Predictors of Quality of Life in Elderly Patients on Hemodialysis: The Role of Fatigue and Functional Status

Marwa Hassan Mohamed Hassan **[(1)] Eman Shokry Abdallah [(2)] Safia Gomaa Mohamed [(3)]**

[(1)] B.Sc. Nursing, Faculty of Nursing, Zagazig University
[(2)] Professor of Community health nursing & Gerontological Nursing, Faculty of Nursing - Zagazig University
[(3)] Lecturer of gerontological nursing , Faculty of nursing – Zagazig University
Corresponding Author: *Marwa Hassan Mohamed Hassan*

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Abstract

Background: Elderly patients on hemodialysis often experience fatigue, which can limit their daily activities and independence. Such fatigue can significantly affect their quality of life. **Aim of the study:** to assess predictors of quality of life in elderly patients on hemodialysis. **Study design:** descriptive research design. **Setting:** The study was conducted at Hemodialysis unit at Belbeis central Hospital in Belbies city in Sharqia governorate affiliated to the ministry of Health & Hemodialysis Unit in Shubra El-Nakhla, affiliated with Belbeis Central Hospital. **Sample:** A purposive sample of (115) elderly patients undergoing hemodialysis. **Tools of data collections:** four tools were used in the present study; **Tool I:** A structured interview questionnaire sheet consist of four parts, Demographic characteristics**,** Health history, clinical data of elderly patients about renal failure & Data about dialysis**, Tool II:** Activities of daily living scale, **Tool III:** The Multidimensional Fatigue Inventory Scale (MFI-20), **Tool IV:** Quality of life scale. **Results:** 51.3% had high level of fatigue and there is significant correlation between fatigue, functional status and quality of life among elderly patients on hemodialysis. **Conclusion:** The study concluded that sociodemographic and clinical factors strongly influence elderly patients on hemodialysis, with fatigue emerging as the most critical determinant negatively affecting quality of life and independence. Education level, chronic disease history, and renal failure duration were also significant predictors, highlighting the multifaceted challenges faced by this population **Recommendations:** Considering the high prevalence of fatigue among patients on hemodialysis and its adverse effect on their quality of life, it is recommended to perform routine screenings and implement fatigue alleviation interventions.

Keywords: *Elderly, Fatigue, Functional Status, Hemodialysis, Quality of Life.*

Introduction

Hemodialysis patients commonly experience fatigue due to generalized weakness, muscle atrophy, and exercise intolerance. Pain, another underappreciated yet prevalent symptom, significantly impacts individuals with end-stage renal disease, often arising from complications, comorbidities, and the dialysis process itself. Chronic pain, particularly with neuropathic components, frequently coexists with mood disorders, sleeps disturbances, and diminished life satisfaction **(Sułkowski et al., 2025)**.

Fatigue has been reported to be the most common symptom experienced by patients receiving hemodialysis (HD) therapy, 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 quality of life, Fatigue is a pervasive yet under-recognized symptom among dialysis patients, with profound effects on daily functioning and mental health **(Bossola et al., 2023)**.

Patients with end-stage renal disease (ESRD) undergoing hemodialysis have several muscle abnormalities that negatively impact functional capacity. Skeletal muscle dysfunction is associated with

anemia, malnutrition, low physical activity, high serum calcium, acidosis, uremic myopathy, loss of muscle mass, uremic neuropathy (primary axonal degeneration with segmental demyelination), and impaired oxidative capacity and altered capillarity in all fiber types **(Matsufuji et al., 2024**).
Moreover, end-stage kidney disease (ESKD) and chronic HD are associated with a shift in body composition; besides a decrease in lean tissue mass, some patients experience additional fat tissue loss, which is a poor outcome indicator, while others gain fat tissue, which is associated with decreasing QoL **(Nowickaet al., 2022)**.

The adherence of the patients to hemodialysis treatment plans, usually three times a week (about 15 h), results in disrupting their normal lives and diminishing their QOL. QOL is among the crucial challenges in the healthcare field and one of the main factors in survival, as well as the therapeutic outcome of chronic diseases. In fact, it is a broad concept that covers the various aspects of life, such as religion, love, belonging, financial and occupational status, and mental, social, and physical health. Furthermore, QOL is a predictor of mortality in ESKD patients and the most important criterion for determining their health outcomes **(Nouri et al., 2024)**.

