RESEARCH PAPER

BRIDGING THE GAP: EDUCATIONAL STRATEGIES TO ENHANCE DISEASE KNOWLEDGE AND QUALITY OF LIFE IN CKD MANAGEMENT

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ABSTRACT

Background

Chronic Kidney Disease (CKD) is a progressive and irreversible condition associated with significant morbidity, mortality, and reduced quality of life. Patients undergoing maintenance hemodialysis are required to follow complex therapeutic regimens including medication adherence, dietary restrictions, fluid management, and regular dialysis sessions. Lack of adequate disease knowledge often leads to poor adherence and unfavorable clinical outcomes. Structured educational interventions may help improve patient awareness, self-management practices, and overall quality of life among CKD patients.

Aims and Objective

The study aimed to evaluate the effectiveness of educational strategies in enhancing disease knowledge and improving quality of life among CKD patients undergoing maintenance hemodialysis. The objective was to assess the impact of a structured educational program on disease knowledge, adherence to therapeutic regimen, and quality of life among CKD stage 5 patients receiving maintenance hemodialysis.

Materials and Methods

A randomized controlled trial was conducted among 128 CKD stage 5 patients undergoing maintenance hemodialysis at a tertiary care hospital. Participants were divided equally into study and control groups. Baseline assessment of disease knowledge, adherence, and quality of life was performed using structured questionnaires and WHOQOL-BREF scale. The study group received a structured educational program, while the control group received routine care. Post-intervention assessment was carried out after six months. Statistical analysis was performed using descriptive and inferential statistics.

Results

Posttest knowledge scores were significantly higher in the study group compared to the control group (19.88 ± 4.57 vs 14.33 ± 3.24; p=0.0001). Adherence scores also improved significantly following intervention (15.33 ± 2.09 vs 13.56 ± 2.13; p=0.0001). Quality of life scores demonstrated marked improvement in the study group compared to controls (92.92 ± 3.99 vs 51.33 ± 2.94; p=0.0001). Significant improvements were observed in knowledge levels, adherence behavior, and overall quality of life among patients receiving the educational intervention.

Conclusion

Structured educational strategies were effective in improving disease knowledge, therapeutic adherence, and quality of life among CKD patients undergoing maintenance hemodialysis. Incorporation of regular patient education programs into routine dialysis care may enhance self-management practices, improve clinical outcomes, and reduce disease burden among CKD patients.

Keywords: Chronic Kidney Disease, Hemodialysis, Structured Educational Program, Disease Knowledge, Therapeutic Adherence, Quality of Life, CKD Management, Patient Education, Maintenance Hemodialysis, Self-Care.

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INTRODUCTION

Chronic Kidney Disease (CKD) is a progressive and irreversible disorder characterized by gradual loss of kidney function over time, resulting in the inability of the kidneys to maintain fluid, electrolyte, and metabolic balance. It has emerged as a major global

public health problem due to its increasing prevalence, high morbidity, mortality, and financial burden on healthcare systems (1). According to global estimates, millions of individuals are affected by CKD, with a significant proportion eventually progressing to End-Stage Renal Disease (ESRD), requiring renal replacement therapy such as hemodialysis or kidney transplantation (2). In developing countries like India, the burden of CKD is steadily increasing because of the rising incidence of diabetes mellitus, hypertension, obesity, cardiovascular diseases, and aging populations. Patients undergoing maintenance hemodialysis often experience physical, psychological, social, and economic challenges that significantly affect their quality of life (3).

Hemodialysis is one of the most commonly used renal replacement therapies for patients with CKD stage 5. Although dialysis prolongs survival, it demands strict adherence to complex therapeutic regimens including dietary restrictions, fluid management, medication adherence, regular attendance to dialysis sessions, vascular access care, and lifestyle modifications (4). Failure to adhere to these therapeutic recommendations can lead to severe complications such as fluid overload, electrolyte imbalance, cardiovascular events, repeated hospitalizations, poor treatment outcomes, and increased mortality (4). Therefore, adherence to therapeutic regimens plays a crucial role in improving disease outcomes and enhancing the overall well-being of patients undergoing maintenance hemodialysis (5).

