

# A Descriptive Study to Assess the Knowledge and Perceived Barriers Regarding Dietary Modifications among Patients Undergoing Hemodialysis in Dialysis Unit of Selected Tertiary Care Hospital

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## ABSTRACT

**Objectives:** Diet therapy is the critical component of the treatment of chronic renal failure (CRF) patients undergoing hemodialysis. The dietary restrictions are vital to maintain optimal health for the CRF patients. The study was aimed at assessing the knowledge regarding dietary modifications & perceived barriers regarding compliance to dietary modifications among patients undergoing hemodialysis. The study also had secondary objective to associate the knowledge and perceived barriers regarding dietary modifications with their selected demographic variables and to associate knowledge with perceived barriers regarding dietary modifications among patients undergoing hemodialysis.

**Methods:** Exploratory descriptive research design was used in the study. 60 subjects were included in the study with non probability convenience sampling at dialysis unit of tertiary care hospital. Data related to knowledge was collected with structured questionnaire and data related to perceived barriers regarding dietary modification was collected with Likert scale from patients visiting for their hemodialysis

**Results:** -Assessment of knowledge regarding dietary modifications among patients undergoing hemodialysis revealed that majority of them 35 (58.3%) had highly adequate knowledge, 24 (40%) had moderately adequate knowledge and a minority of 1 (1.7%) had inadequate knowledge. Knowledge regarding Sodium and Potassium was highest followed by knowledge related to calories and proteins, followed by fluid allowance and Phosphorous. Assessment of perceived barriers regarding compliance to dietary modifications revealed that majority of subjects 47 (88.3%) the barriers were not a problem at all, for 12 (20%) of patients the barriers were somewhat of a problem and for a minority 1 (1.7%) of the patients the barriers were a very important problem. In perceived barrier, behavioural factors were a very important problem, followed by physical condition, technical difficulties and resource adequacy. Social network was the perceived barrier that was of a least problem. There was significant association between marital status and level of knowledge whereas perceived barriers were significantly associated with family income & occupation. Knowledge is significantly associated with perceived barriers. As the knowledge increases the perceived barriers decrease and those with have high perceived barriers have low knowledge. There was no significant association of knowledge and perceived barriers with the age of patient, gender, education, type of diet, duration of hemodialysis & frequency of hemodialysis

**Conclusion:** - Dietary intake is a complex process that involves biological, social, cultural, psychological factors and their interaction. It is believed that the behavior in controlling dietary and fluid intake is determined by individual food choices. Food is at the same time a source of energy, pleasure and reward as well as a social bond and so choices reflect all these characteristics. Besides

keeping continuous education on adequate dietary habits, it is necessary to implement behavioural interventions in order to decrease hemodialysis patients' distress over diet and improve adherence and the control of clinical parameter that implicate on their quality of life. The provision of CKD comprehensive patient care in terms of dialysis plan, medication, fluid and dietary restriction is crucial in slowing the progression and complications of CKD.

**Keywords:** Hemodialysis, Knowledge, Perceived barrier, Dietary modification

## INTRODUCTION

Chronic renal disease is a major health issue in various parts of the world. The number of patients with end stage renal disease (ESRD) is increasing in both developed and developing countries, greatly expanding the need for chronic dialysis and renal transplantation.<sup>1</sup> Average crude and age-adjusted incidence rates were 151 and 232 per million populations, respectively<sup>2</sup>

Though kidney transplant is considered the more favourable method as compared to dialysis there is huge scarcity of organs. But only 2.5% of incident patients with end-stage renal disease undergo renal transplantation as their initial modality of treatment, and majority of patients survive with dialysis. Globally over 1.5 million chronic kidney disorders survive with either hemodialysis or peritoneal dialysis.<sup>3</sup> There are over 1,30,000 patients receiving dialysis and the number is increasing by about 232 per million population, a reflection of increasing longevity in general. Hemodialysis is the most common modality followed by transplantation. India is estimated to have about 1,20,000 patients on hemodialysis.<sup>2</sup>