Older adults constitute the largest group among all people with advanced CKD. Although every single person needs individual care, the multidimensional medical complexity inherent in very old age is challenging. Where specific recommendations or practice points require special consideration in the elderly, we make clear statements in the special considerations section and encourage clinicians to individualize therapies and goals of care in all patients, with special attention to those of advanced age **(Stevens et al., 2024)**.
Nurses and multidisciplinary teams have been demonstrated to play a key role and interplay function in chronic disease management. Hence, the nurse-led multidisciplinary NICIs significantly alleviated total fatigue (muscular fatigue and mental fatigue) and improved other parameters **(Zuo et al.,2022)**. health care providers Considering the adverse effect of fatigue on quality of life and other health outcomes, it is recommended need to create strategies that reduce fatigue and improve quality of life, as well as periodic monitoring of their physical and mental health status, implement training programs and fatigue alleviation interventions **(Akbari et al., 2023)**.

Significance of the Study:
The advancement of chronic kidney disease (CKD) and its development into this fatal sickness, ESRD (end-stage renal disease), remains a massive reason for decreased personal satisfaction and early mortality. When chronic kidney diseases are left untreated, they progress to ESRD. End-stage renal disease is defined as "the presence of both factors (glomerular filtration rate [GFR] less than 60 mL/min and albumin greater than 30 mg per gram. Hemodialysis patients, who adhere to a rigorous dialysis treatment plan, including dialysis, are prone to fatigue, which significantly influences their quality of life. Fatigue affects 60% to 97% of individuals with ESRD undergoing hemodialysis (HD). Fatigue is a significant problem that must be addressed to improve poor health outcomes and quality of life **(Jamal et al., 2023)**. Egyptian studies that assess Fatigue, Functional Status and Quality of life among elderly patients on hemodialysis are limited. Hence, the present study was being conducted to assess predictors of quality of life in elderly patients on hemodialysis.

Aim of the study:
The aim of this study was to determine Predictors of Quality of Life in Elderly Patients on Hemodialysis.
Research questions:

- What are the fatigue's levels among elderly patients on hemodialysis?
- What is the degree of dependency in performing activities of daily living (ADL)?
- What are the levels and predictors of quality of life among elderly patients on hemodialysis?

Subjects and methods:

Research design:
To conduct this study, a cross-sectional descriptive research design was utilized.
Study setting:
The current study was carried out in Hemodialysis unit at Belbeis central Hospital in Belbies city in Sharqia governorate affiliated to the ministry of Health & Hemodialysis Unit in Shubra El-Nakhla, affiliated with Belbeis Central Hospital.

Study subjects:
A purposive sample of 115 elderly patients undergoing hemodialysis from the above-mentioned setting based on the *following inclusion criteria;*

- 60 years old and above.
- Able to communicate.
- Agree to participate in the study
- On hemodialysis more than one year.

Exclusion criteria:

- Elderly patients diagnosed with mental or psychological diseases.
- Elderly patients diagnosed with cancer, tuberculosis, temporary hemodialysis and chronic heart disease.

Tool for data collection:
An interview questionnaire with four parts developed by the researcher and guided by **Abd-Rabouh et al. (2017)** to collect data;
Part I: Demographic data: It was utilized to assess the demographic characteristics of the studied elderly patients as age, sex, level of education, marital status, work nature and income, etc.
Part II: Health history of the studied elderly patients:
to collect data about present history, past history and family history of the studied elderly patients it included questions as; Do you suffer from any chronic diseases?, Do you perform regular check-ups and follow-ups with the doctor?, Do you take other medications? And hospitalized last year ....etc.

Part III: Clinical data of elderly patients about renal failure (18-19) questions: to collect data about onset of chronic renal failure, duration and causes of the disease.

Part IV: Data about dialysis:
It include date of beginning dialysis, number of sessions/weeks, duration of hemodialysis, medications in use and complications

Tool II: - Activities of daily living scale:
This scale was developed by **Katz & Akpom (1976)**. The scale includes six activities of daily living namely, grooming, toileting, eating, dressing, bathing and mobility. The activities of daily living are measured and scored according to the individual's actual performance. They are categorized into three levels of dependency: independent, partially dependent and totally dependent.
Scoring system:
The questionnaire contained 6 items. The questionnaire using a 3-point scale that ranges from 2 “independent”, 1 “need assistance” and zero “complete dependent”. The total score is 12 grades. These scores were summed and converted into a percent score. it was classified into 2 categories:
- Independent if score (9-12 grades)
- Partially dependent if score (5-8 grades).
- Completely dependent if score (0-4 grades).

Tool III: The Multidimensional Fatigue Inventory Scale (MFI-20): -

It was developed by **Haggag & Soliman (1997)**. The scale includes five subscales: general fatigue, mental fatigue, physical fatigue, reduced activity and reduced motivation. The total items are 20 items and have even proportion of positively and negatively worded items. The score achieved by five points likert scale. The subscale scores ranged from 4–20. The total fatigue score is ranged from 20–100. Higher scores indicate a higher level of fatigue.

