

**National Cheng Kung University**

**International Advanced Program in Nursing**

**Master's Thesis**

**Exploring Factors Related to Sleep Quality among Patients**

**Undergoing Hemodialysis in Indonesia**

**探討印尼血液透析病人之睡眠品質及影響因素**

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探討印尼血液透析病人之睡眠品質及影響因素  
Exploring Factors Related to Sleep Quality  
among Patients Undergoing Hemodialysis in  
Indonesia

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## ABSTRACT

**Keywords:** Sleep quality, Patients undergoing hemodialysis

**Background:** Sleep plays a significant role in humans' life, good quality of sleep will help to maintain mental and physical health, and improves the quality of life. Studies found patients with hemodialysis (HD) experienced poor sleep quality. However, factors related to the sleep quality in Indonesia patients undergoing HD remains unclear.

**Purpose:** The purpose of this study is to understand the influence of demographic, disease characteristic, and symptom burden factors on sleep quality among patients undergoing hemodialysis in Indonesia.

**Methods:** A cross-sectional study was conducted. A convenience sample of 202 patients undergoing hemodialysis was recruited from two dialysis units in Center, and North Jakarta Islamic Hospitals from January to February 2017. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), demographic and disease characteristics were assessed using self-developed questionnaire, and the dialysis symptoms burden using the Dialysis Symptom Index (DSI). Data were analyzed using SPSS software. Descriptive statistic was used to identify demographic and disease characteristics and also the current state of symptom burden. A hierarchical multivariate linear regression analysis was performed to assess to identify the predictors of sleep quality.

**Results:** Total of 202 subjects completed the questionnaires in this study. The result shows 90% of the subjects have poor sleep quality ( $n = 182$ ). The average score of the global sleep score was 8.44 ( $SD = 3.50$ ) from potential score of 0 – 21. The final model of hierarchical linear regression analyses explained 17.1% of the global sleep score. Dialysis symptom burden was a significant predictor of sleep quality.

**Conclusion:** The study identified the sleep quality among patients undergoing hemodialysis are significantly associated with dialysis symptom burden. Thus, the dialysis symptom burden is a potential predictor that can be modified in order to improve sleep quality.



## TABLE OF CONTENTS

|   |      |
|---|------|
| ABSTRACT.....   | iii  |
| LIST OF TABLES .....  | viii |
| CHAPTER I.....  | 1    |
| INTRODUCTION .....  | 1    |
| 1.1 Background.....   | 1    |
| 1.2 Purpose.....  | 2    |
| CHAPTER II.....   | 3    |
| LITERATURE REVIEW .....   | 3    |
| 2.1 Number of Patients, HD Process and Drawbacks of HD.....                         | 3    |
| 2.2 Physical, Psychological, and Sleep Problems in Patients with Hemodialysis ..... | 4    |
| 2.3 Sleep Process, Sleep Quality, Sleep Measures, and Sleep Studies in HD .....     | 9    |
| 2.4 Factors Associated with Sleep Quality .....                                     | 11   |
| CHAPTER III .....   | 16   |
| RESEARCH METHODOLOGY.....   | 16   |
| 3.1 Design and Research Framework .....   | 16   |
| 3.3 Sampling .....  | 17   |
| 3.4 Instrument .....  | 18   |
| 3.5 Data Collection Procedure .....   | 21   |
| 3.6 Ethical Consideration <sup>[L]</sup> <sub>[SEP]</sub> .....                     | 22   |
| 3.7 Data Analysis .....   | 23   |
| CHAPTER IV .....  | 24   |
| RESEARCH RESULTS .....  | 24   |

|   |    |
|---|----|
| 4.1 Demographic Characteristics of the Subjects .....   | 24 |
| 4.2 Dialysis Symptoms .....   | 25 |
| 4.3 Sleep Quality.....  | 28 |
| 4.4 Predictors of Sleep Quality .....   | 32 |
| CHAPTER V .....   | 35 |
| DISCUSSION.....   | 35 |
| 5.1 Sleep Quality among Patients Undergoing Hemodialysis .....                                | 36 |
| 5.2 Factor that Explain Sleep Quality among Patients Undergoing Hemodialysis .39              |    |
| 5.3 Factors that Did Not Explain Sleep Quality among Patients Undergoing<br>Hemodialysis..... | 41 |
| 5.4 Limitation.....   | 44 |
| 5.5 Conclusion .....  | 45 |
| 5.6 Clinical Implication .....  | 45 |
| REFERENCES .....  | 47 |
| APPENDIX.....   | 64 |
| Appendix 1: Demographic and Disease Characteristics Questionnaire .....                       | 64 |
| Appendix 2: Dialysis Symptoms Index .....   | 65 |
| Appendix 3: Dialysis Symptoms Index Questionnaire Permission .....                            | 67 |
| Appendix 4: Dialysis Symptoms Index (Bahasa Indonesia).....                                   | 69 |
| Appendix 5: the Pittsburgh Sleep Quality Index .....  | 71 |
| Appendix 6: the Pittsburgh Sleep Quality Index Questionnaire Permission .....                 | 73 |
| Appendix 7: the Pittsburgh Sleep Quality Index (Bahasa Indonesia).....                        | 74 |
| Appendix 8: the Pittsburgh Sleep Quality Index (Scoring) .....                                | 77 |
| Appendix 9: Informed Consent Form .....   | 80 |

Appendix 10: Ethical Clearance Document..... 81  
Appendix 11: Research Permission Approval Document ..... 82



## LIST OF TABLES

|  |    |
|--|----|
| Table 4.1- Demographic and disease characteristics data.....   | 25 |
| Table 4.2- Dialysis symptom index.....   | 27 |
| Table 4.3- Pittsburgh sleep quality index's items.....   | 29 |
| Table 4.4- Sleep component distribution .....  | 31 |
| Table 4.5- Pittsburgh sleep quality index .....  | 32 |
| Table 4.6- Demographic data, disease characteristics and symptoms burden on<br>global sleep quality score..... | 34 |





# CHAPTER ONE

## INTRODUCTION

### 1.1 Background

Sleep plays a significant role in humans' life, good quality of sleep will help to maintain mental and physical health, and improves the quality of life. Many studies reported that patients undergoing hemodialysis (HD) are most likely to have poor sleep quality (Ezzat and Mohab 2015; Pai et al. 2007; Sekercioglu, Curtis, Murphy, & Barrett, 2015; Trbojević-Stanković, Stojimirović et al., 2014), continuous poor sleep quality will affect to the decrease in the quality of life and increase in the mortality rate (Gusbeth-Tatomir, Boisteanu, Seica, Buga, & Covic, 2007; Masoumi, 2015). Studies found that poor sleep quality is associated with lower quality of life and predicted to increase mortality rate in the dialysis population (Brekke et al., 2013; Masoumi, 2015). Although factors related to sleep quality in this population had been studied in several countries, sleep quality and related factors remain unclear in Indonesia patients with HD. Therefore, the purpose of this study is to identify factors related to sleep quality in patients with undergoing hemodialysis in Indonesia.

Patients must be treated with renal replacement therapy (RRT), to maintain the condition of the patients and slow down the worsening of the kidney disease. There are treatments choices for patients who have reached the advanced stage of kidney disease: hemodialysis (HD), peritoneal dialysis (PD), and renal transplantation (Daugirdas, 2011). Although kidney transplantation has been known to be the best renal replacement therapy, it is very limited, and the waiting list is getting longer. Hemodialysis is regarded as the most common therapy, and nearly 90% of patients in advanced stage of kidney disease used this treatment.

Complaints about sleep quality are very common in patients who are undergoing hemodialysis treatment. Poor sleep quality is among the top three problems in hemodialysis population (Curtin, Bultman et al. 2002; Weisbord, 2005). Factors associated with poor sleep quality in patients undergoing hemodialysis have been explored in Western countries, such as age, gender, race, education level, occupation, body mass index (BMI), time on dialysis, presence of diabetes, use of cigarette, and coffee intake. However, factors related to sleep quality in patients undergoing hemodialysis is not completely understood.

Although sleep quality in this population has been studied across nations, studies showed cultural difference may influence sleep quality (LeBourgeois, 2005; Lei et al., 2009). Most of the patients undergoing hemodialysis in Indonesia are receiving hemodialysis treatment twice a week with the duration of 4-5 hour, while patients in other countries receive up to three times a week. To date, there is no information available on sleep quality and associated factors among patients undergoing hemodialysis in Indonesia. Thus, it is necessary to identify factors related to sleep quality among Indonesian patients undergoing hemodialysis to understand more about sleep quality in hemodialysis patients in Indonesia and to provide data to that may help develop the suitable intervention to improve sleep quality in this population.

## **1.2 Purpose**

To identify factors related to sleep quality among patients undergoing hemodialysis in Indonesia. Based on the purpose, the first specific aims are to examine sleep quality among patients undergoing hemodialysis in Indonesia and the second aim is to identify the factors that explain sleep quality among patients undergoing hemodialysis in Indonesia.

## CHAPTER TWO

### LITERATURE REVIEW

#### **2.1 Epidemiology, HD Process and Limitation of HD**

Hemodialysis (HD) is one of the choices for renal replacement therapy other than kidney transplant and peritoneal dialysis (PD). Patients with end stage renal disease (ESRD) patients need permanent hemodialysis treatment since their kidneys are not working properly, or their glomerular filtration rate (GFR) count is below 15ml per minute, also often referred to as stage V of kidney disease (National Kidney Foundation, 2002). Hemodialysis is the most common therapy used to treat patient with ESRD today with roughly 17,193 new patients with hemodialysis in 2014, with more than 15,000 new patients each year since 2011 in Indonesia and more than 400,000 patients in the United States (Indonesia Renal Registry, 2014; NIDDK, 2006; NKF, 2015). The growth rate of HD patients is reaching 6% to 7% in 2013 worldwide, and it keeps increasing every year (Fresenius Medical Care, 2013).

Hemodialysis for patients with ESRD is core to their survival. Studies showed that the survival rate is higher in patients with HD patients' compared to those who initiated PD in the later year (Noordzij & Jager, 2012; Yang et al., 2015).

Hemodialysis is a process of removing waste products and extra fluid via vascular access from patient's body that has lost full or most function of the kidneys, using a human made machine. There are three vascular accesses AV fistula, AV graft, and Venous dialysis catheter, which would be mature at approximately two weeks to three months after it was made, at three months the patients will generally in stable condition (Trbojević-Stanković, Stojimirović et al., 2014). Hemodialysis keeps the balance of chemicals in the body including potassium and sodium (Cvengros, Christensen, & Lawton, 2004; NIDDK, 2006; Daugirdas, 2011). Hemodialysis could

also reduce symptoms that usually occur in this population such as swelling in the legs, a difficulty of breathing, which caused by excessive amount of water in the body.

Although hemodialysis has been proven to help kidney failure patients maintaining their health, it is not without disadvantages. Hemodialysis requires the patients to follow a strict schedule to make the best outcome of the treatment. A patient has to receive two to three times hemodialysis per week, with the duration up to five hours each session (Masterson, 2008). HD may improve the quality of life, prolong life expectancy, and can avoid symptoms such as swelling legs or difficulty of breathing but it only works as much as 10% of the actual kidney, therefore, following the schedule, taking medicine and limiting fluid consumption are very essentials for patients with HD (Susantitaphong, Koulouridis, Balk, Madias, & Jaber, 2012).

## **2.2 Physical, Psychological, and Sleep Problems in Patients with Hemodialysis**

There are several changes in physical and mental condition of patients undergoing hemodialysis. When kidney fails, there are certain changes in the patient's body such as the decreased count of hemoglobin which caused by the kidney that no longer unable to produce erythropoietin. Other than the hemoglobin count, iron in hemodialysis patients is usually low as the result of chronic blood loss that is associated with hemodialysis. Such changes can affect to the patients condition such as lack of energy because the level of oxygen in the body decreased.

Hemodialysis has been known to be useful as a life-sustaining therapy, and it is proven by the prolonging patient's survival (Davison, 2003; Korevaar, Merkus, Jansen, Dekker, & Boeschoten, 2000). However, mental and physical symptoms as manifestations in chronic illness patients receiving hemodialysis are prevalent and

could be severe (Weisbord, 2005). Chronic hemodialysis patients experienced various symptoms, and all symptoms may potentially reducing daily function and their well-being.

Some of the most common reported physical symptoms in this population including fatigue, itching, muscle cramps, easy bruising, shortness of breath, dizziness, numbness in legs, nausea, and lack of appetite (Merkus, 1999). A more recent study (Weisbord, 2005) on physical and emotional symptoms found that four symptoms were reported by at least 50% of the patients, they are dry skin (72%), feeling tired or lack of energy (69%), itching (54%), and bone/joint pain (50%). A study suggested that uremic pruritus or itchy skin is an unbearable symptom that evoke the desire to scratch, caused by multifactorial include uremia-related abnormalities (phosphorus, calcium and parathyroid hormone metabolism), accumulation of uremic toxins, systemic inflammation, cutaneous xerosis, and common co-morbidities such as diabetes mellitus and viral hepatitis (Manenti, Tansinda, & Vaglio, 2009). Narita et al., (2006) found 453 patients had severe pruritus in 1773 hemodialysis patients, and more than 70% of the pruritus patients suffered from sleep disturbance, which is one of the domains of sleep quality. Uremic pruritus has been consistently found to be one of the sleep-disturbing factors. Dialysis patients who had severe uremic pruritus also suffered sleep disturbance such as awakened frequently at night; these results indicated that pruritus is related to the increase of scratching and also sleep disturbance (Szepietowski et al., 2002; Yngman-Uhlin & Edell-Gustafsson, 2006; Zucker, Yosipovitch, David, Gafter, & Boner, 2003).

Fatigue, which also reported to be one of the most common symptoms in patients undergoing hemodialysis can be defined as one subjective feeling of weak,

lack of energy, and quickly tired (Stone, Richards, & Hardy, 1998). Raj, Ahuja, Frandsen, & Jose (2016), found that weakness, reduced mobility, and drowsiness as the most common symptoms reported in an adult with hemodialysis. In people with dialysis, many factors are contributing to fatigue, including physiological factors such as anemia, malnutrition, and uremia. Other factors are socio-demographic, psychological/behavioral, and dialysis-related factors such as dialysis adequacy, frequency, and mode of dialysis (Jhamb, Weisbord, Steel, & Unruh, 2008). A study was conducted to see the relation between sleep and fatigue using subjective and objective measure and find that fatigue does not have a significant correlation with any measurement in objective measurement except stage 2 sleep using Polysomnography (PSG). However fatigue was found to be significantly correlated with poor subjective sleep quality, which also showed patients with fatigue, had higher excessive daytime sleepiness and also had RLS (Jhamb et al., 2013).