Despite advances in dialysis care, many CKD patients continue to have inadequate knowledge regarding disease management and self-care practices. Lack of awareness about the disease process, treatment modalities, dietary management, fluid restrictions, medication compliance, and prevention of complications contributes significantly to poor adherence behaviors (6). In addition, long-term dependence on dialysis therapy often causes emotional stress, anxiety, depression, social isolation, and reduced functional capacity, ultimately affecting patients' quality of life. Studies have shown that inadequate disease knowledge is strongly associated with poor self-management practices and unfavorable clinical outcomes among CKD patients (7).

Patient education has become an essential component in chronic disease management, particularly in CKD care. Structured educational interventions help patients understand their illness, improve self-care abilities, enhance treatment adherence, and develop positive coping mechanisms (8). Educational strategies delivered through counseling, informational booklets, audiovisual aids, and nurse-led teaching programs have demonstrated beneficial effects on patients' knowledge, adherence behaviors, laboratory outcomes, and quality of life (9). Healthcare professionals, especially nurses, play a vital role in educating and motivating patients to actively participate in their treatment and adopt healthy lifestyle behaviors (10).

Bridging the knowledge gap among CKD patients is therefore essential for achieving better therapeutic outcomes and improving quality of life. Enhancing patient awareness through targeted educational strategies can empower individuals to manage their condition effectively and reduce disease-related complications (11). Although several studies have highlighted the importance of patient education in CKD management, there remains a need for more evidence regarding structured educational approaches aimed at improving disease knowledge and quality of life among patients undergoing maintenance hemodialysis (12). Hence, the present study was undertaken to evaluate educational strategies designed to enhance disease knowledge, adherence to therapeutic regimens, and quality of life among patients with chronic kidney disease receiving maintenance hemodialysis.

AIMS AND OBJECTIVES

Aim: To evaluate the effectiveness of educational strategies in enhancing disease knowledge and improving quality of life among patients with chronic kidney disease undergoing maintenance hemodialysis.

Objective: To assess the impact of a structured educational program on disease knowledge and quality of life among chronic kidney disease patients receiving maintenance hemodialysis.

MATERIALS AND METHODS

The present study was conducted using an evaluative research approach with a randomized controlled trial design to assess the effectiveness of a Structured Educational Program (SEP) on disease knowledge, adherence to therapeutic regimen, and quality of life among patients with chronic kidney disease (CKD) stage 5 undergoing maintenance hemodialysis. The study was carried out in the dialysis unit of a selected tertiary care hospital in Belagavi, Karnataka. Patients diagnosed with CKD stage 5 and receiving regular maintenance hemodialysis were enrolled in the study based on predefined inclusion and exclusion criteria. A total of 128 participants were included, with 64 patients each in the experimental and control groups. Participants were selected using purposive sampling, followed by cluster randomization according to dialysis schedules to avoid contamination between groups.

Baseline data were collected using structured interview schedules and standardized assessment tools. The instruments included a socio-demographic questionnaire, laboratory investigation

assessment sheet, knowledge questionnaire regarding CKD management, and the WHOQOL-BREF scale to assess quality of life. Data collection was performed during the first two hours of hemodialysis sessions to minimize patient discomfort. The experimental group received a Structured Educational Program focusing on kidney disease awareness, medication adherence, dietary and fluid restrictions, vascular access care, dialysis compliance, exercise, and prevention of complications. Educational sessions were delivered through individualized teaching and informational materials over a period of six months. The control group received routine standard care and informational booklets provided in the dialysis unit. Evaluation of the intervention was carried out by comparing pre-test and post-test scores of knowledge, adherence, and quality of life at baseline, one month, and six months following implementation of the educational program. Laboratory parameters including serum potassium, creatinine, calcium, phosphorus, hemoglobin, blood urea levels, and pre- and post-dialysis weights were also assessed from patient records. Ethical clearance was obtained from the Institutional Ethics Committee prior to the commencement of the study. Written informed consent was obtained from all participants, and confidentiality and anonymity of the collected data were strictly maintained throughout the study.

