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Original Research Article

Assessment of Pre and Post Dialysis Mental Impact on CKD Patients Registered with a Dialysis Unit of Tertiary Hospital

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Abstract: ***Background*:** Chronic Kidney Disease (CKD) significantly impacts patients' physical and mental health. Dialysis, a critical intervention for CKD patients, has been known to affect both clinical and mental health outcomes, but there remains limited research on the specific changes in mental health associated with dialysis initiation. This study examines the demographic characteristics, clinical history, and mental health impact on CKD patients before and after dialysis. ***Methods:*** The study employed a cross-sectional design with a sample of 42 CKD patients undergoing dialysis. Data were collected on demographic characteristics, clinical history (including duration and frequency of dialysis), comorbidities, and mental health status assessed using the Generalized Anxiety Disorder-7 (GAD-7) scale. Descriptive and correlational statistics, including Spearman's correlation coefficients and Chi-Square tests, were utilized to assess associations between clinical variables and mental health outcomes. ***Result:*** The study population was predominantly female (62%) and aged between 36-55 years (50%). Most respondents had been living with CKD for 1-5 years (50%), with 76.2% undergoing dialysis twice weekly. Pre-dialysis, a majority (47.6%) exhibited minimal mental health impacts, while post-dialysis, a substantial increase in moderate mental impacts (38.1) was noted. Correlation analysis revealed a significant positive relationship between post-dialysis mental health and duration of dialysis ($r=0.38$, $p=0.03$), while frequency of dialysis did not significantly impact mental health outcomes. Chi-Square tests indicated a borderline association between pre-dialysis mental health and dialysis frequency. ($\chi^2=5.13$, $p=0.07$). ***Conclusion:*** The findings suggest that dialysis duration is significantly correlated with post-dialysis mental health, highlighting the potential psychological burden associated with prolonged treatment. However, the frequency of dialysis sessions did not significantly impact mental health outcomes.

Keywords: Chronic Kidney Disease, Dialysis, Mental Health, Anxiety, GAD-7, Clinical Correlations, Psychosocial Factors.

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Introduction

Chronic Kidney Disease (CKD) represents a global health challenge, affects more than 10% of the general population worldwide, amounting to more than 800 million individuals, including older individuals, women, racial minorities and in people

experiencing diabetes mellitus and hypertension.[1] CKD patients suffer from progressive loss of kidney function, which necessitates medical interventions such as dialysis to replace some of the kidneys' essential functions.[2] Dialysis, a life-saving procedure, is typically administered to patients with end-stage renal disease (ESRD), helping to filter toxins, waste products, and excess fluids from the blood when the kidney can no underperform these functions adequately.[3] The factors influencing self-efficacy and self-management in patients with pre-end-stage renal disease were highlighted, along with the impact of depression and explored the use of cognitive-behavioral strategies to improve quality of life and self-care among hemodialysis (HD) patients.[4] CKD patients undergoing dialysis face significant lifestyle adjustments, including the need for frequent hospital visits, dietary restrictions, and the physical toll of treatment, all of which can contribute to heightened levels of anxiety, depression, and stress.[5] Additionally, the chronic nature of the disease and uncertainty about the future further exacerbate mental health challenges, with a strong correlation to depression, particularly in resource-contained settings. This is largely due to the debilitating effects of the disease, coupled with complications such as fatigue, pain and lifestyle restrictions, which can significantly diminish an individual's quality of life and increase feelings of helplessness and distress.[6] Several factors, such as the duration and frequency of dialysis, comorbidities, financial burden, and social isolation, have been identified as contributors to the mental health challenges faced these patients.[7] The cumulative impact of these factors exacerbates psychological distress, increasing susceptibility to mental health disorders such as depression, marked by pervasive sadness and hopelessness; anxiety disorders, characterized by excessive worry and physiological arousal; and post-traumatic stress disorder (PTSD). Understanding the mental impact of dialysis is crucial for developing interventions to improve the holistic well-being of CKD patients. The aim of the objective is to assess the mental impact of pre- and post-dialysis on CKD patients registered with the dialysis unit of Kumudini Hospital, Mirzapur.

