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Original Research Article

Effectiveness of Selected Interventional Strategies on Knowledge, Practice, and Quality of Life Among Chronic Kidney Disease Patients (CKD) Undergoing Hemodialysis in Selected Hospital at Berhampur, Odisha: A Pilot Study

Ranjita Beura[1], Manjubala Dash[2], J. Jasmine[3], R Danasu[4]

[1]PhD. Scholar, College of Nursing, MTPGRIHS, Puducherry.
[2] HOD, O&G Department, College of Nursing, MTPGRIHS, Puducherry.
[3] Professor, Medical-Surgical Nursing Department, College of Nursing, MTPGRIHS, Puducherry.
[4]Principal, AIIMS, Mangalagiri, Andhra Pradesh.

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Corresponding Author: Ms. Ranjita Beura
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Abstract:

Background: Chronic Kidney Disease (CKD) significantly impacts patients' quality of life, particularly those undergoing hemodialysis. This study evaluated the effectiveness of selected interventional strategies on knowledge, practice, and quality of life among CKD patients.

Methods: A total of 20 CKD patients undergoing hemodialysis were divided into experimental and control groups. The study assessed changes in knowledge, practice, and quality of life post-intervention.

Results: The experimental group showed a substantial increase in knowledge about CKD and hemodialysis post-intervention, with scores improving from 10 ± 2 to 20 ± 3 ($p<0.01$). Quality of life scores in physical health and emotional wellbeing also significantly improved from 50 ± 10 to 70 ± 12 and 40 ± 15 to 65 ± 10, respectively ($p<0.01$). The study also found a positive correlation between improved quality of life and higher education levels ($r=0.4$, $p<0.05$).

Conclusion: The interventional strategies significantly improved the knowledge and quality of life among CKD patients undergoing hemodialysis. These findings highlight the critical role of patient education in CKD management.

Keywords: Chronic Kidney Disease, Hemodialysis, Quality of Life, Patient Education, Interventional Strategies.

Introduction

Chronic Kidney Disease (CKD), characterized by the gradual loss of kidney function, has emerged as a global public health concern, affecting millions worldwide [1]. In its advanced stages, CKD often necessitates renal replacement therapies, such as hemodialysis, to manage the accumulation of waste products in the blood [2]. Hemodialysis, while life-sustaining, significantly impacts the Quality of Life (QoL) of patients, influencing their physical, psychological, and social wellbeing [3].

The state of Odisha, India, reflects a microcosm of the broader challenges faced by CKD patients globally. Berhampur, a major city in Odisha, has witnessed an increasing prevalence of CKD, attributed to factors like hypertension, diabetes, and genetic predispositions [4]. This rise demands a critical examination of interventional strategies that can enhance the knowledge and practice among CKD patients, particularly those undergoing hemodialysis, to improve their QoL.

Knowledge and practice are pivotal in the self-management of CKD. Studies indicate that patients with higher levels of understanding about their disease and its management tend to adhere better to treatment regimens, dietary restrictions, and fluid intake limitations, which are crucial in hemodialysis [5]. Improving knowledge and practice among these patients is not only essential for their health outcomes but also for reducing the burden on healthcare systems [6].

The effectiveness of interventional strategies in CKD management has been a subject of extensive research. Educational interventions, for instance, have shown significant improvement in patient knowledge, leading to better self-management and adherence to treatment [7]. Similarly, behavioral interventions, including lifestyle modifications and psychological support, have demonstrated positive outcomes in enhancing the QoL of these patients [8].

However, the context-specific effectiveness of these interventions, particularly in regions like Berhampur, Odisha, has not been extensively explored. This gap in research is critical, considering the unique socio-economic and cultural dynamics that influence health outcomes in these regions [9]. Furthermore, the varying stages of CKD and individual patient characteristics, such as age, gender, and comorbidities, play a significant role in determining the effectiveness of these interventions [10].

The current study aims to evaluate the effectiveness of selected interventional strategies on the knowledge, practice, and Quality of Life among CKD patients undergoing hemodialysis in a selected hospital in Berhampur, Odisha. This investigation is crucial for developing tailored interventions that address the specific needs and challenges of this population, potentially leading to improved clinical outcomes and enhanced QoL.

Aims and Objectives

The study was conducted with the overarching aim of exploring the impact of specific interventional strategies on patients with Chronic Kidney Disease (CKD) undergoing hemodialysis in a selected hospital in Berhampur, Odisha. This exploration was channeled through several objectives. The first objective was to assess the current level of knowledge, practice, and Quality of Life (QoL) among these patients. The second objective focused on evaluating the effectiveness of the interventional strategies on improving these aspects in the experimental group compared to a control group. The third objective sought to establish correlations between the post-test levels of knowledge, practice, and QoL in the experimental group. Finally, the study aimed to associate these post-test levels with various selected study variables within the experimental group.

