Article

dementia

Factors affecting sleep among Thai people with dementia attending an outpatient psychiatric department

Dementia
2020, Vol. 19(2) 135–147

DOI: 10.1177/1471301219833886
journals.sagepub.com/home/dem
SAGE

K.Sinsak Suvanchot
Suansaranrom Psychiatric Hospital, Surat Thani, Thailand

Wipawan Chaoum Pensuksan
Walailak University, Nakhon Si Thammarat, Thailand

Abstract

Sleep quality is a well-studied aspect of overall health, especially for those who have other compounded health issues like dementia. This study identified what factors affected sleep quality among Thai people with dementia who attended an outpatient psychiatric department. While we considered factors associated with poor sleep quality, we discussed the impact that family relationship specifically has on sleep quality for this population. A cross-sectional study was conducted among 80 patient–caregiver dyads. All patients were assessed by the TMSE, a neuropsychiatric assessment (Thai Mental State Examination). The PSQI (Pittsburgh Sleep Quality Index) was administered and multiple factors affecting sleep were investigated through face-to-face interviews with each patient and caregiver dyad. Interviews were conducted by a psychiatric nurse at a hospital offering outpatient psychiatric care. A chi-square test, *t* test, Spearman correlation, Pearson's correlation, and logistic regression were applied to identify statistically significant associations. Overall, we found that the prevalence of poor sleep in our target population was 70%, with a high sleep score (8.14 ± 4.20). Factors affecting sleep included mental health problems, night-time cough and urinary frequency, pain and fever during the night, sleep environment problems, and stimulant use (63.8%, 57.5%, 47.5%, 20%, and 7.5%, respectively). Other factors previously associated with poor sleep quality in other studies were not associated in this study. Those with perceived poor family relationships are at a 5.57 times greater risk for poor sleep than those with perceived good family relationships. On the contrary, those without mental health problems significantly decreased their overall risk for poor sleep. Further investigation into

Corresponding author:
Wipawan Chaoum Pensuksan, School of Nursing, Walailak University, Nakhon Si Thammarat 80160, Thailand.
Email: wipawanp@gmail.com

these associations should be studied. In conclusion, health-care providers are encouraged to consider the impact of family context on sleep quality for people with dementia.

Keywords
sleep quality, factors affecting sleep, people with dementia, outpatient psychiatric department, patient–caregiver dyad

Introduction

Proper sleep is not only a basic human need but also a vital physiological process to maintain overall lifetime well-being. It anatomically serves an important restorative function in the brain and has a critical role in optimal cognitive function (National Institutes for Health, 2017; Cipriani, Lucetti, Danti, & Nuti, 2015; Jirong, Changquan, Hongmei; & Bi-Rong, 2013). Due to an aging population and increased prevalence of dementia worldwide, there has been more interest in the study of sleep in older people with and without dementia (Bombois, Derambure, Pasquier, & Monoca, 2010). Sleep disturbances not only adversely affect life quality and functional abilities for people with dementia but also pose a greater risk for psychiatric symptoms. Moreover, poor sleep quality results in an increased risk of significant morbidities or even mortality in people with dementia, constituting a major source of stress for caregivers and even affecting the caregivers' health (Bombois et al., 2010; Cipriani et al., 2015).

People with Alzheimer's disease (AD) unavoidably undergo changes in sleep architecture, circadian rhythmicity, and thermoregulation compared to people without AD (McCurry, Vitiello, Gibbons, Logsdon, & Teri, 2006). Common dementia–related sleep disturbances include waking up confused, changes in sleep timing, and nightmares (Gibson, Gander, & Jones, 2014). These alterations can lead to further memory deterioration because memory consolidation processes take place during sleeping hours (Chaves da Silva, 2015). Several studies have estimated that between one-quarter and one-half of older people with AD and other dementias suffer from some of these sleep disruptions. These disruptions are caused by multiple factors, such as a progression in the severity of dementia, decreased functional status, mental health problems or psychiatric morbidity, certain medications and poly-pharmacy, the presence of pain and discomfort, an inappropriate sleep environment, and poor sleep hygiene (Cipriani et al., 2015; Deschenes & McCurry, 2009; Rose, Fagin, & Lorenz, 2010).

It is important to note that Thai culture generally believes that dementia is a common result of the degenerative aging process. Most family caregivers prefer to care for their family member with dementia at home. They provide part or total care for the family member depending on his or her physical and psychological condition within their family context. Consequently, family caregivers must manage the consequences of decline in cognitive functioning, especially neuropsychiatric symptoms (NPS). One study (Veragiat et al., 2017) found that family caregivers perceived that the most amount of distress for a family member with dementia occurred during night-time motor behavior, e.g., sleep walking, sleep talking, or any other activities during sleep.

Regarding other factors affecting sleep, additional studies in Korea showed sleep disturbance was different between males and females (Quan et al., 2016; Lee, Kim, & Han, 2015).

