International Journal of Medical and Health Research
ISSN: 2454-9142
www.medicalsciencejournal.com
Volume 4; Issue 5; May 2018; Page No. 91-97

Relationship with dietary adherence and renal dietary regimen among hemodialysis populace

Bhavana Shailendranath[1*], Prashant G Kedlaya[2], Renuka Satish[3]

[1] Renal Nutritionist, Department of Nephrology, St. John's Medical College Hospital, Sarjapur Road, Bengaluru, Karnataka, India
[2] Professor, Department of Nephrology, St. John's Medical College Hospital, Sarjapur Road, Bengaluru, Karnataka, India
[3] Professor and Head, Department of Nephrology, St. John's Medical College Hospital, Sarjapur Road, Bengaluru, Karnataka, India

Abstract
'Adherence level' to a set regimen predicts the degree of 'beliefs' by an individual. Belief influences their achievement and maintenance of behavioral change in adhering to a prescribed treatment regimen. A collaborative framework between patient and health care provider establishes a realistic treatment approach. A retrospective study of one year was carried out to evaluate the level of adherence with renal dietary and fluid regimen among hemodialysis patients. There was adequate level of adherence for major and minor nutritients intake, but there was non-adherence for sodium and fluid intake among the study samples. It was found that compliance level can be further enhanced with periodical and effective educational programs.

Keywords: dietary, fluid, adherence, intake, regimen

1. Introduction
Chronic Kidney Disease (CKD) is a condition characterized by a gradual loss of kidney function over time [1]. Upon the cessation of renal function excess fluid, metabolic toxins and electrolytes accumulate in blood and body tissues which needs to be removed by alternative methods [2]. Current renal replacement therapies include several forms of dialysis but the most common form is hemodialysis (HD) performed two-three times per week for four-five hours or peritoneal dialysis (PD) performed four times a day [3]. Based on the modality of dialysis dietary prescription is framed. Patients with End Stage Renal Disease (ESRD) undergo a number of lifestyle, dietary and fluid restrictions to accommodate their illness [4]. Nonadherence to the prescribed regimen is a pervasive problem among the ESRD population [5]. The dietary regimen for HD patients includes the controlled intake of fluid, protein, sodium, potassium and phosphorus. The amounts of these nutrients in the diet are based on biochemical parameters and clinical manifestations [6]. One of the most challenging component of dialysis treatment is adherence to a complicated and restrictive dietary and fluid regimen [7]. Malnutrition in the form of protein energy wasting (PEW) is highly prevalent among hemodialysis patients and it is associated with adverse clinical outcomes, hospitalization, higher rate of morbidity and mortality which has an overall impact on quality of life [8]. This study was conducted to clarify the level of adherence with diet and fluid restrictions among HD patients.

2. Materials and Methods
2.1 Sample selection
A study was designed for one year on 100 patients who were regularly undergoing hemodialysis on twice/thrice weekly dialysis regimen at St. John's Medical College Hospital. The samples were retrospectively followed up on a three monthly interval. 90 patients completed the research while 10 patients were dropped out of the study due to logistic reasons. Subjects of either gender with ≥18 year and ≤65 year of age with ≥3 months of HD and voluntarily willing to participate by signing informed consent form were included in the study. Institutional Ethical Committee approval was obtained to conduct the study.

2.2 Dietary assessment
A 24-hour dietary recall on three consecutive days was taken to assess the nutrient composition of the dietary intake by food diary method during every study visit at three monthly intervals. The dietary information was collected on the day of study visit inclusive of daily fluid intake. Three days included were;
Day 1: One day prior to HD session
Day 2: On the day of HD session
Day 3: One day post HD session
Nutrient information was calculated as per Asian Indian Food Articles according to the guidelines of Dietary Guidelines for Indians, National Institute of Nutrition, Hyderabad, India, 2011. Dialysis phase effect describes the food intake information around the HD sessions, which varied with study samples. On the previous day of HD, patients tend to either restrict or relax their dietary restrictions based on twice/thrice weekly dialysis regimen. On the day of dialysis, patients' tend to overeat or have limited intake based on accessibility of food choices. Next day of dialysis, patients' would be more comfortable to have preferred food choices. Generally twice weekly dialysis regimen patients tend to adhere to dietary and fluid restrictions to limit their dialysis expenses while thrice weekly patients' frequent visit for dialysis tend to liberalize their restrictions. Interaction effect is the combined effect of overall dietary intake over the timelines on days of dialysis (previous day, on that day and next day) as they have varied kinds of food consumption based on their clinical condition.
Food Frequency Questionnaire (FFQ) was employed to obtain the frequency and choices of foods consumed. Foods were

categorized in all food groups on the basis of never, monthly, fortnightly, 3-4 times a week, twice a week, once a week and daily intake performed on a six monthly interval during the study period. FFQ was framed on the pretext of list of foods to avoid and allowed in each food group to have an insight of the consumption &/or non-consumption.