Methods

The study was conducted at dialysis unit of Kumudini Hospital, Mirzapur, Tangail from 10 September, 2024 to 10 October, 2024 to assess the pre- and post-dialysis mental impact on patients with chronic kidney disease (CKD) who were registered with the dialysis unit of Kumudini Hospital, Mirzapur. A total of 42 patients participated in the study. The inclusion criteria were limited to CKD patients who were registered with the dialysis unit at Kumudini Hospital, Mirzapur. The participants included both males and females aged more than 18 years, with varying educational backgrounds, marital statuses, and religious affiliations. The clinical data collected included the duration of CKD, the frequency of dialysis, and the duration of dialysis in months. Information on comorbidities, family size, and monthly income (both prior to and post-dialysis) was also gathered. To assess the mental impact of dialysis, the Generalized Anxiety Disorder 7 (GAD-7) scale was administered both before and after the dialysis treatment. The pre-dialysis mental health status was categorized into four groups: minimal mental impact (0-4), mild mental impact (5-9), moderate mental impact (10-14), and severe mental impact (15-21). The same categorization was applied post-dialysis to assess any changes in mental health. In addition, information was collected on the duration of dialysis (in months), frequency of dialysis sessions per week, and the duration of CKD (in years). Descriptive statistics were used to summarize the characteristics of the study population. The association between clinical variables (such as dialysis duration, frequency, and CKD duration) and mental health scores was examined using the Chi-square test for categorical variables and Spearman's rank correlation for continuous variables. Correlations between dialysis duration and mental health scores were calculated, with a p-value of less than 0.05 considered statistically significant. Statistical analysis was conducted using SPSS version 26.

Results

The study population primarily consists of middle-aged individuals, with 20 respondents (50%) aged between 36-55 years. This is followed by 13 respondents (30.9%) aged 56 years or older and 9 respondents (21.4%) aged 18-35 years. In terms of gender distribution, females constitute the majority, with 26 respondents (62%), while males account for 16 respondents (38%). Regarding marital status, 27 respondents (64.3%) are married,

while 15 respondents (35.7%) are unmarried. Educational attainment among the study population shows that 16 samples of the population (38%) have completed primary education, 10 (23.8%) have attained secondary education, 7 (16.7%) have qualifications above HSC, and 9 (21.4%) are illiterate. Religious affiliation reveals that 39 respondents (92.9%) identify as Muslim, with smaller represents from Hinduism (2, 4.8%) and Buddhism, (1, 2.4%). The mean family size was 4.69±SD, ranging from a single member to a maximum of 10 members. Family sizes ranged from a minimum of 1 member to a maximum of 10 members. Monthly income data demonstrate a marked decline following dialysis, reflecting the substantial economic impact of the procedure on patients. The mean income before dialysis was 9809.60 BDT±SD, reflecting a wide variation in income levels across participants. After dialysis, the mean income dropped to 1262 BDT±SD, showing that while the financial burden impacted most individuals, some experienced more drastic reductions than others. This demographic and economic data underline the diverse socioeconomic backgrounds and significant financial challenges faced by the population under study [Table 1].

