Relationship between Fatigue and Physical, Psychological and Situational Factors in Hemodialysis Patients

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Address: Golestan University of Medical Science, Gorgan, Iran
Received: 28 Aug 2016
Revised: 29 Aug 2016
Accepted: 8 May 20217

Background: Fatigue is among the most common complications for hemodialysis patients. The theory of unpleasant symptoms is associated with fatigue in hemodialysis patients. According to this theory, fatigue has three physical, mental and situational factors. Considering this theory, we aimed to determine some factors related to fatigue in hemodialysis patients.

Methods: In this descriptive-analytical study, of 165 hemodialysis patients admitted to Panje Azar Medical and Educational Center in Gorgan, Iran, 58 eligible ones were randomly selected. Data was collected using demographic information questionnaire, Fatigue Severity Scale, Beck Anxiety Inventory and Beck Depression Inventory. Data analysis was conducted in SPSS 17, using Mann-Whitney, Kruskal-Wallis and Spearman's rank correlation coefficient tests.

Results: The mean fatigue in all patients was 4.76 ± 1.66 out of 7. Fifty-two patients (89.7%) suffered from some degree (mild to severe) of anxiety and 43 patients (74.1%) suffered from some degrees (mild to severe) of depression. Fatigue only had a direct relationship with psychological factor [anxiety ($P = 0.006$, $r = 0.353$, and depression ($P < 0.001$, $r = 0.525$)].

Conclusion: Considering the high prevalence of fatigue among hemodialysis patients and associated factors, care providers are advised to identify high-risk individuals through conducting periodic psychiatric examinations and to promote their knowledge on available strategies to reduce adverse effects in these patients.

Keywords: fatigue, anxiety, depression, hemodialysis

This paper should be cited as Royani Z, Roohi GH, Sabzi S, Mancheri H, Mollaei E. Relationship between Fatigue and Physical, Psychological and Situational Factors in Hemodialysis Patients. Journal of Research Development in Nursing & Midwifery. 2017;14(2):65- 71.

Introduction

Chronic kidney disease (CKD) is a progressive and irreversible disorder disabling kidneys to excrete metabolic wastes and maintain fluids and electrolytes that eventually d leads to uremia. The prevalence of CKD is increasing. More than 1.5 million people worldwide live through hemodialysis, peritoneal dialysis and kidney transplantation and the number is predicted to double in the next decade (2). In Iran, according to the latest statistics provided by the association of nephrology, more than 16,000 patients are currently undergoing hemodialysis (3). Hemodialysis reduces the symptoms of advanced chronic kidney disease; however, it will not ultimately change the natural course of the underlying disease and would not completely replace the kidney. It produces various problems and complications for suffered patients (4). Fatigue is the most common problem in people with chronic diseases, including those with kidney disease who require preservative hemodialysis (5, 6). Fatigue is defined as severe exhaustion due to lack of energy or extreme fatigue with strong desire for rest or sleep (7). The American Nursing Diagnosis Association (NANDA) defined fatigue as an overwhelming sustained sense of exhaustion and decreased capacity for mental and physical work (8).

Because of the gradual trend of fatigue, many patients will adapt to lower levels of energy. However, they are unaware of the severity of the damage and may think that fatigue is a natural element in CKD or in its treatment process. If the nurse does not ask about fatigue, the patient usually will not talk about it and it will remain unknown (9). Several factors may lead to fatigue in End Stage Renal Disease (ESRD) patients. They include physical diseases, anemia, malignancy, bad nutrition, advanced heart disease and infection (10), drugs and their complications, nutritional deficiencies, physiological changes (especially abnormal urea and hemoglobin levels), hemodialysis-related issues (low sodium dialysis solution and high-speed ultrafiltration) and psychological factors such as depression and sleep disorders (11).

Several theories have been presented on fatigue and the theory of unpleasant symptoms is the one introduced by Lenz et al (12). This is an invaluable theory in discovering factors affecting fatigue symptoms in patients with CKD. These factors include physical, psychological and situational variables (13). McCann and Boore (2000) studied fatigue in hemodialysis patients within the framework of this theory. They found that fatigue had significant relationships with physical and psychological variables in these patients; as with increasing fatigue, physical problems such as sleep disorders, joint pain, itching and headache increased in these patients. Fatigue also had significant relationships with anxiety and depression (14). Goodman (2005) also found that fatigue had significant relationships with physical (anemia and malnutrition), situational (social support) and psychological variables (anxiety and depression) (15). In Iran, Asadi and Royani (2014) also investigated this issue and found that fatigue had significant relationships with psychological (depression) and situational factors (social support) (16). Fatigue is a multi-dimensional concept and understanding its different aspects will help nurses to better plan and implement fatigue relief strategies in hemodialysis patients. Therefore, this study was conducted to investigate the relationship between fatigue and physical, psychological and situational factors in hemodialysis patients admitted to the Hemodialysis Center in Gorgan, Iran.