Patients having chronic kidney disease/end stage renal disease undergoing hemodialysis deal not only with stressful chronic illness but complex and demanding treatment regimens, affecting quality of life of both patients and their families.<sup>4</sup> The prevalence of chronic kidney disease (CKD) is high and it is gradually increasing. Individuals with CKD should introduce appropriate measures to hamper the progression of kidney function deterioration as well as prevent the development or progression of CKD-related diseases.<sup>5</sup> Diet plays an important role in patients with end stage renal disease (ESRD) and a slight

increase in any component of diet can make a major difference in pathogenesis of disease.<sup>6</sup> A kidney-friendly diet may help to protect kidneys from further damage. Patients with kidney damage should limit the intake of certain foods to reduce the accumulation of unexcreted metabolic products and also to protect against hypertension, proteinuria and other heart and bone health problems.<sup>5</sup> Despite rapid progress in the science and technology of renal replacement therapy (RRT), the mortality rate of patients with ESRD remains high. Dietary interventions are essential in individuals with kidney diseases and nutritional recommendations vary depending on each patient's stage of progression, cause of disease, medications and other treatment methods. The primary complications that arise with most ESRD patients include hypertension, electrolyte imbalances (e.g. high potassium, low calcium and high phosphate), excessive body fluids and anaemia.<sup>6</sup> The modification of food cannot directly improve the working of the kidney, but it reduces the excess load on functioning of the kidney and improves the quality of the life of chronic renal failure patients undergoing hemodialysis.

Patient's compliance to dietary modifications is one of crucial element of dietary management of renal failure. Health professionals should ensure that the patients are adequately educated to follow the dietary restrictions. They should be aware of the factors behind noncompliance in hemodialysis patients and assist them in making lifestyle changes. But unfortunately no direct relationship was observed between dietary knowledge and any compliance measures. Dietary and fluid compliance was observed in only 35.5% and 40.3% of the patient's respectively.<sup>7</sup>

The study conducted to describe prevalence of non-adherence with the prescribed diet and fluid restrictions among patients receiving hemodialysis found that many patients had difficulty following diet (81.4%) and fluid (74.6%) restrictions. Younger male patients and smokers were at highest risk for non-adherence. Higher levels of interdialysis weight gain were associated with non-adherence.<sup>8</sup> More than half of participants in study reported having problems related to specific behavioral factors (e.g. feeling deprived) technical difficulties (e.g.-tracking nutrients) and physical condition (e.g.-appetite) but issues of time and food preparation and behavioral factors tended to be most deterministic of reported dietary intakes.<sup>9</sup>

### **Need of the study**

Chronic diseases have become a major cause of global morbidity and mortality even in developing countries. The burden of chronic kidney disease (CKD) in India cannot be assessed accurately. The approximate prevalence of CKD is 800 per million populations (pmp) and the incidence of end stage renal disease (ESRD) is 150-200 pmp. The most common cause of CKD in population based studies is diabetic nephropathy.<sup>1</sup>

Bajwa SS, et al. (2013) conducted a study on 'Nutritional needs and dietary modifications in patients on dialysis and chronic kidney disease' in Punjab, India concluded that nutritional needs in patients with chronic kidney disease are different from those of the normal population. As such, estimation of these nutritional requirements mandates a thorough understanding of the various physiologic and pathologic processes related to renal system. The estimation of nutritional needs and dietary modifications in patients with chronic kidney disease, although challenging can become fairly easy with a close coordination between nephrologists, dietitian and intensivist, especially when these patients are admitted in intensive care units. The nutritional needs and requirement

in patients with chronic disease have to be titrated on an individual basis with an emphasis on underlying diseases, nutritional status, severity of renal disease and so on.<sup>10</sup>

Clark M N, Sevick M A.(2018) conducted a study on 'perceived barriers to adherence to hemodialysis dietary recommendations' and concluded that time, convenience and financial constraints hindered dietary adherence. Dietary counselling efforts were stated positively but require individualization. Ability to follow recommended guidelines was challenging.<sup>11</sup>

K Griva et al. (2013) in their study 'Managing treatment for end stage renal disease –a qualitative study exploring cultural perspectives on facilitators and barriers to treatment adherence' identified personal and social/ contextual factors as major barriers or facilitator of treatment adherence. Barriers include time consumption, forgetfulness, concerns about safety, poor knowledge/understanding, poor communication and lack of control/social pressure. Participants also identified facilitators both internal (self initiated) and external initiated by family, health care professional and peers to ensure treatment adherence.<sup>12</sup>

Yoke M C, et al. (2013) conducted a study on 'Factors associated with quality of life among hemodialysis patients in Malaysia'. The study concluded that to improve the overall quality of the hemodialysis patients, a multidisciplinary intervention that includes medical, dietetic and psycho-social strategies that address factors associated with mental and physical quality of life are warranted to reduce further health complications and to improve quality of life.<sup>13</sup>

