Kufa Journal for Nursing Sciences
Open Access Full Text Article

Publisher
University of Kufa, Faculty of Nursing

Received: 12 May, 2024
Accepted: 26 June, 2024
Published: 30 June, 2024
Vol. 14(1), 2024: 258 – 270

https://doi.org/10.36321/kjns.vi202401.16148
ORIGINAL RESEARCH

Fatigue and Health-Related Quality of Life among Hepatitis and Non-Hepatitis Patients Undergoing Hemodialysis

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ABSTRACT

Background: A common problem in hemodialysis patients, fatigue is a personal perception of extreme tiredness that impairs their quality of life, physical and mental abilities, activity levels, and performance.
Objectives: This comprehensive study aims to assess the impact of fatigue on health-related quality of life in hemodialysis patients.
Methodology: A descriptive A-non-probability (purposive sample) of (205) male and female hemodialysis patients in AL-Diwaniyah City with end-stage renal disease and undergoing hemodialysis. Most patients were diagnosed with ESRD > one year ago, including those who have been on a maintenance hemodialysis programmer for more than a year. A validated and comprehensive health-related quality of life questionnaire (SF-36) tailored for individuals undergoing hemodialysis was utilized to assess fatigue and health-related quality of life among hepatitis and non-hepatitis patients undergoing hemodialysis. The study was conducted at hemodialysis centers, ensuring representation from different geographic regions and patient populations.
Results: A total of 205 hemodialysis patients participated in the study. The results revealed that most participants had moderate fatigue (88 (42.9%), mild fatigue (61 (29.8%), and severe fatigue (56 (27.3%). The patient's overall health-related quality of life was found to be low, with a mean score of 19.82.
Conclusion: Fatigue is a prevalent symptom in hemodialysis patients, affecting their ability to engage in routine activities and self-care, negatively impacting self-confidence and health-related quality of life. Addressing fatigue is crucial for improving physical well-being and mental health.
Recommendation: To reduce fatigue, the researcher suggested Regular physical activity, personalized nutrition, emotional support, adequate rest and sleep, monitoring medication side effects, and exploring alternative therapies can help patients manage tiredness and improve overall well-being, especially in ESRD patients.

Keywords: Fatigue, health-related quality of life, hemodialysis, Hepatitis and Non-Hepatitis.

How to Cite: Abod, A. F., & Al-Ashour, I. A. (2024). Fatigue and health-related quality of life among hepatitis and non-hepatitis patients undergoing hemodialysis. *Kufa Journal for Nursing Sciences, 14*(01), 258–270. https://doi.org/10.36321/kjns.vi202401.16148

INTRODUCTION

Chronic kidney disease (CKD) has become a global public health problem with a rising prevalence. In 2017, 697.5 million cases of all-stage CKD were recorded, for a global prevalence of 9.1%. The global all-age prevalence of CKD increased 29•3% since 1990. In Iraq, the prevalence of CKD about 3,044,399 cases in 2017 [1].

Current international guidelines define CKD as decreased kidney function shown by GFR of less than 60 mL/min per 1•73 m², or markers of kidney damage, or both, of at least 3 months duration, regardless of the underlying cause. End-stage renal disease (ESRD) occurs when a person's GFR falls below 15 mL/min per 173m2, indicating that kidney function is no longer capable of sustaining life over the long term and the patient will rely on one of the renal replacement therapy methods: dialysis or kidney transplantation [2].

Hemodialysis is one of the most widely used dialysis procedures. It is a treatment that uses a dialyzer to remove excess fluid, waste materials, and poisonous substances from the blood accountable for the uremic syndrome, and then returns pure and filtered blood to the patient, and prolongs survival [3].

End-stage renal failure (ESRD) is a severe condition that imposes substantial restrictions on both the physical and psychosocial health of individuals. It can hinder the capacity of patients undergoing hemodialysis (HD) to lead a typical life [4]. Moreover, quality of life (QOL) among patients under treatment of HD is low, which affect their life style. Hemodialysis can take a physical and emotional toll on patients, and most patients on hemodialysis describe poor quality of life [5].

Patients with end-stage renal disease (ESRD) who are undergoing hemodialysis treatment and have multiple comorbidities, such as cardiovascular disorder, renal bone diseases, and anemia, often experience a reduced quality of life and heightened depression. This is primarily due to the significant physical symptoms and mental health issues they face. Physical inactivity, a significant factor in the decline of physical function in patients on hemodialysis, has been associated with adverse clinical results such as increased morbidity and death rates [6].

Fatigue is a personal perception of extreme tiredness felt by an individual. It is a prevalent issue among people with HD and is linked to the presence of illnesses that affect their quality of life. The concept is ambiguous and presents challenges in terms of both qualitative and quantitative definition and evaluation. Fatigue typically encompasses various elements, including diminished physical and mental capabilities, decreased activity levels, and lower-than-anticipated performance. The incidence of weariness in individuals on long-term replacement kidney therapy varies from 60% to 97% [7].