Table 1: Basic Characteristics of Study population based on Basic Characteristics (n=42)

Basic Characteristics	**(n, %)**
Age	
18-35	9, 21.4%
36-55	20, 50.0%
≤ 56	13, 30.9%
Sex	
Male	16, 38.0%
Female	26, 62.0%
Marital Status	
Married	27, 64.3%
Unmarried	15, 35.7%
Education	
Primary	16, 38.0%
Secondary	10, 23.8%
Above HSC	7, 16.7%
Illiterate	9,21.4%
Religion	
Islam	39, 92.9%
Hinduism	2, 4.8%
Buddhism	1, 2.4%
Family Size	
Mean	4.69 ± SD
Minimum	1
Maximum	10
Monthly Income (TBDT) - Prior Dialysis	
Minimum	0 BDT
Maximum	50000 BDT
Mean	9809.60 BDT ± SD
Monthly Income (TBDT) - Post Dialysis	
Minimum	0 BDT
Maximum	21000 BDT
Mean	1262 BDT ± SD

The clinical history of the study population reveals varied durations of chronic kidney disease (CKD). Among the respondents, 21 individuals (50%) have been living with CKD for 1-5 years, while 11 individuals (26.2%) have had the condition for 6-10 years. Equal proportions of 5 individuals (11.9%) have had CKD for less than 1 year and more than 10 years. The mean duration of CKD across the population is 4.91 years ± SD. This suggest that most participants have had CKD for approximately 5 years, although the duration varies widely, ranging from less than 1 year to a maximum of 18 years.The frequency of dialysis shows that the majority of study population, 32 samples (76.2%), undergoes dialysis twice a week. A smaller proportion, 6 samples (14.3%), receives dialysis once a week, while 4 samples (9.5%) undergo dialysis three times a week. The duration of dialysis is evenly distributed, with 21 samples (50%) having undergone dialysis for less than 12 months and an equal number for 12-60 months. The mean duration of dialysis is 13.77 months±SD, indicating considerable variation in dialysis experience. The duration ranges from a minimum of 1 month to a maximum of 36 months.

Comorbidities are exceedingly prevalent within the study population, with 41 samples (97.6%) reporting the existence of at least one comorbid condition. This finding underscores the significant and multifaceted health burden associated with chronic kidney disease (CKD) and its concomitant management within this cohort, highlighting the intricate interplay of CKD with other prevalent medical conditions. [Table 2]

Table 2: Distribution of study population based on Clinical history (n=42)

Clinical history	(N, %)
Duration of CKD (in Years)	
<1 years	5,11.9%
1-5 years	21,50.0%
6-10 years	11,26.2%
>10 years	5,11.9%
Mean	4.91 Years ± SD
Minimum	<1 year
Maximum	18 years
Frequency of Dialysis	
Once in a week	6, 14.3%
Twice in a week	32, 76.2%
Thrice in a week	4, 9.5%
Duration of Dialysis (in months)	
Less than 12 months	21, 50.0%
12-60 months	21, 50.0%
Mean	13.77 months ± SD
Minimum	1 month
Maximum	36 months
Comorbidity	
Yes	41, 97.6%
No	1, 2.4%

The mental health assessment of the study population, based on the GAD-7 scoring system, highlights significant changes in mental health status before and after dialysis. Before undergoing dialysis, 20 individuals (47.6%) exhibited minimal mental health impacts, as indicated by Generalized Anxiety Disorder-7 (GAD-7) scores ranging from 0 to 4, suggesting a relatively low level of anxiety. Mild mental health impacts, defined by GAD-7 scores between 5 and 9, were observed in 18 individuals (42.8%), while 4 individuals (9.5%) reported moderate mental health impacts with scores ranging from 10 to 14. Notably, no participants (0.0%) exhibited severe mental health impacts, characterized by GAD-7 scores between 15 and 21, prior to dialysis initiation. These findings underscore a predominance of lower mental health impact levels before dialysis treatment, reflecting relatively stable mental well-being among the majority of participants. In the post dialysis phase, the distribution of mental health impacts exhibited a noteworthy shift. The proportion of individuals reporting minimal mental health impacts (scores of 0-4) decreased substantially, with only 8 individuals reporting mild mental health impacts (scores of 5-9) remained consistent, with 18 individuals (42.8%) continuing to fall within this range. However, there was a substantial increase in the proportion of individuals reporting moderate mental health impacts (scores of 10-14), which rose to 16 individuals (38.1%). Similar to pre-dialysis assessments, no respondents (0.0%) reported severe mental health impacts following dialysis treatment, maintaining a consistent trend of absence of severe mental health distress. [Table 3]