Quan et al. (2016) studied 382 Korean subjects (175 males and 207 females) and reported that sleep disturbance was common in females and lack of exercise was a risk factor of poor sleep. For males, alcohol consumption was a risk factor for poor sleep. A study by Gildner, Liebert, Kowal, Chatterji, & Josh Snodgrass (2014) documented associations between sleep duration, sleep quality, and obesity risk in older individuals. They stated that shorter sleep durations in both men and women were significantly associated with higher body mass index (BMI) and waist circumference (WC). Surprisingly, high sleep quality was also significantly associated with increased male BMI and WC in China and India. However, few studies have examined these trends, in Thai older adults.

In Thailand, given the dearth of epidemiological studies in sleep quality among people with dementia, more research into this area should be undertaken to promote deeper understanding of sleep quality and factors affecting sleep among this vulnerable population. This study investigates the current prevalence of poor sleep quality and factors affecting sleep in Thai people with dementia. Association between poor sleep quality and causative factors are explored to provide further information for developing proper management, effective behavioral interventions, and non-pharmacological strategies to reduce sleep problems in this population.

Methods

Research design and sample

This cross-sectional study was conducted in the outpatient psychiatric department at the largest psychiatric hospital in southern Thailand, from May to August, 2017. The participants included in this study were aged 60 years or older and were accompanied by their family caregivers to an outpatient appointment. The participants must have already been diagnosed with dementia by a certified psychiatrist, have obtained a qualifying cognitive impairment score at the time of the appointment (obtained $\leq$ 23 points in the TMSE), be currently using psychotropic drugs to treat NPS, and were living at home with the caregiver who attended this appointment. Patients were excluded if they had a severe mental illness, mental retardation, an inability to speak Thai, or had problems related to hearing and communication.

The sample size was calculated by using n4Studies application for population proportion (Ngamjarus, Chongsuvivatwong, & McNeil, 2016). This calculation is based on the findings of a previous study (Veragiat et al., 2017), presenting the prevalence of dementia in Thai older people attending outpatient departments of all psychiatric hospitals in southern Thailand (52.0%) and the number of people with dementia per year in the studied hospital (N = 400). The sample size calculation was considered a 95% confidence interval (CI). The sample theoretically needed to include at least 78 participants. There were 84 older people surveyed with a dementia diagnosis and 4 of them were rated with no cognitive impairment as measured by the TMSE scale. Therefore, these 4 were not included in the study. A total of 80 patient–caregiver dyads fulfilled the criteria and were enrolled in the study. All the participants and their family caregivers were well informed of the content and the aim of the study and returned a written informed consent. Next, sleep status was measured by a psychiatric nurse at the studied hospital using face-to-face interviews with each patient–caregiver dyad. If a patient could not answer some questions, his or her caregiver would support and confirm information. All study procedures and documents related to protocol

were reviewed and approved by the Research Ethics Committee of the Suansaranrom Psychiatric Hospital.

Measures

The questionnaire was comprised of demographic questions including family data such as gender, age, living status, education attainment, and who paid the medical expenses. Family relationship was measured by first using a subjective assessment which was identified by both the patients and the family caregivers' perception. A psychiatric nurse then classified the family relationship on a good or poor level based on the face-to-face interviews. Physical activity was categorized by either any or no physical exercise within one week which was assessed by the caregiver during the interview. The other information, e.g., diagnosis and BMI, was based on current medical records. The TMSE scale (Train the Brain Forum Committee Thailand, 1993), the PSQI scale (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989), and the semi-structured questionnaire interview were used.

Assessment of cognitive impairment

The TMSE is comprised of six basic subtests concerning orientation (6 points), registration (3 points), attention (5 points), calculation (3 points), language (10 points), and recall (3 points). The tests screen for dementia or cognitive impairment. The total score is 30 and the cut-off point for the diagnosis of dementia or cognitive impairment is 23 points or less (Train the Brain Forum Committee Thailand, Thailand, 1993). In this study, the TMSE was used to assess patients for current cognitive impairment.

Assessment of sleep quality

Sleep quality was assessed by PSQI. The PSQI has been validated for use as a suitable instrument for measuring sleep quality for both people living at home or in a nursing home and has been administered in different cultures (Daglar, Pinar, Sabanciogullari, & Kav, 2014; Hinz et al., 2017). The PSQI is a 19-item questionnaire consisting of seven sleep components related to sleep habits within the past month including duration of sleep, sleep disturbance, sleep latency, habitual sleep efficiency, use of sleep medicine, daytime dysfunction, and overall sleep quality. Each sleep component yields a score ranging from 0 (better) to 3 (worse), with 3 indicating the greatest dysfunction. A global score was defined as a continuous variable (range 0–21), with higher scores reflective of poorer sleep quality and also as a dichotomous variable. A global score greater than 5 was regarded as indicative of a poor-quality sleeper, indicating that a subject is suffering severe difficulty in at least two areas, or moderate difficulty in more than three areas of sleep quality in the past month (Rehman, Gumley, & Biello, 2018). All those scoring 5 or less were defined as "good sleepers." The PSQI has demonstrated good psychometric properties in a similar Asian population (Tsai et al., 2005 cited in Yu, Mahendran, Abdullah, Kua, & Feng, 2017). The internal consistency reliability of a global PSQI in the present study was shown to be 0.82.

