

Quality of sleep in dialysis patients

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ABSTRACT

Background: Sleep quality is an important and determining factor in the quality of life in dialysis patients. Although many chronic dialysis patients complain of poor sleep, we know little about its related factors. Therefore, this study was designed to study sleep quality and its predictors among dialysis patients.

Materials and Methods: This was a cross-sectional study carried out during August-December 2009 in Shariati Dialysis Center, Fasa University of Medical Sciences. Data were gathered on 61 patients receiving a hemodialysis treatment. Quality of sleep was measured using the Pittsburgh Sleep Quality Index (PSQI) in dialysis patients in association with the main clinical and biochemical variables. Logistic and multiple linear regressions were used to assess predictors of sleep quality.

Findings: Forty-five subjects (73.8%) reported poor sleep quality defined as a global PSQI score > 5. As the age ($p = 0.036$) and duration of dialyses ($p = 0.022$) increased, sleep quality decreased. Significant differences were found between sex and sleep quality ($p = 0.044$). Sleep quality problems had a significant association with MCV ($p = 0.025$).

Conclusions: Poor sleep quality is a very common problem in dialysis patients. Assessment and management of sleep quality should be an important component of care giving to these patients. Large prospective longitudinal studies are needed to confirm the high prevalence of impaired quality of sleep and its related factors while controlling confounding variables.

Key words: Hemodialysis, sleep quality, Pittsburgh sleep quality index (PSQI) questionnaire, MCV, CBC

INTRODUCTION

Chronic kidney disease and end stage renal disease (ESRD) have become worldwide public health problems. The prevalence of ESRD cases in Iran was 700,000 in 2004 and its incidence rate was 173 per 100,000 people.^[1] These conditions increase patient morbidity and mortality risks and put major economic strain on the health care system.^[2]

Poor sleep quality affects many hemodialysis patients and can potentially predict their morbidity, mortality, quality

of life and pattern of medication use.^[3] The reported prevalence of poor sleep, including waking up and breathing disorders during the sleeping period and excessive sleeplessness, is in the range of 45-80%.^[4] Several studies carried out in the last 20 years have demonstrated a high percentage of sleep disorders.^[5] Similar to the general population, increased stress, anxiety, depression and worry are associated with poor sleep quality in dialysis patients.^[6] Furthermore, it has negative impacts on the immune response and can cause the development of cardiovascular disease which is the first cause of death in all patients with renal disease.^[7]

Although many chronic dialysis patients complain of sleep disorder, we know little about the associated factors. This study aimed to measure the sleep quality of dialysis patients and determine its associative factors. Nurses, more than other healthcare professionals, can address poor sleep quality in hemodialysis patients; hence, knowing these associative factors is necessary for them to help these patients acquire a healthy life.

MATERIALS AND METHODS

This was a cross-sectional study carried out during August-December 2009 in the dialysis center of Shariati Hospital, Fasa University of Medical Sciences. Fasa is located in the south-west of Iran and has about 100 thousand citizens. This city has two hospitals and a dialysis center. About 80 patients were registered and

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admitted to this dialysis center. The subjects included non-pregnant, clinically stable patients of 20 to 70 years of age from both genders. These patients were on a regular dialysis schedule for at least 6 months.

For each patient a special form was completed by a nurse during dialysis processes. This form includes demographic characteristics, laboratory values and medication profiles. Quality of sleep was measured using the Pittsburgh Sleep Quality Index (PSQI).^[8] PSQI has been previously translated into Persian, validated and frequently used in Iran.^[9,10] A Cronbach's alpha of about 0.8 was reported for this questionnaire.^[11] The questionnaire includes sleep quality, latency, duration, efficiency, and disturbance, use of sleep medication, and daytime dysfunctionality. Each component is scored from 0 to 3, yielding a global PSQI score between 0 and 21, with higher scores indicating lower quality of sleep, a score greater than 5 indicates poor sleep quality.