methods

In this descriptive-analytical study, the study population was all hemodialysis patients admitted to Panje Azar Medical and Educational Center, Gorgan. The inclusion criteria were following : to have a record of hemodialysis at Panje Azar Center, no history of mental disabilities, good listening and speaking abilities to answer questions, no history of common psychiatric diseases, no history of hospitalization in psychiatric wards and performing hemodialysis at least 2 times a week, 4 hours each time.

Of 165 hemodialysis patients, 58 eligible ones were randomly selected. The sample size was determined (n= 58) based on the study of

Sajadi et al. (9). After providing necessary explanations for patients and ensuring them about the confidentiality of their information, they signed informed written consent forms and entered the study. Data was collected after obtaining permission from the Ethics Committee and conducting coordination with the authorities of Hospital. Fatigue Severity Scale was used to measure fatigue. This scale merely evaluates the concept of fatigue. The reliability of the Persian version of this tool has been evaluated by Rasooli and Zakeri Moghadam with Cronbach's alpha coefficients of 0.88 and 0.91, respectively. In addition, its content and face validity have been confirmed by Schneider and Zakeri Moghaddam. This scale contains nine questions rated with a 7-point Likert scale (1: no fatigue, 2-4: moderate fatigue and above 4: severe fatigue) (17, 18 and 19). Used variables and tools include:

Physical variables: The physical variables studied in this study related to the pathology of CKD included anemia, systolic blood pressure, the overweight of two dialysis sessions and a history of dialysis. Hemoglobin levels were used to measure anemia (14). To measure anemia, blood samples were collected and all samples were sent to a center and cell counter Hema Screen 13 was used to determine Hemoglobin levels. Blood pressure levels were measured using an adult sized BP gauge, calibrated with a mercury device. Participants' weights were measured using a digital balance with an accuracy of 500g.

Psychological variables: Beck Anxiety Inventory and Beck Depression Inventory were used to assess psychological variables (14). This inventory contains 21 items based on a 3-point Likert scale (0-7: no anxiety, 8-15: mild anxiety, 16-25: moderate anxiety and 26-63: severe anxiety). The validity and reliability of the Beck Anxiety Inventory have been confirmed by Kaviani and Mousavi. The validity of the inventory has been evaluated using interview approach by two evaluators and with a quantitative grading as r= 0.72 with a reliability of r= 0.83 and an internal consistency of α= 0/93 (20). Beck Depression Inventory-short form was used to measure depression. This inventory contains 13 questions and 4 points on a 4-point Likert scale (the total scores between 0-3: normal, 4-7: mild depression, 8-11: mild to moderate depression, 12-15: moderate depression and 15-39: severe depression). This tool has already been used in various studies and its validity and reliability have been calculated (21).

Situational variables: To assess the situational variables, factors such as gender, age, employment status and marital status were measured (14).

The questionnaires were provided to the patients. The patients completed the questionnaires and in the case of illiteracy, the patients were questioned and the researcher himself completed the questionnaires. Data was analyzed in SPSS 17. The normality of data was measured using Shapiro-Wilk Test and since data had a normal distribution, Mann-Whitney, Kruskal-Wallis and Spearman's rank correlation coefficient tests were used for data analysis.

Results

The mean age of the participants was 53.32 ± 17.46. Fifty percent of the patients (n=29) were female. The mean fatigue in all patients was 4.76 ± 1.66, indicating high fatigue levels in these patients. Twenty-four point one percent (n=13) suffered from moderate fatigue and 69% (n= 40) suffered from severe fatigue. Those with systolic blood pressure levels between 120-140 mm Hg, dry weight above 3 kg, a history of treatment for 13-36 months and hemoglobin levels between 12-14 g/dl suffered from higher levels of fatigue compared to the others; however, no statistically significant difference was observed (Table 1).

