

# Effects of Dietary Counseling Strategies to Improve Nutritional Status of Hemodialysis Patients: A Quasi-Experimental Study

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## ABSTRACT

**Objective:** Malnutrition is a major concern for CKD patients. Patients on dialysis with severe malnutrition have a higher risk of mortality. The objective of this study was to explore the impact of two different nutritional strategies for improving nutritional status and dietary knowledge of hemodialysis patients.

**Methodology:** This quasi-experimental study was conducted at Shifa International Hospital Islamabad from Jan 2022 to July 2022. A total of 54 participants were enrolled and divided into two groups and received counseling for 2 months fortnightly. Measurement was taken on three occasions, namely, at baseline, after 2 months, and after 4 months.

**Results:** Moreover, this study has established there was an improvement in nutritional knowledge post-intervention, with 67% of Group A and 66% of Group B showing a good understanding of dietary restrictions. There was a rise in albumin and reduction in the levels of potassium in the two groups after counseling.

**Conclusion:** Dietary counseling therefore enhanced nutritional knowledge and improved nutritional status in hemodialysis patients. These findings underscore the importance of nutrition education in the management of CKD and have implications for the development of tailored nutrition counseling programs.

**Keywords:** Hemodialysis, Nutritional Knowledge, Restrictions

### Authors' Contribution:

<sup>1,2</sup>Conception; Literature research; manuscript design and drafting; <sup>2,3</sup>Critical analysis and manuscript review; <sup>5,6</sup>Data analysis; Manuscript Editing.

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## Introduction

Chronic Kidney Disease is a significant public health concern, affecting approximately 13.4% of the global population.<sup>1</sup> Initially, glomerulonephritis was considered the primary cause of CKD<sup>2</sup> but recent studies have established a clear link between metabolic disorders, such as diabetes mellitus and hypertension, and the progression of kidney diseases or nephropathy.<sup>3</sup> Malnutrition is a major

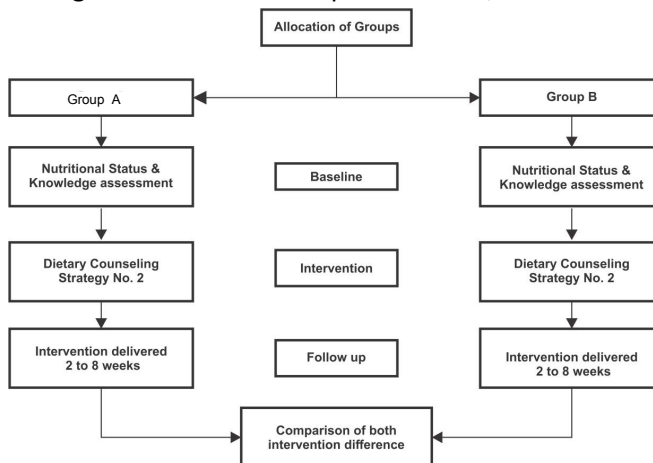
concern for CKD patients, with a prevalence rate of 20% to 50% before hemodialysis and 23% to 73% after hemodialysis.<sup>4</sup> Patients on dialysis with severe malnutrition have a higher risk of mortality.<sup>5</sup> In Asia, the prevalence of CKD varies from 10 to 18%<sup>1</sup> with a significant burden on healthcare systems and patients' quality of life, particularly in underdeveloped or developing countries.<sup>6</sup> Regular assessment of nutritional status and personalized

nutrition counseling (PNC) are essential for CKD patients.<sup>7</sup> Providing education and counseling on nutrition in renal diseases can help maintain renal function and overall well-being.<sup>8</sup> Various strategies, including individual and group counselling, family support groups, and nutritional tips, can be effective in promoting healthy eating plans and providing food choices for patients.<sup>9</sup> This study aims to investigate the effects of different nutrition strategies on the nutritional status and knowledge of hemodialysis patients. The purpose of this study is to evaluate the nutritional profile of hemodialysis patients and to assess the impact of dietary restrictions on nutritional status.

