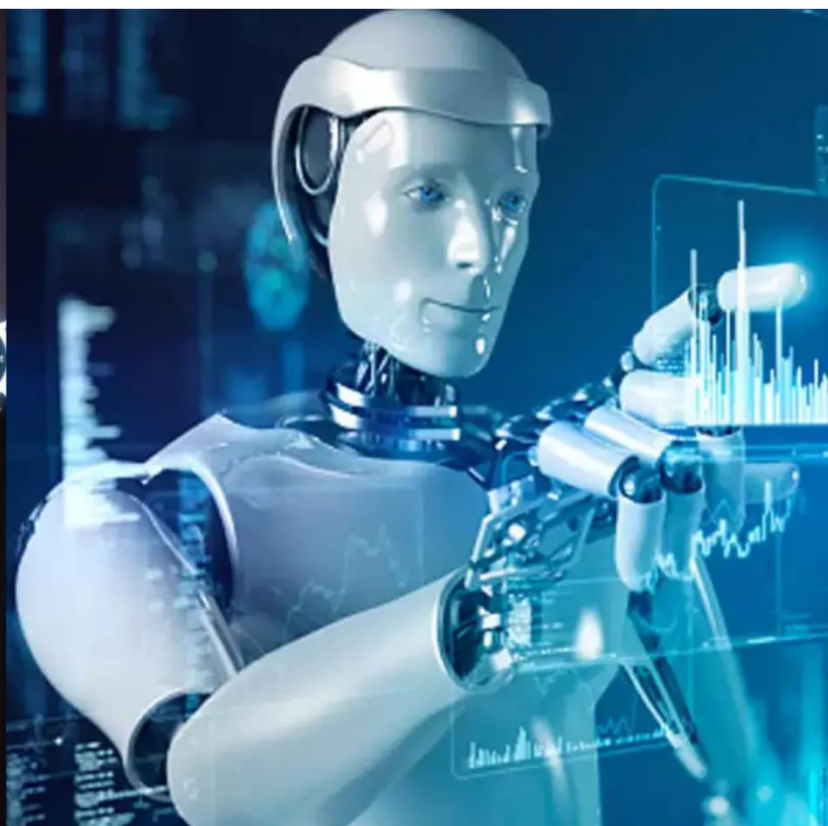




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# Dialysis Related Factors Affecting Self-Efficacy and Quality of Life in Patients on Maintenance Hemodialysis

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**ABSTRACT:** Maintenance Hemodialysis (MHD) is a life-sustaining treatment for patients with End-Stage Renal Disease (ESRD), imposing a significant burden on their physical and psychological well-being. The interplay between dialysis-related factors, patient-reported outcomes like Quality of Life (QoL), and self-efficacy management is crucial for holistic patient care. This study aimed to analyze the demographic and clinical profile of MHD patients and identify the significant dialysis-related factors affecting their QoL, as measured by the EQ-5D-5L instrument, and their self-efficacy management scores.

A cross-sectional study was conducted involving 100 MHD patients. Data on demographic characteristics (age, gender, education, income, family issues), clinical factors (basic kidney disease, dialysis vintage, sessions per week), EQ-5D-5L scores, and self-efficacy management scores were collected. Descriptive statistics, t-tests, and one-way ANOVA were employed to analyze the data and test for significant differences.

The sample comprised predominantly males (78%), aged 51-60 years (49%), with Hypertension and Diabetes as the primary etiology (57%). A majority had a dialysis vintage of over 3 years (40%), reported family issues (50%), and had an income below Rs. 10,000 (63%). Most patients underwent two dialysis sessions per week (67%). Statistical analysis revealed that age, basic kidney disease, dialysis vintage, family issues, income level, and sessions per week significantly influenced EQ-5D-5L scores ( $p < 0.05$ ).

For self-efficacy management, significant differences were found across age groups, basic kidney disease, family issues, and income level ( $p < 0.05$ ). Gender and education level did not show a significant association with either outcome measure. Several modifiable and non-modifiable dialysis-related factors significantly impact the QoL and self-efficacy of MHD patients. Younger age, higher income, and the absence of family issues are associated with better outcomes. A tailored, multidisciplinary approach addressing these factors is essential to improve the overall well-being and empowerment of patients undergoing hemodialysis.