2.3 Anthropometric measurements

The anthropometric status was interpreted using the indices of Body Mass Index (BMI, kg/m^2) and Arm Muscle Area (AMA, cm^2) using primary anthropometric measurements - Weight (Wt, kg), Height (Ht, cm), Mid Arm Circumference (MAC, cm) and triceps skin fold thickness (mm). Anthropometry was assessed after one hour of post dialysis session at every study visit of three months duration. MAC and triceps skin fold thickness were assessed one hour post HD on the other limb without AV fistula. BMI was classified as per adult Asia-Pacific standards [9].

2.4 Methods

The overall calorie, protein, macro and micronutrients, electrolyte and fluid intake was calculated at baseline and at 3rd, 6th, 9th, 12th month.

2.5 Statistical analysis

Descriptive and inferential statistics was employed to analyze the data. Repeated measures ANOVA was carried out to assess the time effect and interaction effect of outcome which was used to analyze anthropometry and nutrient intake and Cochran's Q test was used to analyze FFQ. A p value of ≤0.05 was considered for statistical significance. SPSS version 18.0 was used to analyze the data.

3. Results

Table 1: Demographic profile (N=90)

Characteristics	Category	Respondents	
		Number	Per cent
Age Group (years)	≥18 – 30 yrs.	11	12
	31 – 45 yrs.	17	19
	46 – 55 yrs.	22	24
	56 – 65 yrs.	40	45
Age (Mean±SD): 49.67±13.17years			
Gender	Male	61	68
	Female	29	32
Frequency of dialysis	Twice a week	59	66
	Thrice a week	31	34

The data in table 1 provides the demographic profile of the respondents. Nearly two-thirds (45%) of the study population were in the age group of 56 to 65 years and 68% of the study samples belonged to male gender. The mean age of the samples was found to be nearly 50 years. Majority of patients (66%) were on twice weekly dialysis regimen.

Table 2: Anthropometry (N = 90)

Category	Respondents					p value
	0 Month Mean (SD)	3 Month Mean (SD)	6 Month Mean (SD)	9 Month Mean (SD)	12 Month Mean (SD)	
Mid Arm Circumference (MAC, cm)	25.25 (3.95)	25.28 (4.01)	25.26 (3.96)	25.26 (4.01)	25.28 (3.99)	0.320, NS
Triceps skinfold thickness (mm)	10.32 (4.51)	10.29 (4.49)	10.27 (4.46)	10.25 (4.44)	10.26 (4.45)	0.306, NS
Body Mass Index (BMI, kg/m^2)	21.25 (3.97)	21.29 (3.96)	21.30 (3.96)	21.32 (3.96)	21.34 (3.93)	0.557, NS
Arm Muscle Area (AMA, cm^2)	30.56 (11.66)	30.69 (11.91)	31.81 (14.89)	30.73 (11.99)	30.80 (11.98)	0.332, NS

NS - Non Significant

The anthropometric indices mentioned in table 2 depicted that there was no significant change in the mean measurements of MAC, triceps skinfold thickness, BMI, AMA over the study period. The mean value of each anthropometric parameter was nearly similar at each time point indicative of non-detriment in body composition. BMI of the study group were in the ideal range all through the study duration.

Table 3: Energy and Protein Intake (N = 90)