## Methodology

This quasi-experimental study aims to evaluate the efficacy of two different nutritional counseling interventions among hemodialysis patients. Study was conducted at the Dialysis unit of Shifa International Hospital, Islamabad from Jan 2022 to July 2022. A total of 54 participants were enrolled, 27 in each arm, based on sample size calculations using a significance level of 5% and statistical power of 90%, as derived from the World Health Organization sample size calculator. For this sample size, the study was powered to detect clinically meaningful differences between the two intervention groups. Participants were selected by applying the responsive sampling technique, which includes participants who meet the inclusion criteria and are willing to participate. The participants were all adults aged between 18 and 65 years with serum albumin below 4.0 g/dl, who gave their consent to being part of this study. Such subjects are those with life-threatening diseases like cancer and liver cirrhosis, clients on peritoneal dialysis, pediatric clients, and those who refused consent. Inclusion and exclusion criteria were specified to ensure homogeneity in the study population and subsequently, increase generalizability to the target population. Data

collection was at three time points: baseline, post-counseling after 2 months, and post-intervention after 4 months. The following data were collected: demographic details, anthropometric measurements such as height and weight using anthropometric scales, Body Mass Index (BMI) (calculated based on South Asian criteria); laboratory tests for biochemical profile including sodium, potassium, albumin, hemoglobin, phosphorus, and calcium levels; dietary intake was assessed using a food frequency questionnaire (FFQ); and nutritional knowledge and dietary history were assessed using a self-designed questionnaire. Dietary intake was determined by using FFQ, which was validated to be used in the Pakistani population. Nutritional knowledge and dietary history of the patients were assessed by using a self-structured questionnaire, which was



**Figure 1: Study flow chart.**

also pilot tested before use in the present study. The biochemical tests were carried out in the laboratory by following standard protocols. Participants were divided into two groups: Group A received Strategy 1-informative data on sodium, potassium, albumin, and phosphorus, and portion sizes-while Group B participants were allowed and not allowed food strategy. The participants of both A and B groups received fortnightly counseling for 2 months. The counseling sessions were conducted by a trained dietitian, tailored to meet the

individual needs of the participant. Data analysis was done using SPSS, version 22. Other statistical analyses used were the paired sample t-test for continuous variables, description statistics-standard deviation was used for categorical variables, and ANOVA to test for difference among groups. The given data were analyzed to check the effect of using two different nutritional counseling strategies in improving nutrition status and knowledge of the participants. The ethical approval was obtained from the competent authority of the hospital. Participants were provided with information about the study, and an informed consent form was signed, ensuring confidentiality and free choice in participation.

**Ethical approval** for the study was obtained from the institutional review board of Allama Iqbal Open University, Department of Environment, Design, Health, and Nutritional Sciences Islamabad (AIOU-01-2022-IRB-A-049) on 14-01-2022 and got permission letter from Shifa International Hospital (IRB#272-1092-2020).

## Results

**Demographics:** The sample included 54 participants, with both groups having 27 respondents. The mean age for the respondents of Group A was 51.5±11.1 years and for Group B was 52.4±12.2 years. Most respondents, about 37%, had ages within the group range of 48-57 years. Majority participants' demographics in both groups consisted of males, with group A consisting of 74% and group B 59%. The major portion of the subjects was from the private sector with 42% in group A and 39% in group B. The shopkeepers or businessmen only formed 11% and 8% of subjects

in groups A and B, respectively. In addition, housewives comprised 29% in group A and 19% in group B. Regarding education, in group A, 70% of participants and in group B, 52% had above Matric education, and 30% and 48%, respectively, had only up to Matric education. Income-wise, 56% of participants in group A and 44% in group B had a monthly income of 50-70,000 PKR. Only 15% of the participants in group A and 19% of participants in group B received less than 50,000 PKR per month, while majority received more than 70,000 PKR per month.

**Intervention effect on anthropometric measurements:** Mean weight and BMI for participants in both cohorts did not show any significant difference after the intervention.

**Intervention Effects on Biochemical Characteristics:** The investigation was done on the biochemical aspects of patients undergoing hemodialysis, divided into two groups: A and B, before and after dietary counseling. Following dietary counseling, albumin levels showed a significant increase in both the groups. The dietary counseling also significantly reduced the potassium in all subjects in both groups. Though the values of phosphorus levels were stable in the Group A, it increased significantly in Group B (*Table: III*).