At the end of the dialysis process, 5 cc blood samples were taken from patients. Blood urea nitrogen (BUN) level, creatinine (Cr), albumin, calcium level (Ca), Phosphorus level (P), and hematological parameters like hemoglobin (Hb), Hematocrit (Hct), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin concentration (MCHC); were assessed. The patients were asked of the occurrence of uncomfortable factors during sleep

(snoring, sleep apnea, twitching or jerking of the legs, and confusion during sleep) in the 4 weeks prior to the study in four scales (not at all, less than once, once or two, three or more times). Dialysis information and comorbidity based on medical documentations and medicines were recorded as medical profile.

This study was approved by the research and ethics committee of Fasa University of Medical Science. Patient information was collected and his/her consent was obtained as required by the ethics committee. Data were summarized as mean (standard deviation), or frequency and percentage. Comparison of demographic factors and medical profiles among good and poor sleepers was done with chi-square test. Biochemical factors among poor and good sleepers were compared with independent t-test. Sub scores of the PSQI questionnaire were compared between male and female patients by the Mann-Whitney test and between different age groups by the Kruskal-Wallis test. The analysis was performed using the SPSS statistical software version 13 (SPSS Inc, Chicago USA). A p-value of less than 0.05 is considered as a statistically significant level.

FINDINGS

In this study 61 patients undergoing hemodialysis completed the questionnaire. Their mean age was 52.5 (SD = 18.0), and median disease duration was 16 (6 to 33) months. Other characteristics are shown in table I.

Table 1. Comparison of factors affecting sleep between good and poor sleepers

		Sleep		p-value
		Good (N = 16)	Poor (N = 45)	
Sex	Female	2 (10.0%)	18 (90.0%)	0.044
	Male	14 (34.1%)	27 (65.9%)	
	< 49	6 (28.6%)	15 (71.4%)	
Age	50-60	1 (5.6%)	17 (94.4%)	0.036
	61 >	9 (40.9%)	13 (59.1%)	
	Married	10 (22.2%)	35 (77.8%)	
Marital status	single	6 (37.5%)	10 (62.5%)	0.233
	Occupation	Unoccupied	36 (75.0%)	
	Occupied	4 (30.8%)	9 (69.2%)	
Dialysis duration	≤ 6 month	8 (47.1%)	9 (52.9%)	0.022
	> 6 month	8 (18.2%)	36 (81.8%)	
	Dialysis count per week	1	6 (50.0%)	
	2	5 (17.2%)	24 (82.8%)	0.094
	3	5 (25.0%)	15 (75.0%)	
Other comorbidity	No	9 (30.0%)	21 (70.0%)	0.510
	Yes	7 (22.6%)	24 (77.4%)	
	Hypertension	No	8 (25.0%)	
	Yes	8 (27.6%)	21 (72.4%)	
Diabetes	No	12 (27.9%)	31 (72.1%)	0.645
	Yes	4 (22.2%)	14 (77.8%)	
Loud snoring	Not	14 (41.2%)	20 (58.8%)	0.003
	Yes	2 (7.4%)	25 (92.6%)	
	Long pauses between breaths while asleep	Not	15 (30.0%)	
	Yes	1 (9.1%)	10 (90.9%)	
twitching or jerking of the legs while asleep	Not	11 (37.9%)	18 (62.1%)	0.048
	Yes	5 (15.6%)	27 (84.4%)	
	Episodes of disorientation or confusion during sleep	Not	12 (38.7%)	
	Yes	4 (13.3%)	26 (86.7%)	

Cronbach's alpha of the PSQI questionnaire was 0.734. The average of the PSQI total score in the study population was 8.4 (SD = 4.0), and 45 (73.8%) patients had poor sleep quality (PSQI total score higher than 5).