Scoring system:

The scale contained 20 items, divided into 5 subscales (general fatigue, mental fatigue, physical fatigue, reduced activity and reduced motivation), every subscale contains 4 items. Items 2, 5,9,10,13,14,16,17,18,19 had reversed score. The total score is 100 grades. These scores were summed and converted into a percent score. it was classified into 3 categories:

- **High** if score ≥ 75% (75-100 grades).
- **Moderate** if score from 50-<75% (50-74 grades).
- **Low** if score <50%. (1-49 grades**).**

Tool IV: Quality of life scale:-

This scale was used to determine the level of quality of life of dialysis patients. It was developed by **Mahmoud et al (2018)**. The scale consists of 70 items grouped into 4 subscales measuring different domains of health-related quality of life (physical functioning wellbeing It contains 38 questions from 1-38, psychological wellbeing that contains 13 questions from 39 to 51 socioeconomic status which consisted of 11 questions from 52 to 62 and spiritual wellbeing that comprised 8 questions from 63 to 70).

Scoring system:

The scale contained 70 items, divided into four domains, namely, physical functioning wellbeing (38 items), psychological wellbeing (13 items), socioeconomic status (11 items), and spiritual wellbeing (8 items). The scale using a 5-point scale that ranges from 5 “Does not apply to me”, 4“never”, 3 “weak degree”, 2 “moderate degree” and 1 “large extent”. Items 40,41,42,43,44,45,46,51,53,55,57,64,65,66,67,68,69,70 had reversed score The total scores of the scale were 350 grades. These scores were summed and converted into a percent score. It was classified into 3 categories:

- **Good** if score ≥ 75% (263-350 grades).
- **Fair** if score from 50-<75% (175-262 grades).
- **Poor** if score <50%. (1-174 grades)**.**

Content validity and reliability:

Three community health nursing and medicine experts reviewed the study tool and made some modifications based on their opinions to test its content validity. In order to assess each item individually and determine whether or not it is relevant and appropriate to test the desired outcomes, the content validity of the study tools was measured. The reliability of tools was tested by measuring their internal consistency. It demonstrated a good level of reliability with Cronbach's Alpha at Activities of daily living scale 0.905, The Multidimensional Fatigue Inventory Scale 0.976 and Quality of life scale 0.996.

Field work:

The first phase of the work is the preparatory phase once the permission was granted to proceed with the study, the researcher started to prepare a schedule for collecting the data. Each elderly was interviewed individually by the researcher who introduced herself and explained the aim of study briefly, and reassured them that information obtained is strictly confidential and would not be used for any purposes other than research.

After that, the oral approval was obtained to collect the necessary data. Data were collected in the Hemodialysis unit at Shubra El-Nakhla where the researcher was directly present, and in Belbeis unit , where the researcher had previous working experience that provided familiarity with schedules for interviewing the elderly who fulfilling the criteria. The study tools were answered by each elderly during the interview and the time needed ranged from 30 to 40 minutes, according to understanding and cooperation of the elderly. The field work was executed over a period about four months from the September 2024 to the end of December 2024.

Pilot study:

To ensure the clarity and comprehensiveness of the tool, A pilot study was carried out on a sample of 12% of the study subjects the aim was to test clarity of the instructions, the format of the questionnaire, comprehension of the items, and to estimate the exact time required for filling the questionnaire sheet. The participants involved in the pilot study were included in the main study sample as there were no modifications done in the study tool.

Administration and ethical consideration:

The study proposal was approved by the research Ethics and postgraduate committees of the Faculty of Nursing at Zagazig University. Participants were given oral informed consent after understanding the study's purpose. They had the option to withdraw at any stage and anonymity was protected by assigning code numbers for each elderly participant (M.D ZU. NUR /243 / 9/7/2024). The information was kept confidential and used for research purposes only. An official letter from the Dean of the Faculty of Nursing Zagazig University to the Director of Zagazig University Hospitals Administration was issued to clarify the study's nature and researcher role.

Statistical analysis:

The statistical analysis of data was done by using the computer software of Microsoft Excel Program and Statistical Package for Social Science (SPSS) version 25. Data were presented using descriptive statistics in the form of frequencies and percentage for categorical data, the mean (X) and standard deviation (SD) for quantitative data. Chi square test used to assess the association between two variables. Correlation coefficient test (r) was used to test the correlation between studied variables. Linear regression model was used to examining the predictors of activities of daily living, fatigue and quality of life among the studied elderly patients on hemodialysis. Reliability of the study tools was done using Cronbach's Alpha.

Degrees of significance of results were considered as follows:

- P-value ≥ 0.05 Not significant.
- P-value < 0.05 Significant.
- P-value < 0.01 Highly Significant.

