Adherence to nutritional interventions – Does it have an impact on nutritional status in hemodialysis patients in a tertiary care centre?

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Abstract
Nutritional health is one of the most important considerations among hemodialysis patients. It has been recognized that poor adherence can be a serious risk to the health and well being of patients which is associated with protein energy wasting. A prospective study of one year was conducted to ascertain an impact on nutritional status among hemodialysis group with nutritional intervention techniques. The challenges of nutritional barriers contributing to malnutrition can be empowered with adequate and periodic educational programs. Strategies to enhance knowledge and adherence to dietary guidelines for management of eating disorder among dialysis populace were found to be effective in changing dietary behavior.
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1. Introduction

The ancient Indian medicine which has all along emphasized the importance of diet and nutrition, has to be amalgamated into the modern medicine. The advise on the consumption of natural nutrient advocated by ancient principles of Charaka has now been put on sound footing by WHO and National Bodies like National Institute of Nutrition (NIN) (Acharya,1999). Clinical nutrition is nutrition of patients in health care. Medical Nutrition Therapy (MNT) is a therapeutic approach to treating medical condition and their associated symptoms by the use of a specifically tailored diet devised and monitored by health care team (https://en.m.wikipedia.org).

Protein-energy malnutrition (PEM) is found to be common among dialysis populace adversely affecting morbidity, mortality, functional activity and patients' quality of life (QoL) (Guidelines for the management of nutrition,2005). Several studies reveal greater dependence on vegetable source than animal protein source. This vegetarianism may be due to spirituality, religious and cultural perspectives and in some dislike to foods (Abraham *et al*,2003, Kamat *et al*,2005).

Many studies have shown that nutritional status is an important factor in determining the outcome of Chronic Kidney Disease (CKD) patients. They undergo a number of lifestyle, dietary and fluid restrictions in order to accommodate their illness and treatment modalities that has an impact on their sense of personal control influencing coping, adjustment, anxiety and depression (John *et al*,2013). The incidence of malnutrition disorders in CKD appears unchanged over time while patient care and dialysis technology continue to progress (Fouque,2011). There is a strong belief that effective educational methods that focus on motivating patients to comply with dietary restrictions tend to improve compliance (Durose *et al*,2004, Baraz *et al*,2010, Hoover,1989). Healthy diets can be obtained from a wide variety of foods (Schlenker *et al*,2011).

Hence a prospective study was designed to assess the impact on nutritional status with nutrition intervention among maintenance hemodialysis patients (MHD).

2. Research Method

Sample Selection

A one year prospective study was conducted on 100 hemodialysis (HD) patients who were on three monthly follow-up i.e., at baseline, third month, sixth month, ninth month and twelfth month (End of study, EOS). 90 patients completed the research while 10 patients couldn't complete due to logistic reasons. Institutional Ethical Committee approval was procured for the conduct of the study.

The following criterion was considered for patient recruitment into the study;

Inclusion criteria:

- Either gender with ≥18 years to ≤65 years of age.
- Those who had undergone ≥3 months of HD and permanent dialysis access [Aterio Venous (AV) fistula/AV Graft].
- Those who were willing to undergone regular tests.
- Those who were voluntarily willing to participate in the research program and sign informed consent.

Exclusion criteria:

- Those suffering from severe cardiac and liver failure.
- Those who were retroviral positive.
- Those diagnosed to have tuberculosis or malignancy.
- Those with active infections and fluid overload.

Nutritional status assessment techniques

- ➢ *Anthropometry*: All anthropometry details were measured every three months from baseline to EOS visit. Primary anthropometric measurements were weight (Wt, kg), height (Ht, cm), Mid Arm Circumference (MAC, cm), triceps (mm). The primary anthropometric measurements were derived to obtain indices like Body Mass Index (BMI, kg/m^2) using BMI classification of adult for Asia-Pacific standard, Arm Muscle Area (AMA, cm^2).

- ➢ *Biochemical Investigations*: The laboratory test for serum Albumin (S. Alb, g/dL) was performed on a sub-sample of the study population to 30 samples during every study visit.

- ➢ *Appetite status*: An indetailed profile on barriers and facilitators of adequate food consumption of past one week duration was assessed.

