Original Article

Psychological Morbidity across the CKD Trajectory: A Multi-Center Comparative Study of Pre-Dialysis versus Maintenance Dialysis Patients in Bangladesh

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Abstract:

Background: Chronic Kidney Disease (CKD) imposes a significant psychological burden on patients, which may evolve as the disease progresses from the pre-dialysis stage to requiring maintenance dialysis. Understanding this shift is crucial for delivering holistic care in resource-limited settings, such as Bangladesh. **Objective:** This study aimed to compare the levels of depression, anxiety, and stress between pre-dialysis and post-dialysis CKD patients. **Methods:** A comparative cohort study was conducted from July 2024 to June 2025 at Eastern Medical College & Hospital (EMCH) and another tertiary care hospital. A total of 80 participants were recruited, comprising 40 in the pre-dialysis (CKD stage 4 and 5) group and 40 in the post-dialysis (on maintenance hemodialysis for more than 3 months) group. The Depression, Anxiety, and Stress Scale (DASS-21) were used for psychological assessment. Data were analyzed using SPSS version 23.0, employing independent t-tests and Chi-square tests. **Results:** The post-dialysis group demonstrated significantly higher mean scores for depression (18.4 vs. 11.2, $p<0.001$), anxiety (15.7 vs. 9.8, $p<0.001$), and stress (19.6 vs. 13.1, $p<0.001$). A significantly greater proportion of dialysis patients also met the threshold for severe depression (35% vs. 12.5%, $p=0.012$) and anxiety (30% vs. 10%, $p=0.025$). A significant negative correlation was found between eGFR and all psychological distress scores ($p<0.01$). **Conclusion:** Initiation of dialysis is associated with a severe increase in psychological morbidity among CKD patients in Bangladesh. Integrating routine mental health screening and support into standard nephrology care is strongly recommended to address this significant burden.

Key words: Anxiety, Chronic Kidney Disease (CKD), Depression, Dialysis, Psychological stress

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Introduction:

Chronic Kidney Disease (CKD) is a growing global public health challenge, with prevalence rising due to hypertension and diabetes mellitus[1]. Progression to end-stage renal disease (ESRD) necessitates dialysis or transplantation. In Bangladesh, the healthcare system faces increasing strain from a rapidly growing CKD population amid limited resources[2]. The management of ESRD profoundly impacts every dimension of a patient's life, with the psychological dimension being particularly vulnerable[3]. The diagnosis and lifelong commitment to dialysis precipitate significant psychological distress. The relentless treatment schedule, dietary restrictions, loss of independence, financial toxicity, and constant confrontation with mortality collectively contribute to high rates of mental health disorders[3–4]. Depression and anxiety affect 20–40% of dialysis patients—a rate substantially higher than in the general population and other chronic illness groups[5]. This psychological burden is linked to poorer treatment adherence, reduced quality of life, increased hospitalizations, and elevated mortality risk[6,7]. While the psychological challenges of dialysis patients are well-documented globally, the experience of pre-dialysis patients remains understudied, particularly in low- and middle-income countries. The pre-dialysis phase (CKD stages 4–5) is marked by anxiety about impending treatment, progressive physical symptoms, and adjustment to a chronic illness[8]. Understanding this phase is crucial, as it represents a potential window for early intervention. Comparative

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analysis across these stages can elucidate the additional burden imposed by dialysis initiation[9]. In Bangladesh, research on psychosocial aspects of CKD is nascent. Existing literature has focused on epidemiological profiles or quality of life in single-center studies[9,10]. A direct, multi-center, comparative investigation of psychological morbidity between pre-dialysis and maintenance dialysis patients is lacking. Such a study is imperative to inform stage-specific patient care. The socio-cultural and economic realities of Bangladesh, including high out-of-pocket healthcare expenditures, low health literacy, and strong familial dependencies create a unique milieu that modulates psychological responses to illness[11,12]. This study aims to fill this knowledge gap. Employing a comparative cohort design across multiple tertiary care centers, it seeks to evaluate and compare depression, anxiety, and stress levels between pre-dialysis and post-dialysis CKD patients in Bangladesh. The findings will provide evidence to guide policymakers and clinicians in developing targeted mental health screening programs and psychosocial support services tailored to patients at different stages of their renal disease journey, ultimately striving for holistic and compassionate care[13].

