Restless Legs Syndrome, Sleep Quality and Fatigue in Hemodialysis Patients

Hemodiyaliz Hastalarında Huzursuz Bacak Sendromu, Uyku Kalitesi ve Yorgunluk

ABSTRACT

OBJECTIVE: Restless legs syndrome (RLS) is a common condition in hemodialysis patients and can lead to both insomnia and fatigue. This study examines the relationship between RLS, sleep quality and fatigue in hemodialysis patients.

MATERIAL and METHODS: The population of this cross-sectional study included 360 patients on hemodialysis treatment. 61 patients of study group were diagnosed with RLS due to criteria of International RLS study group. 50 patients of study group without RLS were evaluated as the control group of study. Data were collected from the patient data charts; International RLS study group criteria severity scale intended for determining the severity of RLS in patients with RLS; the Pittsburgh Sleep Quality Index(PSQI), the Epworth sleepiness scale (ESS) and the Piper Fatigue Scale (PFS) were used.

RESULTS: RLS was found in 17.8% (n=61) of patients and the mean severity score was 22.5 ± 8.1. The RLS group was found to have a PSQI score of 10.8±4.8, an ESS score of 6.5±4.3 and a PFS score of 5.8±2.4 whereas the control group was found to have scores of 6.4±3.8,3.7±3.2and 3.3±2.2 respectively (p=0.0001).

CONCLUSION: RLS associated with chronic renal failure, both increase the fatigue of patients and adversely affect the quality of sleep.

KEY WORDS: Hemodialysis, Restless legs syndrome, Sleep, Sleep quality, Fatigue

ÖZ

AMAÇ: Huzursuz bacak sendromu (HBS), hemodiyaliz (HD) hastalarında sık karşılaşılan uykusuzluğa ve yorgunluğa neden olabilen bir durumdur. Çalışmanın amacı, HD tedavisi alan bireylerde HBS, uyku kalitesi ve yorgunluk arasındaki ilişkiyi incelemektir.

GEREÇ ve YÖNTEMLER: Bu kesitsel çalışma HD tedavisi alan 360 hasta üzerinde yürütüldü. Altmış bir hastaya uluslararası HBS çalışma grubu kriterlerine göre HBS tanısı kondu. HBS tanısı almayan 50 hasta kontrol grubu olarak alındı. Verilerin toplanmasında hasta tanıtım formu, HBS tanısı alan hastalara HBS şiddetini belirlemek için uluslararası HBS çalışma grubu kriterlerine göre şiddet ölçeği, Pittsburg Uyku Kalite İndeksi (PUKİ), Ephworth Uykululuk Skalası (EUS) ve Piper Yorgunluk Ölçeği (PYÖ) kullanıldı.

BULGULAR: Hastaların %17,8'inin (n=61) HBS ve şiddet ortalamalarının ise 22,5±8,1 olduğu tespit edildi. HBS olan grupta PUKİ skoru 10,8±4,8, EUS skoru 6,5±4,3, PYÖ skoru 5,8±2,4; kontrol grubunun ölçek puanlarının sırasıyla 6,4±3,8, 3,7±3,2 ve 3,3±2,2 olduğu bulundu (p=0,0001).

SONUÇ: Kronik böbrek yetmezliğine eşlik eden HBS hem hastaların yorgunluklarını arttırmakta hem de uyku kalitesini negatif yönde etkilemektedir.

ANAHTAR SÖZCÜKLER: Hemodiyaliz, Huzursuz bacak sendromu, Uyku, Uyku kalitesi, Yorgunluk

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OBJECTIVE

Chronic kidney disease (CKD) is characterized by the progressive and irreversible loss of nephrons due to various conditions (1-3). According to the Turkish Society of Nephrology (TSN) data, 74.475 patients are under renal replacement treatment (RRT) in Turkey. Hemodialysis is the most preferred (76%) type of RRT (4). With HD treatment modality, major aim is to extend the life span of patients and to maintain a high quality of life level. Beyond this, replacement therapies might also cause some adverse effects like restless leg syndrome (RLS) (5). RLS is a disorder characterized by a feeling of discomfort in the lower extremities that forces the patient to move the legs. It may be also related to pregnancy, rheumatoid arthritis and anemia of iron deficiency (6-8). RLS is more common in dialysis patients than in the normal population, but the frequency is not certain. In studies conducted according to the International RLS Study Group criteria (IRLSSG), the prevalence of RLS in dialysis patients varies from 6.6% to 62% (9,10). It usually occurs at the onset of sleep and causes sleep deterioration by delaying it. The prevalence of sleep problems in uremic patients varies from 50% to 80% (10,11). Poor sleep quality generally associated with fatigue. Inability to adjust fluid-electrolyte disturbances, unbalanced hematopoietic functions, irregular metabolic and endocrine functions, cause significant fatigue in this patient group. The rate of fatigue in these patients varies between 60% and 97% (12). Although fatigue is a major problem for the patients, it would be underestimated by the health care teams. Fatigue affects the individual's daily life activities and decrease quality of life if it is not under control.