Results:

Table 1, showed that 56.5% of the studied elderly patients were aged between 60-<70 years old, the mean SD of age was 68.82 ± 5.36 years. Also, 60.0% of them were male. Furthermore, 43.5% of them were married. Moreover, 38.3% of them were basic education. In addition, 80.0% of them didn't work. Also, 61.7% of them lived in more than one person in room. Likewise, 57.4% and 47.0% of them didn't have enough income, and depend on pension as source of income, respectively. Also, 42.6% of them lived with one of the children.

Table 2, showed that 88.7% of the studied elderly patients had chronic diseases, 62.7% of them hand kidney diseases. Moreover, 61.8% of them didn't do regular check-ups and follow-ups. Furthermore, 80.9% of them had other treatments, 40.8% of them had analgesic medications. Also, 64.8% of them

were hospitalized last year, 28.0% of them had cardiac problems during hospitalization period, 37.8% of them exposed to hospital infection during hospitalization. In addition,42.9% of them did surgeries last year, 55.6% of them did angioplasty. Likewise, 53.9% of them had family history for diseases, 51.6% of them had diabetes.

Table 3, showed that 54.8% of the studied elderly patients had renal failure from more than 5 years ago. Also, 40.8% of them had renal failure due to high blood pressure.

Figure (1): showed that, 55.7% of elderly patients on hemodialysis adults were partially dependent in performing activities of daily living. Also, 30.4% of them were independent. While, 13.9% of them were completely dependent.

Table 4 showed that, 52.2% of the studied elderly patients on hemodialysis sometimes feel healthy. Also, 51.3% of them don't feel comfortable. Regarding mental fatigue, 50.4% of the studied elderly patients on hemodialysis sometimes focused on what they did and sometimes focused well, respectively. Regarding physical fatigue, 52.2% and 60.0% of the studied elderly patients on hemodialysis cannot do a lot of physical work and didn't feel that their physical condition was excellent, respectively.

Figure (2): showed that, 52.2% of the studied elderly patients had poor level of total quality of life. Also, 39.1% of them had average level. While, 8.7% of them had good level.

Table 5, displays that, there was highly statistically significant relation between total quality of life of the studied elderly patients on hemodialysis and their demographic data as age, gender, social status, education level, current work, crowding index monthly income and living at (P= < 0.01).

Table 6, displays that, there was highly statistically significant relation between total quality of life of the studied elderly patients on hemodialysis and their history from chronic disease, regularity of check-ups, history from hospitalization last year, family history for diseases, duration suffered from renal failure, date of beginning dialysis, number of sessions per week, side effects during dialysis at (p= < 0.01). Also, there was no statistically significant relation with their history from surgery in the previous year at (P= > 0.05).

Table 7, showed the presence of a highly significant model, as indicated by the F-test result of 536.006 with a p-value of 0.000. This model explains 97.9% of the variation in total quality of life score, with an R-squared value of 0.979. Also, it presented that the domain of fatigue score had a strong negative effect on older adults' quality of life score with (B -2.370 - and Beta -0.637-) followed by age with (B -17.646- and Beta -0.151-). While, the domain of education level had a strong positive effect on quality of life with (B 9.993 and Beta 0.177).

Table (1): Frequency distribution of the studied elderly patients on hemodialysis according to their demographic characteristics (n=115).

Demographic characteristics	No.	%
Age		
60-<70	65	56.5
70-<80	47	40.9
≥80	3	2.6
Mean ± SD 68.82 ± 5.36		
Gender		
Male	69	60.0
Female	46	40.0
Social status		
Married	50	43.5
Widower	38	33.0
Divorced	27	23.5
Education level		
Illiterate	17	14.8
Reads and writes	20	17.4
Basic education	44	38.3
Secondary education	25	21.7
University education	9	7.8
Current work		
Works	23	20.0
Does not work	92	80.0
Crowding index		
≤1	44	38.3
>1	71	61.7
Monthly income		
Not enough	66	57.4
Enough	44	38.3
Enough and saved	5	4.3
Current source of income		
Pension	54	47.0
Helping children	30	26.1
Still working	23	20.0
Property income	8	7.0
Living		
Alone	13	11.3
Husband/Wife	42	36.5
One of the children	49	42.6
A relative	11	9.6

Table (2): Frequency distribution of the studied elderly patients on hemodialysis according to their health history (n=115).