RESULTS

Table 1: Baseline Demographic Characteristics of CKD Stage 5 Patients in Study and Control Groups

Variables		Study Group		Control Group		χ^2 value	p-value
		n	%	n	%		
Gender	Male	30	46.88	31	48.44	0.031	0.86
	Female	34	53.13	33	51.56		
Age Group	≤30 years	22	34.38	25	39.06		
	>30 years	42	65.63	39	60.94		
Educational Status	Illiterate	5	7.81	13	20.31		
	Read & write	12	18.75	21	32.81		
	Primary	32	50	23	35.94		
	PUC	15	23.44	7	10.94		

The demographic characteristics of CKD stage 5 patients were largely comparable between the study and control groups. Majority of participants were females, aged above 30 years, and had primary level education. No statistically significant differences were observed for most baseline variables except educational status, indicating overall homogeneity between groups before intervention.

Table 2: Comparison of Pretest and Posttest Knowledge Scores Between Study and Control Groups

Time Points	Study Group Mean ± SD	Control Group Mean ± SD	Mean Difference	t-value	p-value
Pretest	14.52 ± 4.37	13.58 ± 3.12	0.94	1.397	0.1648
Posttest	19.88 ± 4.57	14.33 ± 3.24	5.55	7.921	0.0001*
Difference	5.36 ± 3.21	0.75 ± 2.19	4.61	9.492	0.0001*

There was no statistically significant difference in pretest knowledge scores between the study and control groups, indicating similar baseline knowledge levels. However, posttest knowledge scores were significantly higher in the study group following the structured educational program. This demonstrates that the educational intervention effectively improved disease-related knowledge among CKD patients undergoing maintenance hemodialysis.

Table 3: Comparison of Pretest and Posttest Adherence Scores Between Study and Control Groups

Time Points	Study Group Mean ± SD	Control Group Mean ± SD	Mean Difference	t-value	p-value
Pretest	12.64 ± 2.51	12.44 ± 2.17	0.20	0.490	0.6249
Posttest	15.33 ± 2.09	13.56 ± 2.13	1.77	4.738	0.0001*

Difference	2.69 ± 1.10	1.13 ± 0.93	1.56	8.677	0.0001*

The pretest adherence scores were similar between the two groups with no significant difference. Following the intervention, the study group showed significantly higher adherence scores compared to the control group. These findings indicate that the structured educational program improved adherence to therapeutic regimens including diet, medication, fluid restriction, and dialysis attendance.

Table 4: Comparison of Pretest and Posttest Quality of Life (QOL) Scores Between Study and Control Groups

Time Points	Study Group Mean ± SD	Control Group Mean ± SD	Mean Difference	t-value	p-value
Pretest	49.95 ± 2.92	49.77 ± 2.85	0.19	0.368	0.7137
Posttest	92.92 ± 3.99	51.33 ± 2.94	41.59	67.156	0.0001*
Difference	42.97 ± 3.94	1.56 ± 2.45	41.41	71.355	0.0001*

Both groups had comparable quality of life scores before the intervention. After implementation of the structured educational program, the study group demonstrated a highly significant improvement in quality of life compared to the control group. This finding highlights the beneficial impact of educational strategies on the physical, psychological, and social well-being of CKD patients.

Table 5: Intra-Group Comparison of Knowledge Scores in Study and Control Groups

Group	Pretest Mean ± SD	Posttest Mean ± SD	Mean Difference	% Change	t-value	p-value
Study Group	14.52 ± 4.37	19.88 ± 4.57	5.36	36.92%	13.361	0.0001*
Control Group	13.58 ± 3.12	14.33 ± 3.24	0.75	5.52%	2.740	0.0080*

A statistically significant improvement in knowledge scores was observed in the study group after the educational intervention, with a 36.92% increase from baseline scores. Although slight improvement was also noted in the control group, the magnitude of improvement was substantially lower. This confirms the effectiveness of the structured educational program in enhancing disease knowledge among CKD patients.