Table 1: The mean fatigue in hemodialysis patients on the basis of systolic blood pressure levels, dry weight, hemoglobin levels and history of dialysis treatment

The mean fatigue was not significantly different in both genders. Fatigue levels were higher in patients aged 40-49 and above 70 years compared to others; however, there was no significant relationship between different age groups and fatigue. The marital status also had no significant relationship with fatigue in these patients. Eighty-nine percent of the patients (n= 52) were unemployed. The

employed patients had also experienced insignificant levels of fatigue (Table 2).

Table 1: The mean fatigue in hemodialysis patients on the basis of systolic blood pressure levels, dry weight, hemoglobin levels and history of dialysis treatment

Criterion Statistics		Number	Mean±Sd	Sig.
Systolic blood pressure levels	> 120 mm Hg	18 (0.31)	4.72±1.48	0.67
	120-140 mm Hg	25 (43.1)	4.63±1.68	
	140-160 mm Hg	14 (24.13)	5.07±1.51	
	> 160 mm Hg	1 (1.72)	4.44±0	
History of dialysis treatment	6-12 months	13 (22.4)	4.47±2.06	0.74
	13-36 months	27 (46.5)	5.51±1.19	
	37-72 months	17 (29.3)	4.51±1.9	
	> 73 months	1 (1.72)	3.44±0	
Dry weight	< 1 kg	5 (8.62)	3.86±1.71	0.36
	1-3 kg	44 (75.8)	4.82±1.67	
	> 3 kg	9 (15.5)	4.96±1.58	
Hemoglobin levels	<12 g/dl	5 (8.62)	4.55±1.48	0.75
	12-14 g/dl	19 (32.7)	5.05±1.45	
	> 14 g/dl	34 (58.6)	4.63±1.80	

Table 2: The mean fatigue in hemodialysis patients on the basis of gender, age, marital status, job, education and income

Criterion Statistics		N(./.)	Mean±Sd	Sig.
Gender	Female	29 (50)	4.59±1.49	0.18
	Male	29 (50)	4.93±1.82	
Age	< 29	7 (12)	4.72±1.8	0.9
	30-39	8 (13)	4.86±1.79	
	40-49	5 (8.6)	3.93±1.75	
	50-59	13 (22.4)	4.9±1.64	
	60-69	14 (24.1)	4.76±1.72	
	> 70	11 (18.96)	4.91±1.65	
Marital status	Married	40 (68.9)	4.97±1.57	0.36
	Single	8 (13.79)	4.34±1.49	
	Divorced	3 (5.17)	3.92±1.6	
	Widow	7 (12.06)	4.39±2.37	
Job	Unemployed	52 (89.6)	4.85±1.64	0.15
	Employed	6 (10.4)	3.94±1.68	
Education	illiterate	25 (43.1)	4.96±1.73	0.68
	Elementary	12 (20.6)	4.89±1.48	
	Middle school	6 (10.3)	4.38±2.21	
	High school	13 (22.4)	4.59±1.34	
	University	2 (3.4)	3.61±3.06	
Income	Adequate	39 (67.24)	4.88±1.54	0.59
	Inadequate	19 (32.7)	4.52±1.89	

Ninety-three point three percent of the patients (n= 52) suffered from some degrees of anxiety, of which 29.5% suffered from mild anxiety and 44.8% moderate anxiety and 19% suffered from severe anxiety. In terms of depression, 43 (74.1%) suffered from some degree (mild to severe) of depression, among which 12.1% suffered from mild depression, 19% mild to moderate, 13.8% moderate and 6.9% suffered from severe depression (Table 3).

Table 3: The relationship between the mean fatigue with anxiety and depression in hemodialysis patients

Criterion Statistics	N (./.)	The mean fatigue	SD	Sig.
Anxiety	15 (25.9)	3.8	1.69	P≤0.001 R=0.52
	7 (12.1)	3.9	1.65	
	11 (19)	4.9	1.48	
	8 (13.8)	5.2	0.96	
	17 (29.3)	5.04	1.65	
Depression	6 (10.3)	3.9	2.08	P=0.006 R=0.35
	15 (25.9)	4.1	1.89	
	26 (44.8)	4.9	1.25	
	11 (19)	5.6	1.63	

There was no significant relationship between physical variables (anemia, systolic blood pressure, the overweight of two dialysis sessions and history of dialysis treatment) and fatigue; however, fatigue had a direct relationship with psychological variables

[Anxiety ($P = 0.006$, $r = 0.353$, and depression ($P < 0.001$, $r = 0.525$)].