The nurse plays a central role in renal management by directing the dietary regulations through patient education, and enhance the patient's knowledge and practices regarding dietary regulation in patients with chronic renal failure (CRF) undergoing hemodialysis, because it helps in reduction of discomfort, prevention

further damage to kidney, by reducing the kidney's work load, and maintenance of health in prolonging life. In the light of above mentioned studies and research evidences, coupled with the investigator's experience on management of patients with chronic kidney disease, it was the interest of the investigator to conduct the study to assess the knowledge and the perceived barriers regarding dietary modifications in patients undergoing hemodialysis

## METHODS

The present study used cross sectional descriptive design to assess the knowledge and perceived barriers. 60 Patients undergoing hemodialysis for chronic kidney disease were included in the study with non probability convenient sampling. Inclusion criteria & exclusion criteria was as follows

### Inclusive criteria:

- Patients who are on dialysis for more than 3 months.
- Hemodialysis patients who are willing to participate.
- Hemodialysis patients who can understand/read/write English/Marathi

### Exclusive criteria:

- Those who are sick or who had been admitted for treatment e.g. comorbidities affecting GI system within last 3 months.
- Those who have the history of renal transplantation.
- Patients with Visual impairment
- Known cognitive impairment
- Known psychiatric illness

To select the sample needed for the study, the investigator approached the proper authorities of tertiary care hospital for obtaining the necessary permission and cooperation. Data related to demographic profile & knowledge regarding dietary modification was collected using self structured questionnaire. Data related to perceived barrier was collected using Likert scale.

## Instrument

There were three sections made for data collection:

**Section I:-** It consists of questions related to age, gender, education, occupation, family income, marital status, vegetarian or non vegetarian, duration of period undergoing haemodialysis in years and number of haemodialysis per week.

### Section II: Structured questionnaire

It contains 20 items to assess the knowledge regarding dietary modifications in patients undergoing haemodialysis. The four subclasses are related to fluid allowance, related to calories and proteins, related to sodium and potassium and related to phosphorous. Each item had four options with one most appropriate answer. The maximum score for the correct response to each item was one and for the wrong response the score was zero. Thus for 20 items the maximum obtainable score was 20. No negative scoring was given.

To assess the level of the knowledge of the patients undergoing haemodialysis was grouped into categories like Inadequate, Moderately adequate and highly adequate.

Level of knowledge	Score
Inadequate	0 – 7
Moderately adequate	8 – 14
Highly adequate	15 – 20

**Section III:** Likert scale to assess the barriers faced by patients to comply with dietary modifications. The scale contained 22 items and 5 subscales describing the various problems hemodialysis patients encounter in trying to follow the diet. The subscales included items geared to isolate dietary problems related to the participant's physical condition (e.g., comorbid conditions and symptoms experienced), resource adequacy (e.g., adequate income, access to transportation and grocery stores), social network (e.g., family, friends), behavioral factors (e.g., motivation) and technical difficulties (e.g., ability to interpret food labels and understanding nutrient values). Participants were suppose to respond to each using a 5-point visual

numeric scale (VNS) on which The subscale scores will be derived by averaging responses given to items within each subscale. Total scores will be derived by averaging subscale scores. To assess the level of the perceived barriers regarding compliance to dietary modifications among patients undergoing hemodialysis the score was grouped into categories like not a problem at all, somewhat of a problem and a very important problem

The tool was submitted to eight experts, comprising of four PG teaching faculty from Medical-Surgical department, nurse in charge of dialysis unit, one Nephrologists, one dietician and one statistician, as per experts suggestion, the duration of period undergoing dialysis and frequency of dialysis was added in relation to patient's information. Questionnaires were grouped under the different headings e.g. fluid restriction, Na<sup>+</sup> restriction etc. Reliability of the tool was checked by Cronbach's Alpha. The knowledge score questionnaire reliability was found to be 0.826, the percentage being 82.6 and the perceived barrier rating scale reliability was found to be 0.95 the percentage being 95. Hence the tool was found to be highly reliable. The questionnaire and Likert scale was translated into Marathi language by bilingual professional with post graduate degree and then another language expert with similar qualification translated it back to English. After comparing both versions both the tools were adapted for study.

