



Impact of Dietary Counseling on Nutritional requirements and Mitigating Noncompliance behavior in Hemodialysis Patients: A Pilot Study

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Abstract

Introduction Hemodialysis is the most sought-after treatment modality in patients with end-stage renal disease. The success of hemodialysis depends on the patient's adherence to diet and fluid restrictions to a great extent. Nutritional health is a critical consideration, especially for hemodialysis patients. Nutritional education and counseling for renal disease patients significantly preserve renal function and overall well-being.

Methods Quantitative research approach with a quasi-experimental crossover design to determine the effectiveness of dietary counseling on the nutritional requirement and noncompliance behavior of patients undergoing hemodialysis conducted at Mangala Kidney Hospital, Mangalore, Karnataka, India.

Results The mean age among the participants was 46.07 ± 9.67 years. Nearly half of the subjects, 11 (39.29%), had undergone dialysis for 1 to 5 years. Twenty-six (96.3%) had noncompliance behavior toward diet and fluid. Based on biochemical parameters, 20 (74.07%) were classified as low-risk noncompliance and 7 (25.92%) high-risk noncompliance behavior. A paired *t*-test showed that there is a significant difference in knowledge of nutritional requirements, $t(26) = 6.30$, $p \leq 0.001$ at 5% level of significance, and noncompliance among the participants before and after the dietary counseling program as $t(26) = -5.41$, $p \leq 0.001$ at 5% level of significance.

Conclusion Implementing nurse-led counseling for hemodialysis patients can improve biochemical parameters and enhance understanding of dietary and fluid restrictions, positively impacting laboratory indicators.

Keywords

- ▶ nurse-led dietary counseling
- ▶ noncompliance behavior
- ▶ hemodialysis patients
- ▶ nutritional requirements

Introduction

Nutritional health is one of the most critical considerations among patients with chronic kidney disease, especially those undergoing hemodialysis. Nutritional education and

counseling for renal disease patients significantly preserve renal function and overall well-being. In preparation for renal replacement therapy, a consultation with the renal nutritionist or a nurse to establish a diet consistent with the current diagnosis may increase the likelihood of reducing

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cardiovascular risk factors, preventing malnutrition anemia, and slowing the progression of renal disease, all of which can contribute to positive patient outcomes. Nutrition tips are another effective way of providing a practical nutrition education message in a simple format.¹

Nursing intervention has been progressively identified as increasingly important in improving patients' compliance with dialysis. Such interventions, including education, training, and behavioral introduction, help patients learn about dialysis and develop healthy life habits, further improving their compliance with this treatment. The most commonly reported indicators for assessing compliance include serum phosphorus level and interdialytic weight gain (IDWG). In contrast, in some studies, compliance has been directly evaluated, and the compliance rate has been reported. Nephrology nurses can lead the way to implement numerous proactive interventions before, during, and after hospitalization of patients on hemodialysis. Nurses often have more contact with patients than other clinical personnel and are in an ideal position to optimize assessment, management, and monitoring of clinical issues likely to affect patients on dialysis, including malnutrition status. Nurses are encouraged to apply the principles of successful nursing models to develop site-specific practices and processes to improve the quality of care before, during, and after hospitalization of patients on dialysis. Moreover, the role of nurses in the nutritional screening and counseling of these patients has been shown to have positive impacts.

Materials and Methods

Study Design and Participants

The investigator adopted a quantitative research approach with a quasi-experimental crossover design to determine the effect of dietary counseling on the noncompliance behavior of patients undergoing hemodialysis at a private hospital specialized in kidney diseases at Mangalore, Karnataka, India. Twenty-seven participants between 18 and 60 years who fulfilled the inclusion criteria participated in the study. Patients with multiple organ failure, critically ill patients, unconscious patients, patients not interested in the counseling program, patients with human immunodeficiency virus or hepatitis, and patients preparing for kidney transplantation were excluded from the study.

Data Collection Instruments

Data was collected using the sociodemographic pro forma. Self-reported checklist on assessing noncompliance behavior among dialysis patients and self-reported checklist on nutrition status (24-hour recall) was administered. The self-reported checklist on the assessing compliance behavior scale was used to allow the samples into two study groups: compliance and noncompliance. Based on biological parameters, the noncompliance group is subdivided into control and experimental groups based on criteria prepared by the clinician and reviews. The checklist consisted of four items related to drug, diet, treatment, and fluid. It included

biochemical parameters like hemoglobin, serum potassium, serum phosphorus, and IDWG.

