

Investigation of Sleep Quality on Family Members of Patients with Cranial Nerve Disorders

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Abstract

Objective: To clarify the actual status of sleep quality in family members of patients with cranial nerve disorders (CNDs).

Methods: The study design is quantitative explorative research using a sleep quality index. The Japanese version of the Pittsburgh Sleep Quality Index (PSQI-J) was employed as the questionnaire, which was mailed to the study participants. Family members of patients with CNDs who have experienced being hospitalized in the department of neurosurgery or neurology at a university hospital that supports tertiary emergency cases participated in this study. Descriptive statistics analysis was employed, and sleep quality was calculated using the method prescribed in PSQI-J.

Results: Answer sheets with valid responses were collected from 75 of 143 participants (92.6 % valid response rate). Regarding the total sleep duration, 35 participants responded that they had five to six hours or less sleep, which consisted of the largest portion (47.9 %). The reasons for sleep difficulties included sleep interruption, toilet activities, coughing, snoring, heat, and bad dreams. Sleep quality measured by PSQI-J indicated that 30 participants were categorized in the good sleep quality group (46.2 %) and 35 were categorized in the bad sleep quality group (55.2 %), indicating that more than half of 67 participants excluding those with unknown sleep quality had bad sleep quality. The mean value and standard deviation of the PSQI-J score was 6.7 ± 3.9 , indicating that family members of patients with CNDs did not experience strong sleep difficulties. However, their sleep quality tended to degrade for approximately one month after discharge from the hospital.

Discussion: It is essential for nurses attending patients with CNDs to provide patients' family members with emotional support and appropriate hospital environment control from the start of hospitalization to reduce their concerns and anxieties.

Introduction

Cranial nerve disorder (CND) is a general term referring to organic diseases associated with the brain, spinal cord, and peripheral nerves. It presents with various symptoms, ranging from life-threatening conditions, such as impaired consciousness, circulatory dysfunction, and sensory disturbance, to complicated conditions, such as intellectual deterioration and emotional disorder. More than 100,000 new cases of cerebrovascular disease, including cerebral infarction, intracerebral hemorrhage, and subarachnoid hemorrhage, are reported to occur each year in Japan, making it the fourth most common cause of death [1]. If CND occurs in a specific site or treatment of CND is delayed, activities of daily living decrease, requiring caregiving in many cases. Family members of patients with CND frequently carry physical and psychological burdens due to long-term caregiving.

In general, family life changes if a family member has a health problem. Family members worry about the patient's prognosis and the financial burden associated with treatment. The emotional burden on family members of patients is huge. In addition, their irregular lifestyle due to caregiving results in poor sleep quality [2]. Nurse intervention plays a crucial role in supporting family members who suffer from sleep deprivation [3]. Nurses should help such family members and let them rest while taking into consideration their daily schedule. CND is a life-threatening condition and causes sequelae in many CND survivors who require long-term support from their family members. This indicates that CND is a disease that affects the physical and mental condition of patients and their family members. Several studies involving family members of patients with CND have been conducted. These include studies examining family members

of severe patients hospitalized in the ICU [4] and patients under home health care [5]. Studies have evaluated sleep quality in family members of patients, regardless of disease type. These studies involve family members of patients with dementia [6] and patients who receive emergency and critical care [7], demonstrating that sleep quality in such family members is extremely poor. Factors behind this sleep deprivation are uncertainty about the future [3] and caregiving burden [8]. In particular, family members of patients with CND may suffer from sleep deprivation for a long period of time, from patients' hospitalization to their discharge.

Sleep plays several roles, such as improving physical and mental function and repairing brain tissues. In addition, sleep quality affects not only health but also cognitive function and judgment performance [9,10]. There has been no study into the sleep quality of family members of individuals with CND, an illness that could be deadly. We believe that clarifying their sleep quality reduces their burden and encourages them to receive early support. This study aimed to clarify the actual status of sleep quality in family members of patients with CND.

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Terms Definition

CND encompasses a condition resulting from damage to the cerebral parenchyma, cerebral blood vessels, and cranial nerves. In this study, CND was defined as an organic diseases associated with the brain, spinal cord, and peripheral nerves. The organic diseases included brain tumors, cerebral vascular disorder, head injury, brain infection, spinal/spinal cord disease, degenerative/ demyelinating/ metabolic disease, and malformation.