In this study we aimed to analyze the relationship between RLS, sleep quality and fatigue in individuals on HD treatment. Data obtained in this study can be used by nephrology services and health professionals working in dialysis units.

MATERIAL and METHODS

This was a cross-sectional study conducted in 2016 between February and May, in patients who were on HD treatment at Baskent University Dialysis Centers. A total of 360 patients were interviewed face-to-faced and the diagnosis criteria of the IRLSSG were asked: "Is there any desire to move your legs with the feeling of discomfort or unpleasant feelings in your legs?""If so, will your complaints decrease if you move your feet or sit around?""Will your complaints decrease when you move your legs or move around?" and "Are your complaints much more in the night or the day?"A total of 61 patients who answered "yes" to all of questions were diagnosed as RLS. Two patients did not want to participate in the study and one patient was excluded because of alcohol abuse, the study was conducted with 58 patients. Patients were older than 18 years and were on HD for at least six months, all were volunteered and mentally healthy. Nobody was with high body mass index (BMI<40 kg/m²); nobody used alcohol and has any acute inflammatory disease. The control group of the study consisted of 50 patients who were not diagnosed with RLS and met the inclusion criteria

for the study. A questionnaire was prepared to evaluate sleeping habits. IRLSSG -RLS severity scale was used to determine the severity. This scale consists of 10 questions and get points in each question according to severity; none (0 points), mild (1 point), moderate (2 points), severe (3 points) and very severe (4 points). Thus, a total score ranging from 0-40 is obtained. Patients with RLS grouped according to the total score, 1-10 points: mild, 11-20: moderate, 21-30: severe, 31-40 very severe. The Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep quality. PSQI is commonly used to determine the last one month's sleep quality, consists of seven items in which sleep latency, sleep duration, usual sleep activity, sleep disturbance, sleep pacemaker use and deterioration in daytime function are assessed. The response to each item is scored between 0 and 3 according to symptom frequency. Scoring is as following: 0 if none during the previous month, 1 if less than once a week, 2; once a week, 3; ≥ 2times a week. The evaluation of the sleep quality in the questionnaire was as following, very good as 0, fairly good as 1, fairly bad as 2, and very bad as 3. The global score ranged from 0 to 21 and high values indicated poor sleep quality and a high level of sleep disturbance. A global score of ≥5 evaluated as significantly worse sleep quality. The Epworth Sleepiness Scale (ESS) was used to assess the general level of daytime sleepiness. The ESS requires participants to rate the likelihood of falling asleep in eight situations on a scale from 0 (never) to 3 (high), giving a maximum possible score of 24. A score of >10 for daytime sleepiness assessment was considered as "increased daytime sleepiness". The Piper Fatigue Scale (PFS) was used in the evaluation of fatigue. The scale was developed by Piper et al. in 1987 to evaluate the multifaceted measurement model of fatigue (Integrated Fatigue Model). The PFS is composed of 22 items which are evaluated on VAS "Visual Analogue Scale", each of which is 0-10 points, with revisions made over time.

Ethics Approval from Başkent University Ethics Board and Permission of Written Authority from Headquarters of Başkent University Hospital to be able to carry out the research were obtained regarding the appropriateness and implementation of the research. Since the individual rights in the use of the human being in the research must be preserved, the 'İnformed Consent' condition was fulfilled in the light of the 'Willingness, Volunteering' principle.

In the statistical evaluation of the data, Statistical Package For Social Sciences 17 package program was used. Student's t test for differences between groups, and the chi-square method for comparing frequencies of variables were used. Statistical significance was accepted as p <0.05.