Methods:

This comparative cohort study was conducted from July 2024 to June 2025 at Eastern Medical College & Hospital (EMCH) and another collaborating tertiary care hospital in Bangladesh. A total of 80 participants were enrolled and divided into two groups: 40 patients with advanced CKD (stage 4 and 5) not yet on dialysis (pre-dialysis group), and 40 patients with ESRD who had been undergoing maintenance hemodialysis for more than three months (post-dialysis group). Pre-dialysis participants were recruited from nephrology outpatient departments, while post-dialysis participants were recruited from hemodialysis units. All participants provided written informed consent. Ethical approval was obtained from the Ethical Review Board of Eastern Medical College (Reference No: EMC-519(A)/24). Participants aged 18–70 years were included. Pre-dialysis patients were confirmed to be in CKD stages 4 or 5 based on eGFR criteria. Post-dialysis patients were those receiving regular hemodialysis thrice weekly at the participating centers. Individuals with pre-existing diagnosed psychiatric disorders, significant cognitive impairment, history of substance abuse, or acute medical instability were excluded to isolate the psychological impact related to CKD and its treatment. A structured questionnaire was used to record socio-demographic characteristics (age, gender, occupation, marital status) and clinical details (primary etiology of CKD, duration of CKD, serum creatinine, and eGFR). Laboratory parameters were obtained from participants recent medical records. The Depression, Anxiety, and Stress Scale (DASS-21), a validated 21-item self-report questionnaire, was administered to all participants to assess psychological morbidity. Each domain (depression, anxiety, stress) comprises seven items scored on a 4-point Likert scale. Severity categories (normal/mild, moderate, severe/extremely severe) were assigned based on standardized cutoff scores. Data were analyzed using SPSS version 23.0. Descriptive statistics were computed for socio-demographic and clinical variables. Independent samples t-tests were used to compare mean DASS-21 scores between the two groups. Chi-square tests were applied to compare categorical variables, including severity distributions. Pearson's correlation coefficient was used to assess the relationship between eGFR and psychological scores. A p-value of <0.05 was considered statistically significant.

Results:

The study successfully enrolled 80 participants, evenly distributed between the pre-dialysis and post-dialysis groups. The socio-demographic profile of the cohorts is presented in the first table. Both groups were comparable in terms of age and gender distribution, with no statistically significant differences observed. The mean age was 52.4 years in the pre-dialysis group and 54.1 years in the post-dialysis group. However, a significant difference was noted in the occupational status, with a higher proportion of unemployed individuals in the post-dialysis group (62.5% vs. 35.0%). The clinical characteristics of the study population are summarized in the subsequent table. The most common primary etiology of CKD in both groups was diabetic nephropathy, followed by hypertension. The post-dialysis group had a significantly longer median duration of diagnosed CKD (5.2 years vs. 2.8 years). As expected, laboratory parameters showed a more deranged renal profile in the post-dialysis group, with significantly higher serum creatinine and lower estimated glomerular filtration rate (eGFR) levels. The primary outcome of this study, the psychological morbidity assessed using the DASS-21 scale, revealed stark contrasts between the two groups. The mean scores for depression, anxiety, and stress were all significantly higher in the post-dialysis group compared to the pre-dialysis group. The mean depression score was 18.4 in the dialysis-dependent patients versus 11.2 in the pre-dialysis patients. A similar pattern was observed for anxiety and stress. Further analysis categorizing the severity of psychological symptoms is displayed in the following tables. A significantly larger proportion of patients in the post-dialysis group suffered from severe or extremely severe levels of depression (35.0% vs. 12.5%). This trend was consistent for anxiety, where 30.0% of the post-dialysis group reported severe or extremely severe symptoms compared to only 10.0% in the pre-dialysis group. The distribution of stress severity also followed this pattern, with the post-dialysis group bearing a significantly greater burden of severe stress.

Table-I: Socio-demographic characteristics of the participants (n=80)

Characteristic	Pre-dialysis (n=40)	Post-dialysis (n=40)	p-value
Age (years), Mean ±SD	52.4 ±9.8	54.1 ±10.3	0.442
Gender, n (percentage)			
Male	24 (60.0%)	22 (55.0%)	0.654
Female	16 (40.0%)	18 (45.0%)	
Occupation, n (percentage)			
Employed	26 (65.0%)	15 (37.5%)	0.016
Unemployed	14 (35.0%)	25 (62.5%)	
Marital status, n (percentage)			
Married	34 (85.0%)	32 (80.0%)	0.556
Unmarried/Widowed	6 (15.0%)	8 (20.0%)	

Data analyzed using an independent t-test for age and a Chi-square test for categorical variables