**KEYWORDS:** Hemodialysis, Quality of Life, EQ-5D-5L, Self-Efficacy, End-Stage Renal Disease, Dialysis Vintage, Chronic Kidney Disease.

## I. INTRODUCTION

End-Stage Renal Disease (ESRD) represents a irreversible decline in kidney function, necessitating renal replacement therapy for survival. Maintenance Hemodialysis (MHD) is the most common form of such therapy worldwide, acting as an artificial filtration system to remove waste products and excess fluid from the blood [1]. While MHD prolongs life, it is not a cure. Patients on MHD face a lifelong regimen of rigorous treatment schedules, dietary and fluid restrictions, and complex medication routines, which profoundly disrupt their physical, psychological, social, and economic existence [2].

The concept of Quality of Life (QoL) has emerged as a critical patient-centered outcome in chronic disease management, moving beyond mere survival metrics. For MHD patients, QoL encompasses dimensions such as physical functioning, freedom from pain, emotional well-being, and social participation [3]. The EQ-5D-5L is a standardized,

widely used instrument for measuring health-related QoL, providing a descriptive profile and a single index value for health status [4].

Concurrently, self-efficacy—a patient's confidence in their ability to manage challenges and perform behaviors necessary to achieve specific goals—is a pivotal psychological construct in chronic illness [5]. In the context of MHD, self-efficacy relates to a patient's belief in their capacity to adhere to treatment, manage symptoms, and maintain daily activities, which directly influences health outcomes and QoL [6].

Despite advances in dialysis technology, the QoL of MHD patients often remains suboptimal [7]. A complex interplay of demographic, socio-economic, and clinical factors dictates this experience. Factors such as age, gender, underlying kidney disease, duration on dialysis (dialysis vintage), socio-economic status, and family support systems can either mitigate or exacerbate the burden of dialysis [8], [9]. Understanding which specific factors significantly influence QoL and self-efficacy is paramount for developing targeted interventions.

This study, therefore, seeks to bridge this gap by conducting a detailed analysis of the dialysis-related factors affecting "Self-Efficacy and Quality of Life" in patients on Maintenance Hemodialysis.

The primary objectives are:

1. To describe the demographic and clinical profile of a sample of MHD patients.
2. To assess the level of QoL (using EQ-5D-5L) and self-efficacy among these patients.
3. To identify the significant differences among various dialysis-related factors with regard to EQ-5D-5L scores and self-efficacy management scores.

## **II. LITERATURE SURVEY**

The landscape of research on QoL and self-efficacy in MHD patients is vast, highlighting multifactorial influences. Studies consistently report that MHD patients have a significantly lower QoL compared to the general population and patients with other chronic conditions [10].

**Demographic Factors:** The relationship between age and QoL in dialysis patients is complex. While some studies indicate that younger patients report poorer QoL due to the disruption of life plans and career, others, including the DOPPS study, suggest that older age is associated with lower physical component scores but similar or even better mental component scores [11]. Our study aligns with the latter, hypothesizing that younger patients may have better physical QoL. The influence of gender remains inconclusive, with some studies showing worse QoL in women [12], while others find no significant difference [13].

**Clinical Factors:** The primary kidney disease has a substantial impact. Patients with diabetic nephropathy often experience a more rapid decline and higher comorbidity burden, leading to poorer QoL scores compared to those with glomerulonephritis or hypertension [14]. Dialysis vintage also shows a non-linear relationship; initial improvements in QoL after dialysis initiation may be followed by a plateau or decline as long-term complications arise [15]. The frequency of dialysis sessions is another critical factor. Frequent hemodialysis (e.g., thrice-weekly or more) has been shown in trials like the FHN trial to improve certain QoL dimensions, particularly physical functioning and symptom control, compared to conventional twice-weekly regimens [16].

**Socio-Economic and Psychosocial Factors:** Lower income and education levels are strongly correlated with poorer QoL and lower self-efficacy across chronic diseases, primarily due to limited access to resources, health literacy, and support systems [17]. Family support, or the lack thereof (conceptualized here as "family issues"), is a cornerstone of coping. A supportive family environment is consistently linked to better adherence, improved psychological adjustment, and higher QoL [18].

Self-efficacy acts as a mediator between these socio-economic factors and health outcomes. Studies by [19] and [20] have demonstrated that interventions aimed at improving self-efficacy can lead to significant improvements in fluid adherence, dietary compliance, and overall QoL in MHD patients.