Table 3: Distribution of study population based on Pre and Post Dialysis Mental Assessment (GAD7) (n=42)

Mental Assessment	(N, %)
Pre- Dialysis Mental Assessment	
0-4= Minimal mental impact	20, 47.6%
5-9= Mild mental impact	18, 42.8%
10-14=Moderate mental impact	4, 9.5%
15-21=Severe mental impact	0, 0.0%
Post- Dialysis Mental Assessment	
0-4= Minimal mental impact	8, 19.0%
5-9= Mild mental impact	18, 42.8%
10-14=Moderate mental impact	16, 38.1%
15-21=Severe mental impact	0,0.0%

The analysis of the correlation between pre-dialysis mental health scores (measured using GAD-7) and key clinical variables was conducted using Spearman's correlation coefficient **(r)**. This non parametric measure assesses the strength and direction of monotonic relationships between variables, providing insights into potential associations in this study population. A weak positive Spearman correlation (r=0.25) was found between the pre-dialysis mental health scores and the duration of dialysis, suggesting a potential but limited monotonic relationship. Although this indicates that individuals undergoing dialysis for longer durations may experience slightly greater mental health impacts, the p=0.08 value indicates that this trend is not statistically significant at the conventional threshold ($p<0.05$). In addition, the frequency of dialysis sessions demonstrated an even weaker positive Spearman correlation (r=0.12) with pre-dialysis mental health scores. This minimal association is further reflected in a non-significant p-value of 0.36, highlight the absence of a meaningful monotonic relationship between dialysis frequency and pre-dialysis mental health status. Moreover, the duration of CKD exhibited a

weak positive Spearman correlation (r=0.20) with pre-dialysis mental health scores. While this trend might suggest that longer durations of living with CKD could slightly impact mental health, the relationship was not statistically significant (p=0.16), underscoring its limited explanatory power. [Table 4]

Table 4: Correlation between Pre-Dialysis Mental Score and Clinical Variables

Clinical Variable	Spearman's Correlation Coefficient (r)	P-value
Duration of Dialysis (months)	0.25	0.08
Frequency of Dialysis	0.12	0.36
Duration of CKD (years)	0.20	0.16

The correlation analysis between post-dialysis mental health scores and various clinical variables also was performed using Spearman's correlation coefficient(r). A moderate positive Spearman correlation (r=0.38) was observed between post-dialysis mental health scores and the duration of dialysis. This indicates a moderate, positive monotonic relationship, where longer dialysis durations tend to correlate with higher mental health scores, suggesting more significant mental impacts. Importantly, the p=0.03 value indicates statistical significance at the ($p<0.05$) threshold, thus confirming that the relationship between dialysis duration and post-dialysis mental health is not due to random chance. A weak positive correlation (r=0.16) was found between the frequency of dialysis and post-dialysis mental health scores, which suggesting that the number of dialysis sessions per week is not strongly associated with the mental health scores after dialysis. Additionally, p=0.25 indicates this correlation is not statistically significant, reinforcing that frequency of dialysis does not meaningfully affect post-dialysis mental health outcomes in this sample. At the same time, correlation between the duration of CKD and post-dialysis mental health scores yielded a modest positive value (r=0.27), suggesting a weak positive relationship, but the p=0.09 value indicates it is not statistically significant, implying it could be due to chance. The findings from this analysis suggest that frequency of dialysis and duration of CKD did not show significant correlations with post-dialysis mental health scores, which may indicate that factors other than clinical characteristics such as psychosocial, environmental or individual patient-related variables play a more substantial role in determining mental health outcomes. [Table 5]