Health history	No.	%
Chronic diseases		
Yes	102	88.7
No	13	11.3
*If yes, what is the disease? (n=102)		
Hypertension	60	58.8
Diabetes Mellitus	35	34.3
Arthritis	32	31.3
Respiratory diseases	8	7.8
Nervous system diseases	6	5.5
Liver diseases	14	13.7
Osteoporosis	28	27.4
Kidney diseases	64	62.7
Gastrointestinal diseases	10	9.8
Thyroid diseases	6	5.5
Regular check-ups and follow-ups		
Yes, irregularly	19	16.5
Yes, regularly	25	21.7
No	71	61.8
Take other medications		
Yes	93	80.9
No	22	19.1
*If yes, types of medications (n=93)		
Medicines to treat the digestive system.	20	21.5
Antibiotics	21	22.5
Medicines to treat the respiratory system	9	9.6
Treatments	5	5.3
Analgesic medications	38	40.8
Thyroid medications	8	8.6
Hospitalization last year		
Yes	74	64.3
No	41	35.7
If yes, what is the reason for hospitalization (n=74)		
Diabetes Ketoacidosis	4	5.4
Diabetic foot	2	2.7
Hypertension	9	12.0
Myocardial infarction	5	6.6
Pulmonary edema	4	5.3
Pneumonia	10	13.4
Cerebro vascular stroke	9	12.0
Urinary tract infection	4	5.3
Severe anemia	8	10.7
Cardiac problems	20	28.0
Duration spent in the hospital (n=74)		
≤1 weak	38	51.4
>1 weak	36	48.6

Health history	No.	%
Exposure to any infection while hospitalization (n=74)		
Yes	28	37.8
No	46	62.2
If yes, what infection was exposed to (n=28)		
Chest infection	20	75.6
Urinary tract infection	8	17.4
Surgery in the previous year		
Yes	27	42.9
No	36	57.1
*If yes, what is the surgery? (n=27)		
Amputation	2	7.4
Angioplasty	15	55.6
AV shunt	10	37.0
Family history of any of the diseases		
Yes	62	53.9
No	53	46.1
*If yes, what is it? (n=62)		
High blood pressure	19	30.6
Chest sensitivity	3	4.8
Diabetes mellitus	32	51.6
Brain stroke	16	25.8
Muscular rheumatism	7	11.2
Liver and gallbladder diseases	4	6.4
Kidney disease	19	30.6
Neurological and psychological problems	5	8.0

(*) Responses not mutually exclusive

Table (3): Frequency distribution of the studied elderly patients on hemodialysis according to their clinical data about renal failure (n=115).

Clinical data about renal failure	No.	%
Duration suffered from renal failure		
1- <2 years	28	24.3
2-5 years	24	20.9
>5 years	63	54.8
Cause of renal failure		
High blood pressure	47	40.8
Diabetes mellitus	31	27.0
Birth defect	4	3.5
Medications such as painkillers	33	28.7

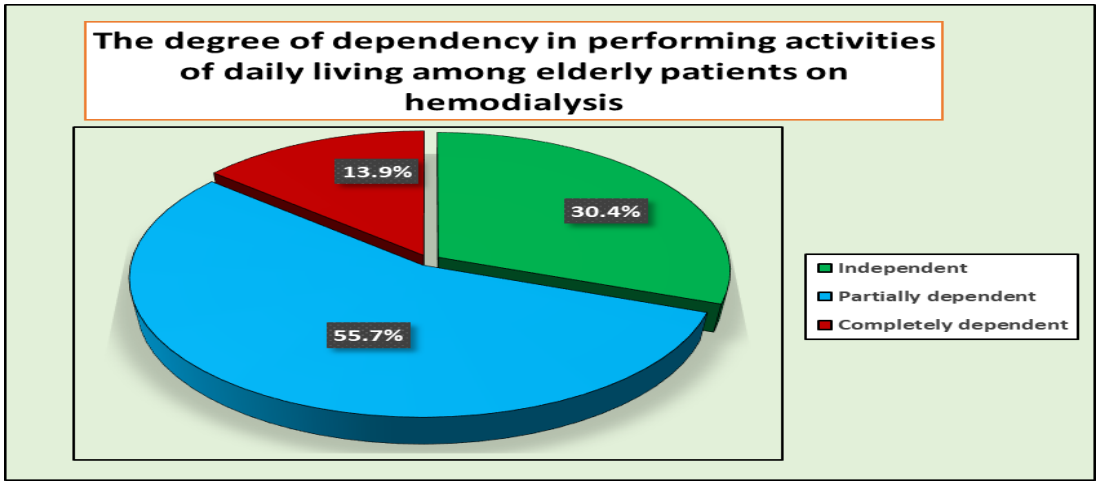

Figure (1): The degree of dependency in performing activities of daily living among elderly patients on hemodialysis (n=115).

Table (4): Frequency distribution of the studied elderly patients on hemodialysis according to their general, mental and physical fatigue (n=115).