Data Collection Procedure

Before the data collection, formal written permission was obtained from the concerned authorities. An informed written consent and participant information sheet were administered to the participants.

The study was conducted in three phases.

First phase: The treatment regimen was explored for each patient using a self-rating scale for compliance and noncompliance based on their noncompliance scores. Qualified participants were randomly categorized into control groups and experimental groups according to the criteria and biochemical parameters.

Second phase: Once the participants were allotted to the study group, their demographic pro forma and noncompliance behavior were collected. Twenty-four-hour dietary recall was assessed on the first selection day. After the preintervention assessment, the high-risk noncompliance participants were subjected to nurse-led dietary counseling for 20 to 30 minutes (form of video, demonstration, pamphlet on dietary guidelines, individualized dietary plan, and PowerPoint presentation) thrice a week for 1 week. Reinforcement sessions were provided if needed during their follow-up visits to the center.

Third phase: As it was a crossover design, the low-risk noncompliance participants were administered the nurse-led dietary counseling. The high-risk noncompliance group became the control group. The same intervention and assessments were performed for the low-risk noncompliance group.

Results

Distribution of Sample Characteristics

The distribution of the subjects is based on their demographic variables. Most patients, 10 (35.71%), were in the age group of 51 to 60 years, and the mean age was 46.07 ± 9.67 . Among the subjects, 16 (57.14%) were males, the majority of the samples 23 (82.14%) were married, 12 (42.86%) of them had high school education (10th standard), 5 (17.86%) were unemployed, and 11 (39.29%) had a monthly income of 5,001 to 10,000. Nearly half of the subjects, 11 (39.29%), had undergone dialysis for 1 to 5 years, and most of them 12 (42.86%) were diabetic.

Assessment of Noncompliance Behavior among Patients Undergoing Hemodialysis

The data were analyzed using frequency and percentage. The findings reveal that 27 (96.3%) exhibited noncompliant behavior, whereas only a minimal rate, 1 (3.7%), adhered to the compliance criteria. Based on biochemical parameters and according to predefined, clinician-reviewed criteria, the noncompliant group was further categorized into control (low-risk noncompliance) and experimental groups (high-risk noncompliance). Among dialysis patients, 20 (74.07%) were classified in the control group, while 7 (25.92%) were in the experimental group (► **Table 1**).

Table 1 Frequency and percentage distribution of noncompliance behavior among patients undergoing hemodialysis ($n = 28$)

Compliance (0–1)		Noncompliance (> 1)		Control group (0–2) (low-risk level)		Experiment group (3–4) (high-risk level)	
<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
1	3.7	27	96.3	20	74.07	7	25.92

Table 2 Domain-wise noncompliance report of hemodialysis patients, $n = 27$ (20 + 7)

Domains	Noncompliance ($n = 27$)		Control group (low-risk level)		Experiment group (high-risk level)	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Drugs	5	18.5	3	60	2	40
Fluid	27	100	20	74.0	7	25.9
Diet	24	96.6	15	57.6	9	34.6
Treatment	4	14.8	2	50	2	50

The result shows that most participants are in good compliance ($n = 22$, 81.5%) with the drugs and treatment ($n = 23$, 85.2%). On the other hand, all the participants ($n = 27$, 100%) showed noncompliance to fluid intake and 96.6% noncompliance to diet (► **Table 2**).

Among the participants, most demonstrated low-risk noncompliance (control group) for almost all biological parameters, including IDWG at 80%, serum phosphorous at 93%, and serum potassium at 100%, except hemoglobin levels. Specifically, 63% of the participants exhibited high-risk noncompliance (experiment group) in maintaining hemoglobin levels (► **Table 3**).

Effectiveness of Nurse-Led Dietary Counseling on Nutritional Status among Hemodialysis Patients

H_1 : There will be a significant difference between the nutritional status among hemodialysis patients before and after the dietary counseling program.