Data collection was done over a period of eight weeks from 3<sup>rd</sup> Nov 2019 to 27<sup>th</sup> Dec 2019. Formal informed consent was taken from the study participants prior to data collection. The samples were given the questionnaires to assess their knowledge and the Likert scale to assess the perceived barriers regarding dietary modifications. Sixty subjects from dialysis unit who fulfilled the criteria of the study, participated in the study.

## **Ethics**

The study proposal was sanctioned by research ethics committee of concerned teaching and research institution. Permission was obtained from the concerned authority of the selected hospital for data collection. Informed consent was taken from the all the participant before participating in the study. In order to maintain confidentiality and anonymity, participation and responses of the subjects were kept confidential. The subject had right to withdraw a consent at any time of the study.

## **Data analysis**

The collected data was analyzed through descriptive and inferential statistics. Data Analysis was done using the SPSS (Statistical Package for the Social Science) Version 17 for window. The demographic variables, knowledge score and perceived barrier score were calculated with number and percentage. The correlation and Z test for correlation was used to find correlation between knowledge score and perceived barriers score. The ANOVA test and Mann Whitney test was used to find out association of knowledge and perceived barriers score with age, gender, education, occupation, family income, marital status, type of diet, duration of period undergoing hemodialysis (years) and frequency of haemodialysis. A probability value of 0.05 was accepted as the level of statistical significance. The level of statistical significance for this study was set at 95%

**Section I:** Description of samples according to demographic characteristics by frequency and percentage: As per (Table 1) Majority of participant i.e. 55% were 61 & above years of age, 65% were male and 35% were females, 36.7% were of graduate level and above, 63.3% of participant unemployed or retired. In concern with family income per month, a majority of them (51.7%) had more than Rs.15001, 80% of participants were married, 66.7% were following the mixed type of diet. 51.7% of participant

were undergoing hemodialysis for less than 1 year & 61.7% underwent hemodialysis twice a week.

**Table 1 (original): - Participant's characteristics (n=60)**

Parameters		No of cases(f)	Percentage (%)
Age (Years)	20 – 40	13	21.7
	41 – 60	14	23.3
	61 & above	33	55
Gender	Male	39	65
	Female	21	35
Education	Illiterate	4	6.7
	Primary	16	26.7
	Secondary	18	30
	Graduate & above	22	36.7
Occupation	Government employee	6	10
	Private employee	5	8.3
	Self employee	9	15
	Daily wager	2	3.3
	Unemployed/retired	38	63.3
Family income (RS)	≤5000	8	13.3
	5001 – 10000	4	6.7
	10001 – 15000	17	28.3
	15001 & above	31	51.7
Marital status	Married	48	80
	Unmarried	6	10
	Divorcee	2	3.3
	Widow/Widower	4	6.7
Type of diet	Vegetarian	17	28.3
	Non-vegetarian	3	5
	Mixed	40	66.7
Duration of Period undergoing hemodialysis (Years)	<1	31	51.7
	1 – 3	20	33.3
	3 – 5	3	5
	>5	6	10
	Daily	1	1.7
Frequency of hemodialysis	Once a week	11	18.3
	Twice a week	31	61.7
	Thrice a week	11	18.3

**Section II:** Level of knowledge regarding dietary modifications among patients undergoing hemodialysis. As per (table 2) majority of them 35 (58.3%) had highly adequate knowledge, 24 (40%) had moderately adequate knowledge and a minority of 1 (1.7%) had inadequate knowledge. (Table 3) shows area wise knowledge regarding dietary modifications among patients undergoing hemodialysis and reveals that the knowledge regarding Sodium and Potassium was highest followed by knowledge related to calories and proteins, followed by fluid allowance and Phosphorous

**Table 2 (original): -Level of knowledge regarding dietary modifications among patients undergoing hemodialysis. (n=60)**

Knowledge score	No of cases (f)	Percentage (%)
0 – 7 (Inadequate)	1	1.7
8 – 14 (Moderately adequate)	24	40
15 – 20 (Highly adequate)	35	58.3
Total	60	100

**Table 3 (original): - Area wise knowledge regarding dietary modifications among patients undergoing hemodialysis. (n=60)**

Area of knowledge score	Mean	SD
Fluid allowance	3.93	1.22
Calories & Protein	4.67	1.48
Sodium & Potassium	4.75	1.45
Phosphorous	2.15	0.88

**Section III:** Analysis of data related to perceived barriers regarding compliance to dietary modifications among patients undergoing hemodialysis. (Table 4) shows majority of participant 47 (88.3%) the barriers were not a problem at all, for 12 (20%) of patients the barriers were somewhat of a problem and for a minority 1 (1.7%) of the patients the barriers were a very important problem. (Table 5) shows area wise perceived barriers regarding compliance to dietary modifications among patients and reveals that behavioral factors were the perceived barriers that were a very important problem, followed by physical condition, technical difficulties and resource adequacy. Social network was the perceived barrier that was of a least problem.