Table 6: Intra-Group Comparison of Adherence Scores in Study and Control Groups

Group	Pretest Mean ± SD	Posttest Mean ± SD	Mean Difference	% Change	t-value	p-value
Study Group	12.64 ± 2.51	15.33 ± 2.09	2.69	21.26%	19.607	0.0001*
Control Group	12.44 ± 2.17	13.56 ± 2.13	1.13	9.05%	9.632	0.0001*

The study group exhibited a marked improvement in adherence scores following the educational intervention, with a 21.26% increase from baseline. The control group showed only modest improvement. These findings suggest that patient education significantly improves adherence to prescribed therapeutic regimens among CKD patients receiving maintenance hemodialysis.

Table 7: Intra-Group Comparison of Quality of Life (QOL) Scores in Study and Control Groups

Group	Pretest Mean ± SD	Posttest Mean ± SD	Mean Difference	% Change	t-value	p-value
Study Group	49.95 ± 2.92	92.92 ± 3.99	42.97	86.02%	87.159	0.0001*

Control Group	49.77 ± 2.85	51.33 ± 2.94	1.56	3.14%	5.105	0.0001*

A highly significant improvement in quality of life scores was observed in the study group after the structured educational program, with an 86.02% increase from baseline scores. In contrast, only minimal improvement was noted in the control group. This indicates that educational interventions can greatly enhance overall quality of life among CKD patients undergoing maintenance hemodialysis.

Table 8: Comparison of Pretest and Posttest Levels of Knowledge Between Study and Control Groups

Levels of Knowledge		Study Group n (%)	Control Group n (%)	χ^2 value	p-value
Pretest	**Low**	41 (64.06)	51 (79.69)	3.873	0.144
	Moderate	18 (28.13)	10 (15.63)		
	High	5 (7.81)	3 (4.69)		
Posttest	**Low**	11 (17.19)	41 (64.06)	33.577	0.0001*
	Moderate	32 (50.00)	20 (31.25)		
	High	21 (32.81)	3 (4.69)		

At baseline, the majority of participants in both groups had low levels of knowledge regarding CKD management. After the intervention, the study group demonstrated a substantial shift toward moderate and high knowledge levels, whereas the control group largely remained in the low knowledge category. This confirms the effectiveness of the structured educational intervention in improving patient awareness and understanding.

Table 9: Comparison of Pretest and Posttest Levels of Adherence Between Study and Control Groups

Levels of Adherence	Study Group n (%)	Control Group n (%)	χ^2 value	p-value
Pretest			0.827	0.661
Poor	16 (25.00)	15 (23.44)		
Medium	39 (60.94)	43 (67.19)		
Good	9 (14.06)	6 (9.38)		
Posttest			10.121	0.006*
Poor	2 (3.13)	3 (4.69)		
Medium	32 (50.00)	48 (75.00)		
Good	30 (46.88)	13 (20.31)		

Most participants in both groups had medium adherence levels during the pretest assessment. Following the intervention, the study group showed a significant increase in good adherence levels and a reduction in poor adherence levels compared to the control group. This finding indicates that the educational program effectively improved treatment compliance among CKD patients.

Table 10: Significant Predictors of Knowledge and Adherence Among CKD5 Patients

Variables	Adjusted OR	95% CI	p-value
Predictors of High Knowledge (Study Group)			
Read & Write Education	0.01	0.00–0.22	0.003*
Primary Education	0.03	0.00–0.25	0.002*
Smoking	0.12	0.02–0.82	0.031*
Family History	16.13	2.11–123.49	0.007*
Predictors of Good Adherence (Study Group)			
Female Gender	7.92	1.36–46.08	0.021*
Primary Education	7.94	1.17–53.81	0.034*
Rural Residence	0.06	0.01–0.49	0.008*

Multivariate logistic regression analysis identified education level, smoking status, family history, gender, and place of residency as significant predictors of knowledge and adherence among CKD patients. These findings indicate that socio-demographic and behavioral factors influence disease understanding and therapeutic compliance, emphasizing the importance of individualized educational strategies in CKD management.

