Mental Status and Quality of Life in Patients with Different Stages of Chronic Kidney Disease

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Abstract

Background: Chronic Kidney Disease (CKD) is a global health challenge, affecting millions and leading to increased morbidity and mortality, particularly due to cardiovascular complications. Beyond its physical manifestations, CKD significantly impacts patients' mental health and quality of life (QoL). **Material Methods:** This cross-sectional study was conducted in the Department of General Medicine at SGT Hospital over 18 months. A total of 105 participants were divided into three groups: 35 healthy controls, 35 CKD patients not on hemodialysis (stages 3-5), and 35 CKD patients on maintenance hemodialysis. The DASS-21 questionnaire was used to assess mental health, and QoL was measured using the WHO-QoL BREF manual. **Results:** The study analyzed three groups: healthy controls, CKD patients not on hemodialysis, and CKD patients undergoing hemodialysis, with mean ages ranging from 45.85 to 47.94 years and a slight male predominance in all groups. CKD patients, particularly those on hemodialysis, showed higher rates of Diabetes Mellitus and Hypertension. Mental health assessments revealed that hemodialysis patients had significantly higher scores for Depression, Stress, and Anxiety. Additionally, these patients reported lower quality of life in all areas, especially in physical and psychological health, highlighting the severe impact of CKD on daily life and overall well-being. **Conclusion:** This study highlights the critical need for early identification and intervention strategies to address mental health and QoL in CKD patients. Comprehensive care that includes psychological support, lifestyle modifications, and regular monitoring of mental and physical health can potentially improve outcomes for patients across all stages of CKD.

Keywords: Chronic Kidney Disease, Quality of Life, Mental Status, Lifestyle modifications, Hemodialysis

Introduction

Chronic Kidney Disease (CKD) is characterized by structural or functional kidney abnormalities lasting over three months, identifiable through kidney damage markers like albuminuria or a reduced glomerular filtration rate (GFR).[1] The growing prevalence of CKD, driven by rising rates of diabetes and hypertension, poses a major public health challenge. CKD patients face significantly higher mortality from cardiovascular disease compared to those without CKD, and managing CKD and its complications incurs high costs, especially in resource-limited settings.[2]

In India, CKD is a notable health concern, with a prevalence of 17.2% and about 6% of cases being stage 3 or more advanced. The country's projected rise in diabetes rates by 2030 is expected to increase CKD cases. CKD also brings social and psychological challenges, including lifelong treatment, dietary restrictions, high treatment costs, and decreased work capacity. Many patients struggle with out-of-pocket expenses and medication adherence due to the high costs involved.[3]

Quality of Life (QoL), as defined by the World Health Organization, reflects an individual's perception of their life situation relative to their cultural values and personal expectations. It encompasses the impact of illness and treatment on various aspects of personal well-being, including physical, emotional, and social dimensions. Understanding QoL is essential for patients to comprehend their condition and the effects of treatment on their overall well-being.[4]

The Depression, Anxiety, and Stress Scale–21 (DASS-21) items, is a self-report questionnaire designed to assess the three related negative emotional states: depression, anxiety, and stress. The results can help identify levels of distress and guide individuals in seeking appropriate support or treatment if needed. It's often used in research and clinical settings, and while it's useful for screening, a comprehensive evaluation by a mental health professional is recommended for accurate diagnosis and treatment planning.[5]

Chronic Kidney Disease (CKD) typically does not significantly impact health-related quality of life (HRQoL) until stages 4 and 5, when symptoms such as tiredness, muscle weakness, restless legs, itching, and lack of appetite become more prominent.[6] At these advanced stages, HRQoL can be further diminished by issues like malnutrition, anemia, cognitive impairment, disrupted sleep, depression, and reduced social and physical functioning. Co-morbidities such as diabetes and cardiovascular disease also worsen HRQoL. In particular, patients on dialysis have notably lower HRQoL scores, which are associated with higher rates of hospitalization and mortality.[7]

Research indicates that HRQoL can decline even in earlier CKD stages, especially affecting physical and mental health. Longitudinal studies have shown a decline in HRQoL from stages 3–5, with significant deterioration observed just before starting dialysis.[8]The psychosocial aspects of CKD, including the impact of symptoms, treatment effects, and relationships, are crucial to understanding and improving QoL.