Sleep quality was defined as a condition where participants were able to be awake, but their level of consciousness temporarily decreased. Subjective endpoints, such as sleep depth and deep sleep levels, and quantitative endpoints, such as sleep duration and the number of awakenings, evaluated sleep quality.

Method

Study Design

A Quantitative, Exploratory Study Using a Qualitative Sleep Scale

This study used the Japanese version of the Pittsburgh Sleep Quality Index (PSQI -J) to evaluate the sleep quality in family members of patients with CND [11]. Although respondents' feelings easily influence the evaluation of sleep quality, PSQI-J, a questionnaire, allows subjective and quantitative assessment of sleep quality over the past month. This questionnaire consists of sleep habits and difficulty falling asleep. The Pittsburgh Sleep Quality Index, the original version of PSQI-J, was developed by Buysse et al. [12] and has been used in a lot of clinical practice and research. Therefore, PSQI-J was used in the present study.

Participants

This study included family members of patients who were hospitalized in a university hospital designated as an altitude emergency and critical care medical center in Kanagawa Prefecture. The university hospital, a special functioning hospital, offers the initial treatment regardless of disease severity, and 30 to 40% of patients who visit this hospital are those with CND. The study site was a general ward (approximately 60 beds) where patients with CND underwent specialized care and nursing care after completing the acute treatment in the IUC of the cerebral vascular center.

Among family members of patients with CND hospitalized in the general ward, this study evaluated a family member who played an important role in caregiving after discharge. The chief nurse selected study participants based on the following criteria: A family member without mental disorder or dementia who was able to participate in the study on their own will.

Data Collection

The outline of the study was explained to the study participants, and a questionnaire was hand - delivered to them on the day before their family member was discharged. Since PSQI-J evaluates sleep quality over the past month, the study participants were instructed to complete the questionnaire one month after their family member was discharged. The completed questionnaire was recovered by mail, and the responses were digitized.

Questionnaire Items

An anonymous, self-administered questionnaire was administered. The following items were evaluated:

Attributes

In terms of items related to the study participants, we evaluated age, sex, living with the patient with CND, work, and relationship with the patient with CND. In terms of items related to the patient with CND, we assessed age, sex, types of hospitalization, length of hospital stay, disease name, treatment/care during hospitalization, and availability of home health care. The questionnaire included multiple-choice questions (with multiple responses permitted) as well as some open questions.

Items Related to Sleep Quality

Regarding sleep duration and wake-up time, actually measured time was entered. Sleep quality was evaluated using PSQI-J, which consisted of 7 items (e.g., subjective sleep quality, sleep latency, sleep duration, sleep efficiency, difficulty falling asleep, use of sleep medication, daytime dysfunction), and responses were assessed on a 4 -point Likert scale. The creator has authorized the use of this scale.

Duration of Data Collection

July 2021 to December 2021

Analysis

Descriptive statistics were used to analyze items related to the attributes of the study participants. PSQI-J is a 4-point scale questionnaire, with the total score ranging from 0 to 3 points. Regarding items related to difficulty falling asleep, "none," "once or less a week," "1 or 2 times a week," and "at least 3 times a week" were scored as 0, 1, 2, and 3 points, respectively, based on the specified calculation. Regarding items related to subjective sleep quality, "very good," "good," "poor," and "very poor" were scored as 0, 1, 2, and 3 points, respectively. Sleep quality was evaluated based on the total score of each question (0–21 points). Since the cut-off value of PSQI-J was 5.5 points, sleep quality was expressed as binary data (i.e., good group [a total score of ≤ 5 points] and poor group [a total score of ≥ 6 points]).

Ethical Considerations

This study was conducted after approval was obtained from the institutional review board to which the study representatives belong (reception number for application: 21R -072). As ethical considerations for the study participants, the outline of the study was explained verbally and in writing to them when the questionnaire was hand -delivered, and they completed the questionnaire voluntarily.

Results

The questionnaire was administered to 143 participants. Of these, 81 participants returned it (recovery rate: 56.6%), and 75 participants provided effective responses (valid response rate: 92.6%).