**Table 4 (original): - Analysis of data related to perceived barriers regarding compliance to dietary modifications among patients undergoing hemodialysis (n=60)**

Perceived barriers score	No of cases (f)	Percentage (%)
22 – 52 (Not a problem at all)	47	88.3
53 – 83 (Somewhat of a problem)	12	20
84 – 110 (A very important problem)	1	1.7
Total	60	100

**Table 5 (original): - Area wise perceived barriers regarding compliance to dietary modifications among patients undergoing hemodialysis (n=60)**

Area of perceived barriers	Mean	SD
Physical condition	9.35	4.73
Resource adequacy	6.63	3.03
Social network	3.43	1.75
Behavioral factors	11.78	5.56
Technical difficulties	8.97	4.97

**Section IV:** - Analysis of data to find association of knowledge and perceived barriers with their selected demographic variables. (Table 6) shows that p-values

corresponding to marital status when compared with knowledge is less than 0.05 and thus null hypothesis is rejected. Marital status is significantly associated with knowledge regarding dietary modification. Other demographic variables like age, gender, education, occupation, family income, type of diet, period of dialysis and frequency of dialysis are not significantly associated with knowledge regarding dietary

modification. Demographic variables occupation and family income when compared with perceived barriers are found to be significantly associated with perceived barriers for dietary modification. Other demographic variables like age, gender, education, marital status, type of diet, frequency of dialysis, and period of dialysis are found to be not significantly associated with perceived barriers.

Table 6 (original): - Analysis of data to find association of knowledge and perceived barriers with their selected demographic variables

Characteristics	N	Knowledge				Perceived barriers			
		Mean	SD	F or Z Value	P Value	Mean	SD	F or Z Value	P Value
<b>Age</b>									
20-40	13	13.92	4.68			46.31	16.93		
41-60	14	16.79	3.76	1.77	0.18	31.86	5.37	3.09	0.053
61 & above	33	15.58	3.75			41.27	17.65		
<b>Gender</b>									
Male	39	16.00	3.98	1.39	0.16	38.87	16.62	0.84	0.40
Female	21	14.57	4.02			42.57	15.17		
<b>Education</b>									
Illiterate	4	12.50	3.87			45.50	18.64		
Primary	16	14.63	4.58	1.38	0.26	46.94	19.55	2.04	0.12
Secondary	18	16.28	4.17			39.61	16.86		
Graduate & above	22	16.05	3.31			34.73	10.17		
<b>Occupation</b>									
Govt service	6	18.33	3.61			29.17	3.18		
Private service	5	12.80	1.64			57.40	15.29		
Self employed	9	16.00	3.31	1.41	0.24	34.44	9.44	3.27	0.018
Daily wager	2	15.50	3.53			27.00	7.07		
Unemployed	38	15.29	4.31			41.68	16.92		
<b>Family income (in rupees)</b>									
<5000	8	13.50	3.85			34.88	12.44		
5001-10000	4	14.00	4.24	1.67	0.18	58.75	24.51	2.94	0.041
10001-15000	17	14.94	3.86			43.65	17.17		
15001 & above	31	16.52	3.99			37.23	13.66		
<b>Marital status</b>									
Married	48	16.19	3.81			38.35	15.32		
Unmarried	6	14.67	3.98	5.64	0.006	43.50	19.92	1.94	0.15
Divorcee/Widow	6	10.83	2.48			51.33	16.07		
<b>Type of diet</b>									
Vegetarian	17	15.82	3.90			37.94	16.96		
Non veg	3	11.00	2.64	2.06	0.14	61.33	17.95	2.97	0.059
Mixed	40	15.70	4.02			39.53	14.84		
<b>Period of dialy (in year)</b>									
<1	31	16.26	4.00			40.68	17.71		
1-3	20	14.85	3.93	1.20	0.31	40.40	15.65	0.11	0.90
Above 3	9	14.33	4.15			37.89	12.05		
<b>Frequency of dialysis</b>									
Daily	12	14.08	4.87			47.00	20.14		
Twice a week	37	15.49	3.73	1.64	0.20	39.95	15.40	2.12	0.13
Thrice a week	11	17.09	3.70			33.45	11.04		

**Section V:** - Analysis of data to find association of knowledge with perceived barriers regarding dietary modifications among patients undergoing hemodialysis. (Table 7) shows that knowledge is significantly associated with perceived barriers. As the knowledge increases the perceived barriers decrease and those with have high perceived barriers have low

knowledge. (Figure 1) shows that as knowledge is increasing the perceived barriers are decreasing.