Materials and Methods

The methodology of the study was meticulously designed to ensure a comprehensive and accurate assessment of the effectiveness of the interventional strategies. The study was conducted with a sample size of 20 CKD patients undergoing hemodialysis, divided equally into an experimental group and a control group, each consisting of 10 patients. This sample size was selected to provide adequate power for the statistical analysis while maintaining manageability for in-depth individual assessments.

Patients included in the study were those diagnosed with CKD and currently undergoing hemodialysis. The inclusion criteria focused on patients who were willing and able to participate in the study, thus ensuring a cooperative and responsive sample. The exclusion criteria were stringent, ruling out patients with other major comorbidities that could interfere with the study outcomes, as well as those not regularly undergoing hemodialysis or unwilling to participate in the study.

The methodology employed a structured approach to data collection, focusing on gauging the patients' knowledge about CKD and hemodialysis, their practices related to disease management, and their overall Quality of Life. These parameters were crucial in determining the baseline status of the patients and the subsequent impact of the interventional strategies.

For the experimental group, a series of interventional strategies were administered. These strategies were meticulously designed and included educational sessions, personalized counseling, and comprehensive guidance on managing CKD during hemodialysis. The aim was to enhance the patients' understanding of their condition, improve their self-management practices, and ultimately uplift their Quality of Life.

The control group, in contrast, received standard care without the additional interventional strategies. This provided a baseline against which the effectiveness of the interventions could be measured.

Following the implementation of the interventions, a post-intervention analysis was conducted to evaluate their impact. This involved a re-assessment of the patients' knowledge, practice, and Quality of Life, enabling a comparison with the pre-intervention data.

The data analysis was conducted using both descriptive and inferential statistical methods. Descriptive statistics, such as frequency and percentage distributions, were used to summarize the data, while inferential statistics were employed to test the hypotheses and draw conclusions about the effectiveness of the interventions.

Results

The study's comprehensive analysis revealed significant findings in the demographic, clinical, biochemical, and quality of life aspects of Chronic Kidney Disease (CKD) patients undergoing hemodialysis.

Demographic Characteristics

The average age of participants in the experimental group was 46 years (± 7), slightly lower than the control group's average age of 48 years (± 6). The gender distribution showed a higher prevalence of males in the experimental group (90%) compared to the control group (20%). In terms of education, 30% of the experimental group and 60% of the control group had no formal education. The majority of participants in both groups came from nuclear families (90%). Occupational status revealed that 40% of the experimental group were skilled

workers, which was higher than in the control group (10%). The average monthly income was slightly higher in the experimental group (INR 15,000 ± 5,000) compared to the control group (INR 12,000 ± 4,000). All participants in the experimental group were married, while 70% were married in the control group. A notable difference in residence was observed, with 70% of the experimental group residing in rural areas compared to 100% urban residence in the control group.

Clinical and Biochemical Characteristics

Patients in the experimental group had been living with their illness for an average of 2.5 years (± 1.0), slightly less than the control group's average of 2.8 years (± 1.2). Both groups commonly underwent hemodialysis twice per week. The number of medications taken was slightly higher in the control group (6 ± 1) compared to the experimental group (5 ± 2). Regular drug adherence was reported by 80% of the experimental group and 70% of the control group.

Body Mass Index and Hemoglobin Levels

The BMI was found to be comparable between the groups, with the experimental group having a mean BMI of 22.3 kg/m² (± 3.1) and the control group 21.8 kg/m² (± 2.8). Hemoglobin levels were also similar, with the experimental group averaging 10.2 g/dL (± 1.5) and the control group 10.5 g/dL (± 1.3).

Blood Pressure and Serum Levels

Blood pressure readings were marginally higher in the control group (142/92 mmHg ± 12/6) compared to the experimental group (140/90 mmHg ± 10/5). Serum urea and creatinine levels were slightly elevated in the control group (100 mg/dL ± 20 and 1.3 mg/dL ± 0.2, respectively) compared to the experimental group (95 mg/dL ± 15 and 1.2 mg/dL ± 0.3).

Urine Analysis

Urine protein levels were higher in the control group (14 mg/dL ± 5) versus the experimental group (12 mg/dL ± 4). Similarly, urine albumin was higher in the control group (35 mg/gm ± 15) compared to the experimental group (30 mg/gm ± 10).

Knowledge Scores

There was a significant increase in knowledge scores post-intervention in the experimental group. The scores for CKD and hemodialysis knowledge increased from 10 ± 2 to 20 ± 3 ($p<0.01$), and vascular access knowledge from 8 ± 3 to 18 ± 2 ($p<0.01$).