Restless leg syndrome (RLS) is a kind of sleep problem that can occur in anyone but the prevalence is higher in dialysis population and considered as one of the most common symptoms found in dialysis patients (Al-Jahdali, 2009; Kim et al., 2008; Parker, 2003). RLS defined as a neurological condition characterized by uncomfortable sensation inside the legs, which occur while resting, especially bedtime (Lopes et al., 2005). The four essentials criteria for someone to be diagnose with RLS including: 1) Strong needs to move the extremities usually accompanied with unpleasant sensation; 2) How the symptoms when resting or inactivity; 3) Temporary relief with movement and 4) Worsening in evening or night (Walters et al., 1995). People who experience RLS in the night while they are sleeping will need to wake up and move their legs in order to relief it. RLS can make it difficult to go to

sleep, people with RLS are usually do not get enough sleep at night and may feel sleepy and tired during the daytime (American Sleep Association, 2016).

Patients with HD also experienced psychological problems such as anxiety and depression. Studies reported that the level of anxiety in this population reached 46% (Cukor et al., 2008; Shahgholian, Rahimipour, & Yazdani, 2015), while depression found to be one of the most common psychological conditions in ESRD patients treated with peritoneal dialysis or hemodialysis (Aldukhayel, 2015; Kimmel, 2006). The cause of depression is still unclear, although many factors found to be correlated with depression such as physical and mental condition, medications, and environments. Depression in dialysis population found to be correlated with the dialysis shift, lower level of hemoglobin and higher level of phosphorus (Teles et al., 2014). Using polysomnograph, Thase (2006) found depressed people to have decreased sleep efficiency. A study in general population found that people who had less than six hours sleep and more than eight hours sleep to be more depressed than people who had sleep between six and eight hours, this result shows the relationship between depression and the duration of sleep (Kaneita et al., 2006).

Studies found a significant correlation between having depression and poor sleep quality (Williams et al., 2002; Iliescu, 2003; Iliescu, 2004; Bilgic et al., 2007; Pai et al., 2007; Sekercioglu, Curtis, Murphy & Barrett, 2015; Afsar, 2012; Brekke et al., 2013; Elder et al., 2007). Anxiety was also found to be correlated with poor sleep quality (Wang, Chan, Chang, Chen & Tsai, 2013). This is probably because people who are stressed, depressed and feeling anxious often think many things on their mind, which makes sleep is more difficult. An optimal sleep is affected by better psychological health, as well as lower anxiety, stress and depression level (Hamilton, Nelson, Stevens, & Kitzman, 2006).

The most common sleep problems seen in dialysis patients are including sleep apnea (SA) and restless leg syndrome (RLS) (Parker, 2003). Sleep apnea (SA) is a sleep-breathing problem, characterized by unsteady airway obstruction while sleeping, which leads to intermittent hypoxia and sleep fragmentation (Chu et al., 2016). SA and RLS are associated with lower sleep quality (Wu et al., 2015). Hemodialysis patients who experience either SA or RLS, or both will wake up during their sleep, and they will need to wait or move, in order to relief these symptoms. Although symptoms reported by these studies are different, the vast variety of the symptoms can tell us that physical problems in patients with hemodialysis are quite a lot.

A study which focuses on sleep quality found that nearly half (49%) of the subjects in their study experienced poor sleep quality (Elder, 2007). Sleep problems are common in hemodialysis patients with more than 50% for each sleep problems including, trouble staying awake during the day, trouble falling asleep, waking during night/trouble falling back to sleep, and not getting enough sleep (Curtin, Bultman et al., 2002). Weisbord et al. also found that 44% of patients with HD had trouble falling asleep, which made this one of the highest problem experienced by patients undergoing hemodialysis (Weisbord et al., 2005).

Wang (2016) speculated that the high number of symptoms burden in this population might be associated with the dialysis inadequacy. Symptom burden itself can be defined as “the subjective, quantifiable prevalence, frequency, and severity of symptoms placing a physiologic burden on patients and producing multiple negative, physical, and emotional patient responses” (Gapstur, 2007).

A study by Wang (2016) found that sleep quality was associated with symptom burden in patients receiving maintenance hemodialysis, in all seven



domains of sleep quality including subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. The heavier symptom burden will contribute the poorer sleep quality.

### **2.3 Sleep Process, Sleep Quality, Sleep Measures, and Sleep Studies in HD**

Sleep consists of two distinct states, non-rapid eye movement (NREM), which divided into three stages (N1, N2, and N3) and rapid eye movement (REM). Each night sleep has a complex architecture with the predictable 4-6 cycling of NREM/REM states, each cycle lasting approximately 90 to 110 minutes (Luyster, 2012; Callaghan & Gamble, 2015). These definitions show that sleep can be measured using various analyses along multiple dimensions.

Sleep quality can be defined as a person's satisfactory level which include many factors such as subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction (Buysse, Reynolds et al., 1989; Harvey et al., 2008; Kline, 2013). Since many factors included in the sleep quality, it is a complex construct hence it is difficult to evaluate (Landry, Best & Liu-Ambrose, 2015). Studies found poor sleep quality associated with many health outcomes such as increase in mortality, hypertension, coronary heart disease, and metabolic syndrome (Buysse, 2014).

Studies about sleep quality have been done using various methods such as subjective measures (e.g., Pittsburgh Sleep Quality Index) and objective measures (e.g., Polysomnography). Polysomnography (PSG) is a gold standard to measure sleep; sleep quality, quantity, and architecture at one time a person using the tool or facility. PSG is performed in a sleep laboratory or using a portable tool to assess the respiratory while sleeping in the home. The use of PSG is either expensive or needs to

have the subjects to go to laboratory or use specific tool. The Pittsburgh Sleep Quality Index (PSQI) measures a person sleep in the past months subjectively, which include seven components (i.e., sleep quality; sleep latency; sleep duration; habitual sleep efficiency; sleep disturbance; use of sleeping medication; and daytime dysfunction) in a questionnaire consists of 18 items (Landry, Best & Liu-Ambrose, 2015). PSQI has been used in many studies about sleep; specifically sleep quality, because it offers complete result with a much lower cost.

Patients undergoing hemodialysis are often complaining about having poor sleep quality, it is very common for patients who are undergoing hemodialysis treatment (Čengić, Resić, Spasovski, Avdić, & Alajbegović, 2010; Edalat-Nejad and Qlich-Khani, 2013; Ezzat & Mohab, 2015; Sekercioglu, Curtis et al. 2015; Trbojević-Stanković, Stojimirović et al., 2014). Čengić et al. (2010) conducted a study about quality of sleep in patients undergoing hemodialysis in a clinic in Bosnia and Herzegovina. They found 73% of two hundred patients with HD showed a poor sleep quality result measured using the Pittsburgh Sleep Quality Index (PSQI) and it is significantly correlated with the patients' quality of life. Edalat-Nejad and Olich-Khani (2013) in Iran, also found that poor sleep quality, which assessed using the PSQI to be common in chronic hemodialysis patients with 87% from 115 subjects included in the study. They concluded that poor sleep quality is typical in patients with hemodialysis and it is associated with lower quality of life (QoL) especially in the mental part of life quality. Sekercioglu and Curtis (2015) did a study on sleep quality in Canada; they found poor sleep quality in patients with chronic kidney disease either on dialysis or non-dialysis. Their result showed that female patients with small mental component summary scores (MCS) had poorer sleep quality compare to male patients with higher MCS.

## **2.4 Factors Associated with Sleep Quality**

Factors associated with sleep quality in hemodialysis have been broadly examined across countries (Brekke et al., 2013; Mezick et al., 2008). This section reviews the literature on factors of sleep quality in patients with hemodialysis including demographic, disease characteristics, and dialysis symptoms.

### **2.4.1 Age.**

Age is the most common demographic associated with sleep quality in hemodialysis patients, although the strength of the association between age and sleep quality is varied between different studies. Some studies did not find age as an independent factor to sleep quality in dialysis patients (Edalat-Nejad and Qlich-Khani, 2013; Harris et al., 2011; Sekercioglu, Curtis, Murphy & Barrett, 2015). Another study found younger age to have poorer sleep quality than older age in CKD patients (Brekke et al., 2013; Unruh, 2006). But most studies have found older age to be correlated with poor sleep quality both in chronic kidney disease patients whether on dialysis or not on dialysis (Einollahi, Motalebi, Rostami, Nemati and Salesi, 2015; Eryavuz et al., 2008; Merlino et al., 2005; Pai et al., 2007; Plantinga et al., 2011; Tel, & Esmek, 2007).

### **2.4.2 Gender and employment.**

Most studies found female are more likely to have poor sleep quality than male in CKD populations (Kurella, Luan, Lash & Chertow, 2005; Middelkoop, Smilde-van den Doel, Neven, Kamphuisen & Springer, 1996; Pai et al., 2007; Sekercioglu, Curtis, Murphy & Barrett, 2015). This is likely because female reported to be more prone to having metabolic syndrome, which will impact on their sleep (Hung et al., 2013). Female is twice more likely to develop depression than men, where depression has known to be one of leading causes of sleep problems. However,

some studies failed to show gender to be associated with sleep quality (Araujo et al., 2011; Davis et al., 2011; Edalat-Nejad & Qlich-Khani, 2013; Trbojevic-Stankovic et al., 2014).

A study found an association between employment status and components of sleep quality. In this particular study, employed participants developed a better sleep quality (92.5%) compared to 7.5% in the unemployed participants in hemodialysis population (Čengiđ et al., 2010). This is most likely correlated with psychological well-being, where employed patients felt more satisfy with their life, thus impacting their sleep to be better.

#### **2.4.3 Smoking status.**

Few studies included currently smoking status into their study and successfully showed the correlation between smoking and sleep quality, people who are smoking were more likely to have poor sleep quality both in dialysis or non dialysis patients (Afsar, 2012; Elder et al., 2007; Chen et al., 2006; Merlino et al., 2005; Unruh, 2006). People who are smoking, especially they who have been smoking for a long time are more likely to have respiratory problems, compare to people who are not smoking. Respiratory problems such as coughing, trouble breathing can cause sleeping problems, and affect the overall sleep quality. Some studies measured smoking status using the category never, former, and current (Roumelioti et al., 2011; Williams et al., 2002). Most of the study use yes or no question for current smoking status (Elder et al., 2007; Lindner, Novak, Bohra, & Mucsi, 2015; Merlino et al., 2005; Unruh, 2006). Therefore, in this study, yes or no question will be used.

#### **2.4.4 Coffee intake.**

Studies found caffeine consumption such as tea and coffee, to be significantly decreased sleep time and disrupted the overall perceived sleep quality (Hindmarch et al., 2000; Shilo et al., 2002; Walker, Fine & Kryger, 1995). Although Chen (2006) found that there is no association between tea and coffee and poor sleep quality. Caffeine has been known to increase alertness, and reduce sleepiness. Caffeine antagonized the adenosine receptors, which promotes sleepiness, prevent from feeling sleepy. By doing so, the human body clock will change and increase the frequency of daytime sleepiness.

#### **2.4.5 Presence of diabetes.**

Three studies found that patients with diabetes mellitus were more likely to have poorer sleep quality (Chen et al., 2006; Einollahi, Motalebi, Rostami, Nemati & Salehi, 2008; Eryavuz et al., 2008). Contrary with previous result, other studies failed to report the correlation between presences of diabetes mellitus in patients undergoing hemodialysis with having poorer sleep quality (Edalat-Nejad & Qlich-Khani, 2013; Wang, Chan, Chang, Chen & Tsai, 2013). Patients with diabetes are more likely to develop obstructive sleep apnea (OSA) and restless leg syndrome (RLS) compare to the general population, and this condition, both OSA and RLS are two of the highest sleep complaints in end-stage renal disease patients. Patients who experience RLS will be forced to move to relieve from RLS, walking or massaging the lower leg are said to be decreasing the symptom. These two symptoms OSA and RLS are associated with poor sleep quality.

#### **2.4.6 Body mass index (BMI).**

A study found BMI to be an independent parameter that is related to sleep disturbance in hemodialysis population (Afsar & Elsurer, 2013). The higher body

mass index found to be associated with shorter sleep and sleep apnea in general population (Moraes et al., 2013; Schwartz et al., 2008). However, Unruh (2006) did not find a correlation between body mass indexes and sleep quality in the first-year dialysis patients (Unruh, 2006). This phenomenon may be because the participants with higher body mass index included in the study were not enough to make a difference. Čengić (2010) found there was no significant difference in body mass index between good and poor sleepers in hemodialysis patients, but found that only 3.8% of the obese patients had a good sleep.

#### **2.4.7 Duration of hemodialysis.**

A study by Sabbatini (2008) found that sleep quality was reduced when the treatment is longer. This study followed the patients for three different times, and the longer time, the worse the sleep quality and the pain perception. Although another studies did not find any correlation between lengths of dialysis and sleep quality (Čengić, et al., 2010; Edalat-Nejad & Qlich-Khani, 2013), these studies measured the duration of dialysis by counting the months the patients have been treated.

#### **2.4.8 Dialysis symptoms burden.**

Patients with hemodialysis experienced many physical and psychological symptoms that might influence their quality of sleep. There are not many studies exploring the association between the symptoms occurred and their sleep quality, but a study mentioned about obstructive sleep apnea (OSA), which describe as trouble breathing and severe restless legs can directly influence the quality of sleep (Edalat-Nejad & Qlich-Khani, 2013).

Wang (2016) found that sleep quality was associated with symptom distress in patients receiving maintenance hemodialysis, he found that patients who are undergoing hemodialysis and have more symptoms which assessed using the Dialysis

Symptoms Index are more likely to be poor sleepers compare to those who have lesser symptoms distress.

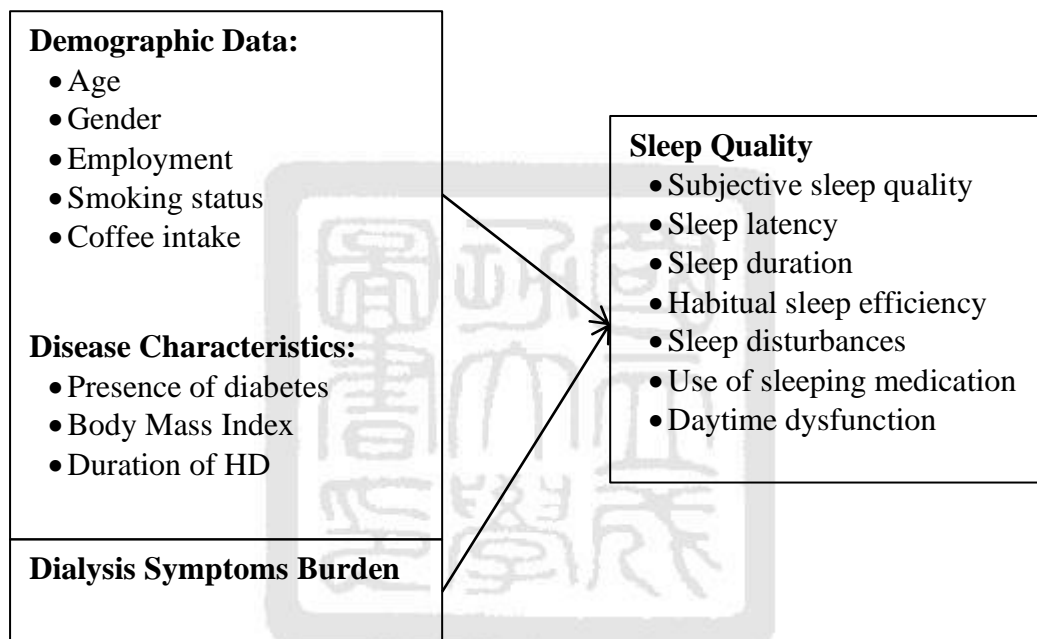
All factors mentioned above including demographic (age, gender, employment, smoking status, and coffee intake), disease characteristics (presence of diabetes, BMI, and duration of HD), and also dialysis symptoms, which include physical and psychological symptoms will be assessed in this study to find the correlation with patients with HD sleep quality.