DISCUSSION

The present study evaluated the effectiveness of structured educational strategies in improving disease knowledge, adherence to therapeutic regimen, and quality of life among chronic kidney disease (CKD) stage 5 patients undergoing maintenance hemodialysis. The findings of the study demonstrated significant improvement in knowledge scores, adherence behavior, and quality of life among patients who received the structured educational program compared to the control group. In the present study, baseline demographic variables were comparable between the study and control groups, indicating homogeneity of participants prior to intervention. Most patients were above 30 years of age, female, and had primary level education. Chronic kidney disease predominantly affects middle-aged and elderly individuals due to the increasing prevalence of hypertension and diabetes mellitus. Webster et al. (2017) reported that CKD is a progressive condition associated with substantial morbidity and increasing healthcare burden worldwide (13).Similarly, Tonelli and Riella (2014) emphasized that aging populations contribute significantly to the growing incidence of CKD and dialysis dependence (14).

The present study revealed that the structured educational program significantly improved disease knowledge among hemodialysis patients. Posttest knowledge scores in the study group were considerably higher compared to the control group, with a statistically significant difference. This finding indicates that educational interventions effectively bridge knowledge gaps related to CKD management. Kaveh and Kimmel (2001) stated that patient understanding regarding disease process, dietary restrictions, fluid management, and medication adherence is essential for achieving better compliance in hemodialysis patients (15). Improved knowledge enhances patients' ability to participate actively in their treatment and self-care activities.

Adherence to therapeutic regimen also improved significantly in the study group following the educational intervention. Patients demonstrated better compliance with prescribed diet, medications, fluid restrictions, and dialysis schedules. Similar findings were reported by Braun et al. (2012), who observed that CKD patients experience high disease burden and often face challenges in adhering to complex therapeutic regimens (16). Educational support and counseling were found to improve treatment adherence and reduce complications. Kaveh and Kimmel (2001) further emphasized that adherence in hemodialysis patients is multidimensional and influenced by patient awareness, motivation, and healthcare support systems (15).

One of the most important findings of the present study was the significant improvement in quality of life among patients receiving the structured educational program. The study group demonstrated marked improvement in physical, psychological, and social well-being following intervention, whereas only minimal improvement was observed in the control group. Chronic kidney disease and long-term hemodialysis negatively affect daily functioning, emotional health, financial stability, and social interactions. Braun et al. (2012) highlighted that CKD patients frequently report poor quality of life due to treatment burden, fatigue, and lifestyle limitations (16). Educational interventions may empower patients with coping strategies, confidence, and self-management skills, thereby improving overall well-being.

The present study findings are also supported by Fleming (2011), who described renal replacement therapy as a long-term treatment requiring active patient participation and continuous education for successful disease management (17). Saran et al. (2019) similarly reported that effective patient-centered interventions are essential in improving dialysis outcomes and reducing hospitalization rates among CKD patients (18). Furthermore, Lozano et al. (2012) demonstrated that chronic diseases such as CKD contribute substantially to global mortality and disability, emphasizing the importance of preventive and educational healthcare strategies (19).

Overall, the findings of the present study suggest that structured educational strategies are effective in enhancing disease knowledge, improving adherence to therapeutic regimens, and promoting better quality of life among CKD patients undergoing maintenance hemodialysis. Educational interventions should therefore be integrated into routine CKD management to improve patient outcomes and reduce disease-related complications.

CONCLUSION

The present study concluded that structured educational strategies were highly effective in improving disease knowledge, adherence to therapeutic regimen, and quality of life among Chronic Kidney Disease stage 5 patients undergoing maintenance hemodialysis. Patients who received the structured educational program demonstrated significantly better understanding of CKD management, improved compliance with medications, dietary and fluid restrictions, and

enhanced overall well-being compared to the control group. Educational intervention played a crucial role in empowering patients to actively participate in self-care and disease management. Improved awareness and adherence may further help in reducing complications, hospitalization, and disease burden among CKD patients. The study findings emphasize the importance of incorporating regular patient education programs into routine dialysis care. Structured educational interventions delivered by healthcare professionals can serve as an effective strategy for improving clinical outcomes and quality of life in patients undergoing long-term hemodialysis management.

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