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Exploring the Relationship Between Fatigue Severity and Clinical Parameters in Hemodialysis Patients Utilizing FACIT-F Scale: A Cross-sectional Study in West Bank Hospitals

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Abstract

Fatigue is one of the most common symptoms experienced by patients with End-Stage Renal Disease (ESRD) and it can be defined as weakness, exhaustion, incapacitating, and disorder. The purpose of this cross-sectional study is to determine the correlation between fatigue severity and key clinical parameters in hemodialysis patients in West Bank hospitals. 62 adult dialysis patients were evaluated for fatigue severity using the Functional Assessment of Chronic Illness Therapy - Fatigue Scale (FACIT-F). Demographic information, health behaviors, and clinical characteristics were gathered. The findings demonstrated a strong negative association between fatigue severity and hemoglobin levels (r=-0.319, p=0.023), emphasizing the role of low hemoglobin levels in increasing fatigue. There were no significant relationships between weariness and serum creatinine, phosphorus, or calcium levels. These findings emphasize the necessity of monitoring and treating hemoglobin levels in dialysis patients' tiredness management, pointing to further research and viable therapies.

Keywords: End Stage Renal Disease. Chronic Kidney Disease. Fatigue. Hemodialysis. Clinical Parameters. Quality of Life.

Introduction

In the end stage of renal disease, fatigue increased and became one of the main symptoms that the patient suffers from, which was associated with lack of sleep and depression, and other factors had appeared in previous studies such as cardiovascular disease and its association with the rate of low hemoglobin in the blood. In End-Stage Renal Disease (ESRD) patients who receive hemodialysis the daily activity living affects and suffers from fatigue which reflects in their relationship with quality of life and physical activity. In this study, we would like to find the correlation between fatigue in patients with end-stage renal disease and clinical parameters **[1,2]**.

Fatigue is one of the most frequently reported symptoms experienced by patients with End-Stage Renal Disease (ESRD) and it can be defined: as

weakness, exhaustion, incapacitation, and disorder. Living with fatigue places extra burdens on individuals and can affect negatively their quality of life, disability, and mortality. End-stage renal disease (ESRD) is the final stage of chronic kidney disease and is defined when GFR is <15 mL/min per 1.73 m2. Symptoms experienced in patients diagnosed with ESRD can vary ranging from symptoms directly due to disturbance in clinical parameters or undefined such as fatigue, anxiety, and depression **[1]**.

Previous studies have looked into the provenance and range of such symptoms and the results were as follows: fatigue/tiredness 71% (12%-97%), pruritus 55% (10%-77%), constipation 53% (8% - 57%), anorexia 49% (25% - 61%), pain 47% (8% - 82%), sleep disturbance 44% (20% -83%), anxiety 38% (12%-52%), dyspnea 35% (11%-55%), nausea 33% (15% -48%), restless legs 30% (8%- 52%), and depression 27% (5%- 58%) **[2]**.

Due to different races and the use of various fatigue measures, the prevalence of fatigue is estimated to range from 60 to 97% among the maintenance hemodialysis (MHD) patients. Previous studies showed that fatigue has a greatly negative influence on patients' quality of life and has serious psychological, physiological, and socio-demographic implications for patients, families, and even the community fatigue also showed significant associations with cardiovascular and suicidal risk, which substantially elevated hospitalization and mortality for the MHD patients **[3-8]**.

The clinical parameters were assessed by monitoring (calcium, potassium, phosphorus, sodium, hemoglobin, albumin, serum creatinine levels) BMI, and coexisting disease. According to the 2022 Palestinian Ministry of Health Annual Report (MOH), and during the year 2022, the total number of kidney dialysis units in the West Bank reached 12 units, of which 11 units belong to the Ministry of Health, containing 256 machines in addition to one unit at Al-Najah National University Hospital in Nablus, which contains 45 machines. There are also 7 kidney dialysis units in Gaza which has 182 machines. The number of patients who received dialysis service in West Bank hospitals regularly reached 1,601 patients, with the total number of dialysis performed by these patients reaching 221,436 dialysis.