**CHAPTER THREE**  
**RESEARCH METHODOLOGY**

**3.1 Design and Research Framework**

A cross-sectional study with convenience sampling method was conducted at two hemodialysis units from two Jakarta Islamic Hospitals in the center and north branches, Jakarta, from January to February 2017.



*Figure 1.* Research Framework

**3.2 Conceptual Model**



This study aimed to identify the factors that are related to sleep quality among patients undergoing hemodialysis in Indonesia. After reviewing relevant researches, we constructed the conceptual model used in the current study. The main variable was sleep quality which included seven components; subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. The independent variables were divided into three, they are demographic variables, disease characteristics variables and dialysis symptoms burden. Demographic variables were including age, gender, employment, smoking status, and coffee intake. Disease characteristics variables were including presence of diabetes, body mass index, and duration of hemodialysis. The dialysis symptoms burden were assessed using the dialysis symptom index that contains 30 symptoms, which often found in dialysis patients.

### **3.3 Sampling**

The target population of this study was patients with hemodialysis in hemodialysis units at Jakarta Islamic Hospitals in Center, and North Jakarta, Indonesia. Convenience sampling technique was applied to collect the data. The inclusion criteria were; patients has been undergoing hemodialysis for more than three months, age equal to or more than 18 years old; understand spoken and written Bahasa Indonesia. Patients with psychological and cognitive impaired disorder were excluded from the study. Patients were informed about the research procedure, and those who agreed to participate in the study, had signed the informed consent.

Sample size was calculated using G-Power Software Version 3.1.9.2 using the F test with the assumption  $\alpha = .05$ , effect size = .10 (Masoumi, 2013), power level = .80, and considering nine predictors (age, gender, employment, smoking status, coffee intake, duration of HD, presence of diabetes, body mass index, and dialysis

symptoms), 166 of patients undergoing hemodialysis needed for this study. A minimum total of 199 subjects including 20% probability of none response rate of the questionnaire given, was needed for this study.

### **3.4 Instrument**

The research instruments consisted of three following questionnaires for the sleep quality, demographic and disease characteristics, and dialysis symptoms list. The researcher or research assistants had administered all questionnaires while patients were receiving hemodialysis treatment.

#### **3.4.1 Demographic and disease characteristics.**

Demographic data were including age, gender, employment, smoking status, and coffee intake. Employment was categorized into two, employed and unemployed (Čengić et al., 2010). The smoking status was assessed using yes no question, most of the study used yes or no question for current smoking status (Lindner, Novak, Bohra, & Mucsi, 2015; Merlino et al., 2005; Unruh, 2006; Elder et al., 2007) and for the coffee intake was also using yes no question whether or not the subjects drink two or more cup of coffee in one day.

Disease characteristics were including the presence of diabetes, BMI, and duration of HD since first initiation. The presence of diabetes was evaluated using yes no question, patients' height and weight was assessed after the HD process to be able to get the dry weight of the patients while wearing light clothes (Sedhain, Hada, Agrawal, Bhattarai, & Baral, 2015). Duration of HD was counted in months of the patients have been on hemodialysis since first initiation.

#### **3.4.2 Sleep quality.**

Sleep quality can be defined as a person's satisfactory level which includes many factors such as subjective sleep quality, sleep latency, sleep duration, habitual

sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction (Buysse, Reynolds et al. 1989). To measure sleep quality, the Pittsburgh Sleep Quality Index (PSQI) was administered to the patients. Dr. Daniel J. Buysse and co-workers at the University of Pittsburgh's Western Psychiatric Institute and Clinic developed the PSQI in the late 1980s.

The PSQI has been widely used as a measurement for sleep quality across nations and has 0.83 for Cronbach's alpha indicating a high degree of internal consistency (Buysse et al., 1989). The original questionnaire has eighteen individual items, which are used to generate seven component scores. The total score will range from 0-21, the results give numbers in seven categories: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. The respondent with the score equal to five or more is considered to be having poor sleep quality. The assessment took about five to ten minutes to administer and scores.

The PSQI was available in Bahasa Indonesia, translated by Mapi. Mapi is a traditional company conducting linguistic validations of Patient-Centered Outcomes instruments worldwide. The Indonesian version of PSQI was obtained from Mapi after receiving permission to use by the University of Pittsburgh. The Indonesian version of PSQI has been through the linguistic validation. The pilot study was conducted in 10 patients undergoing hemodialysis and the questionnaire showed acceptable alpha coefficients ( $\alpha = .758$ ). Patients who were included in the pilot study were not included in the study.

### **3.4.3 Dialysis symptoms burden.**

The Dialysis Symptom Index (DSI) was used to assess dialysis symptom burden by calculating the presence and the severity of 30 symptoms. The DSI

contains 30 items of particular emotional and physical symptom which known to exist in the dialysis population. The emotional symptoms are including difficulty concentrating, feeling nervous, feeling irritable, worrying, feeling sad, and anxiety, also decreased interest in sex and also appetite and last is difficulty becoming sexually aroused. Physical symptoms are including constipation, nausea, vomiting, diarrhea, muscle cramps, swelling in legs, shortness of breath, lightheadedness or dizziness, restless legs or difficult keeping leg still, numbness or tingling in feet, feeling tired or lack of energy, cough, dry mouth, bone or joint pain, chest pain, headache, muscle soreness, dry skin, itching, trouble staying asleep, and trouble falling asleep.

Respondents was asked to answer yes or no on the presence of each symptom. For the severity of the symptoms the DSI using Likert's scale with one as not at all bothersome and five as bothers very much, for the severity of the presence symptoms. This instrument has good test-retest reliability (mean kappa  $0.52 \pm 0.17$ ) and content validity in the hemodialysis population. The symptoms that were not reported will be treat as zero in the severity, and the scores of the presence symptoms was summed to generate an overall severity score. Thus, the minimum possible score for the DSI is zero if the was no symptoms reported, and 150 when all symptoms are present and rated as bothers very much (Weisbord et al., 2004).

This instrument was translated into Bahasa Indonesia. The author of the instrument has given his permission to translate the instrument into Bahasa Indonesia. Regarding process of cross-cultural adaption from Beaton, Bombardier, Guillemin & Ferraz (2000), the process of translation consists of some steps, forward translation, synthesis of the translations backward translation, expert committee, pretesting in some participants, and submission of documentation to the developers.

Two translators started the translation process with the forward translation. Both translators were expert of the source language (English) and the target language (Indonesian) translated the instrument. The two language experts had major in English, and also experience in teaching English for nursing students. The second step was to produce a synthesis of the translation. The third was back translation, the main purpose of this process was validity checking, this process involved one language expert.

Next step was invite four expert committee, which including two experts in hemodialysis and chronic kidney disease and two lecturers with years of experience in teaching in nursing field were invited to ensure the clarity and detect grammatical mistakes in the translation. There were no errors in the meaning thus the process was not repeated. After the calculation, the mean item content validity index (I-CVI) was .916; the I-CVI should not be lower than .78 (Polit & Beck, 2006).

The fifth stage, pre-testing translated version of the questionnaire, instrument were given to 10 participants in the same population of this study target population, they were asked to answer the questions. In the current study, alpha coefficient showed good internal reliability ( $\alpha = .805$ ).

### **3.5 Data Collection Procedure**

After receiving permission letter from NCKU to conduct the research, the researcher submitted the thesis proposal to the Institutional Review Board (IRB) of the Universitas Padjadjaran Bandung. After obtaining the IRB and research permission letter from NCKU, invitation letters to conduct research was to the directors of educational and practice departments of these two Islamic Jakarta Hospitals (center and north).

Two research assistants were recruited to collect data from two hospitals. Research assistants were persons who had at least one-year experience working in the hospital. All research assistants had received training on how to explain the required information to the respondents and how to fill the questionnaires. Evaluation after the training was done, and all research assistants was able to do the same as the researcher to avoid bias.

After receiving permission to conduct the research in the hospital, the researcher visited the head nurses in the HD wards to identify potential subjects who met the inclusion criteria. The head nurses helped by giving the names of the potential respondents. The data collection process was conducted during the HD process, and the patients were given an explanation regarding the research purpose and procedure, and their rights and confidentiality. The researcher or the research assistants also explained the content of the questionnaires clearly to avoid bias. The patients were asked to complete the demographic data first, after finished with the demographic data; patients were handed the dialysis symptoms index, and lastly was given the Pittsburgh Sleep Quality Index. These instruments were given to patients during HD session in which took about 25 minutes. Patients were asked to measure their weight after the hemodialysis process to measure the dry weight and researcher or the RA completed the counting. Researcher or research assistants measured patient's height. Patient's BMI was calculated after obtaining the weight and height. A small towel was given to respondents who participated in research as a token of gratitude.

### **3.6 Ethical Consideration<sup>[11]</sup>**

Informed consent consisted of descriptions about protection of participants, including anonymity; ensure confidentiality by given unnamed signature box, and declaration that all information used for educational purposes only. Also, to keep

participants' confidentiality, the researcher will seal the envelope after receiving completed questionnaire. Then researcher input the data by changing the ID of the participants, and only use code number 1 up to the end. Moreover, the researcher uses a personal computer to prevent the data is access by another person. After all process finishes, the questionnaire should be liquidated.

### **3.7 Data Analysis**

Analyses were performed using IBM SPSS Mac Version 23. Data presented as a mean and standard deviation for the continuous data and percentages for the categorical data. To answer research aim one, to examine sleep quality among patients undergoing hemodialysis in Indonesia, researcher applied the descriptive analysis using frequency distribution, central tendency, standard deviation, and range. For the second research aim that is to identify the factors that explain sleep quality among patients undergoing hemodialysis in Indonesia, hierarchical multiple linear regression analysis was applied.

## CHAPTER FOUR

### RESEARCH RESULTS

#### 4.1 Demographic Characteristics of the Subjects

A total of 210 questionnaires were distributed to two hemodialysis units in two hospitals in Jakarta. From 210 subjects who were approached from the hemodialysis units in two private hospitals in Jakarta, none of them refused to participate. Unfortunately, eight subjects had incomplete data such as demographic data, the DSI and also the PSQI. Therefore, a total of 202 (96%) data were included to be analyzed.

A total of 202 subjects in this study (Table 4.1), most of them were patients in Jakarta Islamic Hospital in Central Jakarta ( $n = 145$ ; 71.8%), and the rest of the subjects were patients in Jakarta Islamic Hospital in North Jakarta. The average age of subjects in this study was around 54 years old ( $SD = 11.89$ ) with the age range between 22 and 78 years. Most of the subjects were female ( $n = 104$ ; 51.5%), unemployed ( $n = 160$ ; 79.2%), non-smokers ( $n = 186$ ; 92.1%), did not drink two or more cups of coffee per day ( $n = 169$ ; 83.7%), and never diagnosed with diabetes ( $n = 110$ ; 54.5%). The average weight of the subjects was 58 kilograms ( $SD = 10.95$ ), and the average height was 1.6 meters ( $SD = 0.07$ ). The average body mass index of the subjects was 23 ( $SD = 3.71$ ); few subjects were categorized into obese ( $n = 6$ ; 3%); overweight ( $n = 41$ ; 20.2%); underweight ( $n = 27$ ; 13.4%); while most of the subjects had normal weight ( $n = 128$ ; 63.4%). The average duration of hemodialysis treatment of the subjects was 36 months ( $SD = 31.64$ ) with the shortest duration to be four months, and the longest was 168 months.



Table 4.1  
Demographic and Disease Characteristics Data

|                            |            | <i>N</i> = 202 |                |
|----------------------------|------------|----------------|----------------|
| Variables                  | Categories | <i>n</i>       | Percentage (%) |
| Gender                     | Male       | 98             | 48.5           |
|                            | Female     | 104            | 51.5           |
| Employment                 | Employed   | 42             | 20.8           |
|                            | Unemployed | 160            | 79.2           |
| Smoking status             | Yes        | 16             | 7.9            |
|                            | No         | 186            | 92.1           |
| Coffee intake <sup>a</sup> | Yes        | 33             | 16.3           |
|                            | No         | 169            | 83.7           |
| Presence of diabetes       | Yes        | 92             | 45.5           |
|                            | No         | 110            | 54.5           |
| Hospital                   | North      | 57             | 28.2           |
|                            | Center     | 145            | 71.8           |

| Variables                         | Mean (SD)     | Minimum | Maximum |
|-----------------------------------|---------------|---------|---------|
| Age (years)                       | 53.86 (11.89) | 22      | 78      |
| Weight (kilograms)                | 58.30 (10.95) | 37.40   | 110     |
| Height (meters)                   | 1.60 (0.07)   | 1.45    | 1.80    |
| Body Mass Index                   | 22.54 (3.71)  | 14.60   | 35.51   |
| Duration of Hemodialysis (months) | 36 (31.64)    | 4       | 168     |

Note: <sup>a</sup>Coffee intake: drink two or more cups of coffee per day

#### 4.2 Dialysis Symptoms

The Dialysis Symptoms Index (DSI) was used to assess the symptoms reported and also the burden of the symptoms. The data was ranked by the number of subjects who had the symptoms, along with information about the mean severity of subjects reporting the symptoms, and mean severity from the total subjects in the study (Table 4.2). The severity of the symptoms was calculated using Likert scale with 1 as “not at all bothersome” to 5 as “bothers very much”. Number of presence symptoms was generated by summing the number of symptoms reported as being present. Dialysis symptoms burden was generated by summing the severity of symptoms, assigning a score of zero for symptoms that were not present.

Trouble staying asleep was the most reported symptom with 178 subjects and mean severity score of those subjects was 2.93 (*SD* = 0.83). The other symptoms with highest reported number were dry skin (*n* = 161; mean = 2.50; *SD* = 1.08); feeling

tired or lack of energy ( $n = 152$ ; mean = 2.80;  $SD = 0.96$ ); dry mouth ( $n = 145$ ; mean = 2.22;  $SD = 0.82$ ); and trouble falling asleep ( $n = 144$ ; mean = 3.19;  $SD = 1.23$ ). Five lowest symptoms reported in this study are including swelling in legs ( $n = 47$ ; mean = 2.31;  $SD = 0.86$ ); chest pain ( $n = 47$ ; mean = 2.32;  $SD = 0.81$ ); and constipation ( $n = 34$ ; mean = 2.67;  $SD = 0.72$ ). Diarrhea (mean = 2.37;  $SD = 0.87$ ) and feeling nervous (mean = 2.21;  $SD = 0.83$ ) were the least reported symptoms with only 32 subjects for each symptom.