Assessment of factors affecting sleep

The semi-structured face-to-face questionnaire interview was designed based on the literature about sleep and older adults (Centre for Ageing Research and Development in Ireland,

2014). The interviewer, a psychiatric nurse, had a semi-structured interview and discussed with participants and their caregivers in more detail. The nurse focused on exploring the caregivers' perception of the factors affecting the patients' sleep including physical symptoms such as pain, fever, night-time cough, and the need to urinate during the night; current mental health problems such as stress, fear, loneliness, and anxiety; sleep environment problems such as temperature, lighting, noise, smell, and bedding or mattress comfort; as well as stimulant use such as alcohol/caffeine consumption and smoking.

Data analysis

IBM's SPSS Version 23 Statistical Software for Windows was used for all statistical analyses. All reported p values are two-sided and deemed statistically significant at $\alpha = 0.05$. We examined the frequency distributions of sociodemographic characteristics of the participants. The characteristics were summarized using the mean (±standard deviation) for continuous variable and counts and percentages for categorical variables. Descriptive analyses were performed to establish the prevalence of sleep quality. A chi-square test or Fisher's exact test (where an expected cell counts <5) and unpaired Student's *t* test were used to determine bivariate differences for categorical and continuous variables respectively. Subsequently, the distribution of sleep quality was across demographic groups. Spearman's correlation coefficients were used to determine the association between sleep quality and factors affecting sleep. The Pearson's correlation was performed to determine the association of continuous variables between cognitive impairment (TMSE total score) and sleep quality (PSQI global score). Logistic regression analysis was used to estimate the odds ratio (OR) and 95% CI of variables as a function of increased risk of poor sleep quality.

Results

Participant characteristics are found in Table 1 and are described by sleep status (good vs. poor). A total of 80 Thai people with dementia were included in this study, 70% of whom were females. The age of the participants ranged from 60 to 94 years and the average age was 77.43 ± 8.40 years. Nearly half of the group (48.8%) were married. As mentioned, a qualifier for this study was current use of psychotropic drugs to treat NPS. They were taking antidepressant drugs (76.3%), antipsychotic drugs (65.0%), cholinesterase inhibitor drugs (53.8%), and antianxiety drugs (benzodiazepine drugs) (25.0%). We performed a chi-square test to determine if there were differences between the number of patients who took benzodiazepine—a drug known to cause sleep issues—and the sleep quality groups. The result shows that there is no significant association between the patients who took benzodiazepine and sleep quality groups (Table 1).

The mean TMSE total score across all participants was 14.64 ± 5.06, 95% CI [13.51–15.76], with 16.08 ± 5.52, 95% CI [13.75–18.42] for males and 14.02 ± 4.77, 95% CI [12.74–15.30] for females. Furthermore, the difference was significant between sleep quality groups and family relationship ($p < 0.01$), physical activity ($p < 0.05$), physical symptoms; pain and fever during the night ($p < 0.05$), mental health problems ($p < 0.01$), BMI ($p < 0.001$), TMSE total score ($p < 0.001$), and PSQI global score ($p < 0.001$).

The mean PSQI global score across all participants was 8.14 ± 4.20, 95% CI [7.20–9.07], (8.63 ± 3.73, 95% CI [7.05–10.20] for males and 7.93 ± 4.41, 95% CI [6.75–9.11]

Table 1. Characteristics of participants according to sleep quality.