Patients with end-stage kidney disease (ESKD) often experience chronic fatigue. However, there are certain types of fatigue in this group of patients that are related to the timing of their dialysis sessions. One pattern is called intradialytic fatigue, which occurs or becomes worse right before the dialysis sessions and continues throughout the treatment (Brys et al., 2019) [8]. Another pattern is called postdialysis fatigued (PDF), which occurs or worsens after the dialysis session ends and may last for several hours [9]. Post-dialysis weariness is a prevalent consequence observed in patients undergoing continuous hemodialysis [10].

Fatigue can be affected by various characteristics, including age, gender, marital status, educational attainment, employment situation, and income level [11]. Patients have reduced levels of vigorous physical activity, diminished functional capacity, and overall muscle weakness, leading to a pervasive sense of weariness. Mental exhaustion is defined as a state of reduced ability to concentrate and maintain focus in specific circumstances, whereas physical fatigue refers to a condition of muscle weakness [12].

Viral hepatitis such as HBV and HCV are the most frequent disease resulting in a complication of HD treatment. Infections with HBV and HCV are well-known and important causes of liver disease in ESRD patients on HD. hemodialysis patients are at high risk for viral hepatitis infections due to a history of blood transfusion, the high number of blood transfusion sessions, the potential for exposure to infected patients and contaminated equipment. The duration of HD therapy is also considered as a risk factor for viral hepatitis infections transmission [13].

The viral infections hepatitis B and hepatitis C contribute significantly to mortality as well as morbidity in patients on hemodialysis and present management challenges in dialysis units because patients with chronic renal failure are unable to effectively clear viral infections [14]. The negative effects of HBV and/or HCV infection on survival and, unquestionably, on health-related quality of life (HRQOL) in this population have also been highlighted by recent evidence [15].

In hemodialysis patients, who already have compromised kidney function and often experience other health issues, the added burden of viral hepatitis can exacerbate symptoms of fatigue. The body may have difficulty eliminating toxins and waste products, leading to increased fatigue and weakness [16].

AIMS OF THE STUDY

This comprehensive study aims to assess the impact of fatigue on health-related quality of life in hemodialysis patients.

METHODOLOGY

Design of the Study:

A descriptive cross-sectional design was used to assess fatigue and health-related quality of life among hepatitis and non-hepatitis patients undergoing hemodialysis.

Ethical consideration:

This is one of the most essential issues in nursing research before collecting the data to preserve the principles of ethics, the goal of that is to ensure the rights of the researcher and participants. The researcher has obtained permission from the Ethics Committee of the College of Medicine /Kufa University. The researcher should keep the patient records confidential, and the data gathered from them can only be utilized in this analysis. The participants' consent is obtained through their signature on the participation decision form that was placed on the first front of the questionnaire after explaining the study to the participants and its purpose.

The Setting of the Study:

The study was conducted at AL-Diwaniyah City, AL- Diwaniyah Health Department /AL-Diwaniyah Teaching Hospital / Fatima Al-Zahraa Dialysis Center.

Study Sample:

A non-probability (purposive sample) of 205 patients with and without viral hepatitis (Type B and Type C) undergoing hemodialysis was selected from those who visited Al-Diwaniyah Teaching Hospital/ Fatima Al-Zahraa Dialysis center.

- **Inclusion criteria of study sample**

1. All participants who have been undergoing hemodialysis for at least one year and are medically stable.
2. Patients who are 20 years old and more because the present study has focused on adult patients , and ESKD most commonly occurs in adult patients compared to young.
3. Patients are conscious, alert, oriented, and able to communicate verbally because the study requires subjective measurements.
4. Cooperation patients.

- **Exclusion criteria of study sample**

1. pediatric patients and children.
2. patients with psychiatric disorders.
3. New entrants to the dialysis unit.
4. The patients who refuse to participate in the study.

5. Respondent did not complete the questionnaire fully and refuse to take a blood sample from them or complete the questionnaire but refuse to take a blood sample from them.

Study Instrument:

A comprehensive assessment tool used to assess fatigue and health-related quality of life among hepatitis and non-hepatitis patients undergoing hemodialysis the instrument included three parts:

Part I: Patient's Socio-Demographic Characteristics:

The characteristics of the subjects under study included (age, sex, level of education, marital states, socio-economic status, and residence).

Part II: The Clinical Characteristics of Patients:

1. Body mass index (BMI).
2. Normalized protein catabolic rate (NPCR).
3. Bio-chemical parameters.
4. Fatigue.

Fatigue Assessment Scale (FAS)

The FAS is a 10-item scale evaluating symptoms of chronic fatigue. the FAS treats fatigue as a uni-dimensional construct and does not separate its measurement into different factors. However, in order to ensure that the scale would evaluate all aspects of fatigue, developers chose items to represent both physical and mental symptoms [17].