Attributes (Table 1)

The most common age group of the study participants was in their 60s to 70s (43 participants, 57.3%), with prime-age and late adulthood participants being overrepresented. The proportion of women was high (47 participants, 62.7%). The majority of the participants were partners (44 participants, 58.7%) and children (17 participants, 22.7%). More than half of the participants lived with the patient (58 participants, 77.3%). Approximately half of the participants worked (38 participants, 50.7%).

Table 1: Participants' Properties.

n=75

Categories	Items	Details	n	(%)
Family	Age	20–30s	2	2(2.7)
		40–50s	24	(32.0)
		60–70s	43	(57.3)
		80s and above	6	(8.0)
	Sex	Male	28	(37.3)
		Female	47	(62.7)
	Living status	Together	58	(77.3)
		Separate	16	(21.3)
		No response	1	(1.3)
	Employment status	Employed	38	(50.7)
		Unemployed	36	(48.0)
		No response	1	(1.3)
	Kinship	Spouse	44	(58.7)
		Parent	7	(9.3)
		Child	17	(22.7)
Sibling		5	(6.7)	
Other		2	(2.7)	
Patient	Age	Teenage	1	(1.3)
		20–30s	2	(2.7)
		40–50s	12	(16.0)
		60–70s	40	(53.3)
		80s and above	20	(26.7)
	Sex	Male	45	(60.0)
		Female	30	(40.0)
	Hospitalization	Less than a week	16	(21.3)
		Less than two weeks	21	(28.0)
		Less than three weeks	13	(17.3)
		One month and above	24	(32.0)
		No response	1	(1.3)
	Disease name	Brain disease		
		Cerebral hemorrhage	17	(22.7)
		Cerebral infarction	17	(22.7)
		Brain tumor	13	(17.3)
		Head trauma	6	(8.0)
		Other brain disease	2	(2.6)
		Neurologic disease		
		Spinal canal stenosis	4	(5.3)
		Intervertebral disc herniation	2	(2.6)
	Other neurologic disease	14	(18.7)	
	Hospitalization purpose (multiple answers allowed)	Surgery	49	(65.3)
Medication		40	(53.3)	
Radiation therapy		10	(13.3)	
Chemotherapy		7	(9.3)	
Rehabilitation		38	(50.7)	
Examination		3	(4.0)	
Unknown		9	(12.0)	
Service use status	No	57	(75.6)	
	Yes	18	(24.4)	

Table 2: Items regarding sleep quality in PSQI-J.

Question item	Options	n	%
How often have you experienced sleep difficulties during the past one month from reasons listed below?			
Unable to sleep within 30 minutes after getting in bed (n=75)	None	27	(36.0)
	Once or less in a week	11	(14.7)
	Once or twice in a week	18	(24.0)
	Three times and above in a week	19	(25.3)
Awake in the middle of the night or early morning (n=74)	None	21	(28.4)
	Once or less in a week	7	(9.5)
	Once or twice in a week	22	(29.7)
	Three times and above in a week	24	(32.4)
Awake for toilet activity (n=75)	None	26	(34.7)
	Once or less in a week	6	(8.0)
	Once or twice in a week	14	(18.7)
	Three times and above in a week	29	(38.7)
Having difficulty in breathing (n=72)	None	67	(93.1)
	Once or less in a week	1	(1.4)
	Once or twice in a week	3	(4.2)
	Three times and above in a week	1	(1.4)
Having coughing or loud snoring (n=74)	None	65	(87.8)
	Once or less in a week	2	(2.7)
	Once or twice in a week	4	(5.4)
	Three times and above in a week	3	(4.1)
Feeling terribly cold (n=75)	None	68	(90.7)
	Once or less in a week	2	(2.7)
	Once or twice in a week	3	(4.0)
	Three times and above in a week	2	(2.7)
Feeling terribly hot (n=75)	None	51	(68.0)
	Once or less in a week	5	(6.7)
	Once or twice in a week	12	(16.0)
	Three times and above in a week	7	(9.3)
Having bad dreams (n=74)	None	56	(75.7)
	Once or less in a week	8	(10.8)
	Once or twice in a week	7	(9.5)
	Three times and above in a week	3	(4.1)
Having pain (n=74)	None	66	(89.2)
	Once or less in a week	1	(1.4)
	Once or twice in a week	2	(2.7)
	Three times and above in a week	5	(6.8)
How do you evaluate your overall sleep quality of the past one month? (n=73)	Excellent	6	(8.2)
	Fairly good	30	(41.1)
	Fairly bad	30	(41.1)
	Terrible	7	(9.6)
How often have you taken medicine to sleep during the past one month? (n=75)	None	66	(88.0)
	Once or less in a week	4	(5.3)
	Once or twice in a week	0	
	Three times and above in a week	5	(6.7)
How often have you experienced trouble in staying awake during the past one month in situations where you must not sleep, such as while driving, having meals, or engaging in social activities? (n=75)	None	62	(82.7)
	Once or less in a week	6	(8.0)
	Once or twice in a week	3	(4.0)
	Three times and above in a week	4	(5.3)
Have you experienced trouble during the past one month in maintaining your motivation necessary to complete various tasks? (n=74)	No issue at all	28	(37.8)
	Experienced some issues	24	(32.4)
	Experienced several issues	20	(27.0)
	Experienced major issues	2	(2.7)