Depression is common among CKD patients and contributes to poorer outcomes and reduced QoL.[9]

Prevalence rates of depression in CKD patients range widely, with most data coming from Western countries and focusing on dialysis patients. The prevalence in India remains less studied. Factors such as advanced CKD stages, gender, relationship status, spirituality, sleep issues, and physical activity influence depression in CKD patients. Various validated tools like the Patient Health Questionnaire-9 (PHQ-9), which is available in Hindi, are used to assess depression. Regular screening for depression is vital for improving the overall well-being of CKD patients.[10]The aim of the study is to evaluate the psychological well-being and quality of life across different CKD stages.

Aims & Objectives

The study aims to evaluate the mental status and health-related quality of life (HRQoL) in individuals with chronic kidney disease (CKD) at stages 3-5 and those undergoing maintenance hemodialysis. It seeks to examine mental status across different CKD stages and treatment types, assess HRQoL in these patients, and analyze the relationship between mental health and HRQoL compared to healthy controls. Additionally, the study explores various factors that might affect both mental status and HRQoL in CKD patients.

Material Methods

Following approval from the institutional ethics committee, a study was carried out over 18 months in the Department of General Medicine at SGT Hospital. The research utilized a cross-sectional design and involved 105 participants, who were categorized into three groups: 35 healthy controls, 35 patients with chronic kidney disease (CKD) stages 3 to 5 not on hemodialysis, and 35 patients with CKD stage 5 who had been on maintenance hemodialysis for over three months. Written informed consent was obtained from all participants, and their confidentiality was maintained. The participants were matched by age and sex. To be included, individuals had to be between 18 and 70 years old and have stable hemodynamics. Those excluded were under 18 or over 70, had pre-existing psychiatric disorders, were pregnant, abused drugs, had undergone kidney transplants, had recent major surgeries, experienced recent trauma, or had a history of cancer.

Detailed histories and physical examinations were performed, and socio-demographic data were collected using a semi-structured questionnaire. Psychological assessments were conducted using the DASS-21 and WHO-QoL BREF questionnaires in both Hindi and English. The analysis of these questionnaires followed standardized methods, and routine laboratory tests were conducted as per standard protocols. Descriptive statistics for the study were reported using mean, range, and frequency (% values). Depression, anxiety, and stress levels were categorized based on scores, and

significance was determined with a p-value of <0.05. To evaluate differences among groups, ANOVA was employed, with significance defined as a p-value <0.05. Statistical analysis was performed using SPSS software.

Results& Observations

This cross-sectional study was carried out in the Department of General Medicine at SGT Hospital over an 18-month period. It included 105 participants divided into three groups: 35 healthy controls, 35 patients with chronic kidney disease (CKD) stages 3 to 5 who were not on hemodialysis, and 35 patients with CKD stage 5 who were undergoing maintenance hemodialysis.

The gender distribution across the three groups is relatively balanced, though Group A has a slight male predominance, Group B shows a higher proportion of males, and Group C also has more males than females. The differences in gender distribution among the groups are not statistically significant(**Table 1**). Age distribution is similar across Groups A and B, with average ages close to 47.6 and 47.94 years, respectively, while Group C has a slightly lower average age of 45.85 years; however, the p-value of 0.84 indicates that age differences are not statistically significant(**Table 2**). Diabetes mellitus (DM) prevalence is significantly higher in Groups B and C compared to Group A, with Group C having the highest rate at 45.71% and a p-value of 0.01 indicating a significant difference. Hypertension (HTN) prevalence increases from Group A to Group C, with Group C showing the highest rate, although the p-value for HTN was not provided. Group A has a higher percentage of individuals with no apparent disease compared to Groups B and C, with a significant difference in the prevalence of no apparent disease(**Table 3**). Socio-economic status is similarly distributed across the groups, with no statistically significant differences and a p-value of 0.96, indicating that socio-economic status variations are likely due to random chance.

DASS: Group A has the lowest mean scores for depression (3.31), stress (3.31), and anxiety (2.91), indicating the lowest levels of psychological distress. Group B shows higher mean scores in each category: depression (7.54), stress (8.68), and anxiety (6.57). Group C has the highest mean scores for all three measures: depression (19.94), stress (18.57), and anxiety (17.02), reflecting the highest level of psychological distress. The p-values of 0.0001 for all pairwise comparisons between groups indicate that these differences in depression, stress, and anxiety scores are statistically significant. Thus, there is a clear and significant increase in psychological distress from Group A to Group B and further to Group C, with Group C experiencing the highest levels of distress(**Table 4**).