Characteristics	Category (Dialysis Phase)	Respondents					p value		
		0 Month Mean (SD)	3 Month Mean (SD)	6 Month Mean (SD)	9 Month Mean (SD)	12 Month Mean (SD)	Time Effect	Dialysis Phase Effect	Inter-action Effect
Energy (kcal/kg body weight/day)	Day 1	30.86 (11.08)	31.04 (10.53)	33.16 (09.50)	34.13 (09.43)	34.71 (10.04)	<0.001, S	<0.001, S	0.168, NS
	Day 2	30.98 (09.49)	31.12 (08.76)	33.37 (09.33)	33.34 (08.66)	32.91 (09.27)			
	Day 3	32.60 (10.44)	33.29 (09.65)	35.65 (09.13)	35.06 (08.92)	35.30 (08.72)			
Protein (gm/kg body weight/day)	Day 1	0.98 (0.39)	0.98 (0.33)	1.03 (0.31)	1.07 (0.30)	1.07 (0.30)	<0.001, S	<0.001, S	<0.001, S
	Day 2	0.95 (0.30)	0.95 (0.26)	1.03 (0.28)	1.05 (0.32)	1.03 (0.30)			
	Day 3	1.07 (0.38)	1.10 (0.34)	1.19 (0.34)	1.15 (0.29)	1.07 (0.28)			

NS: Non-significant and S: Significant

The three day dietary record calculation found that the consumption of high calorie and protein rich food stuff. Calorie and protein intake was calculated adjusted to body weight and fount to be statistically significant over the time as well as the phase of dialysis. However there was no statistical significance for interaction between time period and dialysis phase for energy intake [Fig. 1(a)] but there was significance for protein intake [Fig. 1(b)]. The results showed an increase

in energy and protein intake over the time as well as the phase of dialysis which was nearing to the guideline recommendation (30-35kcal/kg/d and 1.0-1.2g/kg/d respectively) [10].

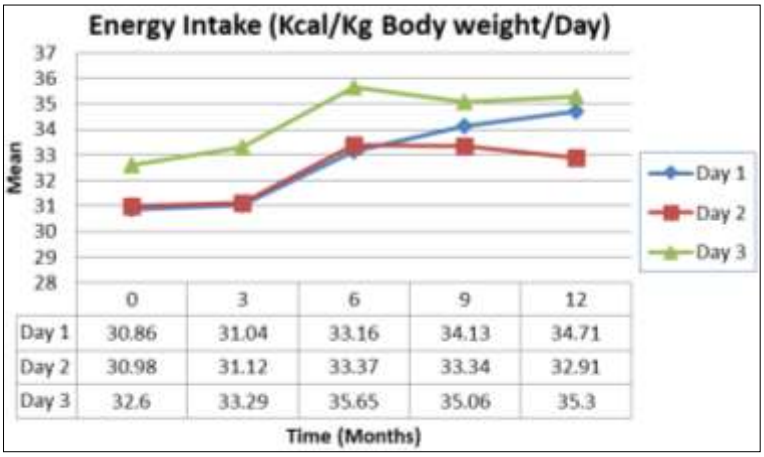

Fig 1(a): *Energy Intake*

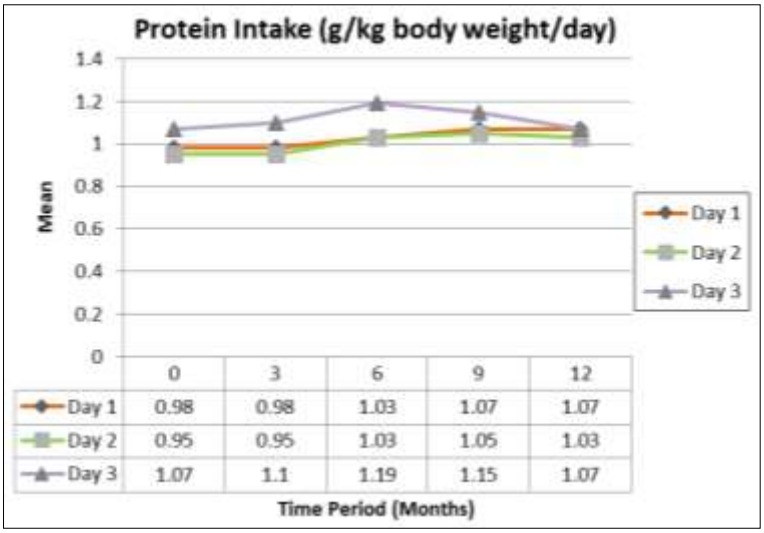

Fig 1(b): Protein Intake

Table 4(a): Macro and Micro Nutrient Intake (N = 90)