The aim of this study is to explore the correlation between fatigue severity and clinical indicators in hemodialysis patients getting treatment in kidney dialysis units in the West Bank. The major goal is to use the FACIT - Fatigue Scale (Version 4) to assess fatigue severity and examine its relationship with particular clinical parameters. Secondary goals include investigating the effect of fatigue on daily functioning and health-related quality of life in this patient population.

Methods

Study Design and Participants

The design of this study is correlation descriptive study through Cross-sectional, according to STROBE (Available: https://www.strobe-statement.org/checklists/. Accessed at: 10/10/2024) approach with 62 participants recruited using convince sampling in hemodialysis unit of Aliah and Jenin hospitals in the West-bank, Palestine. Inclusion Criteria were adult patients (18 years and older) undergoing dialysis treatment (hemodialysis in West Bank hospitals and has the Ability to understand and complete the Fatigue Severity Scale questionnaire. Exclusion Criteria: Patients with severe cognitive impairment or communication barriers. Sample Size Calculation: Based on previous studies and an estimated response rate, a sample size of 62 participants was targeted for enrollment.

Data Collection

In this study, the scale that was used is the Functional Assessment of Chronic Illness Therapy – Fatigue scale (FACIT-F) is a brief, 13-question, easily administered assessment that gauges an individual's fatigue level during their typical daily activities over the past week. Fatigue levels are rated on a four-point Likert scale, ranging from 4 (not fatigued at all) to 0 (very fatigued). This versatile tool has been translated into over 45 languages, allowing for cross-cultural comparisons **[9]**.

From the questionnaire, we gathered information on demographic profile (age, sex, education level, employment status, and marital status), the type of dialysis used, the length of time a patient has been on dialysis (measured in months or years), the underlying cause of end-stage renal disease (ESRD), the dialysis schedule. It was obtained the values for serum albumin, creatinine, phosphorus, sodium, potassium, calcium, and hemoglobin based on the most recent test results available in the file. Comorbidities were assessed using the Index of Coexistent Disease (ICED), and the Body Mass Index (BMI) was determined by the researcher using the formula weight divided by height squared.

Statistical Analysis

For statistical analysis, it was utilized SPSS version 25.0. To describe demographic data, we provided information in terms of frequencies, means, standard deviations (SD), and case numbers with percentages for continuous and categorical, it was conducted correlation analyses to explore the relationship between the final score of the fatigue scale and clinical parameter variables, using the Pearson correlation coefficient. To assess the reliability of the FACIT-F scale after being

translated into the Arabic language, we evaluated its internal consistency. This was achieved by calculating the item-to-total correlation and employing the Cronbach α statistics (0.772 for 13 items). The Cronbach α statistic assesses how effectively a set of items or variables measures a single, unified latent construct. In this study, the α value indicated how well the 13 items of the FACIT-F scale measured the overall fatigue experienced by dialysis patients.

Results

A total number of 62 patients were included, (40.3%) of them were males and (59.7%) were female. Half of them (50%) had a high/higher education level and were married (82.3%). Based on the results (45.2%) have been on hemodialysis for more than 3 years (Table 1). The mean average distribution of respondents with a score >28 was 53.2% experienced severe fatigue, this study used a questionnaire FACIT-F with a total score of 0-52. The assessment mentions that the higher the score show, the less fatigue and better quality of life, the lower score below 30 indicates severe fatigue.

Table 1. Distribution of Respondents According to Gender, Education level, Age, Marital Status, Duration of dialysis.

Variables		**Frequency**	**Percent (%)**
Gender	Male	25	40.3
	Female	37	59.7
Education level	None	10	16.1
	elementary school	21	33.9
	high/ higher education	31	50
Age of Patient	10-20years	4	6.5
	20-30	3	4.8
	30-40	7	11.3
	40-50	8	12.9
	50-60	13	21
	60-70	21	33.9
	70-80	6	9.7
Marital Status	Married	51	82.3
	Unmarried	11	17.7
Duration of dialysis	less than 1 year	20	32.3
	1-3 years	14	22.6
	more than 3 years	28	45.2

The main average Hb level was 9.8, the normal range in CKD to maintain hb level more than (11.5). In ESRD patients the serum creatinine level is useful to calculate the glomerular filtration rate (GFR), a more specific measure to indicate chronic kidney disease. According to BMI most of the patients have overweight average value (26.2). Furthermore, the mean of Sodium was (136.9 mg\L) which was a normal level, the lowest level of calcium was recorded (4.7mg/dL) and the highest level was (11.9 mg/dL) and the mean was (8.2 mg/dL). Phosphorus the lowest level was recorded (2 mg/dL) and the highest level was (11.9 mg/dL) and the mean was (8.2 mg/dL) (Table 2).