RESULTS

RLS was found in 17.8% (n=61) of patients in the study group. Fifty-eight patients who met the study criteria were included in the study as a RLS (intervention) group. 50 patients were assigned as the control group. Demographical characteristics of the patients in the study are shown in Table I.

The mean age of the patients with RLS (n = 58) was 60.43 ± 12.26 years and the mean age of the patients without RLS (n = 50) was 62.52 ± 13.21 years. The majority of patients with RLS were female (51.7%), married (82.8%), primary school graduates (32.8%), not working or unable to work due to illness (70.7% / 20.7%), incomes equal to expenses (46.2%), and living alone at home (46.6%). About 80% of the participants in both groups were taken care of by their spouses and/or daughters. There was a statistically significant difference between the groups in terms of gender (p <0.022), educational status (p <0.014), working status (p <0.038) and monthly income status (p <0.004). The difference between marital status, social security, the number of people living at home, and the presence of caregivers was not statistically significant.

Most participants were receiving four hours of HD sessions three times per week with an arteriovenous fistula and about 40% had HD for 10 years or more. However, we observed that patients in RLS group were receiving more frequent HD sessions (p=0.045). We found that 41.4% of patients with RLS had hypertension as a primary disease. 67.2% of the patients with RLS and 61.2% of the control group did not smoke. There was no statistically significant difference between the duration of HD, vascular access route, time to start HD treatment, primary disease, disease associated with kidney disease, presence of other dialysis patients in the family, and smoking status (Table I).

Anemia parameters of the investigated patients in the study are shown in Table II. There was no statistically significant difference between the blood levels of hemoglobin, iron, serum iron binding capacity and ferritin (Table II).

The sleeping habits of the investigated patients are shown in Table III. It was found that most of the participants in the RLS group had some habits that relaxes and helps them to go sleep. The use of sleeping pills was highest ın the RLS group, at a rate of 36.7%. The patients in the control group watched television at a rate of 50%.

We found that 53.4% of the patients with RLS responded "yes" to the question "Did your sleeping habits change after HD?" while 46% of the control group responded "no". For the two groups, "sleeping difficulties" was most common among sleep related problems. While 31 patients did not respond to the question "Why are you experiencing sleeping problems?" the majority of the responding patients said "unable to sleep due to illness and HD". Almost none of the participants in both groups were not trained to deal with sleeping problems. There was a statistically significant difference between the groups in terms of the change of sleeping habit after HD treatment (p =0.0001).The mean IRLSSG -RLS severity scale score was 22.5 ± 8.1. 43.10% of the patients had severe, 31.03% had moderate, 17.24% had very severe, and 8.63% had mild RLS scores (Figure 1).

In Table IV, PSQI global score and its component scores were summarized. In the RLS group, the mean score of the components and therefore the PSQI global score (10.8 ± 4.8)
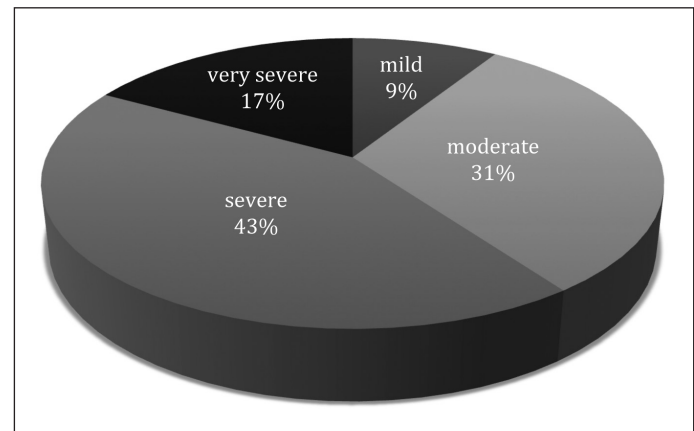

Figure 1: *RLS Severity in Patients with RLS.*

were statistically higher than the non-RLS (6.4 ± 3.8) group. And the sleep quality in the RLS group was worse (P = 0.0001) (Table IV). Also in the RLS group sleepiness rate was higher than the control group.

Table V show the mean scores of ESS and PFS of the patients. The ESS scores (6.5 ± 4.3) of patients with RLS were higher than those without RLS (3.7 ± 3.2) and the difference between them was statistically significant (p = 0.0001). Patients with RLS had higher PFS score (5.8 ± 2.4) than those without RLSS (3.3 ± 2.2), and the difference was statistically significant (p = 0.0001; Table V).