- ➢ *Subjective Global Assessment* (SGA): The standard short-form survey (SF-36) was employed to assess the nutritional status of study samples every six months from baseline to EOS visit.

Nutritional intervention methods

- ➢ *Patient education program*: The education tool was designed in a self-explanatory manner with visual aids using Microsoft Power Point slide presentation which was validated by subject experts. The presentation was explained orally if the patient or care providers needed assistance. An information booklet was formulated to assist patient education which provided eminent information on kidney disease, treatment regimen along with food particulars. Five recipes were developed to suit the renal ailment and were included in the booklet with details of nutrient composition of each product using NIN, Indian Council of Medical Research (ICMR) guidelines.

- ➢ *Periodic Individual and group dietary counseling sessions*: A weekly dietary review was performed during initial stage of study period to ascertain compliance and pursue with diet prescription and resolving dietary issues. Individualized diet charts were provided at the start of HD and the same was reviewed at the commencement of research program. The diet charts were explained to individual patient and their care

givers were counseled about renal dietary regimen, which was supported by group discussions and counseling sessions using audio-visual aids. Dietary reviews were periodically monitored and timed as per individual patient requirement or at scheduled study visit.

➢ ***Renal recipe demonstration and sensory evaluation***: Five renal recipes were developed and tailored to suit the treatment regime. The recipes were standardized in the laboratory. Each product was subjected to sensory evaluation from experimental and control group (30 samples each) using 5-point hedonic rating scale to evaluate the sensory characteristics. Greater the hedonic rating scores detected greater acceptability of each food product. The renal recipes were demonstrated to the patients and care providers to assist their inclusion in daily food platter. The five recipes were Product 1: Shrikhand, Product 2: Methi parata, Product 3: Dhokla, Product 4: Corn pulao, Product 5: Chicken gravy.

Statistical analysis

Descriptive and inferential statistics was employed to analyze the data. A p value of ≤0.05 was considered for statistical significance. SPSS version 18.0 was used to analyze the data.

3. Results and Analysis

Table 1: Demographic profile of the respondents (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

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 sixty eight percent of the study population belonged to male gender. The mean age was found to be nearly 50 years.
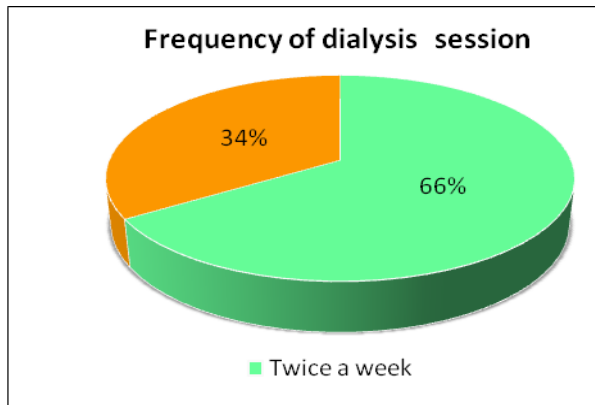
Figure 1: Dialysis treatment regime of the Respondents

Figure 1 depicts the frequency of dialysis schedule among the respondents. The respondents were undergoing hemodialysis since one year and sixty six per cent of them were on a twice weekly dialysis regimen.

Table 2: Anthropometry of the Respondents (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 (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 changes in the mean measurements of MAC, triceps, 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 as per Asia Pacific standard all through the study duration.

Table 3: Biochemical parameter of the respondents

Category	Respondents					p value
	0 Month Mean (SD)	3 Month Mean (SD)	6 Month Mean (SD)	9 Month Mean (SD)	12 Month Mean (SD)	
Serum Albumin (g/dL)	3.49 (0.44)	03.49 (0.35)	03.41 (00.34)	003.47 (00.32)	003.57 (00.38)	0.005, S

S: Significant

Table 4: Assessment of Appetite Status of the Respondents (N = 90)