Items	Yes absolutely		Yes		Sometimes		No		No absolutely		Mean ± SD
	No.	%	No.	%	No.	%	No.	%	No.	%	
General fatigue											
I feel healthy	4	3.5	8	7.0	60	52.2	34	29.5	9	7.8	3.31±0.85
*I feel exhausted	32	27.8	38	33.0	20	17.4	21	18.3	4	3.5	3.63±1.17
I am comfortable	4	3.5	10	8.7	21	18.3	59	51.3	21	18.2	3.72±0.97
*I get tired quickly	38	33.0	26	22.6	32	27.9	14	12.2	5	4.3	3.68±1.18
Mental fatigue											
I can focus my mind on what I am doing	5	4.3	6	5.2	58	50.4	40	34.9	6	5.2	3.31±0.83
I can focus well	3	2.6	8	7.0	58	50.4	22	19.1	24	20.9	3.80±0.93
*Concentrating on my work requires more effort	25	21.7	34	29.6	23	20.0	27	23.5	6	5.2	3.39±1.12
*My thoughts get distracted easily	16	13.9	40	34.8	25	21.7	25	21.7	9	7.9	3.25±1.17
Physical fatigue											
* I feel that I am physically capable of doing only a little	12	10.4	58	50.5	22	19.1	16	13.9	7	6.1	3.44±1.05
I can do a lot of physical work	3	2.6	6	5.2	35	30.4	60	52.2	11	9.6	3.61±0.83
*I feel like my body is tired	42	36.5	20	17.4	29	25.2	23	20.0	1	0.9	3.69±1.18
I feel that my physical condition is excellent	7	6.1	4	3.5	20	17.4	15	13.0	69	60.0	4.17±1.20

Notes: SD: Standard deviation, (*): reverse-scored item.

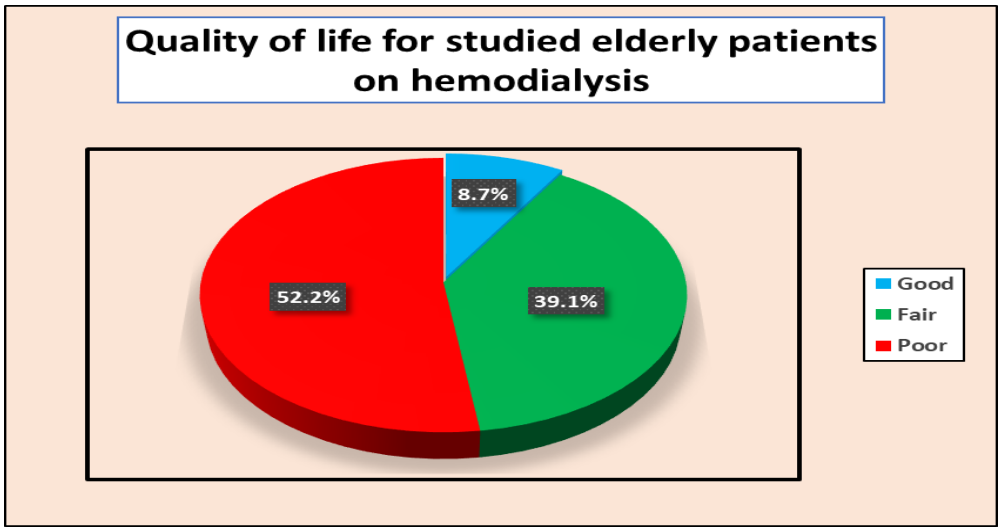

Figure (2): Total quality of life as perceived by elderly patients on hemodialysis (n=115).

Table (5): Relation between demographic data of the studied elderly patients on hemodialysis and their levels of quality of life **(n=115).**

Demographic data		Levels of quality of life						X^2	P-Value
		Good (n=10)		Fair (n=45)		Poor (n=60)			
		No.	%	No.	%	No.	%		
Age (year)	60-<70	10	100.0	45	100.0	10	16.7	**81.09**	**0.000****
	70-<80	0	0.0	0	0.0	47	78.3		
	≥80	0	0.0	0	0.0	3	5.0		
Gender	Male	10	100.0	31	68.9	28	46.7	**12.59**	**0.002****
	Female	0	0.0	14	31.1	32	53.3		
Social status	Married	10	100.0	15	33.3	25	41.6	**15.57**	**0.004****
	Widower	0	0.0	19	42.3	19	31.7		
	Divorced	0	0.0	11	24.4	16	26.7		
Education level	Illiterate	0	0.0	0	0.0	17	28.3	**163.2**	**0.000****
	Reads and writes	0	0.0	0	0.0	20	33.3		
	Basic education	0	0.0	22	48.9	22	36.7		
	Secondary education	1	10.0	23	51.1	1	1.7		
	University education	9	90.0	0	0.0	0	0.0		
Current work	Works	10	100.0	13	28.9	0	0.0	**57.22**	**0.000****
	Does not work	0	0.0	32	71.1	60	100.0		
Crowding index	≤1	10	100.0	30	66.7	4	6.7	**56.86**	**0.000****
	>1	0	0.0	15	33.3	56	93.3		
Monthly income	Not enough	0	0.0	11	24.4	55	91.7	**109.7**	**0.000****
	Enough	5	50.0	34	75.6	5	8.3		
	Enough and saved	5	50.0	0	0.0	0	0.0		
Living	Alone	0	0.0	7	15.6	6	10.0	**31.81**	**0.000****
	Husband/Wife	9	90.0	22	48.8	11	18.3		
	Children	1	10.0	16	35.6	32	53.4		
	A relative	0	0.0	0	0.0	11	18.3		