The average number of present symptoms in this study was 13 symptoms, with the lowest presence symptoms to be zero, and the highest number of reported symptoms to be 29. The range score of the symptoms burden in this study was 0 – 90 and the average of symptoms burden per respondent were 36 ( $SD = 17.42$ ).

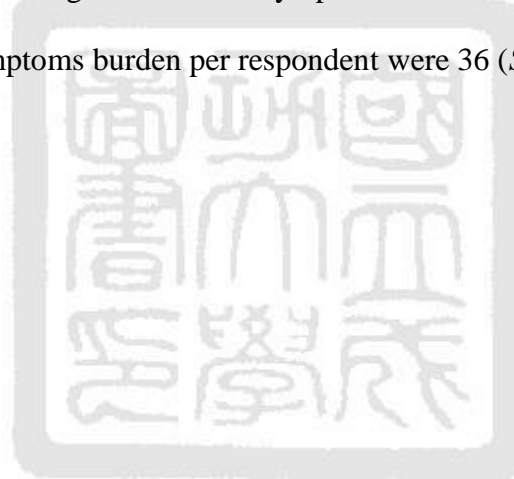


Table 4.2  
Dialysis Symptom Index

| <i>N</i> = 202                     |  |  |  |               |
|------------------------------------|--|--|--|---------------|
| No                                 | Symptoms                                     | Number of patients reported the symptoms | Percentage of patients reported the symptoms | Severity (SD) |
| 1                                  | Trouble staying asleep                       | 178                                      | 88.12  | 2.55 (1.48)   |
| 2                                  | Dry skin                                     | 161                                      | 79.70  | 1.99 (1.34)   |
| 3                                  | Feeling tired or lack of energy              | 152                                      | 75.25  | 2.11 (1.47)   |
| 4                                  | Dry mouth                                    | 145                                      | 71.78  | 1.59 (1.22)   |
| 5                                  | Trouble falling asleep                       | 144                                      | 71.29  | 2.27 (1.78)   |
| 6                                  | Lightheadedness or dizziness                 | 138                                      | 68.32  | 1.76 (1.37)   |
| 7                                  | Muscle cramps                                | 137                                      | 67.82  | 1.86 (1.43)   |
| 8                                  | Decreased appetite                           | 120                                      | 59.41  | 1.64 (1.50)   |
| 9                                  | Itching                                      | 117                                      | 57.92  | 1.64 (1.60)   |
| 10                                 | Nausea                                       | 112                                      | 55.45  | 1.41 (1.37)   |
| 11                                 | Feeling sad                                  | 109                                      | 53.96  | 1.45 (1.45)   |
| 12                                 | Feeling anxious                              | 108                                      | 53.47  | 1.38 (1.43)   |
| 13                                 | Muscle soreness                              | 107                                      | 52.97  | 1.43 (1.48)   |
| 14                                 | Bone or joint pain                           | 95                                       | 47.03  | 1.34 (1.56)   |
| 15                                 | Worrying                                     | 85                                       | 42.08  | 1.01 (1.29)   |
| 16                                 | Cough  | 83                                       | 41.09  | 1.17 (1.56)   |
| 17                                 | Headache                                     | 83                                       | 41.09  | 1.06 (1.40)   |
| 18                                 | Difficulty becoming sexually aroused         | 76                                       | 37.62  | 0.92 (1.50)   |
| 19                                 | Decreased interest in sex                    | 76                                       | 37.62  | 0.95 (1.56)   |
| 20                                 | Difficulty concentrating                     | 75                                       | 37.13  | 0.99 (1.40)   |
| 21                                 | Feeling irritable                            | 69                                       | 34.16  | 0.90 (1.37)   |
| 22                                 | Vomiting                                     | 52                                       | 25.74  | 0.63 (1.16)   |
| 23                                 | Numbness or tingling in feet                 | 51                                       | 25.25  | 0.64 (1.21)   |
| 24                                 | Restless legs or difficult keeping leg still | 49                                       | 24.26  | 0.57 (1.11)   |
| 25                                 | Shortness of breath                          | 49                                       | 24.26  | 0.72 (1.41)   |
| 26                                 | Swelling in legs                             | 47                                       | 23.27  | 0.54 (1.06)   |
| 27                                 | Chest pain                                   | 47                                       | 23.27  | 0.54 (1.05)   |
| 28                                 | Constipation                                 | 34                                       | 16.83  | 0.45 (1.04)   |
| 29                                 | Diarrhea                                     | 32                                       | 15.84  | 0.38 (0.93)   |
| 30                                 | Feeling nervous                              | 32                                       | 15.84  | 0.35 (0.87)   |
| Total                              |  | Mean (SD)                                | Minimum                                      | Maximum       |
| Number of present symptom (0 – 30) |  | 13 (5.64)                                | 0  | 29            |
| Dialysis symptoms burden (0 – 150) |  | 36 (17.41)                               | 0  | 90            |

Note: The severity of the symptoms was calculated using Likert scale with 1 as “not at all bothersome” to 5 as “bothers very much”; Number of present symptoms was generated by summing the number of symptoms reported as being present; Dialysis symptoms burden was generated by summing the severity of symptoms, assigning a score of zero for symptoms that were not present.

### 4.3 Sleep Quality

The Pittsburgh Sleep Quality Index (PSQI) was used to assess the sleep quality of the patients undergoing hemodialysis in this study. Items in the PSQI were shown in Table 4.3. Question items number five to eight used a scale 0 to 3 to calculate the result (0 = not during the past month; 1 = less than once a week; 2 = once or twice a week; 3 = three or more times a week). Question item number nine also used a scale of 0 to 3 with different meaning (0 = very; 1 = fairly good; 2 = fairly bad; 3 = very bad).

Most of the subjects in this study usually went to bed at 10 PM ( $n = 68$ ; 33.6%), and wake up at four in the morning ( $n = 65$ ; 32.2%). The average time taken to fall asleep was 55 minutes ( $SD = 53.66$ ), the shortest time needed was five minutes and the longest was 360 minutes. The average hours of actual sleep was five hours ( $SD = 1.60$ ), with the shortest was one hour and longest was 12 hours.

Sleep disturbance with the highest mean was difficulty to get to sleep within 30 minutes (mean = 2.15;  $SD = 1.09$ ), followed with waking up during sleep (mean = 1.99;  $SD = 1.08$ ), and cough or snore loudly (mean = 0.93;  $SD = 1.14$ ). Having bad dreams was considered to be small in this study (mean = 0.30;  $SD = 0.60$ ). Other reasons (mean = 0.40;  $SD = 0.87$ ) as written by the subjects ( $n = 10$ ; 4.9%), are including headache, stress, lost in thought, and cannot find a comfortable sleep position. Taking medicine to help to sleep was found to be small (mean = 0.16;  $SD = 0.56$ ). Question item number nine about subjective sleep quality has a mean of 1.67 ( $SD = 0.88$ ).

Table 4.3  
Pittsburgh Sleep Quality Index's Items

| N = 202 |  |                  |         |         |
|---------|--|------------------|---------|---------|
| No      | Question Items   | Mean (SD)        | Minimum | Maximum |
| 1.      | When have you usually gone to bed?   | -                | -       | -       |
| 2.      | How long (in minutes) has it taken you to fall asleep each night?  | 55.06<br>(53.66) | 5       | 360     |
| 3.      | When have you usually gotten up in the morning?  | -                | -       | -       |
| 4.      | How many hours of actual sleep do you get at night?  | 5.32 (1.60)      | 1       | 12      |
|         | Time spent in bed in hours (analyzed from question number one and three)   | 6.62 (1.67)      | 2       | 13      |
| 5.      | During the past month, how often have you had trouble sleeping because you?  |                  |         |         |
|         | a. Cannot get to sleep within 30 minutes   | 2.15 (1.09)      | 0       | 3       |
|         | b. Wake up in the middle of the night or early morning   | 1.99 (1.08)      | 0       | 3       |
|         | c. Have to get up to use the bathroom  | 0.76 (9.60)      | 0       | 3       |
|         | d. Cannot breath comfortably   | 0.45 (0.88)      | 0       | 3       |
|         | e. Cough or snore loudly   | 0.93 (1.14)      | 0       | 3       |
|         | f. Feel too cold   | 0.86 (1.05)      | 0       | 3       |
|         | g. Feel too hot  | 0.51 (0.90)      | 0       | 3       |
|         | h. Have bad dreams   | 0.30 (0.60)      | 0       | 3       |
|         | i. Have pain   | 1.21 (1.11)      | 0       | 3       |
|         | j. Other reasons   | 0.40 (0.87)      | 0       | 3       |
| 6.      | During the past month, how often have you taken medicine to help you sleep?  | 0.16 (0.56)      | 0       | 3       |
| 7.      | During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity? | 0.28 (0.59)      | 0       | 3       |
| 8.      | During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done?                       | 0.68 (0.93)      | 0       | 3       |
| 9.      | During the past month, how would you rate your sleep quality overall?  | 1.67 (0.88)      | 0       | 3       |

Note: Question items number five to eight (0 = not during the past month; 1 = less than once a week; 2 = once or twice a week; 3 = three or more times a week); Question item number nine (0 = very; 1 = fairly good; 2 = fairly bad; 3 = very bad).

Information about distribution of seven components of sleep quality based on the PSQI also provided in this chapter (Table 4.4). Subjective sleep quality

component was calculated by looking at question item number nine in the PSQI (mean = 1.67; *SD* = 0.88), most subjects ( $n = 81$ ) considered themselves to have a fairly good sleep (Table 4.5). Sleep latency appears to be the components with the highest mean 2.05 (*SD* = 0.97); this means subjects in the study took a longer time to get to sleep from full wakefulness. This finding was supported by the data in the table 4.4 about the time needed to sleep with the average of 55 minutes (*SD* = 53.66); and the most reported sleep disturbance was the difficulty to get to sleep within 30 minutes (mean = 2.15; *SD* = 1.09).

Sleep duration components (mean = 1.78; *SD* = 0.99), was calculated by categorizing the answer of question item number four. Habitual sleep efficiency was calculated by analyzing the time a person spent in bed and their actual sleeping time. The mean of habitual sleep efficiency in this study was 0.90 (*SD* = 1.11). Sleep disturbance was generated from summing the answer of number 5a to 5j and categorizing the total, in this study, the mean was 1.27 (*SD* = 0.56). The use of sleep medication was found to be the components with the lowest mean of 0.16 (*SD* = 0.56). Daytime sleepiness component score was generated from question items number seven and eight (mean = 0.63; *SD* = 0.74).

Global sleep quality score has a minimum score of zero and a maximum score of 21. Based on the standardized category of sleep quality using PSQI, those who scored five or more in the global sleep score are considered to be poor sleeper or have poor sleep quality. The mean global sleep score in this study was 8.46 (*SD* = 3.5), and the score range in this study was 0 to 17. In this study, not less than 90% of the subjects ( $n = 182$ ) were categorized into the poor sleeper.

Table 4.4  
*Sleep Component Distribution*

*N* = 202

| Variables                       | <i>n</i> | Percentage (%) |
|---------------------------------|----------|----------------|
| Subjective quality of sleep     |          |                |
| Very good (0 point)             | 14       | 6.9            |
| Quite good (1 point)            | 81       | 40.1           |
| Quite poor (2 point)            | 65       | 32.2           |
| Very poor (3 point)             | 42       | 20.8           |
| Sleep latency                   |          |                |
| <15 min (0 point)               | 19       | 9.4            |
| 16–30 min (1 point)             | 33       | 16.3           |
| 31–60 min (2 point)             | 69       | 34.2           |
| >60 min (3 point)               | 81       | 40.1           |
| Duration of sleep               |          |                |
| ≥7 h (0 point)                  | 15       | 7.4            |
| 6–6.9 h (1 point)               | 82       | 40.6           |
| 5–5.9 h (2 point)               | 38       | 18.8           |
| <5 h (3 point)                  | 67       | 33.2           |
| Habitual sleep efficiency       |          |                |
| >85% (0 point)                  | 106      | 52.4           |
| 75–84% (1 point)                | 39       | 19.3           |
| 65–74% (2 point)                | 28       | 13.9           |
| <65% (3 point)                  | 29       | 14.4           |
| Sleep disturbance               |          |                |
| Not experienced (0 point)       | 7        | 3.5            |
| Less than 1 in a week (1 point) | 138      | 68.3           |
| 1–2 in a week (2 point)         | 52       | 25.7           |
| 3 and more in a week (3 point)  | 5        | 2.5            |
| Use of sleep medication         |          |                |
| Not using (0 point)             | 184      | 91             |
| Less than 1 in a week (1 point) | 9        | 4.4            |
| 1–2 in a week (2 point)         | 4        | 2              |
| 3 and more in a week (3 point)  | 5        | 2.5            |
| Daytime dysfunction             |          |                |
| Not experienced (0 point)       | 105      | 52             |
| Less than 1 in a week (1 point) | 67       | 33.2           |
| 1–2 in a week (2 point)         | 29       | 14.3           |
| 3 and more in a week (3 point)  | 1        | 0.5            |

Note: Subjective sleep quality was generated from item question number nine; Sleep latency was calculated after summing and categorizing the result from item question two and 5a; Duration of sleep was generated after categorizing the result from item

question number four; Habitual sleep efficiency was generated after categorizing the result of number four divided with the time subjects on the bed and multiply by 100; Sleep disturbance was generated after summing and categorizing the result from question items 5b to 5j; Use of sleep medication was generated from question item number six; Daytime dysfunction was generated after summing and categorizing the result from question items seven and eight.

Table 4.5  
*Pittsburgh Sleep Quality Index*

*N* = 202

| No. | Components of PSQI          | Mean (SD)   | Minimum        | Maximum |
|-----|-----------------------------|-------------|----------------|---------|
| 1   | Subjective sleep quality    | 1.67 (0.88) | 0              | 3       |
| 2   | Sleep latency               | 2.05 (0.97) | 0              | 3       |
| 3   | Sleep duration              | 1.78 (0.99) | 0              | 3       |
| 4   | Habitual sleep efficiency   | 0.90 (1.11) | 0              | 3       |
| 5   | Sleep disturbance           | 1.27 (0.56) | 0              | 3       |
| 6   | Use of sleep medication     | 0.16 (0.56) | 0              | 3       |
| 7   | Daytime sleepiness          | 0.63 (0.74) | 0              | 3       |
|     | Global sleep score (0 – 21) | 8.46 (3.50) | 0              | 17      |
|     | Sleep Quality Category      | <i>n</i>    | Percentage (%) |         |
| 1   | Good sleeper                | 20          | 9.9            |         |
| 2   | Poor sleeper                | 182         | 90.1           |         |

Note: Global sleep score was generated from summing all the components score. Those who got global sleep score of five or more were categorized into the poor sleeper category. Those who got score less than five were categorized into the good sleeper category.