DISCUSSION

In individuals receiving HD treatment, RLS is seen at varying frequencies. In our study RLS prevalence was 17.8% (61 patients) according to IRLSSG criteria and 60% of these patients had severe RLS symptoms. Similar to our study, Beladi-Mousavi and colleagues found a prevalence of 15% in a group of 139 HD patients and 50% of these patients had severe symptoms (13). The majority of patients with RLS (51.7%) were female in our study. Studies in the literature show similarity to this result and it is stated that female gender is a risk factor for RLS (14-16).

While there was a significant relationship between HD frequency and RLS in our study, there was no relationship between the duration of HD and the primary kidney disease. According to our knowledge there is no study in literature that reports any relationship between primary disease, HD frequency and HD duration with RLS (17, 18).

It is stated in the literature that iron deficiency and accompanying anemia are important risk factors for RLS. Mao and et al. found that reduced hemoglobin / iron levels were major risk factors in dialysis patients with RLS. But in our study there was no statistically significant difference between the blood hemoglobin, iron, serum iron binding capacity and ferritin levels and RLS (19).

Table I: Demographic characteristics of the study group.

	RLS Group (n=58)	Control Group (n=50)	
	Number (n) Percentage (%)	Number (n) Percentage (%)	**P**
Age (min-max)	60.43 ±12.26 (24-84)	62.52 ±13.21 (25-83)	0.080
Gender			
Female	30 (51.7)	15 (30.0)	0.022
Male	28 (48.3)	35 (70.0)	
Marital Status			
Married	48 (82.8)	41(82.0)	0.918
Single	10 (17.2)	9(18.0)	
Education			
Literate	15 (25.9)	4 (8.0)	
First School	19 (32.8)	21 (42.0)	0.014
High School	13 (22.4)	6 (12.0)	
Collage and over	11 (19.0)	19 (38.0)	
Working Condition			
Working	5 (8.6)	7 (14.0)	
Not working	41 (70.7)	40 (80.0)	0.038
Not working because of disease	12 (20.7)	3 (6.0)	
Social Security			
Health card	6 (10.3)	6 (12.0)	
Retirement Fund	16(27.6)	22 (44.0)	0.188
The Self-Employed	23(39.7)	11 (22.0)	
Social Security Institution	13 (22.4)	11 (22.0)	
Monthly Income			
Less Income than Expense	19 (32.8)	4 (8.0)	
Income equal to expense	31 (53.4)	32 (64.0)	0.004
More Income than expense	8 (13.8)	14 (14.0)	
Number of People Living at Home			
Alone	3 (5.2)	4 (8.0)	0.580
Two	27 (46.6)	26 (52.0)	
Three - Five	24 (41.4)	19 (38.0)	
Six and over	4 (6.9)	1 (2.0)	
Is there any interest in care?			
Yes	46 (79.3)	39 (78.0)	0.868
No	12 (20.7)	11 (22.0)	
Hemodialysis frequency			
3 sessions per week	53 (91.4)	41 (82.0)	0.045
2 sessions per week	2 (3.4)	8 (16.0)	
1 sessions per week	3 (5.2)	1 (2.0)	
Hemodialysis Length			
3 hours	3 (5.2)	3 (6.0)	0.851
4 hours	55 (94.8)	47 (94.0)	
Vascular Entry Path			
Arteriovenous Fistula	51 (87.9)	38 (76.0)	
Arteriovenous Graft	2 (3.4)	1 (2,0)	0.141
Vascular Catheterization	5 (8.6)	11 (22.0)	

Table I continue

Time to Start Hemodialysis Treatment			
6 months-1 year	6 (10.3)	7 (14.0)	
2-3 years	12 (20.7)	15 (30.0)	
4-6 years	16 (27.6)	8 (16.0)	0.578
7-9 years	1 (1.7)	1 (2.0)	
10 years and over	23 (39.7)	19 (38.0)	
Primary Disease			
Diabetes Mellitus	14 (24.1)	14 (28.09)	
Hypertension	24 (41.4)	14 (28.0)	0.501
Glomerular Diseases	2 (3.4)	3 (6.0)	
Cystic Kidney Diseases	8 (13.8)	8 (16.0)	
Other	9 (15.5)	8 (16.0)	
Other therapies were implemented before Hemodialysis started?			
Yes	8 (13.8)	6 (12.0)	0.782
No	50 (86.2)	44 (88.0)	
Co-morbid Disorders			
Yes	43 (57.3)	32 (64.0)	
No	15 (45.5)	18 (36.0)	0.254
Do you have family member on Hemodialysis treatment?			
Yes	5 (8.6)	7 (14.0)	
No	53 (91.4)	43 (86.0)	0.375
Smoking			
Yes	9 (15.5)	4 (8.2)	
No	39 (67.2)	30 (61.2)	0.186
Quit	10 (17.2)	15 (30.6)	