Table 5: Correlation between Post-Dialysis Mental Score and Clinical Variables

Clinical Variable	Spearman's Correlation Coefficient (r)	P-value
Duration of Dialysis (months)	0.38	0.03*
Frequency of Dialysis	0.16	0.25
Duration of CKD (years)	0.27	0.09

*= Statistically significant

The Chi-Square test for the association between pre-dialysis mental impact and clinical variables shows a borderline association between the frequency of dialysis and mental health (χ^2=5.13, p=0.07), though the p-value does not reach the threshold for statistical significance. This implies a potential trend, but insufficient evidence to establish a definitive relationship. On the other hand, the duration of CKD, categorized into various time intervals, does not exhibit a significant correlation with pre-dialysis mental health (χ^2=2.72, p=0.43), indicating that disease progression may not be a direct determinant of mental impact before dialysis. Therefore, both clinical variables appear to have limited influence on mental health status in the pre-dialysis stage, warranting further investigation with larger sample sizes or additional variables. [Table 6]

Table 6: Association between Pre-Dialysis Mental Impact and Clinical Variables

Clinical Variable	Category	Chi-square Value (χ^2)	P-value
Duration of Dialysis (months)	Continuous variable	N/A	N/A
Frequency of Dialysis	Once, Twice, thrice	5.13	0.07
Duration of CKD (years)	<1 year, 1-5 years, 6-10 years, >10 years	2.72	0.43

The Chi-square test results presented the relationships between post-dialysis mental health impact and various clinical variables. The frequency of dialysis (χ^2=1.85, p=0.40) does not show a significant association with post-dialysis mental health, indicating that the number of dialysis sessions per week does not substantially affect the mental health outcomes after dialysis in this sample. Similarly, the duration of CKD (χ^2=5.13, p=0.16) does not exhibit a significant impact on post-dialysis mental health, suggesting that the length of time individuals have had CKD before undergoing dialysis does not strongly influence their mental well-being post-treatment. These results indicate that neither the frequency of dialysis nor the length of the disease history significantly contribute to post-dialysis mental health outcomes in this study, although other factors may be at play. [Table 7]

Table 7: Association between Post-Dialysis Mental Impact and Clinical Variables

Clinical Variable	Category	Chi-square Value (χ^2)	P-value
Duration of Dialysis (months)	Continuous variable	N/A	N/A
Frequency of Dialysis	Once, Twice, thrice	1.85	0.40
Duration of CKD (years)	<1 year, 1-5 years, 6-10 years, >10 years	5.13	0.16

DISCUSSION

This study underscores the dual burden of CKD, as psychological impacts compound its physiological demands. The study predominantly consisted of females (62%), with a significant proportion (64.3%) being married. Educational attainment varied with a notable 21.4% identified as illiterate, reflecting the potential barriers to effective health management. Pre-dialysis GAD-7 data from our cohort revealed minimal mental health impact in 47.6% of patients, while moderate impact was reported by only 9.5%; post-dialysis, these metrics shifted to 19.0% and 38.1% respectively. These findings resonate with the frailty-linked HRQoL deterioration seen in Korea's CKD population, where frail patients exhibited a 29% lower variance-adjusted physical health score (p<0.001).[8] Financial strain, with mean incomes plummeting from 9,809.6 to 1,262 BDT post-dialysis, which attributes 35.8 million DALYs to CKD. Our study's significant 38% post-dialysis GAD-7 surge parallels evidence tying renal dysfunction to exacerbated cardiovascular risks and emotional distress. The findings emphasize targeted psychosocial interventions, especially in socioeconomically constrained settings like Bangladesh, where dialysis care gaps risk amplifying global disparities identified in low and middle-SDI regions. There was a study conducted on 112 patients, 78.6% of those with high self-management reported high self-efficacy, while 92% with low self-management.[4] The study population was predominantly male (61.6%), showed significant demographic disparities influencing self-management, with high education levels (62.5% of college graduates) markedly associated with better outcomes (p<0.001). Another study revealed the effects on KDQOL-36 MCS and PCS scores compared to the control group, with adjusted mean differences of 0.3 points (95% CI: -2.69, 13.63, p=0.34).[9] The intervention group experienced a marginal reduction in phosphorus level (-0.5mg/dL, p=0.21) and IDWG (-0.9 lbs), which were not statistically significant, highlights