Daytime dysfunction had the highest and sleep efficacy the lowest PSQI sub scores in patients under hemodialysis (Table 2). According to the results, 27 (44.3%) patients reported loud snoring, 11 (18.0%) had sleep apnea, 32 (52.5%) had twitching in their legs and 30 (49.2%) had disorientation during sleep (Table 3).

Poor sleep had more frequency not only in female (p = 0.044) and in 50 to 60 year olds, but also in patients with a 6-month and more than 6-month dialysis history (p = 0.022). Comorbidity had no effect on the frequency of poor sleep. Loud snoring

(p = 0.003), twitching of the legs (p = 0.048), and disorientation during sleep (p = 0.025) were significant in patients suffering from poor quality of sleep (Table 1).

Sleep onset latency problem score in female patients was higher than male patients (p = 0.008), therefore, PSQI total score in female patients was higher than in male patients (p = 0.038). Patients of 50 to 60 years of age had a higher sleep disturbance problem score than other age groups (p = 0.036) (Table 2).

Hemodialysis patients with poor sleep had a higher MCV level than good sleepers (p = 0.025). There were no differences between the other biochemical factors of good and poor sleep patients. Sleep quality problem had a significant correlation with serum level of MCV (Table 4).

Table 2. PSQI total and sub scores in hemodialysis patients

	Total patients		Sex				p-value	Age						p-value
			Female		Male			< 49		50-60		61 >		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Sleep quality	1.02	0.70	1.20	0.62	0.93	0.72	0.109	1.14	0.79	1.17	0.51	0.77	0.69	0.118
Sleep onset latency	1.36	1.30	2.00	1.26	1.05	1.22	0.008	1.38	1.16	1.89	1.37	0.91	1.27	0.060
Sleep duration	1.31	1.09	1.55	1.00	1.20	1.12	0.228	1.24	1.14	1.83	0.71	0.95	1.17	0.036
Sleep efficacy	0.31	0.74	0.50	0.95	0.22	0.61	0.156	0.24	0.70	0.50	0.86	0.23	0.69	0.239
Sleep disturbance	1.61	0.69	1.65	0.49	1.59	0.77	0.488	1.38	0.67	1.89	0.58	1.59	0.73	0.033
Using sleeping medication	0.74	1.25	0.65	1.14	0.78	1.31	0.977	0.57	1.12	0.67	1.19	0.95	1.43	0.716
Daytime dysfunction	2.05	1.02	2.20	0.89	1.98	1.08	0.502	2.10	1.09	2.00	0.84	2.05	1.13	0.849
PSQI total score (0-21)	8.39	4.04	9.75	3.24	7.73	4.25	0.038	8.05	4.21	9.94	3.32	7.45	4.21	0.045

PSQI: Pittsburgh Sleep Quality Index

Table 3. Uncomfortable factors during sleep in hemodialysis patients

	Never	Less than once	Once or twice	Three or more times
Loud snoring	34 (55.7%)	5 (8.2%)	7 (11.5%)	15 (24.6%)
Long pauses between breaths while asleep	50 (82.0%)	5 (8.2%)	2 (3.3%)	4 (6.6%)
twitching or jerking of the legs while asleep	29 (47.5%)	5 (8.2%)	10 (16.4%)	17 (27.9%)
Episodes of disorientation or confusion during sleep	31 (50.8%)	7 (11.5%)	6 (9.8%)	17 (27.9%)

Table 4. Biochemical factors affecting sleep in hemodialysis patients

	Sleep				p-value
	Good (N = 16)		Poor (N=45)		
	Mean	SD	Mean	SD	
Blood urea nitrogen(mg/dl)	66.94	17.74	65.16	17.15	0.725
Creatinine(mg/dl)	8.00	1.91	7.23	2.89	0.329
Calcium(mg/dl)	8.33	1.22	8.02	0.89	0.284
Phosphorus(mg/dl)	4.91	1.10	4.86	1.01	0.852
Hemoglobin (mg/dl)	9.29	2.14	9.67	1.22	0.393
Hematocrit (%)	30.48	5.89	30.71	3.81	0.854
Mean corpuscular volume (fl)	84.30	8.44	89.31	7.15	0.025
Mean corpuscular hemoglobin (pg/cell)	26.92	3.37	28.15	2.59	0.135
Mean corpuscular hemoglobin concentration(%)	31.07	1.49	30.93	1.69	0.772
Albumin(mg/dl)	3.63	0.20	3.68	0.33	0.543