The available evidence indicates that the Fatigue Assessment Scale is a valid and reliable instrument for measuring fatigue severity across a range of populations and both male and female respondents [18].

Reliability and Validity

Developers Michielsen and colleagues analyzed the scale's psychometric properties and found an internal consistency of .90. Results on the scale also correlated highly with the fatigue-related subscales of other measures like the Checklist Individual Strength [19].

Scoring:

Each item of the FAS is answered using a five-point, Likert-type scale ranging from 1 ("never") to 5 ("always"). Items 4 and 10 are reverse-scored. Total scores can range from 10, indicating the lowest level of fatigue, to 50, denoting the highest.

Part III: Health-Related Quality of Life Questionnaire (SF-36):

The 36-Item Short Form Health Survey questionnaire (SF-36) is a very popular instrument for evaluating Health-Related Quality of Life [20].The 36-Item Short Form Health Survey (SF-36) questionnaire was developed by the Boston Health Research Institute in the United States. The SF-36 questionnaire provides a concise method that is mainly used to check the health status of members of the general population aged 14 years or over [21]. The SF-36 assesses eight dimensions: physical function (PF), roles physical (RP), pain in the body (BP), general well-being (GH), energy (VT), social interaction (SF), the roles emotions (RE), and mental well-being (MH). The SF-36 measures two separate concepts: a physical dimension, which is represented by the Physically Components Summary (PCS), and the mental dimension, which is represented by the Cognitive Components Summary (MCS) [22].

- **Validity of the Study Instrument:** The expert consultation method was used to ensure the face validity of the study instruments. It is determined by a panel of (16) experts in the Nursing and Medicine fields. Scale has good face validity and can be used as a valid instrument.
- **Reliability:** Is concerned with the consistency and dependability of a research instrument to measure a variable. The determination of reliability for a patient's health-related quality of life is based on the internal consistency reliability/alpha Cronbach technique. The degree of internal uniformity among the items, namely the correlation between the items and the eight related domains, was expressed by Cronbach's α coefficient. The overall Cronbach's α coefficient of the SF-36 questionnaire was 0.791, while the respective Cronbach's α coefficients for seven of the eight

dimensions were > 0.70, excluding the social function dimension, which was 0.631. This met the requirement for group comparison. So, the study questionnaire is reliable [23, 24].

- **Method of Data Collection:**

  After the validity and reliability of the study instrument are ensured, the researcher uses a self-report questionnaire to collect the data regarding demographic data and the Short Form Health-Related Quality of Life (SF-36) questionnaire. The data collection process has been performed from January 1st, 2024, to February 1st, 2024.

- **Statistical Analysis:** After the data are prepared for statically analysis, the descriptive and inferential statistics employ for data analysis using the Statically Package of the Social Sciences (SPSS) as follows: Frequency and percentage tables, mean and standard deviation, persons' correlation**,** and ANOVA test.

RESULTS

Table (1) shows the distribution of fatigue level among the positive and negative viral hepatitis hemodialysis patients. The results show that 19 (34.5%) HCV patients with symptoms of mild fatigue in our study and 35 (28.9%) negative viral hepatitis hemodialysis patients with symptoms of mild fatigue. There were 21 (38.2%) HCV patients with symptoms of moderate fatigue in our study, 5 (31.3%) HBV patients with symptoms of moderate fatigue, and 6 (46.2%) HBV patients with symptoms of moderate fatigue. At this time, 56 (46.3%) hemodialysis patients with negative viral hepatitis also experienced symptoms of moderate fatigue. Additionally, 15 (27.3%) HCV patients had symptoms of severe fatigue in our study, while 8 (50.0%) HBV patients had symptoms of severe fatigue, and 30 (24.8%) negative viral hepatitis patients had symptoms of severe fatigue. Overall, the mean level of fatigue among hemodialysis patients tends to be moderate, as the average falls closer to the moderate category. This suggests that hemodialysis patients experience more moderate overall fatigue.

Table (2) demonstration that the patients' responses to the scale of health status Rand -36 items as domain items are low at all most all items in positive and negative viral hepatitis hemodialysis patients. Table (3) shows that there is a significant correlation between hemodialysis patients' health-related quality of life (general health) domain and fatigue, but there is a non-statistically significant correlation between the other domains (physical functioning, role limitations due to physical health, role limitations due to emotional problems, energy, emotional wellbeing, social functioning, and pain) in patients undergoing hemodialysis.

Table (4) shows that there is a non-statistically significant correlation between the patients' health-related quality of life and types of viral hepatitis in patient with ESKD and undergoing hemodialysis. Table (5) shows that there is a highly significant association between fatigue and age and fatigue and socioeconomic status (p-value < 0.05). However, there is a non-significant relationship with sex, marital status, level of education, and residency, with a p-value > 0.05. Table (6) reveals that there is non-statistically significant relationship between Clinical data and fatigue in hemodialysis patients.