#### 4.4 Predictors of Sleep Quality

To examine which variables that could predict sleep quality in this population, the three-step multiple hierarchical linear regression analysis was performed (Table 4.6). Demographic data including age, gender, employment, smoking status, and coffee intake; disease characteristics including presence of diabetes, duration of hemodialysis, and body mass index; dialysis symptom burden was included in the analysis. However the dialysis symptom burden included in the regression analysis did not include the score of two items, which are trouble falling asleep and trouble staying asleep since the two variables have a similarity with the items on the PSQI for the sleep quality variable.



In the first model, only demographic data including age, gender, employment, smoking status, and coffee intake was included, but there was no correlation found in this model ( $R^2 = .025$ ). In second model, demographic data was controlled and disease characteristic data was added but no correlation was found in this model. However, there was a slight change in the R squared ( $R^2 = .047$ ). In the third model, dialysis symptom burden was added. A strong correlation was found between dialysis symptom burden and global sleep score ( $\beta = .68$ ;  $p = < .001$ ), indicating higher symptom burden will increase the global sleep quality score. From the third model it can be interpret after all variables included in the analysis, dialysis symptom burden contributes to 17.1% of the global sleep quality score.



Table 4.6

*Demographic Data, Disease Characteristics and Symptoms Burden on Global Sleep Quality Score*

| Variables                | <i>N</i> = 202 |         |            |          |         |            |              |             |            |
|--------------------------|----------------|---------|------------|----------|---------|------------|--------------|-------------|------------|
|                          | Model 1        |         |            | Model 2  |         |            | Model 3      |             |            |
|                          | <i>B</i>       | $\beta$ | <i>VIF</i> | <i>B</i> | $\beta$ | <i>VIF</i> | <i>B</i>     | $\beta$     | <i>VIF</i> |
| Intercept                | 6.78           |         |            | 6.27     |         |            | 4.90         |             |            |
| Age                      | 0.02           | .07     | 1.22       | 0.01     | .05     | 1.28       | 0.00         | .01         | 1.30       |
| Gender                   | 0.72           | .10     | 1.23       | 0.66     | .09     | 1.27       | 0.29         | .04         | 1.30       |
| Employment               | 0.38           | .04     | 1.25       | 0.42     | .05     | 1.27       | 0.21         | .02         | 1.27       |
| Smoking Status           | 0.43           | .03     | 1.16       | 0.42     | .03     | 1.18       | 0.53         | .04         | 1.18       |
| Coffee intake            | -0.68          | -.07    | 1.12       | -0.51    | -.05    | 1.14       | -0.00        | -.00        | 1.16       |
| Presence of Diabetes     |                |         |            | -0.54    | -.07    | 1.09       | -0.40        | -.05        | 1.10       |
| Body Mass Index          |                |         |            | 0.06     | .06     | 1.04       | 0.05         | .06         | 1.04       |
| Duration of Hemodialysis |                |         |            | -0.01    | -.10    | 1.08       | -0.01        | -.10        | 1.08       |
| Dialysis Symptom Burden  |                |         |            |          |         |            | <b>0.08*</b> | <b>.36*</b> | 1.06       |
| <i>R</i> <sup>2</sup>    | .025           |         |            | .047     |         |            | <b>.171*</b> |             |            |
| $\Delta R^2$             | -              |         |            | .022     |         |            | .124         |             |            |

Note: \*:  $p < .001$

## CHAPTER FIVE

### DISCUSSION

The aim of this study was to identify factors related to sleep quality among patients undergoing hemodialysis, to examine the sleep quality and to find out which factors that could explain sleep quality. The result revealed that most patients who are undergoing hemodialysis in this study have poor sleep quality with the average of sleep latency to be the highest component of sleep quality. Among the factors explored in the study, only dialysis symptom burden was able to predict sleep quality. In general, patients with higher dialysis symptom burden indicate a poorer sleep quality.

The report from Indonesian Renal Registry Association (PERNEFRI) in 2014 showed the age distribution of most the patients undergoing hemodialysis are between 45-54 years old, two other studies in the same population in Indonesia are in agreement with the report (Ibrahim, Taboonpong, & Nilmanat, 2009; Indonesian Renal Registry, 2014; Rinonce et al., 2013). The current study also reported the same result as in that spectrum with an average age of 53 years old. Although only 15.8% of the subjects in this study were >65, most of the subjects (79.2%) are currently unemployed. A large number of End Stage Renal Disease patients were unable to work due to the extent of their illness (Kimmel, 2000). The high rate of unemployed patients in this population might cause a low average income; one study in Indonesia reported that 59.4% of the patients had a monthly income of 500.000 to 2.000.000 Indonesia Rupiah (\$38 - \$150) (Ibrahim, Taboonpong, & Nilmanat, 2009). Studies reported patients undergoing hemodialysis experience noteworthy economic burden

caused by unemployment, which might be caused by their illness (Suja et al., 2012; Wang et al., 2015).

PERNEFRI report also showed Diabetes Mellitus (DM) as a common comorbidity in patients undergoing hemodialysis (Indonesia Renal Registry, 2014). This study found almost half of the subjects had been diagnosed with diabetes. A study found ESRD patients with diabetes as primary renal disease or diabetes as comorbid conditions were increased in the mortality rate compared to patients without diabetes (Schroijen et al., 2011).

### **5.1 Sleep Quality among Patients Undergoing Hemodialysis**

The main finding of this study was that patients who are undergoing hemodialysis have a high rate of poor sleep quality according to the PSQI. In this study, 90% (n = 182) of the subjects had poor sleep quality in the past month. The result of this study showed a striking difference compared to a study about sleep in eight countries including Indonesia (Stranges, Tigbe, Gómez-Olivé, Thorogood, & Kandala, 2012). The study showed only 3.9% male and 5.5% female in general population in Indonesia reported poor sleep quality, compared to 89.79% of male and 90.38% of female reporting poor sleep quality in this study.

Around 30% of the subjects in this study are usually went to bed at 10 PM and wake up at four AM; this might be caused by the religion factors. Although this study did not assess the religion of the subjects, Indonesia has been known as the largest Muslim population country in the world, with latest data support that at least 87% of Indonesian population is Muslims. Muslims are required to do five times prayer in a day, with one of them must be done at night at around eight and another one must be done at early in the morning around four. For that reason, the subjects might go to sleep after eight at night and wake up around four in the morning. Interestingly, the

longest duration of sleep found in this study was 12 hours, which means that the subject did not practice the prayer.

The reported prevalence of poor sleep quality in patients undergoing hemodialysis is relatively broad. Four studies in Asia, including one study for each Taiwan and Japan, and two studies from Iran found 54.3%-87% of the subjects to be poor sleeper (Edalat-Nejad and Qlich-Khani, 2013; Einollahi, Motalebi, Rostami, Nemati and Salesi, 2015; Pai et al., 2007; Tomita et al., 2016). Six studies in Europe, each one study from Bosnia & Herzegovina, Norway, Serbia, and two studies from Turkey, had almost similar result with the prevalence of poor sleeper of 53.3%-88% (Brekke et al., 2013; Čengić, Resić, Spasovski, Avdić, & Alajbegović, 2010; Eryavuz et al., 2008; Tosun et al., 2015; Trbojević-Stanković, Stojimirović et al., 2014). Two studies from Canada, North America reporting the prevalence of 71% and 76% for patients on hemodialysis who had poor sleep quality (Iliescu, 2003; Sabbagh, Iqbal, Vasilevsky, & Barré, 2008). Compared with these several previous studies, the result of this study is consistently had a high prevalence of poor sleeper (>50%).

The prevalence of poor sleeper in this study was almost similar to that study from Turkey, who determined 88% (Eryavuz et al., 2008). On the other hand, several studies on sleep quality in this population showed somewhat different result compared to this study, despite using the same method to assess sleep quality, that is using the PSQI, and categorized those who got five or more on the global PSQI score into the poor sleeper; Brekke et al. and Trbojević-Stanković et al. reported value of 53.3% and 64% respectively (Brekke et al., 2013; Trbojević-Stanković, Stojimirović et al., 2014). Although using the same method in assessing sleep quality using PSQI, different background and characteristics of the subjects from the hospital from each country might have influenced the result. For example, the habit of using the

medication to help to obtain better sleep in other country was higher, and also the availability of expert in sleep to help patients in each hospital might be different.

The second component of sleep quality, sleep latency in this study appears to have the highest mean score of other components, this mean score is even higher when compared with other studies about sleep quality in this population (Edalat-Nejad and Qlich-Khani, 2013; Eryavuz et al., 2008; Iliescu, 2003; Tomita et al., 2016; Wang et al., 2016). The result can be interpreted as most of the subjects got the score of two in the sleep latency, meaning that most subjects need 31-60 minutes to sleep, this is also can be seen from the result of the open question (question item number 2) in the PSQI, where the average time needed to sleep was 55 minutes. The higher time needed to sleep; subjects had less sleep, therefore, they consider their sleep quality to be bad, it is supported by the mean score of component three about sleep duration and component one about subjective sleep quality, as the top three highest mean score of all another sleep component in this study. Two other studies about sleep quality also find similar result where sleep latency and subjective sleep quality have the highest mean score (Tomita et al., 2016; Wang et al., 2016).

The use of sleep medication is the sixth component of sleep quality in PSQI. The result in this study revealed that this component as the lowest component among other components. The low result can be interpreted as; most the subjects in this study did not use medicine to help them sleep even when they had difficulty to get to sleep. The finding was the lowest mean score compared to several other studies in the same population using the PSQI to assess sleep quality (Edalat-Nejad and Qlich-Khani, 2013; Iliescu, 2003; Tomita et al., 2016; Wang et al., 2016). The cultural difference across countries might affect the habit of people going to sleep, which will affect the overall sleep quality of a person including how they use sleep medicine. A study by

LeBourgeois (2005) also supports this statement after studying the relationship between sleep hygiene and sleep quality.

## **5.2 Factor that Explain Sleep Quality among Patients Undergoing Hemodialysis**

The current study reveals that patients who are undergoing hemodialysis in Indonesia experienced substantial symptoms burden; also high symptoms burden are predictive of poor sleep quality. The results of this study suggest that patients undergoing hemodialysis struggled with various symptoms that may have affected their sleep.

The findings were also in agreement with two other studies that examine symptoms in patients undergoing hemodialysis. (Wang et al., 2016; Weisbord et al., 2005). Wang et al. in 2016 examined the association between symptoms burden and sleep quality and also the quality of life. The author found the average of symptoms is 15 per patients maintaining hemodialysis and symptoms burden were associated with sleep quality. Using the same instrument to measure the symptoms burden in patients undergoing hemodialysis, the result of the current study showed an almost similar result as those in Wang's study. Regarding the most reported symptoms in this population, except dry mouth in Wang's result, the other four, trouble staying asleep, dry skin, feeling tired or lack of energy, and trouble falling asleep, were also among the highest reported symptoms in this study.

Trouble falling asleep reported by 71.3% of the subjects was the most severe symptoms; followed with trouble staying asleep, cough, bone or joint pain, and itching. This result was different with that reported in Wang's study, where itching as the second highest reported symptom to be the most severe symptoms in patients undergoing hemodialysis in southern China. It appears that the subjects in this study had less severe symptoms for each symptom reported, compared to the previous study

by Weisbord et al. The differences in demographic, culture, and religious factors of the subjects might influence how they perceive and describe the symptoms. A study supported the statement by finding that religion influenced how people view their illness as a gift from their God, and illness could be interpreted in positive way (Padela, Killawi, Forman, DeMonner, & Heisler, 2012). However, studies about symptom burden in patients undergoing hemodialysis in Indonesia are very limited. Therefore, more studies in other region are needed to find the influence of culture in symptom burden.

The current study found dialysis symptom burden as a predictor to sleep quality. The positive correlation indicates heavier symptom burden resulted in higher global sleep score. The higher the global sleep score, the poorer sleep quality. The in line correlation is expected since the sleep quality also considers various disturbances, and some of the disturbances mentioned in the PSQI are also present as symptoms in the DSI. This finding is also in agreement with one particular study; which also found heavier symptom burden will contribute to a poor sleep quality (Wang et al., 2016). Accordingly, reduction in symptom burden is necessary to achieve better sleep quality. Wang et al. (2016) also found that dialysis alone might not be enough to relieve the symptoms. Therefore, following strict guidelines for patients undergoing hemodialysis might have a vital role in reducing the symptom burden. Also adding the assessment of patient's symptoms in patient management could yield information for diagnosis of certain pathophysiological changes to determine appropriate medical treatments of the symptoms.



### **5.3 Factors that Did Not Explain Sleep Quality among Patients Undergoing Hemodialysis**

Contrary to most studies about sleep quality in patients undergoing hemodialysis, which found significant correlation between ages and sleep quality, regardless whether it is older or younger age (Brekke et al., 2013; Einollahi, Motalebi, Rostami, Nemati and Salesi, 2015; Eryavuz et al., 2008; Li et al., 2012; Merlino et al., 2005; Pai et al., 2007; Plantinga et al., 2011; Tel, Tel, & Esmek, 2007; Unruh, 2006). The current study did not find age as a factor that explains sleep quality, this finding also similar with several other studies (Harris et al., 2011; Edalat-Nejad and Qlich-Khani, 2013; Sekercioglu, Curtis, Murphy & Barrett, 2015). Although the result of this study shows the average age of subjects, who had better sleep quality to be one year younger than people with poor sleep quality. The different result regarding the effect of age on sleep quality may be due to the differences in study population, such as the variance of age, and the average age of the subjects. Some of the methods used to assess sleep quality in the previous studies are also different; therefore it might influence the result.

The result of the current study did not find gender as one of the predictors of sleep quality in any models in the multiple linear regression analysis. Several other studies also found the same result, where gender was not associated with sleep quality (Araujo et al., 2011; Davis et al., 2011; Edalat-Nejad & Qlich-Khani, 2013; Trbojevic-Stankovic et al., 2014). Most of the previous studies about sleep quality in patients undergoing hemodialysis reported gender as one of the predictor of sleep quality, and these studies found female as the gender that would influence sleep quality (Kurella, Luan, Lash & Chertow, 2005; Middelkoop, Smilde-van den Doel, Neven, Kamphuisen & Springer, 1996; Pai et al., 2007; Sekercioglu, Curtis, Murphy

& Barrett, 2015). This different result might be due to more than 50% of the subjects of this study were female. Also, the influence of other confounding factors might lead to the different result.

The current study did not find any correlation between employment statuses of the subjects and sleep quality; the result also showed there were no differences in term of sleep quality between employed and unemployed subjects. This finding is similar to one study in Europe, which also found no correlation between the two variables. But in the previous study, more patients who were employed had good sleep quality, compared to those who were unemployed (Čengiđ, et al., 2010). Being dependent on the dialysis machine and had to come and stay in the hospital will certainly decrease patients activity and might make them feel inferior which negatively affect their sleep quality (Tel, Tel, & Esmek, 2007). The inability to find any correlations between employment status and sleep quality in both the current study and the previous study might be due to the large difference in the number of subjects who were employed and unemployed, 42 compared to 160 in this study and 26 compared to 174 in the previous study.