* Chi-square test was used to compare data.   **RLS:** Restless leg syndrome.

Table II: Anemia parameters of study group.

		n	Mean±Std. Deviation	p
Hemoglobin	RLS Group	58	11.3±1.31	0.221
	Control	50	11.0±1.27	
Iron	RLS Group	51	58.7±24.92	0.660
	Control	48	56.3±28.01	
Serum Iron Binding Capacity	RLS Group	50	131.1±65.73	0.281
	Control	48	144.2±53.40	
Ferritin	RLS Group	52	437±308	0.900
	Control	48	433±270	

* Data were expressed as mean ± standard deviation. * Student t test was used to compare data.   **RLS:** Restless leg syndrome.

Daytime fatigue, sleep problems and depression can be observed with the moderate to severe level of RLS. In our patient group, mean IRLSSG -RLS severity scale score was found as 22.5 ± 8.1 (severe RLS). 43% of the patients were found to have severe, 32% to moderate, 17% to very severe and 8% to have mild RLS. In the study performed by Chavashi and colleagues, the PSQI score above 8 was excepted as poor sleep quality and 76.2% of the RLS patients were found to have poor sleep quality.

In our study, the PSQI score above 5 was excepted as poor sleep quality and 80.4% of the RLS patients had worse sleep quality with 10.8 ± 4.8 of the PSQI global score (14, 20). Similar to our study, in a study conducted by Arauja and colleagues with patients with RLS (PSQI> 5), the PSQI score was found to be 10.07 ± 6.90 (15). These results indicate that patients who undergo dialysis treatment experience chronic sleep disorders.

Table III: Sleep habits of the study group.

	RLS Group(n=58)	Control Group (n=50)	
	Number (n) **Percentage (%)**	**Number (n)** **Percentage (%)**	**P**
Do you have any habits that comfort you before you fall asleep?			
Yes	19 (32.8)	10 (20.4)	0.215
No	39 (67.2)	39 (79.6)	
** If so, what are your habits?			
I take a hot shower	1 (5.3)	0 (0.0)	
Getting up and running	4 (21.1)	3 (30.0)	0.122
Watching Television	6 (31.6)	5 (50.0)	
Reading books	3 (15.8)	3 (30.0)	
I have something warm	2 (12.5)	1 (10.0)	
I take a sleeping pill	7 (36.7)	1 (10.0)	
Did your sleeping habits change after hemodialysis?			
Yes	31(53.4)	19 (38.0)	0.0001
No	6 (10.3)	23 (46.0)	
Partly	21 (36.2)	8 (16.0)	
** What are the problems you have with sleeping?			0.500
I can not sleep at all	6 (11.5)	4 (14.9)	
I am having difficulty falling into sleep	23 (44.2)	11 (40.7)	
I wake up often	20 (38.5)	10 (37.0)	
I have trouble getting up	8 (15.4)	4 (14.9)	
I am asleep during the day	2 (3.9)	3 (11.1)	
My sleep hours changed	3 (5.8)	2 (7.4)	
I wake up very early	9 (17.3)	1 (3.7)	
Have you been trained to deal with sleeping problems?			
Yes	4 (6.9)	2 (4.0)	0.024
No	54 (93.1)	48 (96.0)	

* Chi-square test was used to compare data. * Data expressed in %. ** Some participants responded more than one time. **RLS:** Restless leg syndrome.

Table IV: Pittsburgh Sleep Quality Index, Global Score and Component Score Averages of study group.