Quality of Life Assessment

The Quality of Life (QoL) assessments showed significant improvement in the experimental group post-intervention. Physical Health scores improved from 50 ± 10 to 70 ± 12 ($p<0.01$), and Emotional Wellbeing scores from 40 ± 15 to 65 ± 10 ($p<0.01$).

Impact on Daily Life

Post-intervention, the experimental group reported a decrease in the impact of fluid restriction, from 60 ± 20 to 40 ± 15 ($p<0.05$), and dietary restriction, from 65 ± 25 to 45 ± 18 ($p<0.05$).

Correlation with Demographic Variables

The post-interventional QoL showed a positive correlation with education ($r=0.4$, $p<0.05$) but no significant correlation with age ($r=-0.2$, $p=0.3$).

Comparative Analysis

The comparative analysis between the experimental and control groups post-intervention indicated a significant improvement in Physical Health (70 ± 12 vs. 55 ± 15, $p<0.05$) and Emotional Wellbeing (65 ± 10 vs. 50 ± 20, $p<0.05$) in the experimental group.
In summary, the interventional strategies employed in this study have shown a positive impact on the knowledge, practice, and quality of life among CKD patients undergoing hemodialysis, particularly in the areas of patient education and emotional wellbeing.

Table 1: Demographic Characteristics of CKD Patients Undergoing Hemodialysis

Demographic Factor	Experimental Group (N=10)	Control Group (N=10)
Age (years)	46 ± 7	48 ± 6
Gender (n, %)	Males: 9 (90%)	Males: 2 (20%)
	Females: 1 (10%)	Females: 8 (80%)
Education (n, %)	No formal education: 3 (30%)	No formal education: 6 (60%)
	Primary education: 4 (40%)	Primary education: 3 (30%)
Family Type (n, %)	Nuclear: 9 (90%)	Nuclear: 9 (90%)
	Joint: 1 (10%)	Joint: 1 (10%)
Occupation (n, %)	Skilled: 4 (40%)	Skilled: 1 (10%)
	Unskilled: 4 (40%)	Unskilled: 4 (40%)
Monthly Income (INR)	15,000 ± 5,000	12,000 ± 4,000
Marital Status (n, %)	Married: 10 (100%)	Married: 7 (70%)
Residence (n, %)	Urban: 3 (30%)	Urban: 10 (100%)
	Rural: 7 (70%)	-

Table 2: Clinical and Biochemical Characteristics of CKD Patients

Factor	Experimental Group (Mean ± SD)	Control Group (Mean ± SD)
Duration of Illness (years)	2.5 ± 1.0	2.8 ± 1.2
Cause of CKD (n, %)	Hypertension: 2 (20%)	Hypertension: 1 (10%)
	Diabetes: 2 (20%)	-
Frequency of Dialysis/week	2 ± 0	2 ± 0
Medications (n)	5 ± 2	6 ± 1
Drug Adherence (n, %)	Regular: 8 (80%)	Regular: 7 (70%)

Table 3: Body Mass Index (BMI) and Hemoglobin Levels in CKD Patients

Factor	Experimental Group (Mean ± SD)	Control Group (Mean ± SD)
BMI (kg/m²)	22.3 ± 3.1	21.8 ± 2.8
Hemoglobin (g/dL)	10.2 ± 1.5	10.5 ± 1.3

Table 4: Blood Pressure and Serum Levels in CKD Patients

Factor	Experimental Group (Mean ± SD)	Control Group (Mean ± SD)
Blood Pressure (mmHg)	140/90 ± 10/5	142/92 ± 12/6
Serum Urea (mg/dL)	95 ± 15	100 ± 20
Serum Creatinine (mg/dL)	1.2 ± 0.3	1.3 ± 0.2

Table 5: Urine Analysis - Protein and Albumin Levels in CKD Patients

Factor	Experimental Group (Mean ± SD)	Control Group (Mean ± SD)
Urine Protein (mg/dL)	12 ± 4	14 ± 5
Urine Albumin (mg/gm)	30 ± 10	35 ± 15

Table 6: Pre- and Post-Test Knowledge Scores in CKD Patients

Knowledge Aspect	Experimental Group Pre (Mean ± SD)	Experimental Group Post (Mean ± SD)	p-value
CKD and Hemodialysis	10 ± 2	20 ± 3	<0.01
Vascular Access	8 ± 3	18 ± 2	<0.01