Characteristics	Total ($N=80$) n (%)/mean ± SD	Sleep quality: Good ($N=24$) n (%)/mean ± SD	Sleep quality: Poor ($N=56$) n (%)/mean ± SD	χ^2/t	p
Gender				1.372	0.241
Males	24 (30.0)	5 (20.8)	19 (79.2)		
Females	56 (70.0)	19 (33.9)	37 (66.1)		
Age				0.351	0.554
60–75	34 (42.5)	9 (26.5)	25 (73.5)		
>75	46 (57.5)	15 (32.6)	31 (67.4)		
Living status				1.737	0.188
Non-alone	39 (48.8)	9 (23.1)	30 (76.9)		
Alone	41 (51.2)	15 (36.6)	26 (63.4)		
Education attainment				1.929	0.194
Illiterate	13 (16.3)	6 (46.2)	7 (53.8)		
Primary school and higher	67 (83.7)	18 (26.9)	49 (73.1)		
Medical expense				0.879	0.553
Paid by others: government, insurance agency	65 (81.3)	18 (27.7)	47 (72.3)		
Paid by themselves	15 (18.7)	6 (40.0)	9 (60.0)		
Family relationship				6.924	<0.01
Poor	27 (33.8)	3 (11.1)	24 (88.9)		
Good	53 (66.2)	21 (39.6)	32 (60.4)		
Physical activity				4.063	<0.05
No	30 (37.5)	13 (43.3)	17 (56.7)		
Yes	50 (62.5)	11 (22.0)	39 (78.0)		
Pain and fever				4.621	<0.05
No	42 (52.5)	17 (40.5)	25 (59.5)		
Yes	38 (47.5)	7 (18.4)	31 (81.6)		
Night-time cough and urinary frequency				1.910	0.167
No	34 (42.5)	13 (38.2)	21 (61.8)		
Yes	46 (57.5)	11 (23.9)	35 (76.1)		
Mental health problems				10.223	<0.01
No	29 (36.3)	15 (51.7)	14 (48.3)		
Yes	51 (63.7)	9 (17.6)	42 (82.4)		
Sleep environment problems				0.015	1.000
No	64 (80.0)	19 (29.7)	45 (70.3)		
Yes	16 (20.0)	5 (31.3)	11 (68.8)		
Stimulant use				0.549	0.663
No	74 (92.5)	23 (31.1)	51 (68.9)		
Yes	6 (7.5)	1 (16.7)	5 (83.3)		
Currently taking benzodiazepine drugs				0.317	0.573
No	60 (75.0)	17 (28.3)	43 (71.7)		
Yes	20 (25.0)	7 (35.0)	13 (65.0)		
BMI (kg/m^2)	21.71 ± 4.02	21.62 ± 4.24	21.74 ± 3.96	48.34	<0.001
TMSE total score	14.64 ± 5.06	14.67 ± 4.55	14.63 ± 5.31	25.86	<0.001
PSQI global score	8.14 ± 4.20	3.92 ± 1.10	9.95 ± 3.71	17.32	<0.001

Note: BMI: body mass index, TMSE: Thai Mental State Examination, PSQI: Pittsburgh Sleep Quality Index.

Table 2. PSQI component and total mean scores (mean ± SD).

		Gender	
	Total	Males	Females
Subjective sleep quality	1.08 ± 0.65	1.13 ± 0.54	1.05 ± 0.70
Sleep latency	1.64 ± 0.68	1.67 ± 0.70	1.63 ± 0.68
Sleep duration	0.64 ± 1.06	0.71 ± 1.12	0.61 ± 1.04
Habitual sleep efficiency	0.85 ± 1.15	1.00 ± 1.18	0.79 ± 1.14
Sleep disturbances	1.93 ± 0.57	2.04 ± 0.55	1.88 ± 0.57
Use of sleep medication	1.14 ± 1.05	1.29 ± 1.12	1.07 ± 1.02
Daytime dysfunction	0.88 ± 0.74	0.79 ± 0.51	0.91 ± 0.82
PSQI global score	8.14 ± 4.20	8.63 ± 3.73	7.93 ± 4.41

Note: PSQI: Pittsburgh Sleep Quality Index.

Table 3. Spearman rho correlations for coefficients between the main variables.

Measures	1	2	3	4	5	6	7	8	9	10
1. Age (60–75, >75)	–									
2. BMI (underweight, normal, and overweight)	−0.191	–								
3. Family relationship	−0.025	−0.051	–							
4. Physical activity	−0.196	−0.033	−0.171	–						
5. Pain and fever during the night	0.008	−0.145	−0.115	0.116	–					
6. Night-time cough and urinary frequency	0.182	−0.114	−0.079	0.170	0.261*	–				
7. Mental health problems	−0.070	0.148	−0.263*	0.114	0.144	0.036	–			
8. Sleep environment problems	0.051	−0.038	0.026	0.194	0.025	0.114	0.052	–		
9. Stimulant use	−0.235*	0.123	0.003	0.221*	−0.081	−0.043	−0.081	0.095	–	
10. PSQI categories scores	0.066	−0.013	0.294**	−0.225*	−0.240*	−0.155	−0.357**	0.014	−0.083	–

Note: BMI: body mass index; PSQI Categories Scores: Pittsburgh Sleep Quality Index Categories Scores. p value from correlation coefficients: *$p < 0.05$; **$p < 0.01$.

for females). Among all participants, 70% scored within the range of a poor sleep score (PSQI > 5), 9.95 ± 3.71, 95% CI [8.95–10.94], (9.74 ± 3.36, 95% CI [8.12–11.36] for males and 10.05 ± 3.92, 95% CI [8.75–11.36] for females). Seven components of sleep quality in the present sample population are listed in Table 2. It demonstrates that sleep disturbances rank as the highest, followed by sleep latency and use of sleep medication. The sleep duration received the lowest score. Females reported lower scores than males in six dimensions, except for daytime dysfunction, suggesting that they were better sleepers.

The PSQI score in dichotomous variable was significantly associated with family relationship ($r = 0.29$; $p < 0.01$), physical activity ($r = -0.23$; $p < 0.05$), pain and fever during the night ($r = -0.24$; $p < 0.05$), and mental health problems ($r = -0.36$; $p < 0.01$), indicating an association between poor sleep quality and poor family relationship, physical activity, pain and fever during the night, and mental health problems (Table 3). The PSQI global score was not significantly associated with the TMSE total score ($r = -.05$; $p = 0.65$).