Characteristics	Category (Dialysis Phase)	Respondents					p value		
		0 Month Mean (SD)	3 Month Mean (SD)	6 Month Mean (SD)	9 Month Mean (SD)	12 Month Mean (SD)	Time Effect	Dialysis Phase Effect	Inter-action Effect
Carbohydrate (gm/day)	Day 1	268.46 (90.18)	270.79 (84.18)	289.68 (82.05)	295.05 (86.02)	297.37 (80.79)	0.392, NS	0.006, S	0.226, NS
	Day 2	271.96 (84.67)	277.07 (77.54)	288.58 (70.67)	286.67 (68.55)	290.18 (64.38)			
	Day 3	276.61 (92.26)	279.26 (80.31)	294.31 (72.53)	295.06 (69.45)	308.72 (69.73)			
Fat (gm/day)	Day 1	41.43 (17.92)	43.39 (18.26)	46.78 (18.41)	49.17 (17.11)	49.91 (17.27)	<0.001, S	<0.001, S	0.218, NS
	Day 2	43.18 (18.34)	43.91 (15.81)	47.83 (15.29)	49.75 (14.72)	47.89 (12.88)			
	Day 3	47.85 (20.78)	51.78 (17.04)	56.97 (19.21)	55.23 (16.72)	53.99 (17.16)			
Calcium (mg/day)	Day 1	619.74 (315.81)	651.60 (331.07)	713.43 (367.39)	748.44 (364.21)	736.90 (316.23)	0.041, S	<0.001, S	0.553, NS
	Day 2	648.04 (299.49)	660.00 (271.05)	726.97 (262.75)	755.94 (296.49)	742.57 (283.75)			
	Day 3	641.03 (300.25)	695.97 (240.86)	767.22 (297.16)	793.66 (319.37)	793.27 (365.67)			
Phosphorus (mg/day)	Day 1	1276.41 (472.70)	1237.19 (421.50)	1300.71 (477.40)	1344.12 (506.68)	1315.89 (455.86)	0.001, S	0.001, S	0.598, NS
	Day 2	1251.06 (429.14)	1209.69 (404.68)	1312.44 (418.49)	1317.03 (438.65)	1274.40 (351.59)			
	Day 3	1316.00 (445.79)	1303.12 (385.95)	1436.44 (433.26)	1421.58 (413.35)	1366.03 (483.43)			
Iron (mg/day)	Day 1	17.37 (10.13)	16.22 (6.79)	16.52 (7.23)	16.84 (7.47)	16.55 (6.25)	0.917, NS	0.319, NS	0.375, NS
	Day 2	16.89 (8.81)	16.45 (6.70)	16.49 (6.53)	16.65 (5.97)	16.82 (6.23)			
	Day 3	16.20 (6.70)	15.82 (6.12)	16.59 (6.11)	17.07 (5.95)	16.97 (6.11)			

NS: Non-significant and S: Significant

Table 4(b): Electrolyte and Fluid Intake (N = 90)

Characteristics	Category (Dialysis Phase)	Respondents					p value		
		0 Month Mean (SD)	3 Month Mean (SD)	6 Month Mean (SD)	9 Month Mean (SD)	12 Month Mean (SD)	Time Effect	Dialysis Phase Effect	Inter-action Effect
Sodium (mg/day)	Day 1	3098.93 (1427.07)	3108.58 (1379.71)	3238.81 (1436.81)	3453.96 (1372.26)	3325.34 (1299.95)	0.307, NS	0.001, S	0.057, NS
	Day 2	3293.75 (1248.30)	3257.00 (1211.42)	3449.35 (1456.39)	3628.42 (1361.18)	3279.00 (1186.47)			
	Day 3	3205.39 (1463.74)	3071.06 (1376.45)	3424.38 (1387.85)	3422.35 (1416.23)	3611.10 (1459.75)			
Potassium (mg/day)	Day 1	1420.59 (549.64)	1431.63 (487.27)	1528.72 (547.24)	1577.64 (556.21)	1604.67 (514.62)	0.070, NS	<0.001, S	0.390, NS
	Day 2	1551.94 (722.00)	1482.10 (502.38)	1597.24 (491.28)	1620.68 (560.74)	1603.67 (538.09)			
	Day 3	1537.04 (681.42)	1449.16 (569.92)	1645.88 (570.52)	1660.29 (552.91)	1669.85 (548.71)			
Total Fluid (ml/day)	Day 1	1373.33 (388.11)	1362.78 (345.88)	1383.89 (305.55)	1330.56 (286.56)	1331.11 (263.03)	0.067, NS	0.046, S	0.064, NS
	Day 2	1415.00 (388.85)	1392.78 (354.86)	1403.89 (273.06)	1360.00 (269.22)	1333.33 (239.61)			
	Day 3	1412.78 (380.46)	1368.33 (336.99)	1368.33 (293.12)	1341.11 (290.44)	1295.00 (242.88)			