This current research contributes to this body of knowledge by providing a simultaneous analysis of these diverse factors on both QoL and self-efficacy within a single cohort, using robust statistical methods to delineate their individual significance.

### III. METHODOLOGY

This section outlines the research design, study population, data collection instruments, and statistical methods employed to investigate the factors affecting QoL and self-efficacy in MHD patients.

#### 3.1. Study Design and Setting

A descriptive, cross-sectional study design was adopted. This design is optimal for determining the prevalence and relationships between variables at a specific point in time. The study was conducted at a hemodialysis unit of a tertiary care hospital.

#### 3.2. Study Population and Sampling

A sample of 100 patients undergoing MHD was recruited for the study. The inclusion criteria were: (1) age above 18 years, (2) being on MHD for at least three months, and (3) being clinically stable. Patients with severe cognitive impairment or communication barriers were excluded. A convenience sampling method was used to recruit participants over a defined period.

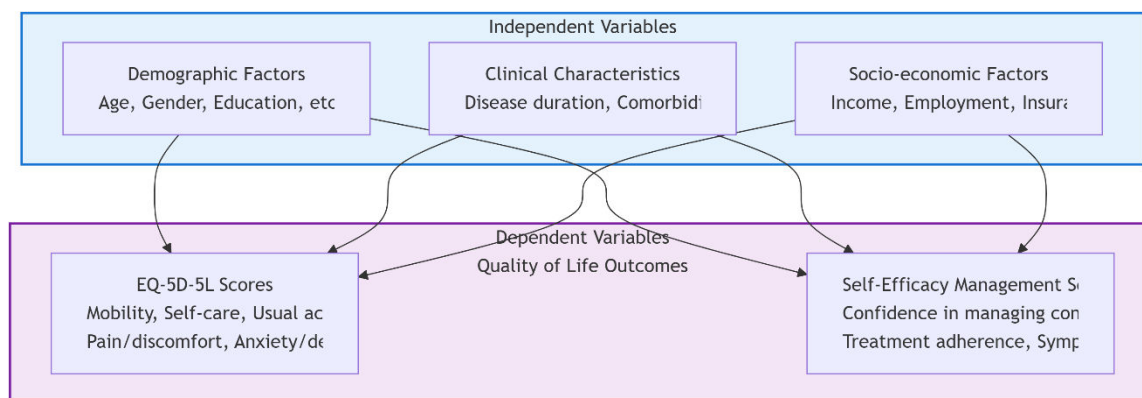


Figure 1: Conceptual Framework of the Study

#### 3.3. Data Collection Instruments

Data was collected using a structured questionnaire with three parts:

- **Socio-Demographic and Clinical Proforma:** This section captured information on age, gender, basic kidney disease, dialysis vintage, family issues, education level, income level, and number of dialysis sessions per week.
- **EQ-5D-5L Questionnaire:** This is a standardized instrument developed by the EuroQol Group for measuring health-related QoL [4]. It comprises two parts:
  - **EQ-5D-5L Descriptive System:** This assesses five dimensions: Mobility, Self-Care, Usual Activities, Pain/Discomfort, and Anxiety/Depression. Each dimension has five levels of severity: no problems, slight problems, moderate problems, severe problems, and unable to/extreme problems.
  - **EQ Visual Analogue Scale (EQ-VAS):** This records the patient's self-rated health on a vertical visual analogue scale from 0 (the worst health you can imagine) to 100 (the best health you can imagine). For this study, the overall EQ-5D-5L score was calculated and used for analysis.
- **Self-Efficacy Management Scale:** A validated scale was used to measure patients' confidence in managing their disease. It typically includes domains such as fatigue, pain, emotional distress, symptoms, daily tasks, and medication management. Patients rate their confidence on a scale, and a total self-efficacy management score is derived.

### 3.4. Ethical Considerations

Informed consent was obtained from all participants. The study protocol was approved by the Institutional Ethics Committee, and confidentiality of the data was maintained throughout the research process.