DISCUSSION:

Fatigue is a common and debilitating symptom for adult patients with end stage renal disease on hemodialysis and has been associated with decreased survival and quality of life [25]. Fatigue is not only detrimental to physical and social functioning but is also associated with poor quality of life for HD patients and is associated with death in patients undergoing chronic hemodialysis. For this reason, it is necessary to know the factors associated with the incidence of fatigue so that appropriate interventions can be carried out, both pharmacologically and non-pharmacologically [26].

The present study resulted in 205 participants. The primary outcome of the present study is to assess the impact of fatigue on health-related quality

of life in hemodialysis patients and understand the relationship between fatigue levels and the quality of life experienced by individuals undergoing hemodialysis treatment. The present study findings revealed that the majority of participants experienced a moderate level of fatigue among both positive and negative viral hepatitis ESRD patients on MHD, with a mean fatigue score of 3.086 on the FAS scale. This is consistent with previous studies reporting fatigue as one of the most prevalent complaints among these individuals [27]. These findings underscore the significant burden of fatigue in this patient population.

Eight subscales measure different areas of health-related aspects of life on the SF-36 questionnaire: a person's mental state, energy/fatigue, pain, role constraints due to physical or emotional issues, social and physical functioning, and general health perceptions [28]. The physical element summary (PCS) as well as the mental portion summary (MCS) scores are two summary components that can be further combined from these subscales. Higher scores on the SF- 36 scores indicate a higher quality of life; values vary between 0 to 100 [29].

The study reveals that patients with end-stage renal disease (ESRD) have generally low health-related quality of life (QOL) responses. This result is in line with the [30] study, which indicates that patients' responses in the health status domain are generally low, with the most impaired responses being in the emotional problems domain. The SF-36 questionnaire has a low mean score of 5.08, with emotional problems dominating the majority and most affected in patients with ESKD.

The low social functioning score in hemodialysis patients can be attributed to factors such as depression, limited social support, and unique psychological conditions [31]. Physical function dominance is the most affected in ESKD, with the lowest mean scores for physical functioning due to chronic fatigue and weakness. Nutritional deficiencies and chronic kidney disease can lead to muscle wasting, resulting in decreased strength and physical function [32].

ESRD patients receiving dialysis therapy have a poorer quality of life than the general population, often linked to worse quality of life, poor sleep, decreased physical function, and depression [33]. The study also found that patients' responses in the positive and negative viral hepatitis hemodialysis patients' health status domain are low at most items, this result is in line with [34] study, which indicates that patients' responses in the health status domain are generally low.

In conclusion, the study highlights the importance of understanding the role limitations and emotional problems in ESRD patients' QOL responses and the impact of these conditions on their overall health.

The result shows that there is a significant Correlation between Hemodialysis Patients' Health-Related Quality of Life (general health) Domain and Fatigue but show a non-statistically significant correlation between the other domain (Physical functioning, Role limitations due to Physical health, Role limitations due to emotional problems, Energy, Emotional wellbeing, social functioning, Pain) in patients undergoing hemodialysis. The absence of a statistically significant relationship appears, even though patients who suffer from moderate and sever fatigue themselves tend to have a poor quality of life. This indicates that the hemodialysis factor is the influencing factor and is more evident in poor quality life.

However, the results of the present study indicate that there is a non-statistically significant correlation between the patients' health-related quality of life and types of viral hepatitis in patient with ESKD and undergoing hemodialysis.

Therefore, socio-demographic factors can have a significant impact on fatigue and quality of life in hemodialysis patients [35]. A study found that physical or mental fatigue had a strong association with advanced age, comorbidities, marital status, level of

education, inadequate information about the disease, insomnia, and change in body appearance [36].

Regarding the relationship between patients' fatigue and their demographic data, our study results showed a highly significant association between fatigue and age, fatigue and socioeconomic status (p-value <0.05). The study is in agreement with [37]. The research results show that there is a highly significant association between fatigue and age ,fatigue and socioeconomic status in hemodialysis patients.

As a result, there is a non-significant relationship between fatigue and sex, marital status, level of education, and residency, which is in agreement with the study conducted in the east of Mazandaran province, Iran, by [38].

Generally, fatigue in hemodialysis patients can also impact their mental health, leading to feelings of frustration, anxiety, and depression. This can further worsen their quality of life and may affect their ability to cope with the demands of their treatment regimen. Addressing both the physical and psychological aspects of fatigue is crucial for improving the overall well-being and quality of life of hemodialysis patients [39].

CONCLUSIONS:

In conclusion, fatigue has been reported to be the most common symptom experienced by patients receiving hemodialysis (HD) therapy, with a moderate level of fatigue reported by our study participants. Fatigue can lead to a reduction in their ability to engage in both routine and self-care activities, which can negatively affect their self-confidence and health-related quality of life (HRQoL). Addressing fatigue in hemodialysis patients is essential not only for improving their physical well-being but also for addressing the psychological impact it can have on their mental health.