NS: Non-significant and S: Significant

The findings from the study showed an improvement in food intake as projected by the means of carbohydrate, fat, calcium, phosphorus, sodium, potassium, iron and total fluid consumption over the study period and also with dialysis phase effect as shown in table 4(a) and (b). There was statistical significance with dialysis phase effect alone for carbohydrate, sodium, potassium content and total fluid intake but not over time effect. Time and dialysis phase effect showed significance for fat, calcium and phosphorus content of the diet pointing on improvement of these nutrients over the time during study duration on 3 dialysis phase (previous day of dialysis, on the day of dialysis, next day of dialysis). There was no statistical significance in interaction effect for time and dialysis phase for all the nutrients indicating no much difference in their dietary food intake during the study term. However there was a trend towards significance for sodium and total fluid intake in interaction effect though statistically insignificant. The nutrient intake in comparison with Kidney Disease Outcomes Quality Initiative Clinical Practice (KDOQI) and European Best Practice (EBP) guidelines on nutrition was found to be adequate except for sodium and fluid content [10, 11]. Better eating was enhanced with emphasis on meticulous and adequate dietary protocol tailored to suit each individual of the target group [Fig. 1(a) and (b)]. The assessment of nutrient intake reflected mainly on dietary intake and pattern of food consumption along with phases of dialysis regimen. The means of macro and micronutrients, electrolyte (only potassium content) showed adequate intake.

Table 5(a): Food Frequency Pattern (N=90)

Characteristics	Category	Respondents											
		Allowed						Avoid					
		0 Month		6 Month		12 Month		0 Month		6 Month		12 Month	
		N	%	N	%	N	%	N	%	N	%	N	%
Normal salt foods	Never	-	-	-	-	-	-	02	02.2	01	01.1	00	00
	Monthly							06	06.7	02	02.2	05	05.6
	Fortnightly							06	06.7	07	07.8	03	03.3
	3-4times a week							19	21.1	13	14.4	11	12.2
	Twice a week							15	16.7	10	11.1	09	10.0
	Once a week							00	0	01	01.1	02	02.2
	Daily							42	46.7	56	62.2	60	66.7
	p value	-						<0.001, S					
Cereals	Never	-	-	-	-	-	-	50	55.6	48	53.3	49	54.4
	Monthly							10	11.1	07	07.8	05	05.6
	Fortnightly							02	02.2	06	06.7	08	08.9
	3-4times a week							08	08.9	10	11.1	07	07.8
	Twice a week							09	10.0	06	06.7	09	10.0
	Once a week							01	1.1	07	07.8	07	07.8
	Daily							10	11.1	06	06.7	05	05.6
	p value	-						0.127, NS					
Dhals	Fortnightly	01	01.1	01	01.1	01	01.1	-	-	-	-	-	-
	3-4times a week	50	55.6	56	62.2	48	53.3						
	Twice a week	04	04.4	03	03.3	07	07.8						
	Once a week	0	0	02	02.2	02	02.2						
	Daily	35	38.9	28	31.1	32	35.6						
	p value	0.174, NS						-					
Grams	Never	-	-	-	-	-	-	-	-	-	-	-	-
	Monthly Fortnightly												
	3-4times a week												
	Twice a week												
	Once a week												
	p value	0.328, NS						-					

Milk and its products	Never	0	0	0	0	0	0	86	95.6	86	95.6	86	95.6
	Fortnightly	03	03.3	0	0	0	0	01	01.1	01	01.1	01	01.1
	3-4times a week	05	05.6	02	02.2	03	03.3	0	0	0	0	0	0
	Twice a week	11	12.2	07	07.8	03	03.3	01	01.1	01	01.1	01	01.1
	Once a week	07	07.8	08	08.9	06	06.7	02	02.2	02	02.2	02	02.2
	Daily	64	71.1	73	81.1	78	86.7	0	0	0	0	0	0
	p value	0.001,S						1.000, NS					
Meat and its products	Never	10	11.1	08	08.9	08	08.9	14	15.5	11	12.2	11	12.2
	Monthly Fortnightly	02	02.2	01	01.1	0	0	08	08.9	02	02.2	02	02.2
	3-4times a week	03	03.3	0	0	02	02.2	13	14.4	09	10.0	08	08.9
	Twice a week	11	12.2	14	15.6	17	18.9	02	02.2	01	01.1	02	02.2
	Once a week	24	26.7	32	35.6	28	31.1	16	17.8	28	31.1	26	28.9
	Daily	17	18.9	09	10.0	07	07.8	35	39.0	37	41.1	39	43.3
		23	25.6	26	28.9	28	31.1	02	02.2	02	02.2	02	02.2
	p value	0.841, NS						0.269, NS					