Table 4. OR and 95% CI for poor sleep quality.

Characteristics	Unadjusted OR (95% CI)	p value	Adjusted OR[a] (95% CI)	p value
Family relationship				
Good	1.0 (reference)	0.072	1.0 (reference)	<0.05
Poor	3.70 (0.89–15.38)		5.57 (1.13–27.34)	
Physical activity				
Yes	1.0 (reference)	0.137	1.0 (reference)	0.213
No	0.44 (0.15–1.30)		0.46 (0.14–1.56)	
Pain and fever during the night				
Yes	1.0 (reference)	0.105	1.0 (reference)	0.112
No	0.39 (0.13–1.22)		0.39 (0.12–1.25)	
Mental health problems				
Yes	1.0 (reference)	<0.05	1.0 (reference)	<0.01
No	0.26 (0.09–0.78)		0.19 (0.05–0.64)	

Note: OR: odds ratio; CI: confidence interval.
[a]Each odds ratio is adjusted for covariates: gender, age, body mass index, and the Thai Mental State Examination score.

As shown in Table 4, binary logistic regression analysis for the associated factors for poor sleep quality, after adjusting for gender, age, BMI, and TMSE score showed that poor family relationships had 5.57 times (OR: 5.57, 95% CI: 1.13–27.34) greater risk than the patients who had good family relationships. Statistical data underlined a significant association between no mental health problems and decreased risk of poor sleep quality (OR: 0.19, 95% CI: 0.05–0.64) when compared to the counterparts with mental health problems.

Discussion

In this study, 70% of the participants were defined as poor sleepers using the PSQI. This finding further indicates that poor sleep quality is prevalent among Thai people with dementia which suggests that poor sleep quality should be considered an important public health concern. A high prevalence of poor sleep quality in the current population could also be due to methodological differences between studies (Eshkoor, Hamid, Nudin, & Mun, 2013; Jirong et al., 2013) such as a variety of methods, differences in study settings, variable response rates, and socio-demographic differences within the subject population (Veragiat et al., 2017). The global PSQI score (8.14 ± 4.20) of this study was also greater than in a previous study (Jirong et al., 2013). Jirong et al. (2013) studied 660 Chinese older adults (90 years and above) with dementia of whom 90% lived in the countryside and reported a global PSQI score of 7.83±2.15, as well as 22.3% occurrence of poor sleep quality. A possible explanation for the higher sleep score in the present population includes lack of awareness of their actual sleep quality and reoccurrences of night-time motor behavior, e.g., sleep walking, sleep talking, or any other activities during sleep (Veragiat et al., 2017). Older people with dementia also often take frequent, short naps throughout the day to compensate for their loss of night-time sleep (Rose et al., 2010). However, our results are in agreement with Pinidbunjerdkool, Saengwanitch, & Sithinamsuwan (2014) who found that 60.9% of Thai people with dementia (N = 67) attending an outpatient neurology clinic scored within the range of poor sleep using the PSQI and had a mean global score of 6.40. In

our findings regarding the seven components of PSQI, sleep disturbances rank as the highest, followed by sleep latency and use of sleep medication. Sleep disturbances are indeed prevalent among older adults worldwide (Li et al., 2013), especially in older people with dementia (Pinidbunjerdkool et al., 2014).

This study showed that the mean TMSE score was significantly different between good and poor sleep quality groups. Those who received a higher TMSE score, having good cognitive function, were "good sleepers" compared to their counterparts. However, the present study reported that the PSQI global score was not significantly associated with the TMSE total score. These findings are concurrent with a study by Nebes, Buysee, Halligan, Houck, & Monk (2009) who studied the relationship between sleep quality and cognitive performance in older adults. The study reported that there was no evidence that self-reported sleep difficulties were associated with decreasing speeds of information processing. Inhibitory function did not seem related to sleep quality. There was no evidence of a difference in immediate and delayed verbal memory.

In our study, we found that factors affecting sleep included mental health problems, nighttime cough and urinary frequency, pain and fever during the night, sleep environment problems, and stimulant use (63.7%, 57.5%, 47.5%, 20.0%, and 7.5%, respectively). Mental health problems and pain and fever during the night were the most significantly different between sleep quality groups and as a result were significantly associated with sleep quality. Similarly, a previous study of 2565 older Singaporeans (Sagayadevan et al., 2016) showed that individuals reporting sleep problems were more likely to have a range of chronic physical and mental conditions including pain and depression. Those suffering from pain ran a 3.2 times greater risk of sleep problems compared to their pain-free counterparts. Similarly, those with depression ran a 1.9 times greater risk of sleep problems than their depression-free counterparts.