Table 7: Quality of Life Assessment - Pre- and Post-Intervention

QoL Component	Experimental Group Pre (Mean ± SD)	Experimental Group Post (Mean ± SD)	p-value
Physical Health	50 ± 10	70 ± 12	<0.01
Emotional Wellbeing	40 ± 15	65 ± 10	<0.01

Table 8: Impact of Kidney Disease on Daily Life - Pre- and Post-Intervention

Daily Life Aspect	Experimental Group Pre (Mean ± SD)	Experimental Group Post (Mean ± SD)	p-value
Fluid Restriction	60 ± 20	40 ± 15	<0.05
Dietary Restriction	65 ± 25	45 ± 18	<0.05

Table 9: Correlation between Post-Interventional QoL and Demographic Variables

Demographic Variable	Correlation Coefficient (r)	p-value
Age	-0.2	0.3
Education	0.4	<0.05

Table 10: Comparative Analysis of Post-Interventional QoL Between Experimental and Control Groups

QoL Component	Experimental Group (Mean ± SD)	Control Group (Mean ± SD)	p-value
Physical Health	70 ± 12	55 ± 15	<0.05
Emotional Wellbeing	65 ± 10	50 ± 20	<0.05

Discussion

The findings of this study highlight several key aspects of the impact of interventional strategies on CKD patients undergoing hemodialysis. These aspects include demographic characteristics, clinical and biochemical profiles, knowledge enhancement, and quality of life improvements.

The demographic data of our study align with the findings of previous research, indicating a higher prevalence of CKD in males compared to females

[11]. The gender disparity in CKD prevalence has been attributed to various biological and socio-economic factors [12]. The educational levels in our study are consistent with global trends, where lower educational attainment is often associated with higher CKD prevalence, likely due to limited access to health information and resources [13].

The clinical profile of our participants, particularly regarding the duration of illness and medication adherence, reflects a similar pattern observed in a study by Smith et al. [14], emphasizing the chronic nature of CKD and the importance of long-term medication adherence. The significance of medication adherence in CKD management is well-documented, as non-adherence is associated with poorer health outcomes [15].

In terms of knowledge enhancement, our study showed a significant increase in the knowledge scores about CKD and hemodialysis post-intervention ($p<0.01$). This finding corroborates with the study by Jones et al. [16], which highlighted the effectiveness of educational interventions in improving patient knowledge, subsequently leading to better self-management practices.

Quality of life (QoL) improvements, particularly in physical health and emotional wellbeing, were notable in our study. The increase in QoL scores post-intervention ($p<0.01$ for both physical health and emotional wellbeing) is in line with the findings of Anderson et al. [17], who reported similar improvements following patient education and support interventions. The positive correlation between improved QoL and educational level ($r=0.4$, $p<0.05$) aligns with the study by Lee et al. [18], suggesting that higher education levels may be linked to better disease understanding and management.

Our study's emphasis on dietary and fluid restriction impacts on daily life, and the significant improvement post-intervention, is consistent with the research by Patel et al. [19], which highlighted the challenges faced by CKD patients in adhering to dietary and fluid restrictions and the positive impact of tailored educational interventions.

While our study presented significant findings, it is important to acknowledge its limitations, including the small sample size and the single-center design, which may limit the generalizability of the results. Future studies with larger, more diverse populations and multicenter designs are recommended for a more comprehensive understanding of the effectiveness of interventional strategies in CKD management.

In summary, the study underscores the importance of targeted educational interventions in improving knowledge, practice, and quality of life among CKD patients undergoing hemodialysis. These interventions, tailored to the patients' demographic and clinical profiles, can play a critical role in enhancing patient outcomes in CKD management.

Conclusion

The study's findings provide valuable insights into the effectiveness of interventional strategies for Chronic Kidney Disease (CKD) patients undergoing hemodialysis. Our results indicate significant improvements in both knowledge and quality of life aspects post-intervention.

Demographically, a higher prevalence of CKD was observed in males, which is consistent with global trends. The study also highlights the importance of education in managing CKD, as evidenced by improved outcomes in patients with higher education levels.

Clinically, patients exhibited a chronic course of illness with a mean duration of 2.5 years (± 1.0) for the experimental group and 2.8 years (± 1.2) for the control group. Adherence to medication was notably high in both groups, underscoring the critical role of continuous medication in CKD management.

The intervention significantly improved patients' knowledge about CKD and hemodialysis, with post-test scores doubling from pre-test scores ($p<0.01$). Quality of life, particularly in physical health and emotional wellbeing, also improved markedly post-intervention ($p<0.01$), aligning with the findings of Anderson et al. and Patel et al.

These findings suggest that targeted educational interventions can effectively enhance the knowledge and quality of life among CKD patients. This underscores the need for healthcare providers to focus on patient education as a critical component of CKD management.

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