logistical and motivational challenges of implementing effective psychosocial and educational interventions within the constraints of hemodialysis settings. In our study, despite a borderline correlation between dialysis duration and post-dialysis scores (r=0.38, p=0.03), income reductions from 9,809.6 to 1,262 BDT emphasize financial strain. Our result aligned with previous studies, highlighting the limited efficacy of interventions on quality-of-life metrics (MCS Δ0.3, p=0.34; PCS Δ3.15, p=0.20) and underscore the pressing need for contextually adapted strategies to improve psychosocial and economic outcomes in CKD patients.[9, 10]

The study demonstrated a 30% increase in patient satisfaction, a 25% improvement in self-management adherence, and a 20% reduction in distress, underscoring the significant role of disease management education in enhancing emotional well-being.[11] Similarly, a systematic review showed that barriers influencing adherence to exercise regimens in chronic patients included a lack of motivation and time, as reported by 76% of participants.[12-14] Importantly, 54% of patients reported enhanced outcomes, such as better disease management, improved emotional well-being, and greater adherence to treatment plans, through individualized interventions and social support.[15] Similarly, our findings align with these studies reinforcing that prolonged illness duration and frequent dialysis correlate with increased mental health impacts. This was evidenced by the rise in moderate mental health impairments post-dialysis (38.1%) and positive Spearman correlation (r=0.38) between dialysis duration and post-dialysis mental health. These findings underscore the mental strain faced by patients, warranting tailored psychological interventions alongside clinical care. Chi-square test analysis highlights limited associations between clinical variables and mental health and mental health in CKD patients.

Pre-dialysis, the frequency of dialysis shows a borderline trend with mental health (χ^2=5.13, p=0.07), while CKD duration shows no significant impact (χ^2=2.72, p=0.43). Post-dialysis, neither dialysis frequency (χ^2=1.85, p=0.40) nor CKD duration (χ^2=5.13, p=0.16) significantly influence mental health outcomes. These findings suggest that non-clinical factors may play a greater role, emphasizing the need for targeted psychosocial interventions to improve patient well-being.[16,17] Our study also associated with previous studies, where the study observed significant association between pain interference and depression among 334 CKD patients, with 22.2% experiencing depressive symptoms (χ^2 = 11.54, p < 0.01).[18,19] The male-to-female participant ratio (47.3% male, 52.7% female), while chronic pain was reported y 32.6% of participants, contributing significantly to their illness perception and self-esteem deficits (χ^2 = 9.24, p < 0.05). A key limitation of this study is its small sample size (n=42), which may limit generalizability. While demographic and clinical factors were considered, the cohort may not fully represent dialysis patients across different regions. Variability in comorbidities and dialysis frequency further limits causal conclusions. Additionally, the cross-sectional design prevents analysis of long-term mental health trends. Future larger, longitudinal studies are needed for stronger evidence.

Conclusion

In this study highlights the significant mental health impact of dialysis treatment on patients with chronic kidney disease (CKD). Pre-dialysis mental health showed relatively low anxiety levels among most participants, but post-dialysis assessments revealed a shift towards more moderate mental impacts. The findings indicate that the duration of dialysis correlates positively with increased mental health challenges, particularly after the procedure, while other factors such as dialysis frequency and CKD duration showed weaker associations. Furthermore, the substantial reduction in monthly income post-dialysis underscores the financial strain faced by patients, emphasizing the multifaceted challenges that CKD patients endure.

Recommendations

Further studies can be undertaken by including large number of patients.

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