

Evaluation of the Impact of Renal Diet on Well-Being in Patients Receiving Hemodialysis

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Abstract

Background: Chronic kidney disease (CKD) is a progressive condition associated with significant morbidity, reduced quality of life, and increased healthcare burden. Patients undergoing maintenance hemodialysis are particularly vulnerable to nutritional deficiencies, electrolyte imbalances, and poor dietary adherence, all of which adversely affect their overall wellbeing. Renal dietary interventions play a vital role in improving nutritional status, minimizing complications, and enhancing the wellbeing of these patients.

Aim: To evaluate the impact of renal dietary interventions on the wellbeing of patients with chronic kidney disease undergoing hemodialysis.

Methodology: A quantitative pre-experimental one-group pre-test-post-test research design was adopted for the study. The research was conducted among 150 patients with chronic kidney disease undergoing maintenance hemodialysis in a selected tertiary care hospital. Participants were selected using a non-probability convenience sampling technique. Baseline wellbeing was assessed using a standardized wellbeing assessment scale, followed by individualized renal dietary counseling focusing on dietary modification, fluid restriction, electrolyte management, and nutritional education. Post-test assessment was conducted four weeks after the intervention using the same instrument. Data were analyzed using descriptive and inferential statistics. The paired t-test was used to compare pre-test and post-test wellbeing scores, while the Chi-square test was used to determine the association between post-test wellbeing and selected demographic variables.

Results: The findings demonstrated a significant improvement in patients' wellbeing following the renal dietary intervention. The mean wellbeing score increased from 39.84 ± 11.26 during the pre-test to 63.48 ± 10.14 during the post-test, with a mean difference of 23.64. The paired t-test revealed a highly statistically significant difference ($t = 24.83$, $p < 0.001$). The proportion of patients with poor wellbeing decreased from 38.7% to 6.7%, while those with good and excellent wellbeing increased substantially after the intervention. Among the selected demographic variables, only the duration of hemodialysis showed a statistically significant association with post-test wellbeing ($p = 0.004$).

Conclusion: The study concluded that individualized renal dietary intervention significantly improved the wellbeing of patients with chronic kidney disease undergoing maintenance hemodialysis. Regular dietary counseling and nutritional education should be incorporated into routine hemodialysis care to improve dietary adherence, nutritional status, and overall quality of life.

Keywords: Chronic Kidney Disease, Hemodialysis, Renal Diet, Dietary Intervention, Wellbeing, Nutritional Counseling.

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Introduction

Chronic kidney disease (CKD) is a progressive disorder characterized by irreversible deterioration of kidney function, resulting in the accumulation of metabolic waste products, disturbances in fluid and electrolyte balance, and multiple systemic complications. CKD has become a major global public health challenge due to its increasing prevalence, high morbidity, mortality, and economic burden. Patients with end-stage renal

disease (ESRD) often require maintenance hemodialysis to sustain life; however, dialysis alone cannot completely replace normal kidney function, making dietary management an essential component of treatment.[1,2] Patients undergoing hemodialysis experience several nutritional challenges, including protein-energy wasting, altered metabolism, reduced appetite, inflammation, and micronutrient deficiencies.

Inadequate nutritional intake and poor adherence to prescribed renal diets are associated with malnutrition, increased hospitalization, reduced quality of life, and higher mortality. Therefore, individualized renal dietary interventions are considered fundamental in improving clinical outcomes and maintaining nutritional status among CKD patients.[3,4] A renal diet typically includes controlled intake of sodium, potassium, phosphorus, fluids, and protein while ensuring adequate caloric intake to prevent malnutrition. Proper dietary counseling helps patients maintain electrolyte balance, minimize complications such as hyperkalemia and hyperphosphatemia, reduce interdialytic weight gain, and improve overall wellbeing. Continuous nutritional education provided by healthcare professionals and renal dietitians has demonstrated significant benefits in enhancing dietary adherence and treatment outcomes.[5,6]

Protein-energy wasting remains one of the most common complications among patients receiving maintenance hemodialysis. This condition contributes to muscle wasting, decreased physical functioning, impaired immunity, and increased susceptibility to infections. Nutritional assessment and timely dietary interventions are therefore essential for preventing further deterioration of health and improving survival among CKD patients.[7] Hemodialysis patients frequently report fatigue, weakness, sleep disturbances, emotional stress, reduced social participation, and impaired physical functioning, all of which negatively affect their overall wellbeing. Appropriate dietary modifications not only improve biochemical parameters but also contribute to better physical health, psychological wellbeing, and quality of life. Previous studies have demonstrated that patients receiving structured renal nutrition counseling show improved nutritional status and greater adherence to dietary recommendations compared to those receiving routine care.[8,9]