Recently, the influence of psychological factors on sleep quality has attracted considerable research interest (Li et al., 2013). In this study, we found that sleep quality is associated with mental health problems, especially in women (81.1%). Our findings are consistent with a previous study (Leblanc, Desjardins, & Desgagne, 2015) that highlighted a significant difference in all sleep measured difficulties between older adults suffering from a mood or anxiety disorder and those who are asymptomatic. However, women and younger seniors (under 75 years of age) were overrepresented in the groups of depressive and anxious older adults, which was also the case with sleep efficiency. Niu et al. (2016) reported that poor sleep quality among older adults with cognitive impairment was most common in females diagnosed with depression. Likewise, other studies (Chang et al., 2014; Yu et al., 2016) have further indicated that negative emotions and anxiety interfered with the sleep quality and sleeping patterns of older adults, subsequently leading to increased sleep latency and reduced sleep efficiency.

Apart from these similarities, this study also notes a number of findings inconsistent with previous research. This study's correlation analysis found sleep quality to be negatively correlated with physical activity, that is, being physically active was correlated with poorer sleep quality. This is in contrast to a previous study (Suzuki, Meguro, & Meguro, 2011) which reported that 107 institutionalized people with dementia with low activities of daily living (ADL) had significantly higher rates of sleep disturbance. Similarly, Sagayadevan et al. (2016) found that older adults who are physically active had a lower risk of sleep problems of 0.5 times than those who did not engage in any physical activities. A possible explanation for this paradox could be that we did not differentiate either the level or type of physical exercise or activity nor did we focus on classification of their ADL.

Our study also indicated that the mean BMI score was significantly different between the good and poor sleep quality groups. However, this is not the case in other studies. For example, in a study by Yan, Chang-Quan, & Zhen-Chan (2012) of Chinese adults aged 90 years or more, they found no association between sleep quality and BMI. Lifestyle factors including stimulant use (alcohol/caffeine consumption/smoking) that have been previously associated with sleep quality were also not associated with our sleep quality groups. The association between poor sleep quality and these lifestyle factors did change slightly with age and pattern of family care. However, this association should be further explored for clarity.

Finally, our study demonstrated that those who had poor family relationships had a 5.57 times greater risk for poor sleep quality compared to those maintaining good family relationships. This result was interpreted to be due to traditional beliefs within the Thai family as caregivers clearly emphasized respect and the need to care for the patient family member during the face-to-face interviews. However, within the present socioeconomic society, family members responsible for providing care for their older adult members are faced with added stress when coping specifically with dementia and deteriorating cognitive or functional impairments. As a result, caregivers can feel caught between their own well-being and their obligations to esteem the well-being of the older family member. For example, as a patient's sleep quality deteriorates, the caregiver's sleep quality also can deteriorate due to disruptions in the night, difficulties assisting the patient in falling asleep, etc. Caregivers are then more prone to not only give the patient family member sleep medications but also to eventually take the medications themselves. As the patient's sleep quality continues to decline, the caregivers can feel increasingly guilty or conflicted about giving him or her higher doses versus fulfilling the duty to help comfort and care for him or her as much as possible.

The interviews also revealed that as a result, the family member with dementia in turn felt more unhappy or anxious about their adult children and/or grandchildren's problems, e.g., family financial stress, conflict in family relationships, and health worries. In addition, family caregivers also felt conflicted between caring for their parent and other responsibilities. In a study by Ailshire & Burgard (2012), non-institutionalized adults aged 25 to 74 years with strained family relationships experienced more troubled sleep, while supportive family relationships were associated with less troubled sleep. This supports another research study indicating that a satisfying relationship with social acquaintances, friends, and relatives most likely promoted healthy sleep patterns in people with dementia (Eshkoor et al., 2013; Yao, Yu, Cheng, & Chen, 2008).

Lastly, people with dementia who have no mental health problems were reported to have a lower risk of 0.19 times compared to those with mental health problems. According to previous studies (Eshkoor et al., 2013; Oliveira, Bertolucci, Chen, & Smith, 2014), the main risk factor for poor sleep quality among people with dementia was mental health problems such as anxiety, stress, and depression.

A few limitations applied to this study. First, although the full sample size of 80 was reasonable for this population, it was solely from one psychiatric hospital, which may not effectively be representative of the general population. Second, the gender ratio of the sample was skewed with the majority of the sample being women. However, this imbalanced gender ratio was also noted in other studies of older people with dementia. Thai women also have an average longer lifespan than Thai men which could be a contributing factor. Third, the cross-sectional data limited the interpretation of the results. However, this could be resolved by using longitudinal studies to further determine causation. Fourth, information about Thai culture affecting family relationship were obtained from face-to-face interviews, therefore

cultural assessment was generalized and there was a lack of qualitative analysis surrounding specific cultural beliefs and expectations within the family context. Furthermore, lack of computed tomography scans or magnetic resonance imaging data resulted in an inability to identify the dementia types. Finally, objective measures for sleep quality for a dementia population in particular, such as actigraphy, were not applied to provide more reliable data. Consequently, further research on a larger scale along with a more balanced gender ratio, specifications of type of dementia, use of objective measurement, measurement of cultural beliefs and expectations surrounding family context, and longitudinal studies are highly encouraged in order to further replicate and clarify these preliminary findings.