The proportion of the patients was slightly higher in men (45 patients, 60.0%). The most common age group was in their 60s to 70s (40 patients, 53.3%), followed by those in their 80s and above (20 patients, 26.7%), with late adulthood patients being overrepresented. More than half of the patients were hospitalized urgently (40 patients, 53.3%). The most common length of hospital stay was more than one month (24 patients, 32.0%). Approximately half of the patients experienced brain diseases, such as cerebral hemorrhage (14 patients, 18.6%), brain tumor (13 patients, 17.3%), and cerebral infarction (10 patients, 13.3%). The most common reason for hospitalization was surgery (49 patients, 65.3%), followed by medication (40 patients, 53.3%) and rehabilitation (38 patients, 50.7%). The majority of the patients did not use home health care after discharge (57 patients, 75.6%).

Items Related to the Sleep of Family Members (Table 2)

The most common sleep duration was 5 to 6 h or less in 35 participants (47.9%), followed by 6 to 7 h in 17 participants (23.3%) and 7 hours or more in 13 participants (17.8%), indicating that most of the participants were able to maintain a recommended amount of sleep for adults. However, 8 participants reported a sleep duration of 5 hours or less (10.9%). In PSQI -J, less than half of the participants responded that they were unable to fall asleep within 30 min after going to bed (27 participants, 36.0%). Nightmares, nocturnal awakenings, urinating, coughing, snoring, and high temperatures were all contributing factors to difficulty falling asleep. The proportion of the participants who responded that their sleep quality was very good was equal to those who responded that their sleep quality was very poor (30 participants, 41.1% for both). The majority of the participants (66 participants, 88.0%) did not use sleep medication. The majority of the participants responded that sleep habits did not affect their daily activities (62 participants, 82.7%). In terms of motivation for achieving a goal, the proportion of the participants who selected "no issue at all" and "some issues" was similar (28 participants, 37.8% vs. 24 participants, 32.4%).

Sleep Quality (Table 3)

Since the cut-off value of PSQI-J was 5.5 points, sleep quality was expressed as binary data (i.e., good group [a total score of ≤ 5 points] and poor group [a total score of ≥ 6 points]). The results showed that 30 participants were classified into the good group (46.2%) and 37 participants into the poor group (55.2%), indicating that more than half of the participants reported poor sleep quality (8 participants who did not respond were excluded). Furthermore, sleep quality scores fell into around the cut-off value in approximately half of the participants, with 20 participants (26.7%) being classified into 4 to 5 points (i.e., good sleep quality) and 17 participants (22.6%) being classified into 6 to 7 points (i.e., poor sleep quality). The mean score of PSQI-J with SD was 6.7 ± 3.9 points. The results indicated that sleep quality in family members of patients with CNS tended to be slightly poor during one month after discharge. However, no family member reported severe difficulty falling asleep.

Discussion

This study conducted a self-administered questionnaire, which was developed based on PSQI -J, with the aim of clarifying the actual status of sleep quality in family members of patients with CNS. According to the results, 33 of the participants (44.1%) were categorized as having good sleep quality, while 42 (55.9%) were deemed as having poor sleep quality.