RECOMMENDATIONS:

To reduce fatigue in ESRD patients, the researcher suggested regular physical activity, develop a personalized nutrition plan, receive emotional support, prioritize adequate rest and sleep, monitor medication side effects, and consider alternative therapies like acupuncture, massage therapy, or mindfulness practices. These strategies can help improve overall well-being and reduce the psychological impact of fatigue.

REFERENCES:

1. Shraida, A. A., Abd-Ali, D. K., & Mohammad, H. Q. (2021). Effectiveness of Intradialytic Stretching Exercises on Prevention and Reduction of Leg Muscle Cramps among Patients undergoing Hemodialysis: Randomized Controlled Trial. *Indian Journal of Forensic Medicine and Toxicology*, 15(3), 5132–5140. https://doi.org/10.37506/ijfmt.v15i3.16249.
2. Lazuardi, N. (2021). Application of predialytic exercise to reduce fatigue In-Patient undergoing hemodialysis. *South East Asia Nursing Research*, 3(1), 28. https://doi.org/10.26714/seanr.3.1.2021.28-32.
3. Al-Hchaim, M. H. S., Ali, B. R. M., & Abdullah, A. M. (2019). Double lumen subclavian catheter complications among patients with end stage renal disease on continuous hemodialysis. *Indian Journal of Public Health Research and Development*, 10(8), 2437. https://doi.org/10.5958/0976-5506.2019.02231.9.
4. Alshammari, B., Alkubati, S. A., Alrasheeday, A., Pasay-An, E., Edison, J., Madkhali, N., Al-Sadi, A. K., Al-Akchar, M., Alshammari, S. T., Alshammari, A., & Alshammari, F. (2024). Factors influencing fatigue among patients undergoing hemodialysis: a multi-center cross-sectional study. *Libyan Journal of Medicine*, 19(1). https://doi.org/10.1080/19932820.2023.2301142.
5. Al-Ashour, I. A., & Mohammed, W. K. (2021). Effectiveness of A Nutritional Instructional Program on Health-Related Outcomes for Hemodialysis Patients. *Indian Journal of Forensic Medicine &*

Toxicology, 15(3), 3273-3282. https://doi.org/10.37506/ijfmt.v15i3.15809.

6. Lin, C. C., Hsu, Y., Hsu, P. H., Lee, Y. L., Lin, C. H., Lee, M. S., & Chiang, S. L. (2021). Effects of intradialytic exercise on dialytic parameters, Health-Related Quality of Life, and Depression status in hemodialysis patients: a randomized controlled trial. *International Journal of Environmental Research and Public Health*, 18(17), 9205. https://doi.org/10.3390/ijerph18179205.
7. Sofia, Z., Deli, M., Fradelos, E., & Alikari, V. (2017). Is quality of life of hemodialysis patients affected by fatigue? ResearchGate. https://www.researchgate.net/publication/319490692_Is_Quality_of_Life_of_Hemodialysis_Patients_Affected_by_Fatigue.
8. Brys, A., Lenaert, B., Van Heugten, C., Gambaro, G., & Bossola, M. (2019). Exploring the diurnal course of fatigue in patients on hemodialysis treatment and its relation with depressive symptoms and classical conditioning. *Journal of Pain and Symptom Management*, 57(5), 890-898.e4. https://doi.org/10.1016/j.jpainsymman.2019.02.010.
9. Bossola, M., Hedayati, S. S., Brys, A., & Gregg, L. P. (2023). Fatigue in patients Receiving Maintenance Hemodialysis: a review. *American Journal of Kidney Diseases*, 82(4), 464–480. https://doi.org/10.1053/j.ajkd.2023.02.008.
10. Li, H., Yin, J., Ye, D., & Tian, Z. (2023). Factors predicting post-dialysis fatigue of maintenance hemodialysis patients. *Renal Replacement Therapy*, 9(1). https://doi.org/10.1186/s41100-023-00486-z.
11. Vitale, E., Lupo, R., Lezzi, A., Artioli, G., Zacchino, S., Valenzano, L., & Conte, L. (2023). Which socio-demographic characteristics impact on the fatigue conditions in nurses: *an Italian investigatory study. PubMed*, 94(3), e2023175. https://doi.org/10.23750/abm.v94i3.14563.
12. Almalag, H. M., Almaghlouth, I., Dabbagh, R., Alsalem, A. R., Alrajban, F. N., Algarni, S. A., Alosaimi, F. N., Alassaf, M. I., Alshamrani, M. A., Alzomia, S., Alanazi, B., Alalwan, T., Alkhalaf, A., Bedaiwi, M., & Omair, M. A. (2023). Prevalence of fatigue functional and social impairment among patients with rheumatic diseases compared to patients without: *A cross-sectional comparison. Medicine*, 102(9), e33151. https://doi.org/10.1097/md.0000000000033151.
13. Al-Abedi, H. M. H., Khafajy, Z. a. a. A., Eidan, A. J., Al-Mossawy, D. a. J., & Al-Zeyadi, A. A. (2020). Assessment self-care of patients' undergoing hemodialysis with end stage renal disease. *Indian Journal of Forensic Medicine and Toxicology*. https://doi.org/10.37506/ijfmt.v14i1.181.
14. Garthwaite, E., Reddy, V. P., Douthwaite, S., Lines, S. W., Tyerman, K., & Eccles, J. (2019). Clinical practice guideline management of blood borne viruses within the haemodialysis unit. *BMC Nephrology*, 20(1). https://doi.org/10.1186/s12882-019-1529-1.
15. Paneerselvam, G. S., Goh, K. W., Kassab, Y. W., Farrukh, M. J., Goh, B. H., Lua, P. L., Hermansyah, A., & Ming, L. C. (2023). Health-related quality of life of dialysis patients during early COVID-19 lockdowns: a snapshot from a public hospital in Malaysia. *Frontiers in Medicine*, 10. https://doi.org/10.3389/fmed.2023.992870.
16. De Arruda, L. D., & Flores, A. M. N. (2022). Educação em saúde acerca das hepatites virais com pacientes renais crônicos em hemodiálise / Health education about viral hepatitis with chronic kidney patients in hemodialysis. *Brazilian Journal of Development*, 8(2), 11883–11897. https://doi.org/10.34117/bjdv8n2-229.
17. Shahid, A., Wilkinson, K., Marcu, S., & Shapiro, C. M. (2011). *Fatigue Assessment Scale (FAS). In Springer eBooks* (pp. 161–162). https://doi.org/10.1007/978-1-4419-9893-4_33.
18. Chung, E., Subramaniam, G., & Dass, L. C. (2020). Online learning readiness among university students in Malaysia amidst COVId-19. *Asian Journal of University Education/Asian Journal of University Education*, 16(2), 45. https://doi.org/10.24191/ajue.v16i2.10294.