QOL: Group A demonstrates the highest mean scores across all quality of life (QoL) domains, reflecting the best physical health (108.26), psychological health (82.14), social health (48.09), and environmental health (56.25). Group B shows significantly lower scores in each domain: physical health (82.75), psychological health (50.59), social health (55), and environmental health (46.69). Group C has the lowest scores in

all domains: physical health (44.59), psychological health (25), social health (32.14), and environmental health (34.19). The differences between all groups are statistically significant for physical, psychological, and environmental health, with p-values of 0.0001. Social health shows significant differences between Group A and Group B (p = 0.04), as well as between Group A vs. Group C and Group B vs. Group C (p-values of 0.0001). Overall, there is a clear gradient in QoL scores from Group A to Group C, with Group A having the highest and Group C the lowest scores, and the differences are statistically significant(**Table 5**).

In Group A, a moderate negative correlation between depression and physical health (r = -0.44, p = 0.008) indicates that increased depression is associated with decreased physical health. However, stress and anxiety do not show significant correlations with physical health. In Group B, while depression does not correlate significantly with physical health, stress shows a moderate negative correlation (r = -0.44, p = 0.01), suggesting that higher stress is linked to poorer physical health. Anxiety does not significantly impact physical health. In Group C, neither depression, stress, nor anxiety shows a significant correlation with physical health, implying these factors do not have a notable impact on physical health in this group(**Table 6**).

In Group A, no significant correlations were found between depression, stress, or anxiety and psychological health, with all p-values indicating non-significant results. In Group B, a moderate positive correlation was observed between depression and psychological health (p = 0.01), suggesting that higher depression scores were associated with better psychological health, though this result is counterintuitive and may need further investigation. Stress showed a weak to moderate negative correlation with psychological health (p = 0.04), indicating that higher stress levels are linked to poorer psychological health. Anxiety did not show a significant correlation with psychological health. In Group C, a moderate positive correlation was also found between depression and psychological health (p = 0.03), and a moderate negative correlation was noted between stress and psychological health (p = 0.02), while anxiety showed no significant correlation(**Table 7**).

In all three groups, there are no significant correlations between depression, stress, or anxiety and social health. In Group A, the correlations are r = 0.117 (p = 0.50) for depression, r = 0.047 (p = 0.81) for stress, and r = 0.025 (p = 0.88) for anxiety. Similarly, Group B shows no significant correlations with r = -0.14 (p = 0.42) for depression, r = 0.11 (p = 0.52) for stress, and r = 0.02 (p = 0.90) for anxiety. In Group C, the correlations are also non-significant with r = 0.177 (p = 0.32) for depression, r = 0.02 (p = 0.90) for stress, and r = 0.007 (p = 0.96) for anxiety(**Table 8**).

In Group A, there are no significant correlations between depression (r = 0.14, p = 0.42), stress (r = -0.07, p = 0.68), or anxiety (r = 0.07, p = 0.68) and environmental health. In Group B, while depression (r = 0.05, p = 0.77) and anxiety (r = -0.05, p = 0.75) do not show significant correlations with environmental health, stress has a moderate positive correlation (r = 0.37, p = 0.02), suggesting that higher stress is

associated with better environmental health, which may warrant further investigation. In Group C, there are no significant correlations between depression (r = 0.18, p = 0.30), stress (r = 0.04, p = 0.81), or anxiety (r = 0.10, p = 0.56) and environmental health(**Table 9**).

Discussion

Chronic Kidney Disease (CKD) is a major global health issue, categorized by kidney damage or reduced kidney function persisting for at least three months. The NKF and KDIGO guidelines, first introduced in 2002 and updated in 2004, classify CKD based on the cause, Glomerular Filtration Rate (GFR), and albuminuria levels to aid in patient risk assessment and treatment. CKD is linked to significant social and psychological challenges, including depression and anxiety, which can exacerbate functional impairments, suicidal thoughts, sleep issues, and nutritional problems, ultimately increasing morbidity and mortality. Despite their prevalence, depression and anxiety in CKD patients are often underdiagnosed and inadequately treated.[6]This study aims to include 105 participants across three groups: Group A (35 healthy controls), Group B (35 CKD stage 3-5 patients not on hemodialysis), and Group C (35 CKD stage 5 patients on hemodialysis for over 3 months) to explore these aspects further.