NS: Non-significant and S: Significant

Table 5(b): Food Frequency Pattern (N= 90)

Characteristics	Category	Respondents											
		Allowed						Avoid					
		0 Month		6 Month		12 Month		0 Month		6 Month		12 Month	
		N	%	N	%	N	%	N	%	N	%	N	%
Vegetables	3-4times a week	14	15.6	08	08.9	05	05.6	02	02.2	01	01.1	0	0
	Twice a week	21	23.3	28	31.1	30	33.3	01	01.1	02	02.2	02	02.2
	Once a week	25	27.8	24	26.7	21	23.3	10	11.1	06	06.7	08	08.9
	Daily	30	33.3	30	33.3	34	37.8	77	85.6	81	90.0	80	88.9
	p value	0.816, NS						0.187, NS					
Fruits	Never	0	0	0	0	0	0	01	01.1	0	0	0	0
	Monthly	0	0	0	0	0	0	09	10.0	04	04.4	01	01.1
	Fortnightly	01	01.1	0	0	0	0	15	16.7	19	21.1	18	20.0
	3-4times a week	08	08.9	07	07.8	07	07.8	02	02.2	01	01.1	0	0
	Twice a week	57	63.3	69	76.7	75	83.3	12	13.3	18	20.0	12	13.3
	Once a week	21	23.3	11	12.2	06	06.7	46	51.1	45	50.0	56	62.2
	Daily	03	03.3	03	03.3	02	02.2	05	05.6	03	03.3	03	03.3
	p value	0.030, S						0.029, S					
Fats and Oils	Daily	90	100.0	90	100.0	90	100.0	-	-	-	-	-	-
	p value	-						-					
Sugar and its products	Never	02	02.2	03	03.3	04	04.4	26	28.9	19	21.1	19	21.1
	Monthly	12	13.3	06	06.7	07	07.8	34	37.8	25	27.8	30	33.3
	Fortnightly	04	04.4	10	11.1	06	06.7	18	20.0	29	32.2	24	26.7
	3-4times a week	01	01.1	01	01.1	01	01.1	0	0	0	0	0	0
	Twice a week	03	03.3	01	01.1	02	02.2	05	05.6	03	03.3	04	04.4
	Once a week	06	06.7	07	07.8	09	10.0	07	07.8	14	15.6	13	14.4
	Daily	62	68.9	62	68.9	61	67.8	0	0	0	0	0	0
	p value	0.217, NS						<0.001, S					
Beverages	Never	02	02.2	02	02.2	01	01.1	15	16.7	10	11.1	11	12.2
	Monthly	0	0	0	0	0	0	06	06.7	05	05.6	03	03.3
	Fortnightly	0	0	0	0	0	0	04	04.4	09	10.0	05	05.6
	3-4times a week	06	06.7	06	06.7	06	06.7	02	02.2	0	0	0	0
	Twice a week	02	02.2	01	01.1	0	0	32	35.6	27	30.0	29	32.2
	Once a week	0	0	0	0	01	01.1	15	16.7	24	26.7	28	31.1
	Daily	80	88.9	81	90.0	82	91.1	16	17.8	15	16.7	14	15.6
	p value	0.727, NS						<0.001, S					
Fried products	Never	-	-	-	-	-	-	01	01.1	0	0	01	01.1
	Monthly Fortnightly							09	10.0	03	03.3	03	03.3
	3-4times a week							08	08.9	11	12.2	08	08.9
	Twice a week							01	01.1	0	0	0	0
	Once a week							09	10.0	09	10.0	08	08.9
	Daily							60	66.7	66	73.3	69	76.7
								02	02.2	01	01.1	01	01.1
	p value	-						0.026, S					
Bakery products	Never	-	-	-	-	-	-	12	13.3	07	07.8	09	10.0
	Monthly Fortnightly							17	18.9	14	15.6	07	07.8
	3-4times a week							07	07.8	14	15.6	18	20.0
	Twice a week							02	02.2	04	04.4	02	02.2