Table 2. The Mean and SD Distrubution of Nutritional Clinical Parameters collects from Patient File.

Nutritional Clinical Parameters	Normal value	Min	Max	Mean	Std. Deviation
Hemoglobin (Hb) level g/dL	10-12 in CKD	6.5	15.8	9.871	1.8431
Albumin (g/dL)	3.5-5.4	2.13	4.80	3.8184	.46978
Serum Creatinine level mg/dL	0.5-1.2	3.60	14.74	8.5868	2.77921
Sodium (mq/L)	135-145	124	144	136.95	3.246
Potassium (meq/L)	3.6-5.5	3.50	6.70	5.0094	.79394
Calcium (mg/dL)	8.5-10.5	4.7	11.9	8.295	1.0937
Phosphorus (mg/dL)	2.5-4.5	2.00	7.00	4.2568	1.23807
Body mass index (kg/m^2):	<25	17.0	43.0	26.253	4.3969

According to the table which show the Pearson correlation (r) (Table 3):

- The findings reveal a significant, moderate negative correlation between the final fatigue score and hemoglobin levels (r (62) = -0.319), with a p-value of 0.023. This suggests that when hemoglobin levels are low, fatigue tends to increase.
- The results indicate a non-significant, weak negative correlation between the final fatigue score and Serum Creatinine levels (r (62) = -0.197), with a p-value of 0.124. This implies that when Serum Creatinine levels are low, fatigue tends to increase.
- Similarly, the results show a non-significant, negative borderline associated with serum phosphorus levels (r (62) = -0.222), with a p-value of 0.124. This means that when phosphorus levels are low, fatigue tends to increase.
- In contrast, there is no discernible relationship between the final fatigue score and calcium levels (r (62) = -0.000), with a p-value of 0.997.

Table 3 Correlation between fatigue severity, nutrient clinical features among chronic hemodialysis patients (n=62).

Variable	P	r
Hemoglobin (Hb) level g/dL	0.023	-.319-*
Albumin (g/dL)	0.65	-.057-
Serum Creatinine level mg/dL	0.3	-.127-
Potassium (mEq/L)	0.5	.086
Calcium (mg/dL)	0.997	.000
Phosphorus (mg/dL)	0.083	-.222-
Body mass index (kg/m^2):	0.443	.099

*Correlation is significant at the 0.05 level (2-tailed).

Discussion

The main symptom in patients with end-stage renal disease (ESRD) who receive hemodialysis (HD) is Fatigue which is defined as a subjective experience, has physical and psychological symptoms, such as feelings of constant exhaustion, burnout or lack of energy, which impacts on daily activity level. in addition, Fatigue affects 20%-91% of patients with chronic kidney disease (CKD), and the prevalence increases with advancing CKD stages **[10]** prevalence of fatigue ranges from 45%-80% in HD patients. To measure fatigue severity, we used the Functional Assessment of Chronic Illness Therapy -fatigue scale (FACIT-F) (Version 4) 13 items after a translated version into Arabic was found. High fatigue if ≤28, Reliability was estimated through internal consistency assessment Cronbach's Alpha 0.772 which means fairly reliable and valid information.

It studied many clinical parameters including nutritional parameters that may affect the fatigue severity in HD patients and the significant association with (hemoglobin level, potassium, phosphorus, albumin level, and BMI). Past studies have reported that when the fatigue severity instrument is assessed, the (FACIT-F) scale is used to exhibit the significance of the correlation with parameters **[2]**. Clinical Factors Associated with Fatigue: lower hemoglobin and albumin, depression, poor sleep quality, daytime sleepiness, and restless leg syndrome **[11]**.