Discussion

This study utilized Lenz' theory of unpleasant symptoms to investigated factors affecting fatigue in CKD patients. Based on this theory, in hemodialysis patients, fatigue is influenced by physical, psychological and situational factors (12). The results of this study revealed high fatigue levels in patients, as 69% of them suffered from severe fatigue. Several studies confirm severe fatigue in hemodialysis patients. In Goodman's study conducted on 36 African-American women undergoing hemodialysis in the U.S., 75% fatigue prevalence was reported (15). Melagho in Turkey also reported high fatigue levels in hemodialysis patients (6). In the study of Sajadi et al. on hemodialysis patients, 60% of the patients suffered from severe fatigue and the total mean fatigue was 5.1 (9).

Although fatigue is mentioned as an indication of anemia (22), there was no significant relationship between physical variables (anemia, systolic blood pressure, dry weight and history of dialysis) and fatigue. In some studies, including the study of McCann and Bor, there was no significant relationship between fatigue and anemia; however, in Goodman's study, this relationship was reported as significant (14, 16). The reason for these differences is calculating the level of hemoglobin in the menopausal state; as the National Kidney Foundation has proposed hemoglobin levels of 12.5 g/dl and 11 g/dl for post and pre-menopausal states, respectively (15). According to the results of the above studies, it seems that fatigue can occur even in the absence of anemia; Anemia alone is not a reliable factor in measuring patients' fatigue levels and other physiological factors such as malnutrition as well as psychological causes such as depression are effective in the incidence of fatigue.

History of dialysis directly affects fatigue in hemodialysis patients (6). However, it did not affect fatigue in the present study. McCann and Bor also did not mention any significant

relationship (14) and this is consistent with the present study. There was no significant relationship between systolic blood pressure levels and dry weight with fatigue and this is consistent with the findings of some studies (9 and 23).

A significant relationship was observed between fatigue and anxiety and depression levels. Many studies have reported similar results (14, 15, 16 and 24). McCann and Bor reported higher prevalence of depression (14); however, Goodman reported higher prevalence of anxiety that is consistent with the present study (15). In the present study, more than 74% of patients suffer from some degree of depression. Several factors can result in high prevalence of this disorder in patients. The existence of various social and economic stressors, including the possibility of job loss, financial problems, nutritional limitations, marital problems, long-term use of certain drugs and ultimately the incurable nature of the disease are the factors leading to depression. Depression is among the major causes of fatigue in hemodialysis patients and on the other hand, hemodialysis patients are susceptible to conditions such as anxiety and depression (14); thus, this significant relationship is justified.

There was no significant relationship between fatigue and situational factors. McCann and Bor also observed no significant relationship between fatigue and situational factors in hemodialysis patients (14). However, Asadi et al. reported a significant relationship between fatigue and situational factors. This difference may be due to the different tools used to measure situational factor (social support) in two studies (16). Most studies have reported significantly higher levels of fatigue in women compared to men (6, 24); however, in this study no significant difference was observed between the two genders. Several studies have reported significant relationship between fatigue and higher ages in hemodialysis patients (24 , 6); however, in this study there was no significant difference between different age groups in terms of fatigue , and fatigue levels were higher in patients aged 40-49 and above 70 years. This suggests that fatigue can affect hemodialysis patients at any age.

Patients' spouses can support them and can be effective in reducing stress, adaptation to chronic disease and adherence to special diets (25); however, marital status was not significantly related to fatigue in this study. Some other studies also found no significant relationship and this is consistent with the findings of the present study (9, 16).

There was no significant difference between employed and unemployed patients in terms of fatigue levels. Most studies have mentioned no significant relationship between employment status and fatigue (26, 27). In this regard, Hadian states that due to the disease and treatment-related fatigue, these patients gradually develop depression and finally lose their job. After losing their job, most of them become poor and this will lead to depression and fatigue in these patients.

Conclusion

The present study showed that fatigue is a serious problem in hemodialysis patients. Identification of high-risk individuals like those with depression and anxiety disorders, through conducting periodic psychiatric examinations is effective in reducing fatigue levels in these patients. In addition, it seems necessary to increase the knowledge and education of patients in the area of fatigue management and to provide practical instructions for energy conservation and self-care.

Acknowledgment

Hereby, the authors of this article would like to express their gratitude and appreciation to the Research Deputy of Golestan University of Medical Sciences for financing this research and authorities and personnel of the Hemodialysis Department of Panje Azar Medical and Educational Center for their kind and sincere cooperation and supports. This article is compiled based on the research project No. 911215150, approved in the 364th meeting of Research Council of Golestan University of Medical Sciences and approved in the 31th meeting of Regional Ethics Committee on March 17, 2013.

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