### 3.5. Data Analysis

The collected data were analyzed using Statistical Package for the Social Sciences (SPSS) software version [e.g., 26.0]. Descriptive statistics including frequency, percentage, mean, and standard deviation were used to summarize the demographic and clinical characteristics of the patients. Inferential statistics, namely the independent samples t-test and one-way Analysis of Variance (ANOVA), were applied to determine the significant difference among the dialysis-related factors with regard to the EQ-5D-5L score and self-efficacy management score. A p-value of less than 0.05 was considered statistically significant.

## IV. RESULT ANALYSIS

The results are presented in two main sections: descriptive analysis of the patient characteristics and their responses, and inferential analysis testing the significance of differences among factors.

### 4.1. Descriptive Analysis of Patient Characteristics

The demographic and clinical profile of the 100 MHD patients is summarized in the tables below.

**Table 1: Gender Distribution of the Patients**

Classification	Number of patients	Percentage
Male	78	78.0
Female	22	22.0
<b>Total</b>	<b>100</b>	<b>100.0</b>

The data indicates a male predominance (78%) in the study sample.

**Table 2: Age Distribution of the Patients**

Classification	Number of patients	Percentage
Up to 40 years	16	16.0
41-50 years	17	17.0
51-60 years	49	49.0
Above 60 years	18	18.0
<b>Total</b>	<b>100</b>	<b>100.0</b>

Nearly half of the patients (49%) belonged to the 51-60 years age group, indicating a middle-aged to elderly cohort.

**Table 3: Basic Kidney Diseases of the Patients**

Classification	Number of patients	Percentage
Hypertension	36	36.0
Diabetes	7	7.0
Hypertension and Diabetes	57	57.0
<b>Total</b>	<b>100</b>	<b>100.0</b>

The leading cause of ESRD was a combination of Hypertension and Diabetes (57%), followed by Hypertension alone (36%).

**Table 4: Dialysis Vintage of the Patients**

Classification	Number of patients	Percentage
Up to 1 year	32	32.0
1-3 years	28	28.0
Above 3 years	40	40.0
<b>Total</b>	<b>100</b>	<b>100.0</b>

A large proportion of patients (40%) had been on dialysis for more than three years, reflecting a cohort with considerable long-term experience with the treatment.

**Table 5: Family Issues of the Patients**

Classification	Number of patients	Percentage
Yes	50	50.0
No	50	50.0
<b>Total</b>	<b>100</b>	<b>100.0</b>

Half of the patients reported having family issues, highlighting the significant psychosocial challenges faced by this population.

**Table 6: Education Level of the Patients**

Classification	Number of patients	Percentage
Educated	57	57.0
Uneducated	43	43.0
<b>Total</b>	<b>100</b>	<b>100.0</b>

**Table 7: Income Level of the Patients**

Classification	Number of patients	Percentage
Less than Rs.10,000	63	63.0
Above Rs.10,000	37	37.0
<b>Total</b>	<b>100</b>	<b>100.0</b>

A majority of patients (63%) had a low monthly income (less than Rs. 10,000), which could impact their access to ancillary care and nutritional support.

**Table 8: Dialysis Sessions Per Week**

Classification	Number of patients	Percentage
Two	67	67.0
Three	33	33.0
<b>Total</b>	<b>100</b>	<b>100.0</b>

Most patients (67%) were on a twice-weekly dialysis schedule, which is common in resource-constrained settings.

#### 4.2. Descriptive Analysis for EQ-5D-5L Score Responses

The patients' confidence levels across various domains of the QoL instrument are presented below. A high percentage of patients reported being "totally confident."

Table 9: Distribution of Responses for EQ-5D-5L Domains

Domain	Not at all confident	Totally confident
Fatigue	27%	73%
Pain/Comfort	25%	75%
Emotional Distress	28%	72%
Symptoms and Problems	28%	72%
Task and Activity	22%	78%
Medications	36%	64%