Mild to moderate hypophosphatemia was reported after a hemodialysis session with clinical symptoms of muscle cramps, weakness and lethargy, dizziness, headache, nausea, and vomiting **[12]**. This study found that more than 53.7% of patients with ESRD complain of fatigue which affects their lives and decreases the daily activity level. Increased fatigue associated with Anemia (decreased level of hemoglobin less than 9.8g/dL). At the same time decreased levels of phosphorus (hypophosphatemia), especially in patients undergoing hemodialysis increased risk of fatigue.

This study also shows that there is no relation between fatigue level and either calcium, albumin, and potassium levels, the previous study showed that low serum albumin levels were more experience higher levels of fatigue (lower FACIT-F score). There was no association of age or gender, BMI with fatigue. However, the current study had some limitations; a small number of participants, the old laboratory test in the file, and face-to-face interviews may introduce bias in patients who want to respond privately. Need more studies to develop other similar studies involving more samples and various laboratory parameters.

Conclusion

It was concluded that lower hemoglobin levels were associated with increased fatigue among dialysis patients, suggesting a significant negative correlation. However, no significant correlations were found between fatigue and Serum Creatinine, phosphorus, or calcium levels. These findings emphasize the importance of monitoring and addressing hemoglobin levels in managing fatigue in this patient population. As a direction for future research, we recommend exploring a larger and more diverse sample, investigating additional factors contributing to fatigue, and exploring potential interventions or treatments to alleviate fatigue in dialysis patients.

CRediT

Author contributions: **Conceptualization -** Abdalla Qawasmeh, Issa Salha, Khadija Mohammad, Mohammad Farid Al Tamimi, Nizar Abu Hamdeh, Marah Qassrawi, Duha Najajra, Abdulrahman Abu-Haltam, Mohammad Alnees; **Data curation-** Abdalla Qawasmeh, Issa Salha, Khadija Mohammad; **Formal Analysis -** Abdalla Qawasmeh, Issa Salha, Khadija Mohammad, Mohammad Farid Al Tamimi, Nizar Abu Hamdeh, Marah Qassrawi, Duha Najajra, Abdulrahman Abu-Haltam, Mohammad Alnees; **Investigation -** Abdalla Qawasmeh, Issa Salha, Khadija Mohammad, Mohammad Farid Al Tamimi, Nizar Abu Hamdeh, Marah Qassrawi, Duha Najajra, Abdulrahman Abu-Haltam, Mohammad Alnees; **Methodology-** Abdalla Qawasmeh, Issa Salha; **Project administration-** Abdalla Qawasmeh; **Supervision-**Mohammad Alnees; **Writing - original draft-** Abdalla Qawasmeh, Issa Salha, Khadija Mohammad, Mohammad Farid Al Tamimi, Nizar Abu Hamdeh, Marah Qassrawi, Duha Najajra, Abdulrahman Abu-Haltam, Mohammad Alnees; **Writing-review & editing-** Abdalla Qawasmeh, Issa Salha, Khadija Mohammad, Mohammad Farid Al Tamimi, Nizar Abu Hamdeh, Marah Qassrawi, Duha Najajra, Abdulrahman Abu-Haltam, Mohammad Alnees.

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Not applicable.

Ethical Approval

This study was conducted in accordance with the principles of the Declaration of Helsinki and was approved by the Ethics Committee of the Ministry of Health, Palestine. Informed consent was obtained from the parents or guardians of all study participants, and all personal and identifiable information was kept confidential. The study was conducted in accordance with the ethical standards of the institution and relevant laws and regulations. The study protocols and procedures were reviewed and approved by the Ethics Committee before the start of the study.

Informed Consent

It was applicable.

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Data Sharing Statement

Data from this study is available upon request. Interested parties should contact the corresponding author to request access to the data. Data will be shared in accordance with the ethical and legal requirements of the institution and relevant laws and regulations. Requests for data access will be reviewed by the corresponding author and the institution's ethics committee to ensure that the data are used for legitimate research purposes and that the privacy and confidentiality of the study participants are protected. Access to the data will be granted to qualified researchers who have a specific research question and who have obtained the necessary ethical approvals.

Conflict of Interest

The authors declare that they have no conflicts of interest. All authors have contributed significantly to the study and have read and approved the final manuscript. The authors have no financial relationships with any organizations that could have an interest in the submitted work. The authors also have no other conflicts of interest to disclose.

Similarity Check

It was applied by Ithenticate[@].

Peer Review Process

It was performed.

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