Table 7: (original): -Association of knowledge with perceived barriers regarding dietary modifications among patients undergoing hemodialysis

Association of knowledge score	r Value	P Value
Perceived barriers score	-0.51	<0.0001

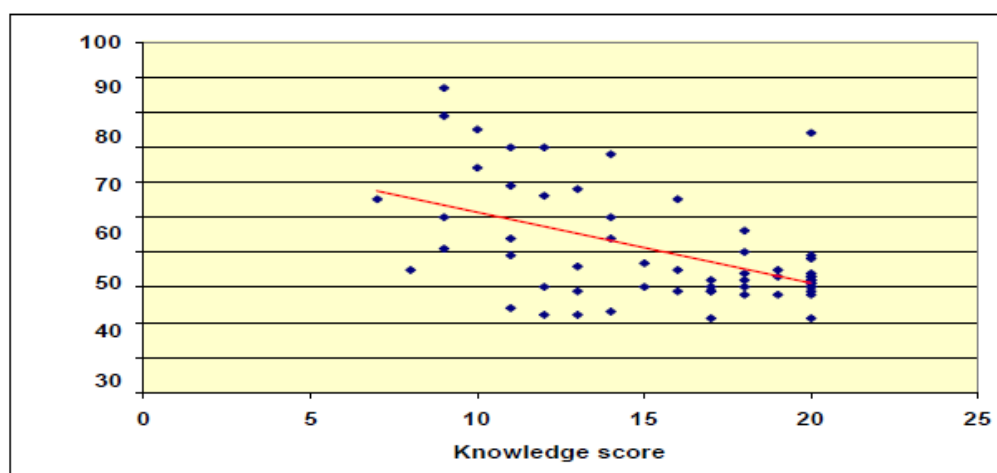


Figure no. 1 (original): -Association of knowledge with perceived barriers regarding dietary modifications among patients undergoing hemodialysis.

## DISCUSSION

The study examined knowledge and perceived barriers regarding dietary modification among patient undergoing hemodialysis. Adequate knowledge regarding dietary modification is essential to make appropriate changes in dietary routine in renal patients. Despite of increasing knowledge regarding dietary modifications and increasing efforts towards patients teaching compliance to renal diet does not necessarily improves. Durose CL et al (2004) studied the relations between dietary adherence and knowledge of the required dietary restrictions and the medical complications of dietary non-adherence in CKD. Patient knowledge alone is not sufficient to ensure the compliance to dietary modifications. Rather greater knowledge of dietary modifications likely to result in poor compliance. Patients with poor compliance had better Level of knowledge than the ones who had better compliance.<sup>14</sup>

In the study, majority of patients had highly adequate knowledge and few patients had inadequate knowledge of dietary modification. Knowledge regarding Sodium and Potassium was highest followed by knowledge related to calories and proteins, followed by fluid allowance. Knowledge regarding phosphorous was least among patients. Gibson, E. L. et. al (2016) examined the 'Differences in knowledge, Stress, Sensation Seeking and Locus of

Control Linked to Dietary Adherence in Hemodialysis Patients'. Patient who were restricted on certain nutrients had better knowledge regarding dietary modification than those who not restricted. Patients who were required to restrict K, PO<sub>4</sub> and fluid tended to have better summed knowledge of which foods were high in those nutrients but the difference did not reach significance. Patients were better at knowing foods that were high in Sodium (Na) or fluid; however, the distributions were only significantly different for knowledge of fluid sources.<sup>15</sup> Srinivaasan K (2014) assessed knowledge of dietary management among chronic renal failure patients undergoing hemodialysis at selected hospital, Kanchipuram, The findings revealed that 20(66.66%) had moderately adequate knowledge, 6(20%) had highly adequate knowledge and 4(13.33%) had inadequate knowledge about dietary management for chronic renal failure.<sup>16</sup>