	Once a week Daily								14 35 03	15.6 38.9 03.3	13 36 02	14.4 40.0 02.2	18 34 02	20.0 37.8 02.2
	p value		-						0.071, S					

NS: Non-significant and S: Significant

Table 5(c): Food Frequency Pattern (N=90)

Characteristics	Category	Respondents											
		Allowed						Avoid					
		0 Month		6 Month		12 Month		0 Month		6 Month		12 Month	
		N	%	N	%	N	%	N	%	N	%	N	%
Nuts and Oil seeds	Never Monthly Fortnightly 3-4times a week Twice a week Once a week Daily	-	-	-	-	-	-	03 04 07 05 26 20 25	03.3 04.4 07.8 05.6 28.9 22.2 27.8	02 02 09 02 37 20 18	02.2 02.2 10.0 02.2 41.1 22.2 20.0	02 02 06 03 31 28 18	02.2 02.2 06.7 03.3 34.4 31.1 20.0
	p value	-						0.359, NS					
Miscellaneous foods (Processsed)	Never Monthly Fortnightly 3-4times a week Twice a week Once a week Daily	-	-	-	-	-	-	02 01 03 04 29 26 25	02.2 01.1 03.3 04.4 32.2 28.9 27.8	01 0 01 02 19 44 23	01.1 0 01.1 02.2 21.1 48.9 25.6	01 0 01 02 20 45 21	01.1 0 01.1 02.2 22.2 50.0 23.3
	p value	-						0.017, S					
Other Ready to eat foods (Outside	Never Monthly Fortnightly 3-4times a week Twice a week Once a week Daily	-	-	-	-	-	-	08 05 05 05 41 22 04	08.9 05.6 05.6 05.6 45.6 24.4 04.4	06 04 03 05 31 37 04	06.7 04.4 03.3 05.6 34.4 41.1 04.4	06 03 02 07 30 38 04	06.7 03.3 02.2 07.8 33.3 42.2 04.4
	p value	-						<0.001, S					
Nutrient Supplements	Never Monthly Fortnightly 3-4times a week Twice a week Once a week Daily	75 0 0 01 0 0 14	83.3 0 0 01.1 0 0 15.6	76 0 0 02 0 0 12	84.4 0 0 02.2 0 0 13.3	77 01 01 02 0 0 09	85.6 01.1 01.1 02.2 0 0 10.0	-	-	-	-	-	-
	p value	0.039, S						-					

NS: Non-Significant and S: Significant

Table 5(a), (b), (c) concentrated on the Food Frequency pattern of the study population. The finding was focussed on the consumption of various food items which were allowed or to be avoided to suit the treatment regimen. The normal salt containing foods which was to be avoided/restricted was consumed by the subjects regularly and this was constant throughout the study with statistical significance resulting in increased fluid intake [Table 4(b)] and more Interdialytic Weight Gain (IDWG, Fig. 2). Milk and its products which were in the allowed list, intake occurred and improved over the time with statistical significance. Fruits which were allowed or to avoid was consumed on equal proportion over the time throughout study period with statistical significance.

Fried food products, non-alcoholic beverages and certain sugar products which were in the avoid list was found to be consumed with statistical significance. The most non-permissible food items like bakery products, processed foods and ready to eat foods which were to be avoided was found to be the favourite of the study population. Regular usage of the foods which were to be avoided was observed and was found to be statistically significant. The nutritional supplement was found to be not in regular consumption and the reason was dislike to the taste of the product which was statistically significant among the respondents over the study duration. The dietary non-compliance can be due to taste variations of different foods and dietary restrictions.