Conclusion

It is evident that health-care providers should acknowledge sleep as a significant health problem for people with dementia. Comprehensive measures of factors affecting sleep in this population should be advanced. While each associated factor needs to be considered when treating people with dementia, the quality of family relationship proved the most compelling factor in this study. Cultural context needs to be closely considered when examining this and future qualitative analysis surrounding current cultural beliefs is recommended. Within a Thai context, family relationships are generally affected by the expectation to respect and care for one's older family members, as well as distress and anxiety that arises because of the perceived or actual emotional and physical strain on the caregiver, creating a negative feedback loop. These findings should be taken into consideration to implement proper management, effective interventions, and non-pharmacological strategies that are focused on people with dementia, as well as their cultural and family contexts in order to reduce sleep problems in this population.

Acknowledgements

We wish to thank all the participants and family caregivers for their participation. We are grateful to all psychiatric nurses at the study hospital who cooperated with us in this study.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iDs

K.Sinsak Suvanchot http://orcid.org/0000-0002-0314-1330
Wipawan Chaoum Pensuksan http://orcid.org/0000-0002-4834-5468

References

Ailshire, A. J., & Burgard, A. S. (2012). Family relationship and troubled among U.S. adults: Examining the influences of contact frequency and relationship quality. *The Journal of Health and Social Behavior*, *53*(2), 248–262.

Bombois, S., Derambure, P., Pasquier, F., & Monoca, C. (2010). Sleep disorders in aging and dementia. *The Journal of Nutrition Health and Aging, 14*(3), 212–217.

Buysse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatry Research, 28*(2), 193–213.

Centre for Ageing Research and Development in Ireland. (2014). Focus on sleep and older people. Retrieved from http://www.cardi.ie/sites/default/files/Focus%20On%20Sleep.pdf

Chang, K. J., Son, S. J., Lee, Y., Back, J. H., Lee, S. J., & ... Hong, C. H. (2014). Perceived sleep quality is associated with depression in a Korean elderly population. *Archives of Gerontology and Geriatrics, 59*, 468–473.

Chaves da Silva, R. A. P. (2015). Sleep disturbances and mild cognitive impairment: A review. *Sleep Science, 8*, 36–41.

Cipriani, G. C., Lucetti, S., Danti, S., & Nuti, A. (2015). Sleep disturbances and dementia. *Psychogeriatrics, 15*, 65–74.

Daglar, G., Pinar, S. E., Sabanciogullari, S., & Kav, S. (2014). Sleep quality in the elderly either living at home or in a nursing home. *Australian Journal of Advanced Nursing, 31*(4), 6–13.

Deschenes, C. L., & McCurry, S. M. (2009). Current treatments for sleep disturbances in individuals with dementia. *Current Psychiatry Reports, 11*(1), 20–26.

Eshkoor, A. S., Hamid, A. T., Nudin, S. S. H., & Mun, Y. C. (2013). The effects of social support and having a partner on sleep quality in dementia. *American Journal of Alzheimer's Disease and Other Dementias, 28*(3), 253–257.

Gibson, R., Gander, P. H., & Jones, L. M. (2014). Understanding the sleep problems of people with dementia and their family caregivers. *Dementia, 13*(3), 350–365.

Gildner, T. E., Liebert, M. A., Kowal, P., Chatterji, S., & Josh Snodgrass, J. (2014). Sleep duration, sleep quality, and obesity risk among older adults from six middle-income countries: Findings from the study on global Ageing and adult health (SAGE). *American Journal of Human Biology, 26*(6), 803–812.

Hinz, A., Glaesmer, H., Brahler, E., Loffler, M., Engel, C., Enzenbach, C., & ... Sander, C. (2017). Sleep quality in the general population: Psychometric properties of the Pittsburgh Sleep Quality Index, derived from a German community sample of 9284 people. *Sleep Medicine, 30*, 57–63.

Jirong, Y., Changquan, H., Hongmei, W., & Bi-Rong, D. (2013). Association of sleep quality and dementia among long-lived Chinese older adults. *AGE, 35*, 1423–1432.

Leblanc, M.-F., Desjardins, S., & Desgagne, A. (2015). Sleep problems in anxious and depressive older adults. *Psychology Research and Behavior Management, 8*, 161–169.

Lee, K. E., Kim, N. S., & Han, S. H. (2015). Gender difference in factors affecting quality of sleep among community dwelling elders. *International Journal of Bio-Science and Bio-Technology, 7*(1), 179–183.

Li, J., Yao, Y.-S., Dong, Q., Dong, Y.-H., Liu, J.-J., Yang, L.-S., &... Huang, F. (2013). Characterization and factors associated with sleep quality among rural elderly in China. *Archives of Gerontology and Geriatrics, 56*, 237–243.