In the present study, the perceived barriers were not a problem at all or only somewhat of a problem to the patients and for almost none of the patient it was a very important problem. Behavioural factors were the perceived barriers that were a very important problem, followed by physical condition, technical difficulties and resource adequacy. Social network was the perceived barrier that was of a least problem. Because of a good social support from friends, families and relatives the patients tend to be



more demanding in their behavior and attitude, whereby it becomes difficult for them to make changes in their eating pattern. Those patients who faced somewhat a problem in compliance to dietary modification had difficulty in motivating themselves in eating the right foods. They also had difficulty in controlling their eating when they are with friends or family, they felt deprived when they had to restrict what they ate. Sometimes they craved for salty foods, used food as a reward and also ate the wrong food when felt stressed and busy or felt overwhelmed. The technical difficulties were also a problem i.e. they had trouble estimating portion sizes, had trouble keeping track of the amount of nutrients that they eat from meal to meal such as Sodium, Potassium and Phosphorous. They didn't know which foods they should and should not be eating as they felt dialysis diet is too complicated. It was difficult to choose the right foods when shopping. Time was a barrier which restrained them from cooking healthy foods. Moreover they had to spend so much time at the dialysis centre, needed extra time for shopping and also they did not have control over what is served or how it is prepared because it was prepared by someone else.

Clark M.N, et al. (2018) conducted a study on 'Perceived barriers to adherence to hemodialysis dietary recommendations' with the purpose to explore perceived barriers to adherence to dietary recommendations in a diverse hemodialysis patient population. Time, convenience and financial constraints hindered dietary adherence.<sup>11</sup> Stevenson J, et al. (2018) studied 'Experiences and perspectives of dietary management among patients on hemodialysis' and identified the exacerbating disruptions (adding to treatment burden, contradicting healthy eating, confused by fragmented advice, conflicting cultural norms, changing appetite and palate, isolation from family and friends) and losing control (risks derailing discipline, frustrated by failure, combating bodily need for hydration) as

major barriers.<sup>17</sup> Nerbass F.B., et al. (2017) assessed 'Perceptions of hemodialysis patients about dietary and fluid restrictions' and concluded that as per the report by many patients it was not so difficult to control sodium because they were used to consume less sodium and did not miss the salty flavour anymore.<sup>18</sup> Beerappa H, et al. (2018) examined adherence to dietary and fluid restrictions among patients undergoing hemodialysis and found that there is a moderate adherence to fluid and dietary restrictions among the participants. Younger patients were at the highest risk for non adherence.<sup>19</sup>

Middle age patients had more knowledge than older age patients and the younger age group had the least knowledge. The perceived barriers were least in the middle age groups, followed by the older age group and the perceived barriers are the most among the younger age groups. Beerappa H, et al. (2018) also found that younger patients were at highest risk for non adherence. There is statistically no significant association between the knowledge and perceived barriers with their age.<sup>19</sup> According to Nerbass F.B. et al (2017) reduction of the thirst sensation with aging helped the older age group to control their fluid intake as against the younger age group. The younger age group is more attracted towards salty foods and sodium being the main trigger of the thirst sensation they tend to increase their fluid intake.<sup>18</sup>

In the present study, males have more knowledge compared to females and the perceived barriers were less in males than in females. But the knowledge and perceived barriers when associated with gender was not statistically significant and there was no association of knowledge and perceived barriers with the gender. Similarly Clark M. N, et al. (2014) examined adherence to Hemodialysis Dietary Sodium Recommendations: Influence of Patient Characteristics, Self-Efficacy and Perceived Barriers and suggested that younger and female patients encounter more difficulty adhering to the hemodialysis regimen.

Hence there may be a need to individualize counselling and interventions for these individuals.<sup>20</sup> In contrast to findings of the present study, Chironda G, et al. (2016) found that being younger male is consistently associated with non-adherence.<sup>21</sup> Chan Y. M, et al (2012) also revealed that younger, male, working patients and those with longer duration on hemodialysis were found more likely to be noncompliant.<sup>22</sup>