A paired *t*-test showed that there is a significant difference in nutritional status among the participants before and after the dietary counseling program as $t(26) = -6.30$, $p \leq 0.001$ at 5% level of significance. There was a notable (14.91%) improvement in the average caloric intake score (mean difference 5.22) following the nurse-led counseling. Hence, the research hypothesis (H_1) is accepted at 5% level of significance (► **Table 4**).

Table 3 Level of noncompliance among hemodialysis patients based on biological parameters ($n = 27$)

Biological parameters	Reference value	Mean	SD	Control group (low-risk level)		Experiment group (high-risk level)	
				<i>f</i>	%	<i>f</i>	%
IDWG 2–6 kg	HL > 6 kg LR < 2 kg	3.66	0.90	7	20	20	80
Hemoglobin M: 14–18 g/dL F: 12–15 g/dL	HR < 10 mg/dL LR > 10 mg/dL	9.65	1.97	17	63	10	37.0
Serum phosphorus 2.5–4.5 mg/dL	HR < 3.5 and > 5.5 mg/dL LR 3.5–5.5 mg/dL	6.26	2.12	2	7	25	93
Serum potassium 3.5–5.5 mg/dL	HR < 3 and > 7 mg/dL LR 3–3.5 mg/dL 5.5–7 mg/dL	5.45	0.86	–	–	27	100

Abbreviations: F, female; HR, high risk; IDWG, interdialytic weight gain; LR, low risk; M, male; SD, standard deviation.

Table 4 Effectiveness of nurse-led dietary counseling on nutritional status among hemodialysis patients before and after the intervention ($n = 27$)

Nutritional status (caloric intake)	Mean	SD	MD	Standard error	<i>t</i> -Value	<i>p</i> -Value
Pretest	17.48	2.26	5.22	0.86	6.309	< 0.001*
Posttest	22.70	3.07				

Abbreviations: MD, mean difference; SD, standard deviation.

*refers to level of significance.

Table 5 Effectiveness of nurse-led dietary counseling on noncompliance among hemodialysis patients ($n = 27$)

Noncompliance ($n = 26$)	Variable	Mean	SD	MD	t-Value	p-Value	95% CI, the difference lower to upper
	Pre-compliance	5.04	0.20	0.75	-5.41	< 0.001*	-1.02 to -0.47
	post-compliance	5.79	0.88				

Abbreviations: CI, confidence interval; MD, mean difference; SD, standard deviation.

Effectiveness of Nurse-Led Dietary Counseling on Noncompliance among Hemodialysis Patients

H_2 : There will be a significant difference between noncompliance among hemodialysis patients before and after the dietary counseling program.

A paired t -test showed a significant difference between noncompliance among hemodialysis patients before and after the intervention as $p \leq 0.001$ at 5% level of significance. Hence, the research hypothesis (H_2) is accepted at a 5% significance level (► **Table 5**).

Association of Noncompliance, Selected Demographic Variables

H_3 : Noncompliance will have a significant association with selected demographic variables.

The table depicts that Fisher's exact test was used to compute the association, and all the p -values of Fisher's exact for the demographic variables were > 0.05 except for the cause for kidney failure ($p = 0.003$) and duration of the disease ($p = 0.046$). It indicates a significant association between causes of disease and duration of illness at 5% significance level. Hence, the research hypothesis (H_3) is accepted for those two variables at 5% significance level (► **Table 6**).

To conclude, ► **Table 6** depicted that compliance behavior was significantly associated with selected demographic variables. Hence, the research hypothesis (H_3) is accepted for compliance behavior with demographic variables. The null hypothesis is accepted for the level of knowledge with demographic variables at a 5% level of significance.