Characteristics	Category	Respondents										p value
		Baseline (0 Month)		3rd Month Followup		6th Month Followup		9th Month Followup		End of study (12th month)		
		No	%	No	%	No	%	No	%	No	%	
Appetite in past 4 weeks	Poor	06	07	02	02	02	02	02	02	03	03	<0.001, S
	Average	32	36	30	33	25	28	17	19	12	13	
	Good	52	57	58	65	63	70	71	79	75	84	
Change in appetite	Increased	17	19	28	31	24	27	28	31	18	20	0.117, NS
	Decreased	11	12	12	13	08	09	05	06	05	06	
	No change	62	69	50	56	58	64	57	63	67	74	
Weight Change in last 3 Months	Gain	31	35	29	32	27	30	20	22	19	21	0.002, S
	Loss	29	32	20	22	18	20	14	16	08	09	
	No change	30	33	41	46	45	50	56	62	63	70	

NS: Non-significant and S: Significant

Serum Albumin level in table 3 revealed that there was a significant change over the time from baseline to EOS which was in the accepted spectrum of visceral protein stores. Though there was no much variation in the means, the statistical significance posed good control of protein status.

Table 4 concentrated mainly on the appetite pattern of the samples which includes feeling fullness of a meal, hungriness, food taste, meal pattern, nauseating and mood swing. There was a statistical mean significance in total appetite assessment scoring which showed an increasing trend over the time projecting improvement of appetite status [Baseline = 21.66 ± 3.62, 6th Monthly = 23.42 ± 2.35, End of study = 24.66 ± 2.23]. There was a good response for appetite which showed improvement from poor to average and then to good criteria with statistical significance. It was also seen that there was a higher number of cases reported for no weight change over the time during every study visit, hence the respondents were maintaining their health status during the study period. A trend of three meal pattern with acceptable food taste was observed among majority of the study population. Gastrointestinal symptoms like vomiting/nausea was found not a barrier for food intake among our study population. Improvement in appetite status was found beneficial with counselling rendered at every study visit. The mean response scores of overall acceptability of all the five food products prepared showed nearly identical acceptability among cohort as well as controls which was evaluated through sensory evaluation.
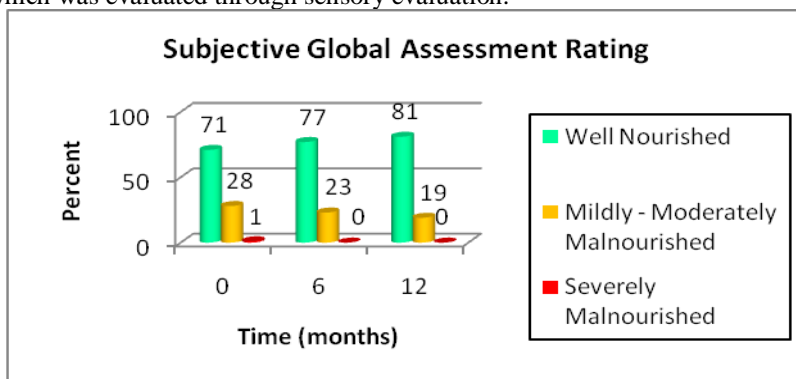

Figure 2: Subjective Global Assessment Rating of the Respondents

There was a shift in the nutritional status from severely malnourished to mildly to moderately malnourished and then to well-nourished group in the overall study population. There was a gradual improvement in the nutritional status of the samples from baseline to end of the study (Figure 2).

4. Discussion

The objective of the study is to assess the impact on nutritional status with nutrition intervention among MHD patients. Relationship between nutritional status and presence or absence of either single or multiple barriers (medical, behavioural or socioeconomic) has be evaluated and targeted with interventions to improve well being of patients (Ekramzadeh *et al*,2014). To enhance patient adherence to treatment recommendations there is a requirement to provide knowledge about the disease and treatment aspects (Guidelines for the psychological management of chronic kidney disease patients,2005). Appropriate management of renal patients links to dietary counseling and nutritional interventions as conventional elements to improve nutritional outcomes (Zadeh *et al*,2015).

5. Conclusion

Nutritional outcomes over the study duration of one year showed the health status of the study population was consistent all through which exhibited continuance of their nutritional status. The counselling rendered was not only limited to correct the dietary pattern but was also extended to comfort their emotional distress and social behaviour in order to improve their quality of life. Underlying barriers and burdens of the illness overcame with effective educative tools employed to improve their overall health status.

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