19. Larson, R. D. (2013). Psychometric properties of the modified Fatigue Impact scale. *International Journal of MS Care*, 15(1), 15–20. https://doi.org/10.7224/1537-2073.2012-01.

20. Hossain, M. J., Islam, M. W., Munni, U. R., Gulshan, R., Mukta, S. A., Miah, M., Sultana, S., Karmakar, M., Ferdous, J., & Islam, M. A. (2023). Health-related quality of life among thalassemia patients in Bangladesh using the SF-36 questionnaire. *Scientific Reports*, 13(1). https://doi.org/10.1038/s41598-023-34205-9.

21. Bunevičius, A. (2017). Reliability and validity of the SF-36 Health Survey Questionnaire in patients with brain tumors: a cross-sectional study. *Health and Quality of Life Outcomes*, 15(1). https://doi.org/10.1186/s12955-017-0665-1.

22. Lins, L., & Carvalho, F. M. (2016). SF-36 total score as a single measure of health-related quality of life: Scoping review. *Sage Open Medicine*, 4, 205031211667172. https://doi.org/10.1177/2050312116671725.

23. Zhang, Y., Qü, B., Lun, S., Guo, Y., & Liu, J. (2012). The 36-Item Short form Health Survey: Reliability and Validity in Chinese medical students. *International Journal of Medical Sciences*, 9(7), 521–526. https://doi.org/10.7150/ijms.4503.

24. Lambert, S. M., Nigusse, S. D., Alembo, D. T., Walker, S., Nicholls, P., & Lockwood, D. N. J. (2023). Validating an Amharic version of the 36-Item Short Form Health Survey (SF-36) in individuals with leprosy in Ethiopia. *Leprosy Review*, 94(1), 53–69. https://doi.org/10.47276/lr.94.1.53.

25. Foy, M., Mang, S., & Mitchell, A. (2023). End-stage renal disease and hemodialysis. *Nursing*, 53(8), 46–51. https://doi.org/10.1097/01.nurse.0000942816.92627.5c.

26. Cahyati, Y., & Rosdiana, I. (2022). Contribution of anxiety and dialysis factors to the event of fatigue in hemodialysis patient. *Enfermería Nefrológica*, 25(2), 156–161. https://doi.org/10.37551/2254-28842022017.

27. Peredo, G., Martins, M., Silva, F. A., Lopes, M. B., Lopes, G. B., & Lopes, A. A. (2023). #6837 association between self-reported fatigue and the need for recovery time after the maintenance hemodialysis session: prohemo. *Nephrology, Dialysis, Transplantation/Nephrology Dialysis Transplantation*, 38(Supplement_1). https://doi.org/10.1093/ndt/gfad063c_6837.

28. Açma, A., Carrat, F., & Hejblum, G. (2022). Comparing SF-36 scores collected through Web-Based Questionnaire self-completions and telephone interviews: an ancillary study of the SENTIPAT Multicenter randomized controlled trial. *JMIR. Journal of Medical Internet Research/Journal of Medical Internet Research*, 24(3), e29009. https://doi.org/10.2196/29009.