The patients with secondary education had highly adequate knowledge, followed by the graduate and above and the primary education group. The knowledge was the least among the illiterate. The perceived barriers were not at all of a problem for graduate and above group, followed by the secondary educated group and the illiterate. The perceived barriers were the most among the illiterate group. But the knowledge and perceived barriers when associated with education was not statistically significant and there was no association of knowledge and perceived barriers with the education. Nerbass F.B. et al. (2017) hemodialysis patients with lower literacy reported a greater difficulty to control sodium intake.<sup>18</sup> Chironda G, et al. (2016) Low education has been found to cause decreased adherence due to poor correlation with knowledge of disease and treatment. Those with low levels of health literacy find it difficult to follow instructions on how to care for themselves or to adhere to treatment regimens such as taking their medicines. People with good basic literacy and numeracy skills, on the other hand, may struggle to understand, interpret health information in a way that prompts them to act appropriately to protect or enhance their health.<sup>21</sup>

Participants who were unemployed had more difficulties with controlling dietary intake. In present study, perceived barriers when associated with occupation was statistically significant. Perceived barriers were not a problem at all to the daily wager, followed by the government employee, the self-employee and the

unemployed. It was a very important problem for the private employee. The government employees had highly adequate knowledge, followed by self-employee, daily wager, unemployed and was inadequate among the private employee. But the knowledge when associated with occupation was not statistically significant.

Highly adequate knowledge was present the majority of married participants and perceived barriers were not a problem at all in them. There was significant association of knowledge and marital status while there was no association of perceived barriers with marital status. Knowledge was the maximum among the participants who earned better salary. The perceived barriers were found to be the minimum in the group that earned the minimum salary. There is a significant association of perceived barriers with the family income. Because of an adequate family income, the barriers were not being a problem at all. They were able to adhere to the required dietary modifications. Their family income being high they do not face any resource adequacy problem. They are able to procure the grocery items needed for adhering to the dietary modifications required to be maintained.

Knowledge was highly adequate among the patients who had a vegetarian diet and the perceived barriers were not a problem at all for them.

In the present study, the knowledge and perceived barriers when associated with period and frequency of hemodialysis was not statistically significant and there was no association of knowledge and perceived barriers with the period and frequency of hemodialysis. Nerbass F.B., et al. (2017) found that control of sodium intake was easier to participants on hemodialysis for a longer period of time.<sup>18</sup> In contrast, Chan Y. M, et al. (2012) conducted a study on 'Determinants of compliance behaviors among patients undergoing hemodialysis in Malaysia and revealed that those with longer duration on hemodialysis were found more likely to be noncompliant. Similarly

Chironda G, et al. (2016) in their literature review 'Contributing Factors to Non-Adherence among Chronic Kidney Disease (CKD) Patients: mentioned that being on treatment for a longer period of time is associated with non-adherence among CKD patients.<sup>22</sup>

Chironda G, et al. (2016) Knowledge is one of the chief facilitator of positive adherence to fluid restriction, with accurate self-assessment, positive psychological factors and supportive social contacts are also playing a role.<sup>21</sup> In the present study, the knowledge is significantly associated with perceived barriers. As the knowledge increases, less are the perceived barriers and those with more perceived barriers have less knowledge. But Durose et al. (2004) when examined relations between dietary adherence and knowledge of the required dietary restrictions found that not only was patient knowledge not predictive of improved dietary adherence, but conversely greater knowledge of dietary PO<sub>4</sub> sources, and of the medical complications of non-adherence was associated with poorer adherence, at least for PO<sub>4</sub> and Na or fluid restrictions.<sup>14</sup> Similarly, Lee Shuk-hang, et al. (2002) conducted a study on 'Dietary and fluid compliance in Chinese hemodialysis patients' found no direct relationship between dietary knowledge and any compliance measures.<sup>23</sup>

## CONCLUSION

It is believed that the behaviour in controlling dietary and fluid intake is due to the fact that dietary intake which is determined by individual food choices is a complex process that involves biological, social, cultural, psychological factors and their interaction. Food is at the same time a source of energy, pleasure and reward as well as a social bond and so choices reflect all these characteristics. Besides keeping continuous education on adequate dietary habits, it is necessary to implement behavioural interventions in order to decrease haemodialysis patients' distress

over diet and improve adherence and the control of clinical parameter that will improve their quality of life. There should be comprehensive plan of dialysis care which would cater to their various needs including medications, dietary modifications, screening for malnutrition and early detection of complications. besides patient's education, health care provider should also anticipate the common barriers that patients likely to face thought out their renal management. They should be prompt enough to recognise the non adherence to dietary modifications and formulate effective strategies factors contributing to adherence in CKD patients.

**Conflict of interest:** Nil

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