**Effects of Nutritional counselling among Hemodialysis patients:** It investigates the effects of dietary counseling on nutritional knowledge among hemodialysis patients, divided into two groups: A and B. There was a significant improvement in nutrition knowledge after the intervention, indicating that both the counseling strategies have the same effects and both lead to an increase in knowledge regardless of the strategy used (*Table.II*)

Table I: Anthropometric measurements of the hemodialysis patients				
Variables	Groups	Pre Intervention	Post Intervention	P value
		Mean± S. D		
Weight (Kg)	A	71.98±13.4	68.30±12.19	0.98
	B	72.64±12.3	70.74±13.94	0.35
Body mass index	A	25.84±5.30	25.08±5.18	0.72
	B	26.02±4.18	25.56±4.55	0.31

**Table II: Effect of dietary counselling on the hemodialysis patients**

Variables	Groups A		Groups B	
	Pre Intervention	Post Intervention	Pre Intervention	Post Intervention
<b>Dietary Restrictions</b>				
Yes	10 (37%)	18 (67%)	11 (41%)	16 (59%)
No	11 (41%)	0 (0%)	9 (33%)	0 (0%)
Somehow	6 (22%)	9 (33%)	7 (26%)	11 (41%)
<b>P values</b>	0.01		0.04	
<b>Egg White Intake</b>				
1 or <1	12 (44%)	2 (7%)	13 (48%)	1 (4%)
More than 2	7 (26%)	18 (67%)	8 (30%)	19 (70%)
2 eggs Whites	8 (30%)	7 (26%)	6 (22%)	7 (26%)
<b>P values</b>	0.04		0.03	
<b>Good Foods (High Protein)</b>				
Pulses	5 (19%)	0 (0%)	8 (30%)	4 (33%)
Meat and eggs	10 (37%)	15 (56%)	9 (33%)	16 (59%)
Milk	12 (44%)	12 (44%)	10 (37%)	7 (26%)
<b>P values</b>	0.30		0.86	
<b>Dairy Products</b>				
Not allowed	15 (56%)	5 (19%)	10 (37%)	3 (11%)
½ to 1 ½ cup	5 (19%)	19 (70%)	7 (26%)	18 (67%)
2 cups or more	7 (26%)	3 (11%)	10 (37%)	6 (22%)
<b>P values</b>	0.01		0.01	
<b>Fruit Juice</b>				
Yes	11 (41%)	5 (19%)	11(41%)	5(19%)
No	4 (15%)	18(67%)	4 (15%)	17 (63%)
Don't know	12 (44%)	4 (15%)	12 (44%)	5 (19%)
<b>P values</b>	0.75		0.87	
<b>Nuts</b>				
Yes	15 (56%)	1 (3%)	14 (51%)	3 (4%)
No	5 (19%)	20 (74%)	7 (26%)	19 (70%)
Don't know	7 (26%)	6 (22%)	6 (22%)	5 (19%)
<b>P values</b>	0.02		0.02	
<b>Processed Food</b>				
Yes	12 (44%)	1 (3%)	13(48%)	2 (7%)
No	4 (15%)	21 (78%)	3 (11%)	20 (74%)
Don't know	11 (41%)	5 (19%)	11 (41%)	5 (19%)
<b>P values</b>	0.27		0.20	
<b>Type of Chapatti</b>				
Whole bread	11 (41%)	5 (19%)	13 (48%)	6 (22%)
White bread	4 (15%)	18 (67%)	4 (15%)	17 (63%)
Don't know	12 (44%)	4 (15%)	10 (37%)	4 (15%)
<b>P values</b>	0.69		0.69	

**Table III: Biochemical Characteristics of the Hemodialysis Patients**

Variables	Groups	Pre Intervention	Post Intervention	P value
		<b>Mean ± S. D</b>		
<b>Albumin (g/dl)</b>	A	3.6± .66	3.9±.27	0.02
	B	3.1± .56	3.9±.3 6	0.00
<b>Potassium (mEq/L)</b>	A	5.6±0.24	4.90±0.24	0.00
	B	5.3±0.21	4.8±0.22	0.00
<b>Phosphorus (mg/dl)</b>	A	5.01±0.60	4.8±0.60	0.57
	B	4.8±0.61	4.9±0.61	0.02
<b>Calcium (mg/dl)</b>	A	8.7±1.19	8.9±.56	0.36
	B	8.41±.61	8.88±.56	0.32
<b>Hemoglobin (g/dl)</b>	A	9.1±2.2	9.4±2.2	0.09
	B	9.2±2.2	9.5±1.5	0.19
<b>Sodium (mEq/L)</b>	A	132.70±2.5	133.8±2.5	0.20
	B	132.63±2.6	132.7±2.61	0.36