Contrary to most of the previous study which found a correlation between smoking statuses and sleep quality, the current study did not reveal any correlation between the two variables (Afsar, 2012; Chen et al., 2006; Elder et al., 2007; Merlino et al., 2005; Unruh, 2006). Smoking may cause respiratory problems, such as trouble breathing, and cough. These two problems are also considered to be sleep disturbance, which can affect overall sleep quality. Although this study did not found smoking as a predictor of sleep quality, only one subjects from 16 subjects who are smoking, had good sleep quality. Many factors may have caused the result of the current study to be

different with previous studies, such as the frequency of smoking of the subjects, and also the duration of being a smoker.

There was no correlation found between coffee intakes per day with sleep quality in this study. This result is similar to one of those Chen et al. who also did not find any correlation between these two variables in patients undergoing hemodialysis (Chen et al., 2006). However, the earlier study in found that intake of two cups of coffee or more was associated with more sleep-wake complain compared to those who take less or no caffeine in a day. Drinking coffee has been known as a way to help increase alertness and prevent someone from sleeping, this proven by other studies in general population that also found coffee to affect in sleep quality. The difference found in the result was possibly because of only small number of subjects in this study drink coffee every day since they have to refrain themselves from drinking too much. Other factors such as the exact amount of coffee consumed might be different, and also the kind of coffee itself.

Having previously diagnosed with diabetes did not find to be a predictor of sleep quality in the current study; this is similar to several other studies, which also found the same result (Edalat-Nejad & Qlich-Khani, 2013; Pai et al., 2007; Wang, Chan, Chang, Chen & Tsai, 2013). Contrary with the result, other study found diabetes to be correlated with sleep quality (Eryavuz et al., 2008). The difference of these results might have been caused by other factors such as the type of diabetes, the duration of diabetes since the first diagnosed, and also other comorbidities.

BMI was not found to be a predictor of sleep quality in the current study. This result is in agreement with other studies in patients undergoing hemodialysis (Čengić, et al., 2010; Sekercioglu, Curtis, Murphy, & Barrett, 2015; Unruh, 2006). These results are different with the other studies in the same population, which found BMI

as a predictor of sleep quality (Afsar & Elsurer, 2013; Mehrabi, Sarikhani, & Roozbeh, 2017). One particular study found that increased BMI will result in an increase the risk of respiratory disturbance and leads to poor sleep quality (Afsar & Elsurer, 2013). Although different result found in the studies, most of the study found, patients who with normal body mass index had slightly better sleep quality. It is possible that other coexisting factors such as anxiety and depression were responsible for the difference of the result.

The result of this study found that the duration time of patients receiving hemodialysis since the first initiation was not predictors of sleep quality after demographic data was controlled in the multiple linear regression analysis. This result was similar to two studies about sleep quality in patients undergoing hemodialysis (Čengiđ, et al., 2010; Edalat-Nejad & Qlich-Khani, 2013). One study shows that sleep quality deteriorates with time (Sabbatini, 2008). However, in this study whether patients have received shorter or longer hemodialysis was not associated with sleep quality. It can be assumed that sleep quality of the patients does not change drastically over time, especially when patients have adapted to their situation.

#### **5.4 Limitation**

There are a few limitations to this study that needs to be considered. As this study used convenience sampling, some biases might affect the result, especially regarding the place where the data was collected. Using cross-sectional study may lead to better representation of the current condition of sleep quality in patients undergoing hemodialysis, but cannot explain much of the causal effect of those variables. However, considering a large scale of research on this topic has been conducted in international settings, the findings of this study might be more applicable for Indonesian's settings in term of geographical context.

The hospital did not provide the updated laboratory results of the patients undergoing hemodialysis; therefore, laboratory result was not included in this study. Several data including religion, education, and monthly income also were not assessed in the current study. Future researchers may want to target a more diverse sample, a larger group of samples, broader variables, and employ better methods to produce more meaningful results.

### **5.5 Conclusion**

The result of the current study reveals a large number of patients undergoing hemodialysis are suffering from poor sleep quality. Along with that, patients undergoing hemodialysis in Indonesia are also suffering from high symptom burden where trouble staying asleep, dry skin, feeling tired, dry mouth and trouble falling asleep as the top five symptoms reported in this population. This study also revealed that symptom burden is a potential predictor of sleep quality that can be modified, where it is contributed to 17.1% of sleep quality.

### **5.6 Clinical Implication**

The findings suggest that health care provider need to develop effective treatment to reduce the dialysis symptom burden in order to achieve better quality of sleep for patients undergoing hemodialysis. Therefore, assessing the symptom burden of the patients is a good initial step in detecting patients who are at risk of having poor sleep quality. The result of symptom burden assessment can also provide information for diagnosis of certain pathophysiological changes to determine appropriate medical treatments of the symptoms. Evaluating symptoms burden of the patients is highly recommended to do for the nephrology nurses as symptoms burden may change in longer time and treated appropriately. Furthermore for the researcher, studies should explore methods intervention that target in decreasing the symptom burden as a

priority treatment to improve sleep quality.

Moreover, as there are limited studies about exploring sleep quality in patients undergoing hemodialysis in Indonesia, more studies are required. Exploring more factors of sleep quality in this population in different settings, and also using different instruments such as objective measure to assess sleep quality could provide more information about the sleep quality in this population.



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## APPENDIX

### Appendix 1: Demographic and Disease Characteristics Questionnaire

For each question below, please answer or circle the answer that best describe your condition.

Age : years old

Gender : Male/Female

Employment : Employed/Unemployed

Duration of HD : months

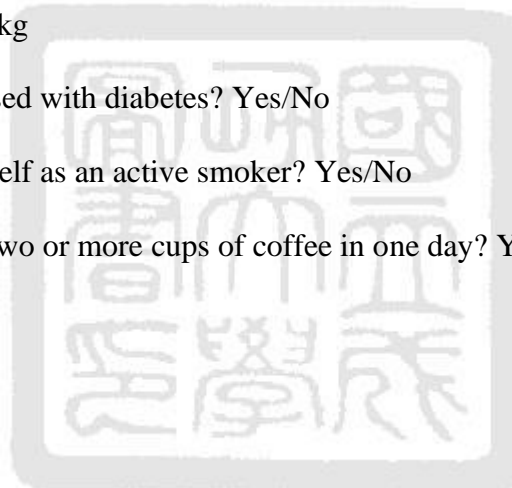
Height : cm

Weight : kg

Have you ever diagnosed with diabetes? Yes/No

Do you consider yourself as an active smoker? Yes/No

Do you usually drink two or more cups of coffee in one day? Yes/No





## Appendix 2: Dialysis Symptoms Index

### Instruction

Below is a list of physical and emotional symptoms that people on dialysis may have.

For each symptom, please indicate if you had the symptom during the past week by circling “yes” or “no.” If “yes”, please indicate how much that symptom bothered you by circling the appropriate number.

| During the past week:<br>Did you experience this symptom? |  |     | If “yes”: How much did it bother you? |              |           |             |           |
|---|--|-----|---------------------------------------|--------------|-----------|-------------|-----------|
|   |  |     | Not at All                            | A Little Bit | Some-what | Quite a Bit | Very much |
| 1.  | Constipation                                   | No  |                                       |              |           |             |           |
|   |  | Yes | 1                                     | 2            | 3         | 4           | 5         |
| 2.  | Nausea   | No  |                                       |              |           |             |           |
|   |  | Yes | 1                                     | 2            | 3         | 4           | 5         |
| 3.  | Vomiting                                       | No  |                                       |              |           |             |           |
|   |  | Yes | 1                                     | 2            | 3         | 4           | 5         |
| 4.  | Diarrhea                                       | No  |                                       |              |           |             |           |
|   |  | Yes | 1                                     | 2            | 3         | 4           | 5         |
| 5.  | Decreased appetite                             | No  |                                       |              |           |             |           |
|   |  | Yes | 1                                     | 2            | 3         | 4           | 5         |
| 6.  | Muscle cramps                                  | No  |                                       |              |           |             |           |
|   |  | Yes | 1                                     | 2            | 3         | 4           | 5         |
| 7.  | Swelling in legs                               | No  |                                       |              |           |             |           |
|   |  | Yes | 1                                     | 2            | 3         | 4           | 5         |
| 8.  | Shortness of breath                            | No  |                                       |              |           |             |           |
|   |  | Yes | 1                                     | 2            | 3         | 4           | 5         |
| 9.  | Lightheadedness or dizziness                   | No  |                                       |              |           |             |           |
|   |  | Yes | 1                                     | 2            | 3         | 4           | 5         |
| 10.   | Restless legs or difficulty keeping legs still | No  |                                       |              |           |             |           |
|   |  | Yes | 1                                     | 2            | 3         | 4           | 5         |
| 11.   | Numbness or tingling in feet                   | No  |                                       |              |           |             |           |
|   |  | Yes | 1                                     | 2            | 3         | 4           | 5         |

|     |                                      |     |   |   |   |   |   |
|-----|--------------------------------------|-----|---|---|---|---|---|
| 12. | Feeling tired or lack of energy      | No  |   |   |   |   |   |
|     |                                      | Yes | 1 | 2 | 3 | 4 | 5 |
| 13. | Cough                                | No  |   |   |   |   |   |
|     |                                      | Yes | 1 | 2 | 3 | 4 | 5 |
| 14. | Dry mouth                            | No  |   |   |   |   |   |
|     |                                      | Yes | 1 | 2 | 3 | 4 | 5 |
| 15. | Bone or joint pain                   | No  |   |   |   |   |   |
|     |                                      | Yes | 1 | 2 | 3 | 4 | 5 |
| 16. | Chest pain                           | No  |   |   |   |   |   |
|     |                                      | Yes | 1 | 2 | 3 | 4 | 5 |
| 17. | Headache                             | No  |   |   |   |   |   |
|     |                                      | Yes | 1 | 2 | 3 | 4 | 5 |
| 18. | Muscle soreness                      | No  |   |   |   |   |   |
|     |                                      | Yes | 1 | 2 | 3 | 4 | 5 |
| 19. | Difficulty concentrating             | No  |   |   |   |   |   |
|     |                                      | Yes | 1 | 2 | 3 | 4 | 5 |
| 20. | Dry skin                             | No  |   |   |   |   |   |
|     |                                      | Yes | 1 | 2 | 3 | 4 | 5 |
| 21. | Itching                              | No  |   |   |   |   |   |
|     |                                      | Yes | 1 | 2 | 3 | 4 | 5 |
| 22. | Worrying                             | No  |   |   |   |   |   |
|     |                                      | Yes | 1 | 2 | 3 | 4 | 5 |
| 23. | Feeling nervous                      | No  |   |   |   |   |   |
|     |                                      | Yes | 1 | 2 | 3 | 4 | 5 |
| 24. | Trouble falling asleep               | No  |   |   |   |   |   |
|     |                                      | Yes | 1 | 2 | 3 | 4 | 5 |
| 25. | Trouble staying asleep               | No  |   |   |   |   |   |
|     |                                      | Yes | 1 | 2 | 3 | 4 | 5 |
| 26. | Feeling irritable                    | No  |   |   |   |   |   |
|     |                                      | Yes | 1 | 2 | 3 | 4 | 5 |
| 27. | Feeling sad                          | No  |   |   |   |   |   |
|     |                                      | Yes | 1 | 2 | 3 | 4 | 5 |
| 28. | Feeling anxious                      | No  |   |   |   |   |   |
|     |                                      | Yes | 1 | 2 | 3 | 4 | 5 |
| 29. | Decreased interest in sex            | No  |   |   |   |   |   |
|     |                                      | Yes | 1 | 2 | 3 | 4 | 5 |
| 30. | Difficulty becoming sexually aroused | No  |   |   |   |   |   |
|     |                                      | Yes | 1 | 2 | 3 | 4 | 5 |

### **Appendix 3: Dialysis Symptoms Index Questionnaire Permission**

From: Abdu Rahim Kamil

Sent: Thursday, June 09, 2016 11:57 PM

To: Weisbord, Steven

Subject: Permission to use and translate the Dialysis Symptom Index

Dear DR. Weisbord,

My name is Abdu Rahim Kamil, I am a lecturer at University of Muhammadiyah Jakarta, Indonesia. Currently, I am finishing my Master Degree in Department of Nursing, College of Medicine, National Cheng Kung University, Taiwan. In order to complete the study, I am currently conducting a research study on hemodialysis patients and their sleep quality, under the supervision of my research advisor Prof. Miaofen Yen, PhD, RN, FAAN. After done some searching on the symptoms list, I have found that the Dialysis Symptom Index suitable instrument for my research.

I would like your kind permission to use the DSI as an instrument in my research project. I would like to incorporate the DSI under the following conditions:

1. I will use this research instrument only for my research study
2. I will include the copyright statement on all copies of the instruments
3. I will translate the original research into Bahasa Indonesia, the international translation guideline procedure will be used and I will conduct validity and reliability test to make it more compatible with Indonesian context.

I hope this will merit your kind response and approval. Thank you for your kind attention, and I am looking forward to hearing from you at your earliest convenience.