DISCUSSION

This study showed that a large amount of hemodialysis patients suffer from poor sleep. In females, of 50 to 60 years of age, lower dialysis duration and uncomfortable sleep factors may decrease sleep quality.

The prevalence of poor sleep in the present study was 73.8%. These findings were consistent with those of previous studies. In the study by Tel et al., 78.7% of the dialysis patients were found to have poor sleep quality,^[12] and in the study by Iliescu et al., 71% of hemodialysis patients experienced sleep problems.^[13] Poor sleep quality affects many hemodialysis patients and can potentially predict their morbidity, mortality, quality of life and the pattern of medication use.^[3]

These results show that dialysis patients commonly experience sleep problems and most of them have poor quality of sleep. In the present study, age of hemodialysis patients was negatively correlated with sleep quality, i.e., as age increased, sleep quality decreased. Yoshioka et al. found that advanced age affects patients experiencing sleep problems.^[14] It is important to note that the mean age of men and women diagnosed with end stage renal diseases increased from 47 to 53 years in Iran, similar to our population, in which the mean age of patients was 52.5 (\pm SD = 18.0).^[15]

In addition, the results show a correlation between the duration of hemodialysis treatment of patients and sleep quality. In this study the sleep quality in females was lower than that of males. In this respect the results of studies are varied. Some studies reported that males had more sleep problems than did females, other studies reported the reverse. Tel et al. found the same results as the current study.^[12] Hemodialysis patients in this study had more problems in their functionality during daytime, which can affect their day time alertness, activity level, the incidence of accidents and overall well-being.^[12]

Hemodialysis patients with poor sleep had a higher MCV level than good sleepers. Dikmenoglu et al. have observed that plasma viscosity is high both in the morning and in the evening in severe obstructive sleep apnea syndrome patients.^[16]

Ast reported that MCV is often a principal factor in diagnosing chronic fatigue syndrome.^[17] In the present study there was no association between the global PSQI and other clinical variables. This finding that comorbidity had no effect on the frequency of poor sleep is consistent with the results of the study by Unruh et al.^[18]

The main limitations of the present study are the lack of a suitable control group and a sample size that does not permit the meaningful evaluation of the large number of variables that can influence the quality of sleep. Large prospective longitudinal studies are needed to confirm the high prevalence of impaired quality of sleep and its associative factors while controlling confounding variables. The PSQI survey is a simple tool offering very complete information on sleep quality. Therefore, it should be encouraged in all hemodialysis patients since it presents the first step to detect poor sleepers in order to begin a more accurate procedure for early diagnosis and treatment.^[19]

CONCLUSION

The results show that the sleep characteristics of hemodialysis patients need to be routinely evaluated. In addition to medical treatment to eliminate sleep problems and increase their sleep quality, the implementation of sleep hygiene interventions could also be beneficial. These interventions include an environment with comfortable room temperature and ventilation, minimal noise, a comfortable bed and proper lighting. They should be applied to each patient's personal routine.^[20] A program that encourages exercise and smoking cessation, as well as other therapeutic methods, such as relieving pruritis and reducing bodily pain, can help patients who suffer from poor sleep quality.^[18]

Nurses, more than other healthcare professionals, can address poor sleep quality in hemodialysis patients. They should not concentrate solely on medical treatment, but should also help these patients to acquire a healthy lifestyle. Further research should focus on identifying new methods and treatment techniques aimed at improving sleep quality.

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