29. Peeters, G., Waller, M., & Dobson, A. (2018). SF-36 normative values according to level of functioning in older women. *Quality of Life Research*, 28(4), 979–989. https://doi.org/10.1007/s11136-018-2077-z.

30. YeşiL, E. E., Pehlivan, Ö., Toprak, Z., Kayabaşi, H., & Şit, D. (2023). Musculoskeletal pain and quality of life in patients undergoing hemodialysis: a single-center study. *The European Research Journal*, 1–8. https://doi.org/10.18621/eurj.1267147.

31. Shirazian, S., Grant, C. D., Aina, O., Mattana, J., Khorassani, F., & Ricardo, A. C. (2017). Depression in Chronic Kidney Disease and End-Stage Renal Disease: Similarities and differences in diagnosis, Epidemiology, and management. *Kidney International Reports*, 2(1), 94–107. https://doi.org/10.1016/j.ekir.2016.09.005.

32. Kashgary, A., Attiah, F. O., AlKhateeb, N. A., Abdulaziz, N. H., Alsaif, B. A., Aljuhani, A. F., Abdalbary, M., Nagy, E., & Abdelsalam, M. (2023). Incidence of bone fractures among patients on maintenance hemodialysis. *Renal Failure*, 45(1). https://doi.org/10.1080/0886022x.2023.2224456.

33. Catalano, A., Gaudio, A., Bellone, F., La Fauci, M. M., Xourafa, A., Gembillo, G., Basile, G., Di Natale, G., Squadrito, G., Corica, F., Morabito, N., & Santoro, D. (2022). Trabecular bone score and phalangeal

quantitative ultrasound are associated with muscle strength and fracture risk in hemodialysis patients. *Frontiers in Endocrinology*, 13. https://doi.org/10.3389/fendo.2022.940040.

34. Elezi, B., Rumano, M., Abazaj, E., & Topi, S. (2023). Health-related quality-of-life measures used in hemodialysis patients in Albania. *The Egyptian Journal of Internal Medicine*, 35(1). https://doi.org/10.1186/s43162-022-00172-2.

35. Burdelis, R. E. M., & Cruz, F. J. S. M. (2023d). Prevalence and predisposing factors for fatigue in patients with chronic renal disease undergoing hemodialysis: a cross-sectional study. *São Paulo Medical Journal*, 141(5). https://doi.org/10.1590/1516-3180.2022.0127.r1.01122022.

36. Rimaud, D., Espeit, L., Mat, F. L., Cudel, C., Chaigneau, C., Lapole, T., & Millet, G. Y. (2023). Fatigue in the general population: associations to age, gender, socioeconomic status, and physical activity -a web-based survey. *Research Square (Research Square)*. https://doi.org/10.21203/rs.3.rs-2408446/v1.

37. Tsirigotis, S., Polikandrioti, M., Alikari, V., Dousis, E., Koutelekos, I., Toulia, G., Pavlatou, N., Panoutsopoulos, G. I., Leftheriotis, D., & Gerogianni, G. (2022). Factors associated with fatigue in patients undergoing hemodialysis. *Cureus*. https://doi.org/10.7759/cureus.22994.

38. Akbari, R., Farsi, Z., & Sajadi, S. A. (2023). Relationship between fatigue and quality of life and related factors in family caregivers of patients on hemodialysis. *BMC Psychiatry*, 23(1). https://doi.org/10.1186/s12888-023-04934-2.

39. Horigan, A. E., Schneider, S., Docherty, S. L., & Barroso, J. (2013). The experience and self-management of fatigue in patients on hemodialysis. *Nephrology Nursing Journal : Journal of the American Nephrology Nurses' Association*, 40(2), 113–123. https://europepmc.org/articles/PMC3703392.

TABLES:

Table (1): Summary Statistics of Overall Assessment of Hemodialysis Patients' Fatigue

Variable	Categories	Statistics	Type of Hepatitis				Total
			Type C	Type B	Both B and C	Negative	
Fatigue	**Mild**	**f**	19	3	4	35	61
		%	34.5%	18.8%	30.8%	28.9%	29.8%
	Moderate	**f**	21	5	6	56	88
		%	38.2%	31.3%	46.2%	46.3%	42.9%
	Severe	**f**	15	8	3	30	56
		%	27.3%	50.0%	23.1%	24.8%	27.3%
Total		**f**	55	16	13	121	205
Mean			**3.086 Moderate**				

Mild= 1-2.32, Moderate = 2.33-3.66, Severe = 3.67-5.