With many thanks and warm greetings

Sincerely yours

Ns. Abdu Rahim Kamil

Ns. Abdu Rahim Kami

Master Student International Advanced Program in Nursing (IAPN)

Department of Nursing, College of Medicine

National Cheng Kung University 1 University Road Tainan (70101), Taiwan

From: Weisbord, Steven  
Sent: Thursday, June 11, 2016 1:34 AM  
To: Abdu Rahim Kamil  
Subject: [EXTERNAL] Permission to use and translate the Dialysis Symptom Index

Dear Abdu,

Yes, You can use it

Sincerely,  
Steven

-----  
Steven Weisbord  
Staff Physician, Renal Section  
VA Pittsburgh Healthcare System  
Phone: 412-360-3911



#### Appendix 4: Dialysis Symptoms Index (Bahasa Indonesia)

##### Petunjuk:

Di bawah ini adalah daftar gejala-gejala fisik dan emosional yang dapat dimiliki orang-orang yang menjalani dialisis. Untuk setiap gejala, mohon sebutkan jika Anda mengalami gejala yang disebutkan dalam satu minggu terakhir dengan melingkari “Ya” atau “Tidak”. Jika anda menjawab “Ya”, mohon tentukan seberapa besar gejala itu mengganggu Anda dengan melingkari angka yang sesuai.

| Dalam satu minggu terakhir:<br>Apakah ada merasakan gejala di bawah ini? |   |       | Jika “Ya”: Seberapa terganggu anda? |         |      |       |        |
|--|---|-------|-------------------------------------|---------|------|-------|--------|
|  |   |       | Tidak sama sekali                   | Sedikit | Agak | Cukup | Sangat |
| 1.   | Konstipasi (susah BAB)                          | Tidak |                                     |         |      |       |        |
|  |   | Ya    | 1                                   | 2       | 3    | 4     | 5      |
| 2.   | Mual  | Tidak |                                     |         |      |       |        |
|  |   | Ya    | 1                                   | 2       | 3    | 4     | 5      |
| 3.   | Muntah-muntah                                   | Tidak |                                     |         |      |       |        |
|  |   | Ya    | 1                                   | 2       | 3    | 4     | 5      |
| 4.   | Diare   | Tidak |                                     |         |      |       |        |
|  |   | Ya    | 1                                   | 2       | 3    | 4     | 5      |
| 5.   | Kurang nafsu makan                              | Tidak |                                     |         |      |       |        |
|  |   | Ya    | 1                                   | 2       | 3    | 4     | 5      |
| 6.   | Kram otot                                       | Tidak |                                     |         |      |       |        |
|  |   | Ya    | 1                                   | 2       | 3    | 4     | 5      |
| 7.   | Pembengkakan di kaki                            | Tidak |                                     |         |      |       |        |
|  |   | Ya    | 1                                   | 2       | 3    | 4     | 5      |
| 8.   | Sesak napas                                     | Tidak |                                     |         |      |       |        |
|  |   | Ya    | 1                                   | 2       | 3    | 4     | 5      |
| 9.   | Terasa melayang atau pusing                     | Tidak |                                     |         |      |       |        |
|  |   | Ya    | 1                                   | 2       | 3    | 4     | 5      |
| 10.  | Kaki gelisah atau sulit menjaga kaki untuk diam | Tidak |                                     |         |      |       |        |
|  |   | Ya    | 1                                   | 2       | 3    | 4     | 5      |
| 11.  | Mati rasa atau kesemutan di kaki                | Tidak |                                     |         |      |       |        |
|  |   | Ya    | 1                                   | 2       | 3    | 4     | 5      |

|     |                                    |       |   |   |   |   |   |
|-----|------------------------------------|-------|---|---|---|---|---|
| 12. | Merasa lelah atau kurang berenergi | Tidak |   |   |   |   |   |
|     |                                    | Ya    | 1 | 2 | 3 | 4 | 5 |
| 13. | Batuk                              | Tidak |   |   |   |   |   |
|     |                                    | Ya    | 1 | 2 | 3 | 4 | 5 |
| 14. | Mulut kering                       | Tidak |   |   |   |   |   |
|     |                                    | Ya    | 1 | 2 | 3 | 4 | 5 |
| 15. | Nyeri tulang atau sendi            | Tidak |   |   |   |   |   |
|     |                                    | Ya    | 1 | 2 | 3 | 4 | 5 |
| 16. | Nyeri dada                         | Tidak |   |   |   |   |   |
|     |                                    | Ya    | 1 | 2 | 3 | 4 | 5 |
| 17. | Sakit kepala                       | Tidak |   |   |   |   |   |
|     |                                    | Ya    | 1 | 2 | 3 | 4 | 5 |
| 18. | Nyeri otot                         | Tidak |   |   |   |   |   |
|     |                                    | Ya    | 1 | 2 | 3 | 4 | 5 |
| 19. | Sulit konsentrasi                  | Tidak |   |   |   |   |   |
|     |                                    | Ya    | 1 | 2 | 3 | 4 | 5 |
| 20. | Kulit kering                       | Tidak |   |   |   |   |   |
|     |                                    | Ya    | 1 | 2 | 3 | 4 | 5 |
| 21. | Gatal-gatal                        | Tidak |   |   |   |   |   |
|     |                                    | Ya    | 1 | 2 | 3 | 4 | 5 |
| 22. | Merasa khawatir                    | Tidak |   |   |   |   |   |
|     |                                    | Ya    | 1 | 2 | 3 | 4 | 5 |
| 23. | Merasa gugup                       | Tidak |   |   |   |   |   |
|     |                                    | Ya    | 1 | 2 | 3 | 4 | 5 |
| 24. | Kesulitan untuk tidur              | Tidak |   |   |   |   |   |
|     |                                    | Ya    | 1 | 2 | 3 | 4 | 5 |
| 25. | Mudah terbangun                    | Tidak |   |   |   |   |   |
|     |                                    | Ya    | 1 | 2 | 3 | 4 | 5 |
| 26. | Merasa mudah marah                 | Tidak |   |   |   |   |   |
|     |                                    | Ya    | 1 | 2 | 3 | 4 | 5 |
| 27. | Merasa sedih                       | Tidak |   |   |   |   |   |
|     |                                    | Ya    | 1 | 2 | 3 | 4 | 5 |
| 28. | Merasa cemas                       | Tidak |   |   |   |   |   |
|     |                                    | Ya    | 1 | 2 | 3 | 4 | 5 |
| 29. | Hasrat seks menurun                | Tidak |   |   |   |   |   |
|     |                                    | Ya    | 1 | 2 | 3 | 4 | 5 |
| 30. | Sulit terangsang secara seksual    | Tidak |   |   |   |   |   |
|     |                                    | Ya    | 1 | 2 | 3 | 4 | 5 |

## Appendix 5: the Pittsburgh Sleep Quality Index

Instructions: The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions. During the past month,

1. When have you usually gone to bed? \_\_\_\_\_
2. How long (in minutes) has it taken you to fall asleep each night? \_\_\_\_\_
3. When have you usually gotten up in the morning? \_\_\_\_\_
4. How many hours of actual sleep do you get at night? (This may be different than the number of hours you spend in bed) \_\_\_\_\_

| 5. During the past month, how often have you had trouble sleeping because you... | Not during the past month (0) | Less than once a week (1) | Once or twice a week (2) | Three or more times a week (3) |
|--|-------------------------------|---------------------------|--------------------------|--------------------------------|
| a. Cannot get to sleep within 30 minutes   |                               |                           |                          |                                |
| b. Wake up in the middle of the night or early morning                           |                               |                           |                          |                                |
| c. Have to get up to use the bathroom  |                               |                           |                          |                                |
| d. Cannot breathe comfortably  |                               |                           |                          |                                |
| e. Cough or snore loudly   |                               |                           |                          |                                |
| f. Feel too cold   |                               |                           |                          |                                |
| g. Feel too hot  |                               |                           |                          |                                |
| h. Have bad dreams   |                               |                           |                          |                                |
| i. Have pain   |                               |                           |                          |                                |

|  |               |                 |                |              |
|--|---------------|-----------------|----------------|--------------|
| j. Other reason(s), please describe, including how often you have had trouble sleeping because of this reason(s):                  |               |                 |                |              |
| 6. During the past month, how often have you taken medicine (prescribe or “over the counter”) to help you sleep?                   |               |                 |                |              |
| 7. During the past month how often have you had trouble staying awake while driving, eating meals, or engaging in social activity? |               |                 |                |              |
| 8. During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done                       |               |                 |                |              |
|  | Very good (0) | Fairly good (1) | Fairly bad (2) | Very bad (3) |
| 9. During the past month, how would you rate your sleep quality overall?   |               |                 |                |              |



## Appendix 6: the Pittsburgh Sleep Quality Index Questionnaire Permission

From: Kelly Epstein  
Sent: Wednesday, June 29, 2016 12:05 AM  
To: Abdu Rahim Kamil  
Subject: Re: Permission to use PSQI

Dear Abdu,

Thank you for your sending your Request for Translation form. Please note that for legal reasons, the original hard copy must be mailed to us (address below).

Enclosed please find the PSQI in Indonesian for Indonesia.

The scoring is available on the below websites:

<http://www.sleep.pitt.edu/research/instruments.html>  
<http://www.sleep.pitt.edu/research/ewExternalFiles/PSQI%20Scoring.doc>

I hope this is helpful. If you need anything else, please feel free to contact us.

Regards,

**!!! NEW !!! Our e-Commerce Platform is Launched on 1 March 2016!! Please discover our platform gathering PROQOLID™ and PROLABELS™ content at <https://eprovide.mapi-trust.org>**

**Kelly Epstein (US Contact)**

Information Resources Specialist  Mapi Research Trust  27 rue de la Villette | 69003 LYON | FRANCE

\*\*\*\*\*

<https://www.linkedin.com/company/mapi-group>

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## Appendix 7: the Pittsburgh Sleep Quality Index (Bahasa Indonesia)

### Kuesioner Universitas Pittsburgh Tentang Kualitas Tidur

#### PETUNJUK:

Pertanyaan-pertanyaan berikut ini berhubungan dengan kebiasaan tidur Anda selama satu bulan (30 hari) terakhir saja. Jawaban Anda harus merupakan jawaban yang paling menggambarkan kebiasaan tidur Anda di sebagian besar siang dan malam hari selama satu bulan terakhir. Jawablah semua pertanyaan yang ada. Dalam satu bulan terakhir,

1. Pukul berapa Anda biasanya beranjak ke tempat tidur di malam hari? WAKTU KE TEMPAT TIDUR \_\_\_\_\_
2. Berapa menit waktu yang Anda biasanya butuhkan mulai dari berbaring hingga benar-benar tertidur setiap malamnya? <sup>[L]</sup><sub>[SEP]</sub>WAKTU DALAM MENIT \_\_\_\_\_
3. Pukul berapa Anda biasanya bangun dari tempat tidur di pagi hari? <sup>[L]</sup><sub>[SEP]</sub>WAKTU BANGUN DARI TEMPAT TIDUR \_\_\_\_\_ <sup>[L]</sup><sub>[SEP]</sub>
4. Berapa jam Anda benar-benar tidur setiap malamnya? (Lamanya waktu ini bisa berbeda dengan lamanya waktu yang Anda habiskan di tempat tidur), <sup>[L]</sup><sub>[SEP]</sub>LAMA TIDUR SETIAP MALAM (DALAM JAM) \_\_\_\_\_ <sup>[L]</sup><sub>[SEP]</sub>

*Jawablah setiap pertanyaan di bawah ini dengan memberi tanda silang [X] pada tempat yang tersedia sesuai dengan jawaban Anda. Jawablah semua pertanyaan yang ada.*

5. Selama satu bulan terakhir, seberapa sering Anda mengalami gangguan tidur karena Anda \_\_\_\_\_

a) Tidak dapat tidur walaupun sudah berbaring selama 30 menit atau lebih

|  |                                      |                                   |                                     |
|--|--------------------------------------|-----------------------------------|-------------------------------------|
| Tidak pernah selama sebulan terakhir _____ | Kurang dari satu kali seminggu _____ | Satu atau dua kali seminggu _____ | Tiga kali atau lebih seminggu _____ |
|--|--------------------------------------|-----------------------------------|-------------------------------------|

b) Terbangun di tengah malam atau terlalu pagi

|                           |                        |                          |                            |
|---------------------------|------------------------|--------------------------|----------------------------|
| Tidak pernah selama _____ | Kurang dari satu _____ | Satu atau dua kali _____ | Tiga kali atau lebih _____ |
|---------------------------|------------------------|--------------------------|----------------------------|

|                       |                    |               |               |
|-----------------------|--------------------|---------------|---------------|
| sebulan terakhir_____ | kali seminggu_____ | seminggu_____ | seminggu_____ |
|-----------------------|--------------------|---------------|---------------|

c) Terpaksa bangun untuk ke kamar mandi

|   |                                     |                                  |                                    |
|---|-------------------------------------|----------------------------------|------------------------------------|
| Tidak pernah selama sebulan terakhir_____ | Kurang dari satu kali seminggu_____ | Satu atau dua kali seminggu_____ | Tiga kali atau lebih seminggu_____ |
|---|-------------------------------------|----------------------------------|------------------------------------|

d) Tidak bisa bernafas dengan nyaman

|   |                                     |                                  |                                    |
|---|-------------------------------------|----------------------------------|------------------------------------|
| Tidak pernah selama sebulan terakhir_____ | Kurang dari satu kali seminggu_____ | Satu atau dua kali seminggu_____ | Tiga kali atau lebih seminggu_____ |
|---|-------------------------------------|----------------------------------|------------------------------------|

e) Batuk atau mendengkur (mengorok) dengan keras

|   |                                     |                                  |                                    |
|---|-------------------------------------|----------------------------------|------------------------------------|
| Tidak pernah selama sebulan terakhir_____ | Kurang dari satu kali seminggu_____ | Satu atau dua kali seminggu_____ | Tiga kali atau lebih seminggu_____ |
|---|-------------------------------------|----------------------------------|------------------------------------|

f) Merasa kedinginan

|   |                                     |                                  |                                    |
|---|-------------------------------------|----------------------------------|------------------------------------|
| Tidak pernah selama sebulan terakhir_____ | Kurang dari satu kali seminggu_____ | Satu atau dua kali seminggu_____ | Tiga kali atau lebih seminggu_____ |
|---|-------------------------------------|----------------------------------|------------------------------------|

g) Merasa kepanasan

|   |                                     |                                  |                                    |
|---|-------------------------------------|----------------------------------|------------------------------------|
| Tidak pernah selama sebulan terakhir_____ | Kurang dari satu kali seminggu_____ | Satu atau dua kali seminggu_____ | Tiga kali atau lebih seminggu_____ |
|---|-------------------------------------|----------------------------------|------------------------------------|

h) Mengalami mimpi buruk

|   |                                     |                                  |                                    |
|---|-------------------------------------|----------------------------------|------------------------------------|
| Tidak pernah selama sebulan terakhir_____ | Kurang dari satu kali seminggu_____ | Satu atau dua kali seminggu_____ | Tiga kali atau lebih seminggu_____ |
|---|-------------------------------------|----------------------------------|------------------------------------|

i) Merasa nyeri/kesakitan

|   |                                     |                                  |                                    |
|---|-------------------------------------|----------------------------------|------------------------------------|
| Tidak pernah selama sebulan terakhir_____ | Kurang dari satu kali seminggu_____ | Satu atau dua kali seminggu_____ | Tiga kali atau lebih seminggu_____ |
|---|-------------------------------------|----------------------------------|------------------------------------|

j) Satu atau beberapa alasan lainnya, mohon jelaskan\_\_\_\_\_

Karena satu atau beberapa alasan tersebut, selama satu bulan terakhir, seberapa sering Anda mengalami gangguan tidur?

|   |                                     |                                  |                                    |
|---|-------------------------------------|----------------------------------|------------------------------------|
| Tidak pernah selama sebulan terakhir_____ | Kurang dari satu kali seminggu_____ | Satu atau dua kali seminggu_____ | Tiga kali atau lebih seminggu_____ |
|---|-------------------------------------|----------------------------------|------------------------------------|

6. Selama satu bulan terakhir, bagaimana kualitas tidur Anda secara keseluruhan?

|                  |                 |                  |                   |
|------------------|-----------------|------------------|-------------------|
| Sangat baik_____ | Cukup baik_____ | Kurang baik_____ | Sangat buruk_____ |
|------------------|-----------------|------------------|-------------------|

7. Selama satu bulan terakhir, seberapa sering Anda minum obat untuk membantu Anda tidur (baik obat resep dokter atau membeli sendiri)? <sup>[[ ]]</sup><sub>SEP</sub>

|   |                                     |                                  |                                    |
|---|-------------------------------------|----------------------------------|------------------------------------|
| Tidak pernah selama sebulan terakhir_____ | Kurang dari satu kali seminggu_____ | Satu atau dua kali seminggu_____ | Tiga kali atau lebih seminggu_____ |
|---|-------------------------------------|----------------------------------|------------------------------------|

8. Selama satu bulan terakhir, seberapa sering Anda merasa mengantuk ketika mengendarai kendaraan, makan, atau melakukan kegiatan dengan orang lain?

|   |                                     |                                  |                                    |
|---|-------------------------------------|----------------------------------|------------------------------------|
| Tidak pernah selama sebulan terakhir_____ | Kurang dari satu kali seminggu_____ | Satu atau dua kali seminggu_____ | Tiga kali atau lebih seminggu_____ |
|---|-------------------------------------|----------------------------------|------------------------------------|

9. Selama satu bulan terakhir, apakah Anda mendapat kesulitan untuk tetap bersemangat menyelesaikan pekerjaan/kegiatan? <sup>[[ ]]</sup><sub>SEP</sub>

|                                      |                                  |                      |                       |
|--------------------------------------|----------------------------------|----------------------|-----------------------|
| Tidak ada kesulitan sama sekali_____ | Hanya ada sedikit kesulitan_____ | Cukup kesulitan_____ | Sangat kesulitan_____ |
|--------------------------------------|----------------------------------|----------------------|-----------------------|

## Appendix 8: the Pittsburgh Sleep Quality Index (Scoring)

### Form Administration Instructions, References, and Scoring Form Administration Instructions

The range of values for questions 5 through 10 are all 0 to 3.