X^2= Chi-square test. **(**)** Highly statistically significant at p ‹ 0.01

Table (6): Relation between health, renal failure and hemodialysis histories of the studied elderly patients on hemodialysis and their levels of quality of life **(n=115).**

Items		Levels of quality of life						X^2	P-Value
		Good (n=10)		Fair (n=45)		Poor (n=60)			
		No.	%	No.	%	No.	%		
History from chronic disease	Yes	0	0.0	42	93.3	60	100.0	87.07	0.000**
	No	10	100.0	3	6.7	0	0.0		
Regularity of check-ups	Yes, regular	3	30.0	16	35.6	0	0.0	82.07	0.000**
	Yes, irregular	7	70.0	18	40.0	0	0.0		
	No	0	0.0	11	24.4	60	100.0		
Hospitalization last year	Yes	0	0.0	19	42.2	55	91.7	47.17	0.000**
	No	10	100.0	26	57.8	5	8.3		
Surgery in the previous year	Yes	0	0.0	14	31.1	15	25.0	4.20	0.122
	No	10	100.0	31	68.9	45	75.0		
Family history for diseases	Yes	0	0.0	19	42.2	43	71.7	21.78	0.000**
	No	10	100.0	26	57.8	17	28.3		
Duration from renal failure	1- <2 yrs	10	100.0	18	40.0	0	0.0	118.60	0.000**
	2-5 yrs	0	0.0	23	51.1	1	1.7		
	>5 yrs	0	0.0	4	8.9	59	98.3		
Date of beginning dialysis	1- <2 yrs	10	100.0	20	44.4	0	0.0	123.3	0.000**
	2-5 yrs	0	0.0	23	51.1	1	1.7		
	>5 yrs	0	0.0	2	4.4	59	98.3		
Number of sessions per week	Two	10	100.0	25	55.6	0	0.0	62.52	0.000**
	Three	0	0.0	20	44.4	60	100.0		
Side effects during dialysis	Yes	0	0.0	25	55.6	60	100.0	57.37	0.000**
	No	10	100.0	20	44.4	0	0.0		

X^2= Chi-square test. No significant at $p > 0.05$. **(**)** Highly statistically significant at $p < 0.01$

Table (7): Multiple linear regression model examining the predictors of elderly patients' quality of life score (n=115).

Predictors	Unstandardized Coefficients		Standardized Coefficients	t	P. value	95% Confidence interval	
	B	Std. Error	βeta			Lower	Upper
(Constant)	438.186	25.347		17.287	.000**	387.927	488.446
Total fatigue score	-2.370-	.242	-.637-	-9.796-	.000**	-2.850-	-1.890-
Age (≥80 years)	-17.646-	3.262	-.151-	-5.410-	.000**	-24.113-	-11.179-
History from chronic disease	-19.018-	6.015	-.094-	-3.162-	.002**	-30.945-	-7.091-
Marital status (Divorced)	-4.688-	1.371	-.058-	-3.419-	.001**	-7.406-	-1.969-
Duration from renal failure (>5 yrs)	-14.364-	3.394	-.188-	-4.232-	.000**	-21.094-	-7.633-
Education level (High education)	9.993	2.306	.177	4.334	.000**	5.422	14.565
History from side effects during dialysis	-20.350-	5.184	-.140-	-3.926-	.000**	-30.629-	-10.071-
Regularity of check-ups	8.014	2.619	.095	3.060	.003**	13.207	2.820
Gender (Male)	4.338	2.148	.033	2.020	.046*	.079	8.597

Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	0.989	0.979	0.977	9.777

ANOVA

Model	Df.	F	P. value
Regression	9	536.006	0.000**

Dependent Variable: Total quality of life score.

Variables entered and excluded: Current work, monthly income, living condition, hospitalization last year, surgery in the previous year, family history for diseases, date of beginning dialysis and number of sessions per week.

Notes: B=Unstandardized Coefficients. Beta=Standardized Coefficients. t: Independent t-test.

R^2 = Coefficient of multiple. * $p < 0.05$. ** $p < 0.01$.