Table (2): Summary statistics for Patients' Health-Related Quality of Life domains

Domains	Categories	Statistics	Type of Hepatitis				Total
			Type C	Type B	Both B and C	Negative	
Physical functioning	**Low**	f	20	6	7	56	89
		%	36.4%	37.5%	53.8%	46.3%	43.4%
	Moderate	f	34	10	6	65	115
		%	61.8%	62.5%	46.2%	53.7%	56.1%
	High	f	1	0	0	0	1
		%	1.8%	0.0%	0.0%	0.0%	0.5%

Mean			**32.27**	**32.50**	**31.92**	**32.69**	**32.35**
Role limitations due to Physical health	**Low**	f	54	13	7	117	194
		%	100.0%	81.3%	67.2%	97.5%	95.1%
	Moderate	f	0	3	4	4	11
		%	0.0%	18.8%	30.8%	2.8%	5.2%
Mean			5.64	**16.25**	**27.31**	**18.95**	**17.09**
Role limitations due to emotional problems	**Low**	f	55	16	13	121	205
		%	100.0%	100.0%	100.0%	100.0%	100.0%
Mean			**0.00**	**2.08**	**10.25**	**7.98**	**5.08**
Energy	**Low**	f	44	14	9	50	117
		%	80.0%	87.5%	69.2%	41.7%	57.4%
	Moderate	f	11	2	4	67	84
		%	20.0%	12.5%	30.8%	55.8%	41.2%
	High	f	0	0	0	3	3
		%	0.0%	0.0%	0.0%	2.5%	1.5%
Mean			**22.91**	**20.94**	**24.23**	**36.04**	**26.03**
Emotional wellbeing	**Low**	f	52	12	8	82	154
		%	94.5%	75.0%	61.5%	67.8%	75.1%
	Moderate	f	3	4	5	39	51
		%	5.5%	25.0%	38.5%	32.2%	24.9%
Mean			**16.22**	**26.00**	**32.62**	**29.69**	**26.13**
Social functioning	**Low**	f	46	10	1	62	119
		%	83.6%	62.5%	7.7%	51.2%	58.0%
	Moderate	f	9	6	11	53	79
		%	16.4%	37.5%	84.6%	43.8%	38.5%
	High	f	0	0	1	6	7
		%	0.0%	0.0%	7.7%	5.0%	3.4%
Mean			**17.27**	**26.56**	**49.04**	**30.37**	**30.81**
Pain	**Low**	f	52	15	11	95	173
		%	94.5%	93.8%	84.6%	78.5%	84.4%
	Moderate	f	3	1	2	26	32
		%	5.5%	6.3%	15.4%	21.5%	15.6%
Mean			**15.14**	**14.38**	**20.58**	**24.19**	**18.57**
General health	**Low**	f	55	13	9	118	195
		%	100.0%	81.3%	69.2%	97.5%	95.1%
	Moderate	f	0	3	4	3	10
		%	0.0%	18.8%	30.8%	2.5%	4.9%
Mean			**5.64**	**16.25**	**27.31**	**18.97**	**17.04**
Mean of Health-Related Quality of Life			13.68	17.33	24.49	22.49	19.82

33.3 an. d less = Low, 33.34-66.67 = moderate, 66.68 and more = High.

Table (3): Correlation between the Fatigue and Health-Related Quality of Life Domains

Variables/Domains	Statistics	Fatigue
Physical functioning	Pearson Correlation	-.082
	Sig. (2-tailed)	.243
Role limitations due to Physical health	Pearson Correlation	-.223
	Sig. (2-tailed)	.342
Role limitations due to emotional problems	Pearson Correlation	-.138*
	Sig. (2-tailed)	.048
Energy	Pearson Correlation	-.068
	Sig. (2-tailed)	.335
Emotional wellbeing	Pearson Correlation	-.094
	Sig. (2-tailed)	.180
Social functioning	Pearson Correlation	-.059
	Sig. (2-tailed)	.400
Pain	Pearson Correlation	.107
	Sig. (2-tailed)	.125
General health	Pearson Correlation	.590**
	Sig. (2-tailed)	.000

Table (4): Correlation between the patients' Health-Related Quality of Life and types of hepatitis

Variables/Domains	Statistics	Type of Hepatitis	Fatigue
Type of Hepatitis	Pearson Correlation	1.000	-.057
	Sig. (2-tailed)	.	.412
	N	205	205
Fatigue	Pearson Correlation	-.057	1.000
	Sig. (2-tailed)	.412	.
	N	205	205

Table (5): Relationship between Patients Fatigue and their Demographic data

Variables/domains	df	F	Sig.
Age	2	5.970	0.003 S
Sex	2	0.668	0.51 NS
Marital Status	2	1.035	0.35 NS
level of education	2	1.356	0.25 NS
Residency	2	1.148	0.31 NS
Socioeconomic status	2	3.196	0.04 S

Table (6): Relationship between Patients Fatigue and their Clinical data

Variables/domains	df	F	Sig.
BMI	2	0.599	0.55 NS
Albumin	2	0.363	0.69 NS
HB	2	1.959	0.14 NS
Creatinine	2	0.462	0.63 NS
Na	2	2.653	0.07 NS
Mg	2	0.891	0.41 NS
Ca	2	0.003	0.99 NS
Ph	2	0.386	0.67 NS