## Discussion

In this study, after six months of dietary counselling, there was no significant changes in weight and Body Mass Index (BMI) of hemodialysis patients. These findings were consistent with a similar study, suggesting that dietary counselling may not have a significant impact on anthropometric measurements in this patient group.<sup>10</sup> A study in South India found that dietary counselling had no significant effect on weight during dialysis treatment in patients. This aligns with previous findings, suggesting that dietary counselling may not have a significant impact on weight in hemodialysis patients.<sup>11</sup> This study found significant improvements ( $p < 0.05$ ) in albumin (3.6g/dl to 3.9g/dl) and potassium levels (5.6mEq/L to 4.9mEq/L) after a dietary intervention. In contrast, no significant changes were seen in sodium, calcium, phosphorus, and hemoglobin levels. These results align with a similar 10-month study, which found significant increases in protein

intake, albumin, and cholesterol levels among hemodialysis patients, particularly those who were malnourished. Regular counselling was found to improve nutritional outcomes, including delayed muscle loss, in these patients.<sup>12</sup> A significant increase ( $p < 0.05$ ) in albumin levels was observed, from 3.1g/dl to 3.9g/dl, after counselling. This finding is consistent with a similar study. The study involved 100 participants (74% males, 26% females) with diabetic nephropathy being the leading cause of ESRD. A significant improvement in serum albumin levels and nutritional knowledge was seen after counselling. These results align with a 10-month study that found personalized nutritional counselling increased serum albumin, cholesterol, and dietary protein intake in hemodialysis patients.<sup>13</sup> Before counselling, patients in Group A and B had varying opinions on egg white consumption, with some thinking they should eat 1 egg white daily (44% and 48%, respectively) or 2 egg whites daily (30% and 22%, respectively).

However, after counselling, a significant shift was observed, with 67% of Group A and 70% of Group B patients agreeing that they can consume more than 2 egg whites per day. A similar study conducted in Kerman dialysis centers found that substituting egg white packs for meat products in hemodialysis patients with low serum phosphorus levels led to improvements in serum albumin, phosphate, calcium, PTH, and cholesterol levels. The intervention group consumed six egg whites, 96 calories, and 24g of protein per day, three days a week, for eight weeks.<sup>14</sup> This study found a significant increase in knowledge about dairy products allowed during dialysis, but no change in knowledge about fruit juices. The Kidney Disease Outcome Quality Initiative (KDOQI) 2020 recommendations emphasize modifying phosphorus intake and considering phosphorus sources to achieve normal serum phosphorus levels. Two strategies to reduce phosphorus consumption were investigated: recommending foods with favorable phosphorus-to-protein ratios and decreasing phosphorus additives. Both approaches were found to be effective in managing phosphorus intake in dialysis patients.<sup>15</sup> Extended oxidative stress (OS) is associated with chronic infection and all-purpose mortality in Hemodialysis (HD) patients. Studies have shown that meal-based antioxidant consumption is more beneficial in treating chronic kidney disease than total supplementation. For example, citric fruit consumption has been found to have a better response against OS compared to Ascorbic Acid (AA) supplementation.<sup>16</sup> Polyphenols, found in foods such as apples, act as antioxidant agents and can help prevent cardiovascular disease, a major cause of death among HD patients. The study found a significant effect on knowledge about nuts in both groups, but not in knowledge about processed food or type of chapatti. These results are consistent with a study which found that patients with better knowledge about phosphorus had lower compliance with dietary restrictions.<sup>17</sup> Patients with

end-stage renal disease must limit dietary sodium, potassium, and phosphorus consumption, and food processing has a significant impact on these nutrients. Recommending minimally processed foods and encouraging unprocessed foods may be an effective way to reduce sodium, potassium, and phosphorus consumption.<sup>18</sup> Nutrition plays a key role in the care of people with compromised kidney function, and medical nutrition therapy (MNT) can help promote a medical or health goal.<sup>19</sup> A healthcare provider may refer a patient to a registered dietitian with expertise in kidney disease to help with the patient's food plan. Our study findings are consistent with previous studies, emphasizing the importance of nutrition in the health and well-being of individuals with CKD.

## Conclusion

There were significant improvements in patients' knowledge of dietary restrictions related to egg whites, nuts, and dairy products, as well as increased albumin and potassium levels. However, there were no significant changes in weight, BMI, sodium levels, hemoglobin, or calcium levels. The study emphasizes the importance of dietary counseling for patients receiving hemodialysis in improving nutritional outcomes, with its significant effects being pronounced on albumin and potassium levels.

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