Table-II: Clinical profile of the participants

Characteristic	Pre-dialysis	Post-dialysis	p-value
Primary etiology of CKD, n (percentage)			
Diabetic nephropathy	18 (45.0%)	20 (50.0%)	0.783
Hypertensive nephrosclerosis	15 (37.5%)	14 (35.0%)	
Glomerulonephritis	5 (12.5%)	4 (10.0%)	
Other/Unknown	2 (5.0%)	2 (5.0%)	
Duration of CKD (years), Median [IQR]	2.8 [1.5-4.5]	5.2 [3.0-7.5]	<0.001
Serum creatinine (mg/dL), Mean ± SD	3.8 ± 1.1	7.9 ± 2.4	<0.001
eGFR (mL/min/1.73m²), Mean ± SD	18.5 ± 5.2	8.2 ± 3.1	<0.001

Data were analyzed using the Chi-square test for etiology and the Mann-Whitney U test for duration of CKD. Independent t-test for laboratory values

Table-III: Comparison of DASS-21 scores between the groups

DASS-21 Domain	Pre-dialysis	Post-dialysis	p-value
Depression, Mean ± SD	11.2 ± 4.5	18.4 ± 5.8	<0.001
Anxiety, Mean ± SD	9.8 ± 3.9	15.7 ± 5.1	<0.001
Stress, Mean ± SD	13.1 ± 4.8	19.6 ± 5.9	<0.001

Data analyzed using an independent samples t-test

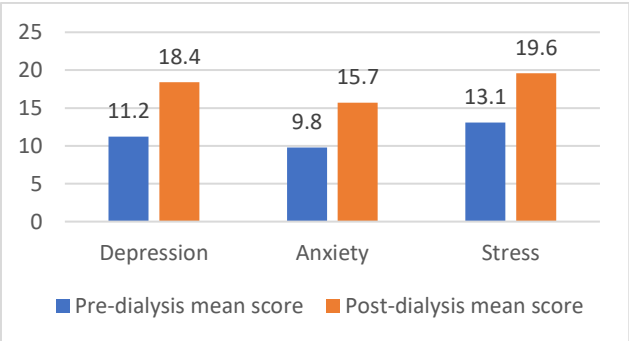

Figure-1: Comparison of mean depression, anxiety, and stress scores between pre-dialysis and post-dialysis CKD patients

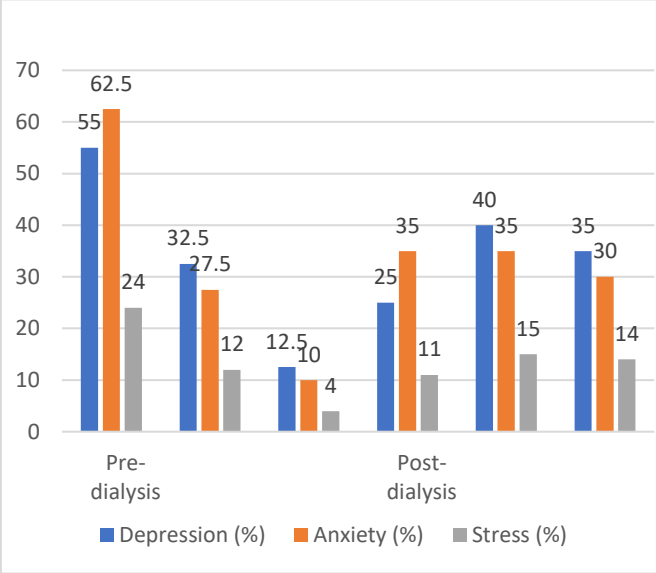

Figure-2: Stacked Bar chart of symptom severity

Table-IV: Severity of depression symptoms based on DASS-21

Severity	Pre-dialysis n (percentage)	Post-dialysis n (percentage)	p-value
Normal/Mild	22 (55.0%)	10 (25.0%)	0.012
Moderate	13 (32.5%)	16 (40.0%)	
Severe/Extremely Severe	5 (12.5%)	14 (35.0%)	

Data analyzed using the Chi-square test

Table-V: Severity of anxiety symptoms based on DASS-21

Severity	Pre-dialysis n (percentage)	Post-dialysis n (percentage)	p-value
Normal/Mild	25 (62.5%)	14 (35.0%)	0.025
Moderate	11 (27.5%)	14 (35.0%)	
Severe/Extremely severe	4 (10.0%)	12 (30.0%)	

Data analyzed using the Chi-square test

Table-VI: Severity of stress symptoms based on DASS-21

Severity	Pre-dialysis n (percentage)	Post-dialysis n (percentage)	p-value
Normal/Mild	24 (60.0%)	11 (27.5%)	0.005
Moderate	12 (30.0%)	15 (37.5%)	
Severe/Extremely Severe	4 (10.0%)	14 (35.0%)	