Questions 1 through 9 are not allowed to be missing except as noted below. If these questions are missing then any scores calculated using missing questions are also missing. Thus it is important to make sure that all questions 1 through 9 have been answered.

In the event that a range is given for an answer (for example, '30 to 60' is written as the answer to Q2, minutes to fall asleep), split the difference and enter 45.

#### Reference

Buysse DJ, Reynolds CF, Monk TH, Berman SR, Kupfer DJ: The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatry Research* 28:193-213, 1989.

Scores – reportable in publications

On May 20, 2005, on the instruction of Dr. Daniel J. Buysse, the scoring of the PSQI was changed to set the score for Q5J to 0 if either the comment or the value was missing. This may reduce the DISTB score by 1 point and the PSQI Total Score by 1 point.

#### **PSQI OVERALL SLEEP QUALITY (Component 1)**

Q9

Minimum Score = 0 (better); Maximum Score = 3 (worse)

#### **PSQI LATEN SLEEP LATENCY (Component 2)**

**First, recode Q2 into Q2new thusly:**

IF  $Q2 \geq 0$  and  $\leq 15$ , THEN set value of Q2new to 0

IF  $Q2 > 15$  and  $\leq 30$ , THEN set value of Q2new to 1

IF  $Q2 > 30$  and  $\leq 60$ , THEN set value of Q2new to 2

IF  $Q2 > 60$ , THEN set value of Q2new to 3

**Next**

IF  $Q5a + Q2new = 0$ , THEN set value to 0

IF  $Q5a + Q2new \geq 1$  and  $\leq 2$ , THEN set value to 1

IF  $Q5a + Q2new \geq 3$  and  $\leq 4$ , THEN set value to 2

IF  $Q5a + Q2new \geq 5$  and  $\leq 6$ , THEN set value to 3

Minimum Score = 0 (better); Maximum Score = 3 (worse)

### **PSQI DURATION OF SLEEP (Component 3)**

IF  $Q4 \geq 7$ , THEN set value to 0

IF  $Q4 < 7$  and  $\geq 6$ , THEN set value to 1

IF  $Q4 < 6$  and  $\geq 5$ , THEN set value to 2

IF  $Q4 < 5$ , THEN set value to 3

Minimum Score = 0 (better); Maximum Score = 3 (worse)

### **HABITUAL SLEEP EFFICIENCY (Component 4)**

Diffsec = Difference in seconds between day and time of day Q1 and day Q3

Diffhour = Absolute value of diffsec / 3600

newtib = IF diffhour > 24, then newtib = diffhour - 24

IF diffhour  $\leq$  24, THEN newtib = diffhour

(NOTE, THE ABOVE JUST CALCULATES THE HOURS BETWEEN GNT (Q1) AND GMT (Q3))

tmphse =  $(Q4 / \text{newtib}) * 100$

IF tmphse  $\geq$  85, THEN set value to 0

IF tmphse < 85 and  $\geq$  75, THEN set value to 1

IF tmphse < 75 and  $\geq$  65, THEN set value to 2

IF tmphse < 65, THEN set value to 3

Minimum Score = 0 (better); Maximum Score = 3 (worse)

### **SLEEP DISTURBANCE (Component 5)**

IF  $Q5b + Q5c + Q5d + Q5e + Q5f + Q5g + Q5h + Q5i + Q5j$  (IF Q5JCOM is null or Q5j is null, set the value of Q5j to 0) = 0, THEN set value to 0

IF  $Q5b + Q5c + Q5d + Q5e + Q5f + Q5g + Q5h + Q5i + Q5j$  (IF Q5JCOM is null or Q5j is null, set the value of Q5j to 0)  $\geq$  1 and  $\leq$  9, THEN set value to 1

IF  $Q5b + Q5c + Q5d + Q5e + Q5f + Q5g + Q5h + Q5i + Q5j$  (IF Q5JCOM is null or Q5j is null, set the value of Q5j to 0)  $>$  9 and  $\leq$  18, THEN set value to 2

IF  $Q5b + Q5c + Q5d + Q5e + Q5f + Q5g + Q5h + Q5i + Q5j$  (IF Q5JCOM is null or Q5j is null, set the value of Q5j to 0)  $>$  18, THEN set value to 3

Minimum Score = 0 (better); Maximum Score = 3 (worse)

### **PSQI NEED MEDS TO SLEEP (Component 6)**

Q6

Minimum Score = 0 (better); Maximum Score = 3 (worse)

**PSQI DAYTIME DYSFUNCTION DUE TO SLEEPINESS (Component 7)**

IF  $Q7 + Q8 = 0$ , THEN set value to 0

IF  $Q7 + Q8 \geq 1$  and  $\leq 2$ , THEN set value to 1

IF  $Q7 + Q8 \geq 3$  and  $\leq 4$ , THEN set value to 2

IF  $Q7 + Q8 \geq 5$  and  $\leq 6$ , THEN set value to 3

Minimum Score = 0 (better); Maximum Score = 3 (worse)

**PSQI TOTAL**

$SLPQUAL + LATEN + DURAT + HSE + DISTB + MEDS + DAYDYS$

Minimum Score = 0 (better); Maximum Score = 21 (worse)

Interpretation: A global sum of "5" or greater indicates a "poor" sleeper



## **Appendix 9: Informed Consent Form**

*Dear Ms./Mrs./Mr.*

My name is Abdu Rahim Kamil; I am a graduate student of International Advanced Program in Nursing at National Cheng Kung University (NCKU), Taiwan. I am conducting a research project titled “Exploring Factors Related to Sleep Quality among Patients Undergoing Hemodialysis in Indonesia”. This research is conducted in order to accomplish the requirements for Master in Nursing Program at National Cheng Kung University.

I am inviting you to participate in this project as a respondent. This research does not have any negative impacts physically. Participation in study is totally voluntary. I respect your decision whether to be involved or not in this study. If you are willing to be participant, you may sign this inform consent form.

I guarantee the confidentiality of you identity. The data will be used for the research purpose only. If you have any questions related to this study, you can contact me (Abdu Rahim Kamil)

I agree to participate in this study

---

Initial Name



## Appendix 10: Ethical Clearance Document



KEMENTERIAN RISET, TEKNOLOGI DAN PENDIDIKAN TINGGI  
UNIVERSITAS PADJADJARAN FAKULTAS KEDOKTERAN  
**KOMISI ETIK PENELITIAN KESEHATAN**  
**HEALTH RESEARCH ETHICS COMMITTEE**

Jl. Prof. Eyckman No. 38 Bandung 40161  
Telp. & Fax. 022-2038697 website: kepk.fk.unpad.ac.id, email: kepk.fk.unpad@gmail.com

No. Reg.: 0416121300

PERSETUJUAN ETIK  
ETHICAL APPROVAL

No: 200 /UN6.C1.10/PN/2017

Komisi Etik Penelitian Kesehatan Fakultas Kedokteran Universitas Padjadjaran Bandung, dalam upaya melindungi hak asasi dan kesejahteraan subjek penelitian kesehatan dan menjamin bahwa penelitian yang menggunakan formulir survei/registrasi/surveilans/Epidemiologi/Humaniora/Sosial Budaya/Bahan Biologi Tersimpan/Sel Punca dan non klinis lainnya berjalan dengan memperhatikan implikasi etik, hukum, sosial dan non klinis lainnya yang berlaku, telah mengkaji dengan teliti proposal penelitian berjudul:

*The Health Research Ethics Committee Faculty of Medicine Universitas Padjadjaran Bandung, in order to protect the rights and welfare of the health research subject, and to guaranty that the research using survey questionnaire/registry/surveillance/epidemiology/humaniora/social-cultural/archived biological materials/stem cell/other non clinical materials, will carried out according to ethical, legal, social implications and other applicable regulations, has been throughly reviewed the proposal entitled:*

*"EXPLORING FACTORS RELATED TO SLEEP QUALITY AMONG PATIENTS UNDERGOING HEMODIALYSIS IN INDONESIA"*

Nama Peneliti Utama : Abdu Rahim Kamil, S.Kep., Ners.  
*Principal Researcher*

Pembimbing/Peneliti Lain : Prof. Miaofen Yen, Ph.D., RN., FAAN  
*Supervisor/Other Researcher*

Nama Institusi : National Cheng Kung University  
*Institution*

proposal tersebut dapat disetujui pelaksanaannya.  
*hereby declare that the proposal is approved.*

Ditetapkan di : Bandung  
*Issued in*  
Tanggal : 20 - 02 - 2017  
*Date*

Ketua,  
*Chairman,*

Prof. Dr. Firman F. Wirakusumah, dr.,SpOG-K  
NIP. 19480115 197302 1 001

**Keterangan/notes:**

Persetujuan etik ini berlaku selama satu tahun sejak tanggal ditetapkan.

*This ethical clearance is effective for one year from the due date.*

Pada akhir penelitian, laporan pelaksanaan penelitian harus diserahkan ke Komisi Etik Penelitian Kesehatan.

*In the end of the research, progress and final summary report should be submitted to the Health Research Ethics Committee.*

Jika ada perubahan atau penyimpangan protokol dan/atau perpanjangan penelitian, harus mengajukan kembali permohonan kajian etik penelitian.

*If there be any protocol modification or deviation and/or extension of the study, the Principal Investigator is required to resubmit the protocol for approval.*

Jika ada kejadian serius yang tidak diinginkan (KTD) harus segera dilaporkan ke Komisi Etik Penelitian Kesehatan.

*If there are Serious Adverse Events (SAE) should be immediately reported to the Health Research Ethics Committee*

## Appendix 11: Research Permission Approval Document



### RUMAH SAKIT ISLAM JAKARTA SUKAPURA

Jl. Tipar Cakung No. 5 Sukapura - Jakarta Utara 14140

Telp : 021 4400778, 4400779 - Fax : 021 4400782

Email : rsisjukupura@gmail.com - Website : www.rsisjukupura.co.id

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Nomor : 049/VIII/E.2/2017  
Perihal : Persetujuan Izin Penelitian

Jakarta, 02 Jumadil Awwal 1438 H  
05 Februari 2017 M

Kepada Yth,  
**Dekan**  
**Fakultas Ilmu Keperawatan**  
**Universitas Muhammadiyah Jakarta**  
Di Tempat

Assalamu'alaikum, Wr. Wb.

Teriring salam, semoga kita semua senantiasa diberikan Inayah-Nya sehingga dapat menjalankan tugas dengan sebaik-baiknya, amin.

Menindaklanjuti surat Saudara No.0071/F.9-UMJ/I/2017 di terima tanggal 23 Januari 2017 perihal Permohonan Izin Penelitian di Unit Hemodialisa pada tanggal 6 s/d 28 Februari 2017 atas nama mahasiswa yaitu :

Nama : Ns. Abdu Rahim Kamil, S.Kep  
NIP : 20.1453  
Judul Penelitian : *Exploring factors related to sleep quality among patient undergoing hemodialysis in Indonesia.*

maka kami sampaikan hal-hal sebagai berikut:

- Pada prinsipnya kami menyetujui pelaksanaan kegiatan tersebut.
- Untuk informasi lebih lanjut dapat menghubungi Unit Diklat RS Islam Jakarta Sukapura di nomor Telp. (021) 4400778/79/81-Ext.111/ 140

Demikian, atas perhatian & kerjasamanya diucapkan terima kasih.

Wassalamu'alaikum Wr. Wb.

Direksi  
RS ISLAM JAKARTA SUKAPURA

  
**dr. Rachmat Mulyana Memet, Sp.Rad**  
Direktur Utama



## RUMAH SAKIT ISLAM JAKARTA CEMPAKA PUTIH

Jalan Cempaka Putih Tengah I/1, Jakarta 10510  
Telepon (021) 4250451, 42801567 (*hunting*)  
Faksimile (021) 4206681  
Website : [www.rsi.co.id](http://www.rsi.co.id), E-mail: [rsijpusat@rsi.co.id](mailto:rsijpusat@rsi.co.id)

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Nomor : 179/XIII/02/2017  
Hal : Persetujuan Penelitian

12 Jumadil Awwal 1438 H  
09 Februari 2017 M

**Yth. Bapak Dr. Muhammad Hadi, SKM., M.Kep**  
**Dekan Fakultas Ilmu Keperawatan**  
**Universitas Muhammadiyah Jakarta**  
**Jalan Cempaka Putih Tengah I No. 1**  
**Jakarta Pusat 10510**

*Assalamu'alaikum Wr.Wb*


Menindaklanjuti surat Bapak Nomor : 0072/F.9-UMJ/1/2017 tertanggal 18 Januari 2017 perihal Permohonan melakukan penelitian oleh staf dosen FIK UMJ yang sedang tugas belajar di *National Cheng Kung University* di unit Hemodialisa Rumah Sakit Islam Jakarta Cempaka Putih, dengan ini kami memberikan izin kepada Staf dosen atas nama :

Nama : Ns. Abdu Rahim Kamil, S.Kep  
NIP : 20.1453  
Judul Penelitian : **"Exploring Factors related to sleep quality among patients undergoing hemodialysis in Indonesia"**

Selanjutnya, selama proses penelitian tersebut agar melibatkan / mengikutsertakan pegawai RSIJCP yang berkompeten di bidangnya dan bila diperlukan hasilnya agar dapat dipresentasikan di RSIJCP.

Adapun untuk teknik dan waktu pelaksanaan kegiatan dimaksud pihak Bapak dapat menghubungi Manajer SDI Cq. Kepala Penelitian dan Pengembangan (Litbang RSIJCP) telepon 021-4250451 pesawat 429.

Demikian kami sampaikan. Atas perhatian Bapak, kami mengucapkan terima kasih.

*Wassalamu'alaikum Wr.Wb*  
  
**Dr. Prastowo Sidi Pramono, Sp.A**  
Direktur Utama

Tembusan:

1. Anggota Direksi RSIJCP;
2. Asdir Keperawatan RSIJCP;
3. Komite Etik Penelitian RSIJCP;
4. Manajer SDI RSIJCP;
5. Manajer Yanum & Legal RSIJCP;
6. Ka. Urusan Litbang RSIJCP.