Demographic profile : In our study, Group A showed a near-balanced gender distribution with 17 females and 18 males, indicating a slight male predominance. Group B had 15 females and 20 males, reflecting a higher proportion of males, while Group C recorded 14 females and 21 males, following a similar trend. The mean ages were 47.6 years for Group A, 47.94 years for Group B, and 45.85 years for Group C. Socio-economic status was relatively consistent, with Group A having 19 cases each in Lower Middle and Upper Lower categories, Group B having 20 and 15 cases respectively, and Group C having 19 and 16 cases respectively. Comparatively, studies by Kefale B et al.[11] reported 58% male cases with a mean age of 52.5 years, while Oh T R et al.[12] found a mean age of 57.6 years and 38.5% female cases. Ravindran A et al.[13] noted a predominance of males (73.76%) with most participants over 60 years old. Aggarwal et al.[14] found 56% males with an average age of 49 years, and Tannor E K et al.[15] reported 58.4% males with an average age of 46.7 years. The observed slight male predominance aligns with other research, where males are often associated with faster progression of CKD compared to females. This is supported by a meta-analysis indicating quicker disease progression in males and studies from developed countries reporting a mean CKD patient age over 50 years.[16,17,18]

Co-morbidity: In the present study, Group C exhibits a higher prevalence of Diabetes Mellitus (DM) with 16 cases and Hypertension (HTN) with 17 cases compared to Groups A and B, where DM cases are 7 and 14, respectively, and HTN cases are 10 and 15, respectively. Conversely, Group A shows a higher number of cases classified as No Apparent Disease (NAD) with 18 cases, while Group B has 7 cases and Group C has 8

cases in this category. Aggarwalet al.[14] found that DM was the leading cause of CKD (31.5%), followed by HTN (24%), chronic glomerulonephritis (20.5%), and nephrotic syndrome (11.5%). This aligns with recent findings in India, where diabetic nephropathy is now the primary cause of End-Stage Renal Disease (ESRD), accounting for 31.2% of CKD cases. Elhadad A et al.[19] reported that 26.5% of patients had DM, 19.7% had HTN, and 8.5% had both conditions, while 45.3% had no comorbidities. Sharma S et al.[20] identified DM (60.9%), HTN (56.2%), chronic glomerulonephritis (7.5%), chronic pyelonephritis (6.6%), and polycystic kidney disease (4.7%) as the most common contributors to CKD.

The research highlights notable differences in mental health and quality of life (QoL) across three groups (A, B, and C). Group C has significantly higher mean scores for depression, stress, and anxiety compared to Groups A and B, with Group A having the lowest scores in these measures. The differences are statistically significant ($p < 0.0001$). QoL scores also differ markedly between the groups. Group C consistently scores lowest across all domains—Physical Health, Psychological Health, Social Health, and Environmental Health. Group A scores highest in these domains, indicating the best perceived QoL, while Group B's scores are intermediate. These differences are statistically significant ($p < 0.05$). Other studies support these findings. RavindranA et al.[13] found that social relationships had the highest QoL scores, with psychological health being notably impacted. Aggarwal et al.[14] reported a progressive decline in HRQoL scores with advancing CKD stages, with physical component summary (PCS) scores declining more sharply than mental component summary (MCS) scores. Cruz et al.[21] observed a significant decrease in HRQoL across CKD stages, with notable declines in bodily functions and overall well-being. Singh et al.[22] and Yadav et al.[23] also reported significant reductions in QoL for patients with end-stage renal disease (ESRD) and advanced CKD stages. The study further examines correlations between mental health indicators and different aspects of health. It finds significant associations between depression and stress with psychological and environmental health in some groups, but not across all domains or groups. For example, anxiety did not show significant correlations with psychological health, and depression and anxiety had negligible correlations with social health. Stress was notably associated with poorer environmental health in Group B. These findings align with other literature, showing that CKD significantly impacts QoL, with physical and psychological health deteriorating more with advanced disease stages.

Summary &Conclusion

The study reveals that Group A, averaging 47.6 years old, exhibits the lowest levels of Depression, Stress, and Anxiety and the highest Quality of Life (QoL) scores across all domains compared to Groups B and C. Group B, slightly older at 47.94 years, has higher scores in these mental health measures than Group A but lower than Group C, which, despite having the lowest mean age of 45.85 years, shows the highest levels of

Depression, Stress, and Anxiety and the lowest QoL scores. Demographically, there is a slight male predominance across the groups, with Group C having the highest prevalence of Diabetes Mellitus and Hypertension. Correlation analysis indicates that higher depression and stress levels in Groups B and C are linked to poorer psychological health, but anxiety does not significantly correlate with psychological health in any group. Social health remains unaffected by depression, stress, and anxiety across all groups, while stress is moderately linked to poorer environmental health only in Group B. To address the global rise in CKD and its detrimental impact on HRQoL, early identification and systematic assessment of HRQoL are crucial. This approach can help pinpoint high-risk individuals for timely preventive measures, tailored treatments, lifestyle changes, and support services, ultimately improving patient outcomes and quality of life.