Table 6 Association of noncompliance with selected demographic variables ($n = 28$)

Demographic characteristics		Compliance		Noncompliance				Fisher's exact test	p-Value
				Low risk		High risk			
		f	%	f	%	f	%		
Age (y)	< 40	1	3.57	4	14.29	3	10.71	3.68	0.40
	41–50	–	–	7	25.00	2	7.14		
	51–60		–	9	32.14	2	7.14		
Gender	Male		–	14	50	4	14.29	2.19	0.47
	Female	1	3.57	6	21.43	3	10.71		
Occupation	Government Employee		–	2	7.14	2	7.14	6.46	0.7
	Private employee	1	3.57	3	10.71	1	3.57		
	Daily wager		–	6	21.43	1	3.57		
	Unemployed		–	4	14.29	2	7.14		
Food	Vegetarian		–	5	17.86	2	7.14	0.65	1
	Nonvegetarian	1	3.57	15	53.57	5	17.86		
Duration of disease	> 1	1	3.57	7	25.00	1	3.57	10.55	0.046*
	1–5 y		–	7	25.00	4	14.29		
	6–10 y		–	6	21.43	0	–		
	> 10 y		–	0	–	2	7.14		
Comorbidity illness	Diabetes mellitus		–	2	7.14	2	7.14	18.66	0.003*
	Hypertension		–	8	28.57	0	–		
	Glomerulonephritis		–	4	14.29	1	3.57		
	Polycystic kidney	1	–	1	3.57	4	7.14		
	DM and HTN		–	5	17.86	0	–		

Abbreviations: DM, diabetes mellitus; HTN, hypertension.

Discussion

The patient's adherence to the treatment regimen directly impacts the clinical outcomes. A patient's noncompliance with fluid and diet can increase IDWG, cardiovascular morbidity, and death. Consumption of excessive sodium in the diet increases thirst and volume intake, leading to an increase in total body water and, consequently, an increase in IDWG.¹ We need to emphasize the importance of dialysis therapy since it requires patients to adhere to the treatment regimen criteria and change their lifestyle, optimize their diet, and so on. It is, therefore, essential to improve compliance by utilizing nursing interventions that are usually readily available and affordable.² Research studies have shown that a person's level of education affects how well they adhere to treatment regimens for chronic diseases such as kidney disease. Due to a poor correlation between knowledge of disease and treatment, low education has been linked to lower adherence.³ In the current study, most participants (42.86%) had a high school education.

The current study revealed that around 96.3% had non-compliance behavior, and only a trivial percentage, 3.7%, fulfilled the compliance criteria. Based on biochemical parameters, 74.07% were classified under low-level noncompliance behavior and 25.92% under high-level noncompliance behavior. In addition, most participants were in good compliance (81.5%) with the drugs and treatment (85.2%). On the other hand, all the participants (100%) showed noncompliance to fluid intake and 96.6% noncompliance to diet. The previous studies reported compliance rate ranging from 96.6 to 26%, 98.8 to 17.6%, 98.7 to 19%, and 100 to 67.7%, respectively, in terms of fluid and dietary restrictions, medicines, and dialysis regular sessions.^{4,5} On the other hand, the study by Beerappa and Chandrababu, reveals the adherence rate was 46.6% (good adherence) and 51.6% (fair adherence) for fluid restrictions, and 60 to 68.3% (good adherence) and 20 to 30% (fair adherence) for dietary restrictions.¹

Patients with end-stage renal disease benefit from nursing interventions that include educational, cognitive, behavioral, and dietary techniques.² The present study showed that there is a significant difference in nutritional status among the participants before and after the dietary counseling program as $t(26) = -6.30$, $p \leq 0.001$ at 5% level of significance. There was a notable improvement in the average caloric intake score (mean difference 313.04) following

the nurse-led counseling. The current study showed that p -values of multivariate analysis of variance for selected demographic variables like gender, religion, and level of education with physical and biochemical parameters of nutritional status were < 0.05 . It indicated a significant association between selected demographic variables and nutritional status, namely, gender, religion, and level of education. Hossain and Sitara showed a significant relationship between fluid restriction behavior with age ($p = 0.018$) and nutritional education ($p = 0.01$). Another considerable relationship exists between diet restriction behavior and nutritional education ($p = 0.006$).⁶ In addition to the dialysis regimen, dietary restrictions, and the need for multiple medications with potential side effects, hemodialysis patients must also manage multiple comorbid conditions. To educate dialysis patients on adhering to a prescribed regimen, it is necessary to setup patient education centers in hospitals equipped with appropriate materials, media, and audiovisual aids.

Authors' Contributions

Study design, Data analysis and Manuscript was done by S.T.F. and F.D. whereas Data collection was done by S.T.F.

Conflict of Interest

None declared.

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