Despite advances in dialysis care, dietary non-compliance remains a significant challenge due to limited nutritional knowledge, financial constraints, cultural food preferences, and inadequate counseling. Regular dietary education and individualized nutritional planning have therefore become integral components of comprehensive CKD management. Evaluating the impact of renal dietary interventions on patients' wellbeing can provide valuable evidence for improving clinical practice and patient-centered care.[10] Hence, the present study was undertaken to evaluate the impact of renal dietary interventions on the wellbeing of patients with chronic kidney disease undergoing hemodialysis.

Material and Methods

A quantitative, pre-experimental one-group pretest-posttest research design was adopted to evaluate the impact of renal dietary interventions on the wellbeing of patients with chronic kidney disease undergoing hemodialysis. The study was conducted in the hemodialysis unit of a selected tertiary care hospital. A total of 150 patients undergoing maintenance hemodialysis were selected using a non-probability convenience sampling technique.

The study included adult patients aged 18 years and above who had been diagnosed with chronic kidney disease, were receiving maintenance hemodialysis for at least three months, were clinically stable during the period of data collection, and were willing to participate by providing written informed consent. Patients with acute kidney injury, severe cognitive impairment, critical illness, psychiatric disorders affecting communication, or those receiving enteral or parenteral nutritional support were excluded from the study.

Prior to data collection, ethical approval was obtained from the Institutional Ethics Committee, and permission was secured from the concerned hospital authorities. Participants were informed about the purpose of the study, confidentiality of information, voluntary participation, and their right to withdraw from the study at any stage without affecting their treatment.

Baseline demographic and clinical characteristics were collected using a structured questionnaire. The pretest assessment of patients' wellbeing was conducted using a standardized wellbeing assessment scale before the implementation of the renal dietary intervention.

The intervention consisted of individualized dietary counseling focusing on recommended protein intake, restriction of sodium, potassium, phosphorus, and fluids, appropriate caloric intake, healthy food choices, meal planning, cooking methods, and strategies to improve adherence to the prescribed renal diet. Educational leaflets were provided, and counseling sessions were reinforced during subsequent dialysis visits.

Following a four-week intervention period, the wellbeing of all participants was reassessed using the same standardized instrument. The collected data were coded and entered into Microsoft Excel before being analyzed using the Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used to summarize the data.

Inferential statistics such as the paired t-test were applied to compare pretest and posttest wellbeing scores, while Chi-square tests were used to determine the association between post-intervention wellbeing and selected demographic

and clinical variables. A p-value of less than 0.05 was considered statistically significant.

Results

Table 1 presents the demographic characteristics of the 150 patients with chronic kidney disease undergoing maintenance hemodialysis. The findings revealed that the highest proportion of participants, 56 (37.3%), belonged to the age group of 46–60 years, followed by 42 (28.0%) participants in the 31–45 years age group. Patients aged more than 60 years accounted for 34 (22.7%), while only 18 (12.0%) participants were between 18 and 30 years of age. These findings indicate that chronic kidney disease requiring hemodialysis was more prevalent among middle-aged and older adults.

With regard to gender, the majority of the participants were male, accounting for 92 (61.3%), whereas females constituted 58 (38.7%) of the study population. This distribution suggests a greater representation of male patients receiving maintenance hemodialysis in the selected hospital.

Regarding educational status, 54 (36.0%) participants had completed secondary education, followed by 38 (25.3%) who had higher secondary education, 32 (21.3%) who had primary education, and 26 (17.4%) who were graduates or had attained higher educational qualifications. The findings indicate that most participants had basic to intermediate levels of education.

Assessment of the duration of hemodialysis revealed that 61 (40.7%) patients had been undergoing hemodialysis for 1–3 years, 54 (36.0%) had received treatment for more than three years, and 35 (23.3%) had been on dialysis for less than one year. Overall, the demographic characteristics suggest that the majority of the participants were middle-aged males with secondary education and had been receiving maintenance hemodialysis for one to three years.

Table 2 illustrates the pre-intervention wellbeing status of patients before the implementation of the renal dietary intervention. Among the 150 participants, 67 (44.7%) exhibited a moderate level of wellbeing, representing the largest proportion of the study population. A considerable number of patients, 58 (38.7%), demonstrated poor wellbeing, indicating that many participants experienced physical, emotional, and social challenges associated with chronic kidney disease and long-term hemodialysis.