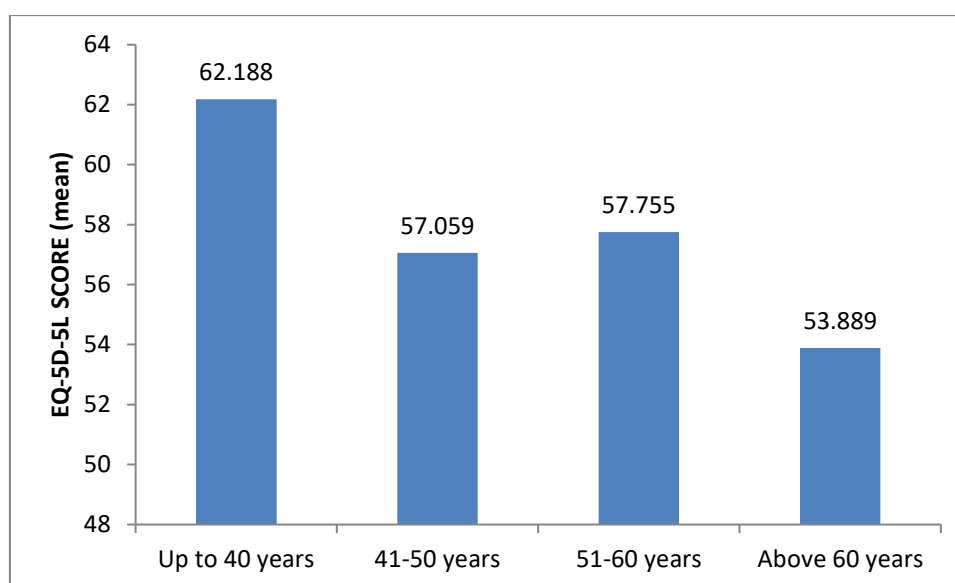


Figure 2: Bar Chart showing the percentage of patients

#### 4.3. Significant Difference among Factors with Regard to EQ-5D-5L Score

To test the hypothesis (H01) that there is no significant difference among dialysis-related factors with regard to the EQ-5D-5L score, t-tests and ANOVA were performed. The results are summarized in Table 10.

Table 10: Difference among the Dialysis related factors with regard to EQ-5D-5L SCORE

Factor	Classification	Mean	SD	t/F-value (p-value)
Age	Up to 40 years	62.188	23.591	**3.339* (p=.027)**
	41-50 years	57.059	24.562	
	51-60 years	57.755	24.753	
	Above 60 years	53.889	22.199	
Gender	Male	59.231	24.733	1.251 (p=.114)
	Female	52.045	19.979	
Basic kidney disease	Hypertension	59.028	23.385	**4.133* (p=.015)**
	Diabetics	52.857	22.886	
	Hypertension & Diabetics	57.400	25.419	
Dialysis Vintage	Up to 1 year	51.875	26.692	**4.401* (p=.011)**
	1-3 years	60.893	23.806	
	Above 3 years	60.000	21.122	
Family issues	Yes	52.200	21.336	**3.335* (p=.022)**
	No	63.100	25.199	
Education level	Educated	58.158	24.939	0.244 (p=.808)

	Uneducated	56.977	22.628	
<b>Income level</b>	Less than Rs.10,000	52.143	26.155	<b>**3.089* (p=.041)**</b>
	Above Rs.10,000	58.919	26.011	
<b>Sessions per week</b>	Two	56.094	23.912	<b>**3.686* (p=.016)**</b>
	Three	61.364	24.214	
*Significant at 5% level				

#### INTERPRETATION:

- **Age:** The significant F-value (3.339, p=.027) leads to the rejection of H01. The highest mean QoL score was in the youngest group (up to 40 years, Mean=62.19), and the lowest was in the oldest group (above 60 years, Mean=53.89), indicating that QoL decreases with age.
- **Basic Kidney Disease:** A significant difference was found (F=4.133, p=.015). Patients with only hypertension had the highest QoL (Mean=59.03), while those with only diabetes had the lowest (Mean=52.86).
- **Dialysis Vintage:** The analysis revealed a significant difference (F=4.401, p=.011). Patients on dialysis for 1-3 years reported the highest QoL (Mean=60.89), while those with less than a year on dialysis had the lowest (Mean=51.88).
- **Family Issues:** The t-test was significant (t=3.335, p=.022). Patients without family issues had a markedly higher QoL (Mean=63.10) compared to those with issues (Mean=52.20).
- **Income Level:** A significant difference was observed (t=3.089, p=.041). Patients with higher income (>Rs.10,000) had a better QoL (Mean=58.92) than those with lower income (Mean=52.14).
- **Sessions Per Week:** The difference was significant (t=3.686, p=.016). Patients on thrice-weekly dialysis had a higher mean QoL score (61.36) than those on twice-weekly dialysis (56.09).
- **Gender and Education:** No significant differences were found for these factors (p > 0.05).

