfunction were the components that influence the assessment of poor sleep score.

The worst sleep quality score (18) occurred in breast cancer patients who had radiotherapy and mastectomy (2 respondents) and stage IV of breast cancer (3 respondents).

These study findings reported that all breast cancer patients with cancer treatments had a poor quality of sleep, nurses should pay more attention to fulfill patients' sleep needs. The nurse needs to prioritize the basic needs of patients such as sleep, and manage the routine intervention activities wisely. For example, delaying the patient's bath when the patient needs more sleep or the patient needs a bath first to be comfortable during sleep, and creating a comfortable environment for the patient to fall asleep.

Implementing non-pharmacological therapy, such as: music therapy, massage, cognitive behavioral therapy, physical activity therapy may help patients breast cancer easy to sleep and health workers in the hospital can advice a treatment to breast

cancer patients to improve the quality of sleep. The researcher is suggested to continue this study by looking at the environmental factors in the hospitals that may affect to the quality of sleep of breast cancer patients.

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