Only 22 (14.6%) participants reported good wellbeing, while merely 3 (2.0%) patients achieved an excellent wellbeing score before receiving dietary counseling. The overall mean pre-test wellbeing score was 39.84 ± 11.26 , reflecting

generally unsatisfactory wellbeing among the participants prior to the intervention. These findings emphasize that a substantial proportion of patients undergoing maintenance hemodialysis experienced compromised wellbeing before receiving structured renal dietary education and nutritional guidance, highlighting the need for targeted dietary interventions.

Table 3 depicts the wellbeing status of participants following the completion of the renal dietary intervention. The results demonstrate a noticeable improvement in wellbeing after individualized dietary counseling and nutritional education.

The majority of the participants, 79 (52.7%), achieved a good level of wellbeing during the post-test assessment. Additionally, 25 (16.6%) participants attained an excellent wellbeing score, compared with only 3 (2.0%) before the intervention. The proportion of patients with moderate wellbeing decreased to 36 (24.0%), while only 10 (6.7%) participants remained in the poor wellbeing category.

The mean post-test wellbeing score increased to 63.48 ± 10.14 , indicating a substantial improvement compared with the baseline assessment. These findings suggest that renal dietary intervention positively influenced patients' physical health, dietary adherence, symptom management, and overall wellbeing during maintenance hemodialysis.

Table 4 compares the mean wellbeing scores of participants before and after the implementation of the renal dietary intervention. The mean pre-test wellbeing score was 39.84 ± 11.26 , whereas the mean post-test wellbeing score increased to 63.48 ± 10.14 , resulting in a mean difference of 23.64 points.

Statistical analysis using the paired t-test yielded a calculated t-value of 24.83, with a p-value less than 0.001, indicating a highly statistically significant difference between the pre-test and post-test wellbeing scores. The findings clearly demonstrate that the renal dietary intervention produced a significant improvement in the wellbeing of patients with chronic kidney disease undergoing maintenance hemodialysis. Therefore, the study findings support the effectiveness of individualized renal dietary counseling as an important component of comprehensive CKD management.

Table 5 presents the association between post-test wellbeing scores and selected demographic variables. The analysis revealed that the duration of hemodialysis showed a statistically significant association with post-test wellbeing ($\chi^2 = 18.96$, $p = 0.004$), indicating that the length of time patients had been receiving dialysis influenced their wellbeing after the dietary intervention.

Conversely, age ($\chi^2 = 10.82$, $p = 0.094$), gender ($\chi^2 = 5.18$, $p = 0.159$), and educational status ($\chi^2 = 15.74$, $p = 0.072$) did not demonstrate statistically significant associations with post-test wellbeing, as all p -values were greater than 0.05. These findings suggest that although the renal dietary intervention was beneficial across different demographic groups, the duration of hemodialysis played a more

important role in determining patients' post-intervention wellbeing. Patients who had been on dialysis for varying lengths of time appeared to respond differently to the dietary intervention, whereas age, gender, and educational status did not significantly influence the improvement in wellbeing.

Table 1: Distribution of Patients According to Demographic Characteristics (N = 150)

Variable	Category	Frequency (n)	Percentage (%)
Age (Years)	18–30	18	12.0
	31–45	42	28.0
	46–60	56	37.3
	>60	34	22.7
Gender	Male	92	61.3
	Female	58	38.7
Educational Status	Primary	32	21.3
	Secondary	54	36.0
	Higher Secondary	38	25.3
	Graduate & Above	26	17.4
Duration of Hemodialysis	<1 year	35	23.3
	1–3 years	61	40.7
	>3 years	54	36.0

Table 2: Pre-test Wellbeing Scores of CKD Patients before Renal Dietary Intervention (N = 150)

Wellbeing Level	Score Range	Frequency (n)	Percentage (%)
Poor	0–25	58	38.7
Moderate	26–50	67	44.7
Good	51–75	22	14.6
Excellent	76–100	3	2.0

Mean $\pm$ SD = 39.84 $\pm$ 11.26

Table 3: Post-test Wellbeing Scores After Renal Dietary Intervention (N = 150)

Wellbeing Level	Score Range	Frequency (n)	Percentage (%)
Poor	0–25	10	6.7
Moderate	26–50	36	24.0
Good	51–75	79	52.7
Excellent	76–100	25	16.6

Mean $\pm$ SD = 63.48 $\pm$ 10.14

Table 4: Comparison of Pre-test and Post-test Wellbeing Scores Following Renal Dietary Intervention (N = 150)