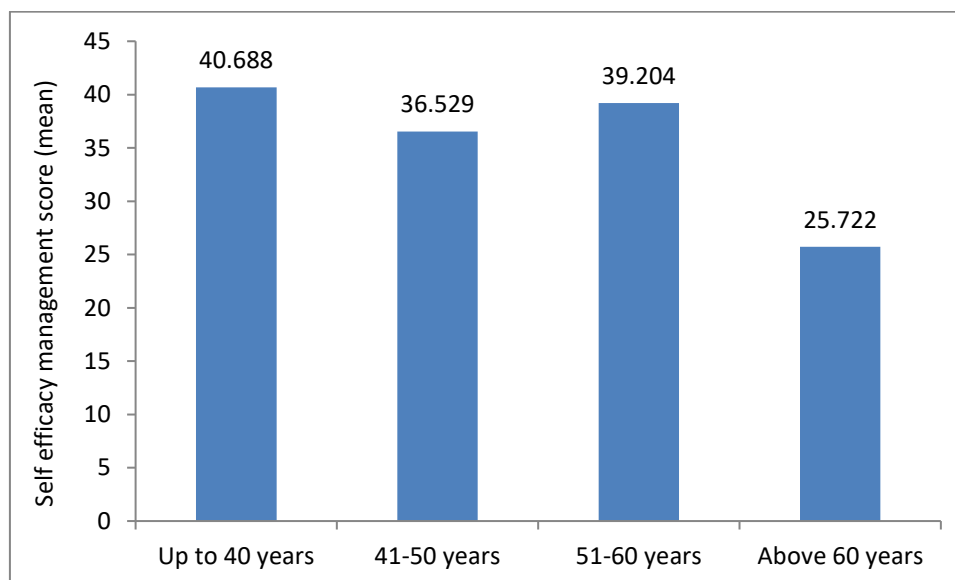


Figure 3: Graph showing Self Efficacy across different Age Groups

#### 4.4. Descriptive Analysis for Self-Efficacy Management Responses

The distribution of responses for the self-efficacy domains, based on the EQ-5D-5L descriptive system, is shown below.

\*Table 11: Distribution of Responses for Self-Efficacy Management Domains\*

Domain	No Problem	Slight	Moderate	Severe	Unable/Extreme
Mobility	52%	14%	13%	4%	17%
Self-care	62%	7%	7%	5%	19%
Usual activity	51%	8%	15%	8%	18%
Pain/Discomfort	39%	15%	21%	8%	17%
Anxiety/Depression	23%	10%	14%	17%	36%

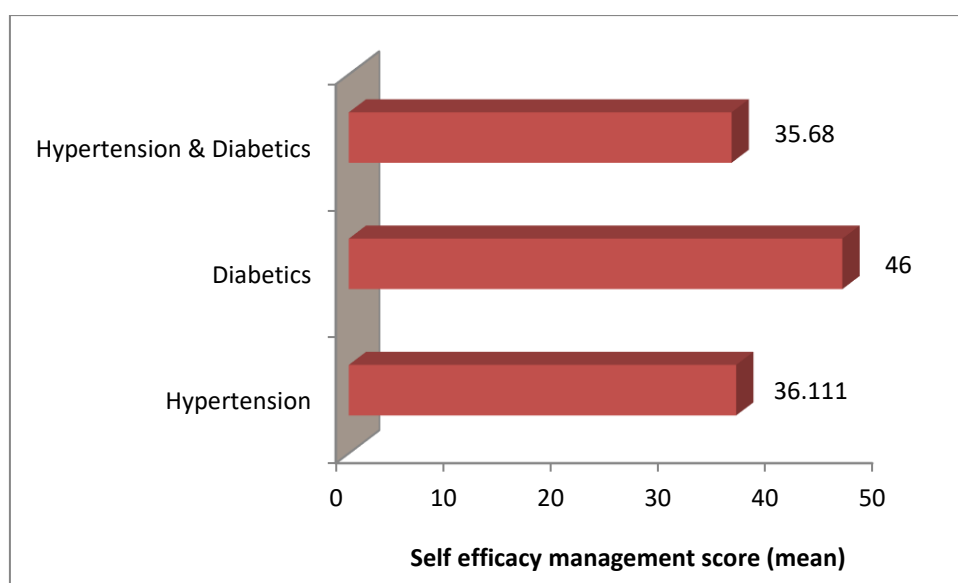


Figure 4: Stacked Bar Chart showing the distribution of problems across all five self-efficacy dimensions

Notably, while a majority reported no problems with Mobility, Self-care, and Usual Activities, the domain of Anxiety/Depression showed the highest level of impairment, with 36% of patients reporting "unable to/extreme problems."