Data analyzed using the Chi-square test

Table-VI: Correlation between eGFR and DASS-21 scores

DASS-21 domain	Correlation coefficient (r)	p-value
Depression	-0.421	0.001
Anxiety	-0.387	0.002
Stress	-0.354	0.005

Data analyzed using Pearson's Correlation Coefficient

Discussion:

This comparative cohort study provides compelling evidence of a significantly higher psychological burden in Bangladeshi patients undergoing maintenance dialysis compared to their pre-dialysis counterparts. Our findings affirm the primary hypothesis that the initiation of dialysis is associated with a marked deterioration in mental health, manifesting as significantly elevated levels of depression, anxiety, and stress. The results align with the global literature, which consistently highlights the profound psychosocial impact of transitioning to a dialysis-dependent life[6,14]. The socio-demographic comparability of our two groups, particularly in age and gender, strengthens the inference that the observed differences in psychological morbidity are primarily attributable to the disease and treatment stage rather than baseline demographic factors. However, the significantly higher rate of unemployment in the post-dialysis group is a critical finding. This likely reflects the debilitating nature of ESRD and the rigid, time-consuming dialysis schedule, which often renders sustained employment impossible[15]. The resulting loss of financial independence and role identity within the family and society is a potent stressor, exacerbating feelings of worthlessness and dependency, which are core features of depression[16]. In a resource-limited setting like Bangladesh, where social safety nets are weak, the economic ramifications of job loss can be catastrophic, directly contributing to psychological distress[11]. The clinical data revealed that diabetic nephropathy was the leading cause of CKD in both cohorts, consistent with the rising epidemic of diabetes in Bangladesh[2]. The post-dialysis group's longer disease duration and more severe biochemical markers confirm the progressive nature of CKD. The core of our findings lies in the DASS-21 scores. The mean scores for depression, anxiety, and stress were not only higher in the dialysis group but also reached thresholds indicative of clinically significant morbidity[17]. More alarmingly, the categorization of symptom severity revealed that over one-third of dialysis patients were suffering from severe or extremely severe depression, a proportion three times higher than in the pre-dialysis group. This underscores that while the pre-dialysis phase is fraught with anxiety about the future, the actual reality of dialysis imposes a much heavier, and often severe, psychological burden. The significant negative correlation between eGFR and scores for depression and anxiety across the entire sample suggests a continuous relationship between declining renal function and worsening mental health. This finding implies that psychological intervention should not be delayed until dialysis initiation but should be integrated into the management plan from earlier stages of CKD[18]. Early screening and support during the pre-dialysis period could potentially build resilience and coping mechanisms, preparing patients for the challenges ahead. Our results have several important implications. Firstly, they argue compellingly for the routine integration of validated screening tools like the DASS-21 into the standard care protocol of all CKD patients, especially those approaching ESRD[19]. Secondly, there is an urgent need to establish accessible psychosocial support services within nephrology departments, which are currently scarce in Bangladesh. Simple, low-cost interventions such as structured patient education, support groups, and training nurses in basic cognitive-behavioral techniques have shown efficacy in other settings and could be adapted here[20,21]. Furthermore, the high unemployment rate calls for vocational counseling and exploring possibilities for flexible work arrangements for patients on dialysis. The limitations of this study must be acknowledged. The sample size, though adequate for this initial comparison, was relatively small and recruited from tertiary care centers, which may limit the generalizability to all CKD patients in Bangladesh. The cross-sectional nature of the analysis precludes establishing causal relationships. Longitudinal studies tracking the same patients from the pre-dialysis to the dialysis phase would provide more robust evidence of the temporal sequence of psychological decline[22].

Conclusion:

This study concluded that patients on maintenance hemodialysis in Bangladesh experience a significantly greater burden of depression, anxiety, and stress compared to pre-dialysis patients. The transition to dialysis represents a critical point for psychological deterioration, driven by the treatment's rigors, physical suffering, and socio-economic consequences. These findings highlight a critical gap in the current holistic care of CKD patients and serve as a call to action for healthcare providers and policymakers to prioritize mental health as an integral component of renal care.

Limitations:

This study's limitations include a modest sample size from tertiary centers, limiting generalizability. The cross-sectional design identifies associations but cannot establish causality between dialysis initiation and the observed psychological decline. A longitudinal design would be more robust.

Recommendation:

We recommend integrating routine mental health screening using DASS-21 into standard CKD care. Establishing accessible psychosocial support and counseling services,

particularly for patients transitioning to dialysis, is crucial to mitigate the high burden of psychological morbidity identified in this study.

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