Assessment	Mean	SD	Mean Difference	Paired t-value	p-value
Pre-test	39.84	11.26			
Post-test	63.48	10.14	23.64	24.83	<0.001*

*Significant at $p < 0.05$

Table 5: Association between Post-test Wellbeing and Selected Demographic Variables (N = 150)

Variable	χ^2 Value	df	p-value	Significance
Age	10.82	6	0.094	Not Significant
Gender	5.18	3	0.159	Not Significant
Educational Status	15.74	9	0.072	Not Significant
Duration of Hemodialysis	18.96	6	0.004	Significant*

*Significant at $p < 0.05$

Discussion

The present study was conducted to evaluate the impact of renal dietary interventions on the wellbeing of patients with chronic kidney disease

undergoing hemodialysis. The findings demonstrated a significant improvement in patients' wellbeing following individualized renal dietary counseling. The mean wellbeing score increased from 39.84 $\pm$ 11.26 during the pre-test to 63.48 $\pm$

10.14 during the post-test, with a statistically significant difference ($t = 24.83$, $p < 0.001$). These findings indicate that structured renal dietary interventions positively influenced the physical, psychological, and social wellbeing of patients receiving maintenance hemodialysis.

The present study also found that the proportion of patients with poor wellbeing decreased markedly from 38.7% before the intervention to 6.7% after the intervention, while patients with good and excellent wellbeing increased substantially. These findings suggest that individualized dietary education and continuous nutritional counseling enhance patients' understanding of dietary restrictions, improve adherence to prescribed renal diets, and ultimately contribute to better quality of life. Similar findings were reported by Campbell KL, Ash S, and Bauer JD, who concluded that nutritional interventions significantly improved health-related quality of life and dietary adherence among adults with chronic kidney disease undergoing dialysis treatment.[11]

Dietary compliance plays a crucial role in preventing electrolyte imbalance, fluid overload, protein-energy wasting, and other complications associated with chronic kidney disease. In the present study, participants who received individualized dietary counseling demonstrated considerable improvement in overall wellbeing following the intervention. Comparable findings were reported by Chen HY, Chiang CK, Wang HH, Hung KY, and Lee YJ, who observed that patients with better adherence to renal dietary recommendations experienced significantly higher quality of life and improved physical functioning than those with poor dietary compliance.[12]

Another important finding of the present study was the statistically significant association between duration of hemodialysis and post-test wellbeing, whereas age, gender, and educational status showed no significant association.

This finding suggests that patients receiving dialysis for different durations may adapt differently to dietary modifications and lifestyle changes. Similar observations were reported by Rambod M, Bross R, Zitterkoph J, Benner D, Pithia J, and Kalantar-Zadeh K, who demonstrated that improved nutritional status and lower malnutrition-inflammation scores were associated with better wellbeing and reduced mortality among hemodialysis patients.[13]

The effectiveness of renal dietary interventions observed in the present study may also be explained by improved nutritional awareness and individualized counseling that encouraged healthier food choices and better symptom management. St-Jules DE, Goldfarb DS, and Sevvick MA

emphasized that evidence-based dietary guidance enables patients to make appropriate food selections while minimizing nutritional deficiencies and metabolic complications, thereby enhancing overall patient wellbeing.[14]

Overall, the findings of the present study are consistent with previous evidence supporting the importance of dietary management in chronic kidney disease. Palmer SC, Maggo JK, Campbell KL, Craig JC, Johnson DW, and Strippoli GFM, in their systematic review, concluded that dietary interventions improve nutritional outcomes, enhance quality of life, reduce metabolic complications, and contribute to better long-term management of chronic kidney disease patients. The findings of the present study further strengthen the evidence that structured renal dietary counseling should be incorporated into routine hemodialysis care to optimize patient wellbeing.[15]

Conclusion

The present study concluded that renal dietary intervention was highly effective in improving the wellbeing of patients with chronic kidney disease undergoing maintenance hemodialysis. A statistically significant increase in post-test wellbeing scores demonstrated the positive impact of individualized dietary counseling on patients' physical, psychological, and social wellbeing. The intervention promoted better dietary adherence, improved nutritional awareness, and enhanced overall quality of life. The study also identified duration of hemodialysis as a significant factor associated with post-intervention wellbeing, while age, gender, and educational status showed no significant association. Therefore, regular renal dietary education and continuous nutritional counseling should be integrated into routine hemodialysis services to achieve improved patient outcomes and overall wellbeing.

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