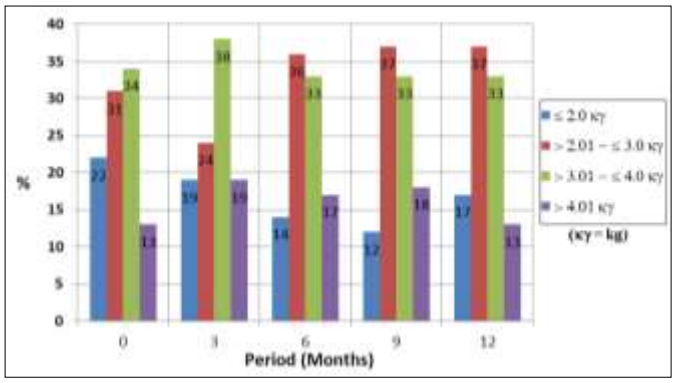

Fig 2: Interdialytic weight gain

4. Discussion

The present study was planned to evaluate the adherence level to diet and fluid regimen. Inadequate energy and protein intake along with other major and minor nutrients was attributed to low dietary intake among the subjects in a study conducted by Linda *et al*., 2015 [12]. Hemodialysis subjects were found to have a weak adherence for dietary and fluid restrictions as reported by Christiane, *et al*., 2005 [13] and Belguzar, *et al*., 2007 [14]. Non-adherence to fluid limitation among this group was one of the stressful aspects in terms of treatment [13, 14]. The overall compliance behavior to therapeutic regimens revealed that patients with longer duration on HD were more non-compliance in a study conducted by Yoke, *et al*., 2012 [15]. Though ESRD group was eager to change their dietary habits to meet the requirement of a newly-received life-saving HD treatment, the subjects felt bored and got easily frustrated with the need to comply on long lists of dietary and fluid restrictions [15].

5. Conclusion

Dietary intake among HD patients showed adequate energy and protein intake along with other major and minor nutrients. There was non-adherence to limited prescription of sodium and fluid allowance. Dietary and fluid adherence can be improvised with effective periodic educational programs which could further modify the subjects' knowledge and behavior towards diet regimen.

6. Reference

1. https://www.kidney.org
2. Mallick NP, Gokal R. Haemodialysis. Lancet. 1999; 353(9154):737-742.
3. Newmann JM, Litchfield WE. Adequacy of dialysis: the patient's role and patient concerns. Semin Nephrol. 2005; 25(2):112-119.
4. Jennifer FJ, Veronica JT. The Psychosocial Experience of Patients with End-Stage Renal Disease and Its Impact on Quality of Life: Findings from a Needs Assessment to Shape a Service. ISRN Nephrology 2013; 2013, Article ID 308986, 8 pages. http://dx.doi.org/10.5402/2013/308986
5. Kianoosh K, Paul LK. Compliance in Hemodialysis Patients: Multidimensional Measures in Search of a Gold Standard. American Journal of Kidney Diseases. 2001; 37(2):244-266.
6. Sahar AA. Adherence of Dietary Modification for Patient Receiving Hemodialysis. Mosul Nursing Journal. 2013; 1(1):1-7.
7. Susan S, Linda S, Beth H, Roslyn AS, Sunghee K, Beth P, *et al*. Nutritional Intake in Adult Hemodialysis Patients. Top Clin Nutr. 2011; 26(1):45-56.
8. Maryam E, Zohreh M, Peyman J, Maryam A, Mohammad MS. Major barriers responsible for malnutrition in hemodialysis patients: challenges to optimal nutrition. Nephro Urol Mon. 2014; 6(6):e23158.
9. Luisito OL, Roberto M. Comparison of Body Mass Index based nutritional status using WHO criteria versus "Asian" criteria: report from the Philippines. Philippine Society of Parenteral and Enteral Nutrition (PhilSPEN) (Article 1| http://www.dpsys120991.com/POJ_0005.html) Issue Jan 2010 – Jan 2012: 1-8.
10. KDOQI Guidelines. Kidney Disease Outcomes Quality Initiative Clinical Practice Guidelines for Nutrition in Chronic Renal Failure. American Journal of Kidney Diseases. 2000; 35(6):S76-S85.
11. Denis F, Marianne V, Piet T, Wee C, Wanner A, BasciBernard C, *et al*. EBPG Guideline on Nutrition. Nephrology Dialysis Transplantation. 2007; 22(2):ii45-ii87.
12. Linda GR, Manjunath SS, Asna U. Screening of Malnutrition Using Clinical, Dietary and Anthropometric Variables in an Indian Hemodialysis Population. J Med Res 2015; Article ID 847823, DOI: 10.5171/2015.84782.
13. Christiane K, Hans V, Axel H, Bart M. Nonadherence with diet and fluid restrictions among adults having hemodialysis. Journal of Nursing Scholarship 2005; 37(1):25-29.
14. Belguzar K, Kayser C, Selim K. Nonadherence with diet and fluid restrictions and perceived social support in patients receiving hemodialysis. Journal of Nursing Scholarship. 2007; 39(3):243-248.
15. Yoke MC, Mohd SZ, Sing ZH. Determinants of compliance behaviours among patients undergoing hemodialysis in Malaysia. PLos One. 2012; 7(8):e41362. www.plosone.org