McCurry, S. M., Vitiello, M. V., Gibbons, L. E., Logsdon, R. G., & Teri, L. (2006). Factors associated with caregiver reports of sleep disturbances in persons with dementia. *American Journal of Geriatric Psychiatry, 14*(2), 112–120.

National Institutes for Health. (2017). Sleep deprivation and deficiency. Retrieved from https://www.nhlbi.nih.gov/health/health-topics/topics/sdd/

Nebes, R. D., Buysee, D. J., Halligan, E. M., Houck, P. R., & Monk, T. H. (2009). Self-reported sleep quality predicts poor cognitive performance in healthy older adults. *Journal of Gerontology: Psychological Sciences, 64B*(2), 180–187.

Ngamjarus, C., Chongsuvivatwong, V., & McNeil, E. (2016). n4Studies: Sample size calculation for an epidemiological study on a smart device. *Siriraj Medical Journal, 68*, 160–170.

Niu, J., Han, H., Wang, Y., Wang, L., Gao, X., & Liao, S. (2016). Sleep quality and cognitive decline in a community of older adults in Daqing city, China. *Sleep Medicine, 17*, 69–74.

Oliveira, F. F., Bertolucci, P. H. F., Chen, E. S., & Smith, M. A. C. (2014). Assessment of sleep satisfaction in patients with dementia due to Alzheimer's disease. *Journal of Clinical Neuroscience, 21*, 2112–2117.

Pinidbunjerdkool, A., Saengwanitch, S., & Sithinamsuwan, P. (2014). Behavioral and psychological symptoms of dementia. *Journal of the Medical Association of Thailand, 97*(Suppl. 2), S168–S174.

Quan, S.-A., Li, Y.-C., Li, W.-J., Li, Y., Jeong, J.-Y., & Kim, D.-H. (2016). Gender differences in sleep disturbance among elderly Koreans: Hallym aging study. *Journal of Korean Medical Science, 31*, 1689–1695.

Rehman, A., Gumley, A., & Biello, S. (2018). Sleep quality and paranoia: The role of alexithymia, negative emotions and perceptual anomalies. *Psychiatry Research, 259*, 216–222.

Rose, K. M., Fagin, C. M., & Lorenz, R. (2010). Sleep disturbances in dementia: What they are and what to do. *Journal of Gerontological Nursing, 36*(5), 9–14.

Sagayadevan, V., Abdin, E., Saleha, B. S., Jeyagurunathan, A., Sambasivam, R., Zhang, Y. &... Subramaniam, M. (2016). Prevalence and correlates of sleep problems among elderly Singaporeans. *Psychogeriatrics, 17*, 43–51.

Suzuki, R., Meguro, M., & Meguro, K. (2011). Sleep disturbance is associated with decreased daily activity and impaired nocturnal reduction of blood pressure in dementia patients. *Archives of Gerontology and Geriatrics, 53*, 323–327.

Train the Brain Forum Committee Thailand. (1993). Thai Mental Status Examination (TMSE). *Siriraj Hospital Gazette, 45*(6), 359–374.

Veragiat, S., Pensuksan, C. W., Suvanchot, S. K., Yooyen, C., Chetkhunthod, P., & Sarsanas, P. (2017). Prevalence of dementia and neuropsychiatric symptoms among elderly patients attending outpatient Departments of Psychiatric Hospitals in Southern Thailand. *Walailak Journal of Science and Technology, 14*(1), 43–49.

Yan, Z., Chang-Quan, H., & Zhen-Chan, L. (2012). Association between sleep quality and body mass index among Chinese nonagenarians/centenarians. *AGE, 34*, 527–537.

Yao, K. W., Yu, S., Cheng, S. P., & Chen, I. J. (2008). Relationships between personal, depression and social network factors and sleep quality in community-dwelling older adults. *Journal of Nursing Research, 16*(2), 131–139.

Yu, J., Mahendran, R., Abdullah, F. N. M., Kua, E.-H., & Feng, L. (2017). Self-reported sleep problems among the elderly: A latent class analysis. *Psychiatry Research, 258*, 415–420.

Yu, J., Rawtaer, I., Fam, J., Jiang, M. J., Feng, L., Kua, E. H. & ... Mahendran, R. (2016). Sleep correlates of depression and anxiety in an elderly Asian population. *Psychogeriatrics, 16*, 191–195.

K.Sinsak Suvanchot is a psychiatric nurse and head of Quality Development Center, Suansaranrom Psychiatric Hospital, Department of Mental Health, Ministry of Public Health, Thailand. He graduated PhD in Research for Health Development from Chulalongkorn University. His fields of research typically focus on substance abuse and geriatric mental health problems.

Wipawan Chaoum Pensuksan is a dean of School of Nursing, Walailak University, Thailand, with a PhD in Research for Health Development from Chulalongkorn University, Thailand. She was a visiting scholar in Multidisciplinary International Research Training Program, School of Public Health, University of Washington, Seattle, USA. She currently teaches in Mental Health and Psychiatric Nursing Course and Older Adult Nursing Course, with specific expertise in sleep health promotion for the elderly patients.