Discussion:

Hemodialysis (HD) remains the most widely used renal replacement therapy worldwide. Fatigue, in particular, is among the most distressing symptoms in HD patients, affecting up to 90% of them. It significantly reduces patients' ability to carry out daily activities and worsens physical, mental, and social functioning (**Kim et al., 2023; Liu et al., 2024**). Quality of life (QoL) in elderly patients on HD is often compromised due to symptom burden, functional dependence, and psychosocial stressors. **(Zhou et al., 2023; Ali et al., 2024)**. Therefore, the current study was conducted to assess fatigue, functional status and quality of life among elderly patients on hemodialysis.

A highly statistically significant correlation was identified between total quality of life and the aforementioned demographic factors ($P < 0.01$). Quality of life was also significantly influenced by clinical variables including chronic disease history, consistency of follow-up, recent hospitalizations, family medical history, renal failure duration, start of dialysis, session frequency, and dialysis-related side effects ($P < 0.01$). Again, no statistically significant relationship was found between quality of life and history of surgery in the preceding year ($P > 0.05$). These findings are consistent with recent studies. **Alghamdi et al. (2023)** found that older age, presence of diabetes, and lower income and education levels were significantly associated with lower QoL among hemodialysis patients in Saudi Arabia.

The study demonstrated a strong positive correlation between total ADL scores and total quality of life scores ($r = 0.943$, $p < 0.01$), and strong negative correlations between total fatigue and both ADL score and quality of life scores. ADL dependency was highly significant, fatigue had the strongest negative effect on ADL performance, followed by chronic disease history. In contrast, education level showed a positive impact, indicating that better-educated patients were more independent.

These results align with **Pereira et al. (2024)** who observed that post-dialysis fatigue was strongly associated with poorer physical quality of life and greater dependency among the elderly on hemodialysis (*both $r \approx -0.45$ to -0.5*). In another cohort of older adults receiving dialysis, **Yagi et al. (2025)** reported that reduced functional status (reflecting lower ADL performance) correlated with higher fatigue levels and worse quality of life and that ADL impairment was predicted by comorbidity burden and low serum albumin, a proxy for chronic disease history.

Education level had the strongest protective effect, followed closely by chronic disease history. Conversely, duration of renal failure positively predicted fatigue. These findings are consistent with the Piper Fatigue Scale investigations, which observed that longer dialysis duration and multiple comorbidities correlate with increased fatigue severity, while higher education levels correlate with lower fatigue **(Mardiyah & Azmy, 2022).** Fatigue exerted the most pronounced negative influence, with age as a secondary factor. Meanwhile, higher education positively impacted QoL. These results mirror findings from a recent fatigue QoL study in hemodialysis patients, which reported that higher fatigue strongly correlates with reduced QoL especially in physical and psychological domains while education enhances patients' ability to cope **(Sułkowski et al., 2025)**.

The study showed that fatigue exerted the strongest negative effect on QoL, followed by advanced age (≥80 years) and chronic disease history. Conversely, higher education and regular medical check-ups significantly improved QoL. Dialysis-related side effects had a marked negative influence, while being male had a modest protective association.In agreement with our results, **Alghamdi et al. (2023)** found that older age, diabetes, and lower education/income levels were significantly associated with reduced QoL among dialysis patients, consistent with our findings. **Sułkowski et al. (2025**) also reported that higher fatigue strongly correlated with lower QoL across physical and psychological domains, while education enhanced coping capacity.

Yagi et al. (2025) also showed that reduced functional status and multimorbidity were predictive of lower QoL in elderly dialysis patients, echoing our model results. In contrast, **Lewis et al. (2023**) emphasized that environmental factors such as transportation burden and treatment-related costs were stronger determinants of QoL than demographic factors, which diverges from our findings where

fatigue, age, and education emerged as the strongest predictors.

Conclusion:

In light of the study's findings and answer of research question, it was concluded that sociodemographic and clinical factors strongly influence elderly patients on hemodialysis, with fatigue emerging as the most critical determinant negatively affecting quality of life and independence. Education level, chronic disease history, and renal failure duration were also significant predictors, highlighting the multifaceted challenges faced by this population.

Recommendations:

Based on findings, the study recommended:

- Routine screening for fatigue, functional ability, and quality of life should be integrated into standard care.
- Supported by individualized interventions such as physical activity programs, psychological support, and tailored patient education.

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AUTHOUR'S CONTRIBUTIONS

M.H.M.: Conceptualized the study and designed the research framework. E.S.A.: Led data collection and coordinated fieldwork activities. S.G.M.: Performed statistical analysis and interpretation of data. All authors participated, revised, and approved the final manuscript.

DECLARATION OF CONFLICTING INTERESTS

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