#### 4.5. Significant Difference among Factors with Regard to Self-Efficacy Management Score

The hypothesis (H02) that there is no significant difference among dialysis-related factors with regard to the self-efficacy management score was tested. The results are in Table 12.

Table 12: Difference among the Dialysis related factors with regard to Self efficacy management

Factor	Classification	Mean	SD	t/F-value (p-value)
Age	Up to 40 years	40.688	16.648	**3.917* (p=.011)**
	41-50 years	36.529	12.913	
	51-60 years	39.204	14.367	
	Above 60 years	25.722	18.094	
Gender	Male	35.436	16.392	1.337 (p=.184)
	Female	40.546	13.605	
Basic kidney disease	Hypertension	36.111	13.507	**3.887* (p=.015)**
	Diabetics	46.000	18.761	
	Hypertension & Diabetics	35.680	16.568	
Dialysis Vintage	Up to 1 year	36.813	16.634	0.211 (p=.816)
	1-3 years	37.929	17.966	
	Above 3 years	35.400	13.981	

Family issues	Yes	40.220	14.217	**2.354* (p=.021)**
	No	32.900	16.771	
Education level	Educated	35.895	16.238	0.481 (p=.632)
	Uneducated	37.442	15.584	
Income level	Less than Rs.10,000	31.250	11.543	**3.480* (p=.018)**
	Above Rs.10,000	34.811	15.754	
Sessions per week	Two	35.516	16.654	0.382 (p=.685)
	Three	38.455	14.064	
*Significant at 5% level				

#### INTERPRETATION:

- **Age:** A significant difference was found ( $F=3.917$ ,  $p=.011$ ). Self-efficacy was highest in the youngest group (Mean=40.69) and lowest in the oldest group (Mean=25.72), suggesting that younger patients manage their condition more effectively.
- **Basic Kidney Disease:** The difference was significant ( $F=3.887$ ,  $p=.015$ ). Contrary to the QoL findings, patients with only diabetes had the highest self-efficacy (Mean=46.00), while those with both hypertension and diabetes had the lowest (Mean=35.68).
- **Family Issues:** The t-test was significant ( $t=2.354$ ,  $p=.021$ ). Interestingly, patients who reported having family issues had a higher mean self-efficacy score (40.22) than those without (32.90).
- **Income Level:** A significant difference was observed ( $t=3.480$ ,  $p=.018$ ). Patients with a higher income level had better self-efficacy (Mean=34.81) compared to those with lower income (Mean=31.25).
- **Dialysis Vintage, Gender, Education, and Sessions per Week:** No significant differences were found for these factors concerning self-efficacy management ( $p > 0.05$ ).

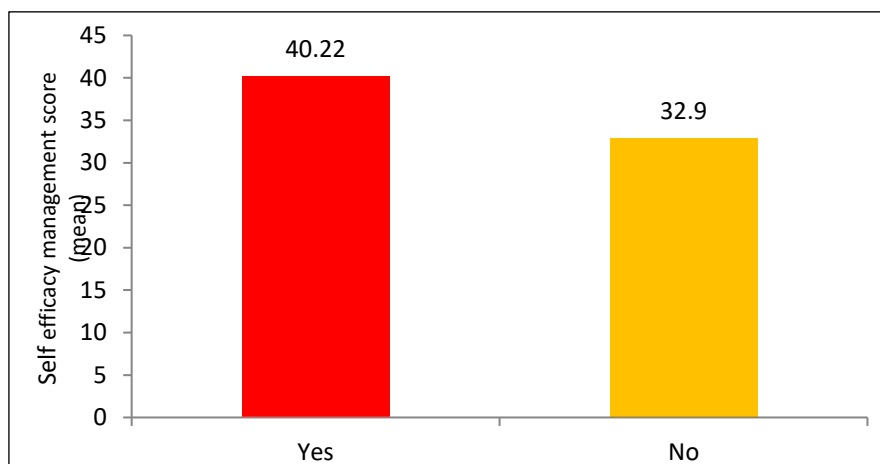


Figure 5: Bar Chart comparing Mean Self-Efficacy Scores for patients with and without Family Issues

#### V. DISCUSSION

The findings of this study offer a detailed insight into the factors shaping the experiences of MHD patients. The demographic profile reveals a cohort that is predominantly male, middle-aged, and of low socio-economic status, with a high burden of hypertensive and diabetic kidney disease. This profile is consistent with the epidemiology of CKD in many developing nations [21].