	RLS Group (n=58)	Control Group (n=50)	p
Subjective sleep quality (Component 1)	1.7±0.9	0.9±0.7	0.0001
Sleep latency (Component 2)	1.8±0.9	1.2±0.8	0.001
Sleep duration (Component 3)	1.4±1.2	0.9±1.0	0.018
Conventional sleeping activity (Component 4)	1.2±1.1	0.7±1.1	0.018
Sleeping disorder (Component 5)	1.9±0.8	1.5±0.5	0.006
Use of sleeping pills (Component 6)	0.8±1.2	0.2±0.7	0.007
Daytime function Impairment (Component 7)	1.7±0.8	0.7±0.9	0.0001
Global Score	10.8±4.8	6.4±3.8	0.0001

* Data were expressed as mean ± standard deviation. * Student t test was used to compare data. **RLS:** Restless leg syndrome.

Table V: Epworth Sleepiness Scale and Piper Fatigue Scale Score Average of the study group.

	RLS Group(n=58)	Control Group (n=50)	p
Epworth Sleepiness Scale Score	6.5±4.3	3.7±3.2	0.0001
Piper Fatigue Scale Score	5.8±2.4	3.3±2.2	0.0001

RLS: Restless leg syndrome.

Sleep is an indispensable necessity for life since it has vital for sustaining health and productivity (21). For this reason, it is important to question whether there are sleep problems in uremic patients to take necessary precautions. In our study, "sleeping difficulty" was the leading sleeping problems experienced by the patients in both groups. Sleep latency in the PSQI was found to be significantly higher (1.8±0.9) than in those without RLS. In the study of Rohani and his colleagues, it is stated that the RLS group had difficulty in falling asleep. It was found that the most of the participants in the RLS group with habits that relaxed them before hibernation helped them to sleep. Using sleeping pills rate was 36.7% as the highest rate in this group. And as a component of PSQI, using sleeping pill was found to be significantly higher (0.8±1.2) than those in patients without RLS. In the study of Rohani et al., it was noted that 68.8% of patients used sleeping pills in RLS group. Contrary to our study, Colbay et al. reported that only 6.3% of dialysis patients with RLS were taking sleeping pills (17,22). These results show that sleep quality of HD patients is bad and this condition is further exacerbated by accompanying RLS. As health professionals, we must inform our patients with sleep problems primarly about non-drug treatment methods to resolve sleep problems. It is stated that, the initial treatment approach in sleep disorders (according to the 2014 treatment guide) should be control of the determined causes of insomnia, regulation of sleep-wakefulness and sleep hygiene education (23). Sleep hygiene education aims to (24,25) avoid individual behaviors that usually affect or inhibit normal sleep patterns or encourage behaviors that promote good sleep. Since 94.4% of the patients in our study did not informed about sleep problems, our priority should be to train for sleep hygiene. In addition, daytime short sleep habits are frequently observed, since HD patients are not able to achieve effective sleep at night. In our study group, mean ESS score was determined as 6.5±4.3. Science ESS score ≥10 was considered to be "increased daytime sleepiness", the patient group with RLS have high daytime sleepiness ratio in respect to control group. Similarly, in the study of patients with end stage renal disease, Araujo and colleagues found that mean ESS score was 8.37±4.67, and also significantly higher than the control group (15). The daytime sleepiness negatively affects the sleep quality and the daily activities of the people. For this reason, patients should be informed that they should avoid daytime sleeps and if they have to take a nap it should be kept less than an hour and that these daytime sleeps should not be after three pm.

Fatigue is a symptom that is commonly experienced by patients with end-stage renal failure. In the literature, fatigue is seen at a rate of 60-97% patients in different races who have received dialysis treatment (12). In our study, PFS scores (5.8±2.4) of patients with RLS were significantly higher than those without RLS (3.3±2.2). When we asked patients the cause of their fatigue, the most common answers were "disease" and "dialysis". This can cause fatigue not to be reported as a problem by patients since it is regarded as a normal result of illness and dialysis. Wang and colleagues in their study investigated fatigue and related factors in dialysis patients, and found that fatigue was associated with sleep and it affected the individuals' quality of life (26). Patients should be also informed about fatigue symptoms to not underestimate its related reasons.

The limitation of this study is that it was carried out at one center.

CONCLUSION

Restless legs syndrome accompanying chronic kidney disease both enhances the fatigue symptoms of individuals and affects sleep quality negatively. It is therefore important to educate the HD patients to strength self-management and to regulate sleeping habits for eliminating the related sleeping and fatigue problems.

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