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Table 1: Distribution of cases according to gender

Gender	Group A		Group B		Group C		p-value
	No. of Cases	Percentage	No. of Cases	Percentage	No. of Cases	Percentage	
Female	17	48.57	15	42.86	14	40	0.76
Male	18	51.43	20	57.14	21	60	
Total	35	100.00	35	100.00	35	100	

Table 2: Distribution of cases according to age

Age Distribution (in years)	Group A		Group B		Group C	
	No. of Cases	Percentage	No. of Cases	Percentage	No. of Cases	Percentage
18-33	8	22.86	8	22.86	10	28.57
34-49	12	34.29	12	34.29	11	31.43
50-65	7	20.00	7	20.00	8	22.86
>65	8	22.86	8	22.86	6	17.14
Total	35	100.00	35	100.00	35	100
Mean±SD	47.6±17.91		47.94±15.28		45.85±15.93	
p-value	0.84					

Table 3: Distribution of cases according to comorbidity

Comorbidity	Group A		Group B		Group C		p-value
	No. of Cases	Percentage	No. of Cases	Percentage	No. of Cases	Percentage	
DM	7	20.00	14	40.00	16	45.71	0.01
HTN	10	28.57	15	42.86	17	48.57	
NAD	18	51.43	7	20.00	8	22.86	

Table 4: Distribution of cases according to DAAS Score

DASS Score	Group A		Group B		Group C		p-value		
	Mean	SD	Mean	SD	Mean	SD	Group A vs Group B	Group A vs Group C	Group B vs Group C
Depression	3.31	2.65	7.54	3.14	19.94	4.01	0.0001	0.0001	0.0001
Stress	3.31	2.98	8.68	2.98	18.57	4.29	0.0001	0.0001	0.0001
Anxiety	2.91	2.18	6.57	3.01	17.02	3.89	0.0001	0.0001	0.0001

Table 5: Distribution of cases according to QoL Score

QoL Score	Group A		Group B		Group C		p-value		
	Mean	SD	Mean	SD	Mean	SD	Group A vs Group B	Group A vs Group C	Group B vs Group C
Physical Health	108.26	3.94	82.75	4.28	44.59	5.63	0.0001	0.0001	0.0001
Psychological Health	82.14	6.27	50.59	4.06	25	7.49	0.0001	0.0001	0.0001
Social Health	48.09	14.58	55	11.28	32.14	9.51	0.04	0.0001	0.0001
Environmental Health	56.25	8.37	46.69	6.86	34.19	8.77	0.0001	0.0001	0.0001

Table 6: Correlation of DASS Score with QoL (Physical Health) Score.

Score	Physical Health					
	Group A		Group B		Group C	
	r-value	p-value	r-value	p-value	r-value	p-value
Depression	-0.44	0.008	0.005	0.97	0.12	0.49
Stress	-0.004	0.980	-0.44	0.01	0.105	0.54
Anxiety	-0.047	0.780	-0.15	0.30	0.23	0.18

Table 7: Correlation of DASS Score with QoL (Social Health) Score.

Score	Social Health					
	Group A		Group B		Group C	
	r-value	p-value	r-value	p-value	r-value	p-value
Depression	0.117	0.50	-0.14	0.42	0.177	0.32
Stress	0.047	0.81	0.11	0.52	0.02	0.90
Anxiety	0.025	0.88	0.02	0.90	0.007	0.96

Table 8: Correlation of DASS Score with QoL (Psychological Health) Score.

Score	Psychological Health					
	Group A		Group B		Group C	
	r-value	p-value	r-value	p-value	r-value	p-value
Depression	0.05	0.77	0.42	0.01	0.31	0.03
Stress	-0.005	0.97	-0.27	0.04	-0.35	0.02
Anxiety	0.15	0.38	0.17	0.32	-0.1	0.56

Table 9: Correlation of DASS Score with QoL (Environmental Health) Score.

Score	Environmental Health					
	Group A		Group B		Group C	
	r-value	p-value	r-value	p-value	r-value	p-value
Depression	0.14	0.42	0.05	0.77	0.18	0.30
Stress	-0.07	0.68	0.37	0.02	0.04	0.81
Anxiety	0.07	0.68	-0.05	0.75	0.1	0.56