The high levels of confidence reported across most EQ-5D-5L domains (e.g., 78% for Task and Activity) are encouraging but should be interpreted with caution. This could indicate genuine adaptation and resilience. However, it might also reflect response bias or a lack of critical self-assessment. The notably lower confidence in medication management (64%) underscores the complexity and burden of polypharmacy in this population, aligning with studies on medication adherence in ESRD [22].

The inferential analysis provides robust evidence for rejecting the null hypotheses for several factors concerning QoL. The inverse relationship between age and QoL is well-documented and can be attributed to the cumulative burden of comorbidities, age-related frailty, and decreased physiological reserve [11]. The finding that patients with only diabetes had the lowest QoL is particularly striking and emphasizes the particularly debilitating nature of diabetic complications on overall well-being [14].

The non-linear relationship with dialysis vintage, where QoL was lowest in the first year, suggests an "adaptation phase." The initial period on dialysis is often marked by psychological distress and physical adjustment, with QoL potentially improving as patients acclimatize to their new routine [15]. The powerful influence of the absence of family issues on QoL highlights the critical role of psychosocial support as a buffer against the stresses of chronic illness [18]. The positive association of higher income and more frequent dialysis sessions with QoL points to the importance of economic resources and adequate treatment dosage in achieving better health outcomes [16], [17].

For self-efficacy, the results are equally revealing. The strong age effect corroborates theories that younger individuals may be more proactive and adaptable in managing chronic conditions. The counterintuitive finding that patients with diabetes alone reported the highest self-efficacy warrants further investigation. It is possible that the singular, focused nature of managing diabetes, compared to the multifaceted management of multiple conditions, fosters a stronger sense of control in some patients.

The finding that patients *with* family issues had higher self-efficacy is paradoxical. One plausible explanation is that the presence of family challenges might force patients to develop greater self-reliance and problem-solving skills in managing their health, thereby boosting their self-efficacy. Alternatively, the measure of "family issues" might be complex, and some forms of family engagement, even if perceived as challenging, might still promote disease management activities.

## **VI. CONCLUSION**

This study successfully identified key dialysis-related factors that significantly impact the Quality of Life and self-efficacy of patients on Maintenance Hemodialysis. The conclusions are as follows:

1. The typical MHD patient in this setting is a middle-aged male with low income, suffering from hypertension and diabetes, and on dialysis for over three years.
2. While patients generally report high confidence in managing various life and health domains, psychological distress (Anxiety/Depression) remains a profoundly under-addressed issue.
3. **Quality of Life** is significantly better in younger patients, those with hypertension as the primary cause (vs. diabetes), those who have surpassed the first year of dialysis, those without family issues, those with higher income, and those on a thrice-weekly dialysis schedule.
4. **Self-Efficacy** is significantly higher in younger patients, those with diabetes as the sole cause (vs. combined etiology), those who report family issues, and those with higher income.

### **Implications for Practice:**

- **Psychosocial Support:** Routine screening for anxiety, depression, and family dynamics should be integrated into dialysis care. Counseling services and support groups are essential.
- **Patient Education:** Tailored education programs, especially for older patients and those new to dialysis, can improve self-efficacy and QoL.
- **Economic Advocacy:** Social workers should assist low-income patients in accessing financial aid and support schemes.
- **Clinical Policy:** Whenever clinically feasible, advocating for more frequent dialysis sessions (thrice-weekly) could improve patient outcomes.

## **VII. LIMITATIONS AND FUTURE RESEARCH**

The cross-sectional design limits causal inference. The use of convenience sampling and a single center may affect generalizability. The measure of "family issues" was binary and could benefit from a more nuanced assessment. Future longitudinal studies and interventional research focusing on boosting self-efficacy in identified vulnerable groups are recommended

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