Table 3: Sleep quality of family members.

n=75			
	PSQI-J score	n	(%)
Good	0-1	2	(2.6)
	2-3	8	(10.8)
	4-5	20	(26.7)
Bad	6-7	17	(22.6)
	8-9	7	(9.3)
	10-11	5	(6.7)
	12-13	3	(4.0)
	14-15	2	(2.7)
	16-17	1	(1.3)
	18	2	(2.6)
	19 and above	0	(-)
	Unknown	8	(10.7)

Cutoff value: 5.5

Approximately half of the participants (i.e., family members of patients with CNS) were partners categorized into late adulthood, which encompasses persons aged 60 years and above. This overrepresentation may be attributed to the fact that hypertension and dyslipidemia, factors contributing to CNS, frequently develop in older adults. Even after patients with CNS required caregiving, more than 70% of the family members lived with them. This result may reflect the family structure of Japan, where the aging of the population and the low birth rate are progressing. In terms of sleep, the most common duration indicated by participants was 5 to 6 hours or less. The reasons for difficulty falling asleep were nocturnal awakening, going to the toilet, coughing and snoring, high temperatures, and nightmares. The quality of normal sleep is influenced by age, sex, and lifestyle, and total sleep duration tends to be short in older adults aged 60 years and above, especially those aged in their 70s, frequently experiencing a short sleep duration of less than 6 hours [13, 14]. People aged 50 years and above frequently experience nocturnal awakening [15]. Aging caused sleep quality to be poor in family members of patients with CNS in the present study.

More than half of the participants worked (38 participants, 50.7%). A decrease in physical function is often reported as a sequela of CNS, requiring caregiving at home. Some workers have no choice but to arrange their work schedule to care for family members with CNS. Jobs play an important role in establishing the identity and sustaining the livelihood. Social interactions, such as lifestyle, jobs, and relationships with others, influence sleep. In this study, the participants arranged their work schedules to care for family members with CNS, possibly affecting their sleep quality. It was unlikely that hospitalization and onset of CNS directly affected sleep quality in family members of patients with CNS. Changes in lifestyle are burdensome for older adults. Therefore, nurses need to participate in caregiving while taking into consideration the burden on family members.

The patients with CNS in the present study ranged from 40 to 80 years old. Thirty-six percent of them had cerebrovascular disease. This age group frequently experiences subarachnoid hemorrhage (middle-aged or older age people), cerebral infarction, and cerebral

hemorrhage (older adults). More than half of the patients were hospitalized to receive surgery and medication. Because of the unexpected beginning of CNP and hospitalization, the study's participants may be fearful of losing their loved one, leading to depression and perhaps causing poor sleep quality.

The proportion of women was higher in this study. Many women play a role in caregiving for family members. However, their sleep quality tends to be poor if they have accumulated stress due to prolonged caregiving [8]. CNP tends to be more severe if it recurs. Sleep quality in family members of patients with recurrent CNP becomes poor [12]. In the present study, 12 patients (16%) were hospitalized again, suggesting that study participants may feel stressed. This accumulated stress may affect their sleep quality. If CNP occurs in a specific site, it causes complications associated with neurological disorders and secondary conditions that affect prognosis. Many patients with CNP require family member's caregiving and repeat hospital admissions. We believe that the present study highlights the need for early support to maintain good sleep quality in family members of patients with CNP who repeat hospital admissions. Suppose they suffer from sleep deprivation because they feel stressed and anxious about the future. In that case, nurses should share information with them at the appropriate time, provide emotional support, such as empathetic attitudes, and arrange family members' schedules, such as visiting hours, to relieve their stress and anxiety.

Nurses are required to examine whether sleep quality is maintained in family members of patients with CNP. To this end, they should immediately assess family members' age, developmental tasks, and family backgrounds. In addition, nurses need to share information with family members at the appropriate time, provide emotional support through empathetic attitudes, and arrange family members' schedules.

Conclusion

In terms of the sleep quality in family members of patients with CNP during one month after discharge, 30 participants (46.2%) and 37 participants (55.2%) were classified into the good group and poor group, respectively. The mean PSQI-J score was 6.7 3.9 points, indicating that their sleep quality was slightly poor.

Competing Interests

The authors declare that they have no competing interests to disclose for the presentation speaker or co-presenters in relation to this study.

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