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TO ASSESS THE NUTRITIONAL KNOWLEDGE AND EDUCATE THE SIGNIFICANCE OF NUTRITION AMONG OUTPATIENTS UNDERGOING HEMODIALYSIS

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Abstract— **Background: Globally, Chronic kidney disease (CKD) is the 16th leading cause of death. Patients with CKD stage III or above are likely to undergo dialysis based on their Glomerular filtration rate (Teresa K. Chen et al 2019). Nutrition education plays an important role in improving nutritional status in patients undergoing hemodialysis (HD). Aim & objective: The aim of the study is to assess the Nutritional knowledge and educate the significance of nutrition among outpatients undergoing hemodialysis. Material & methods: After obtaining approval from the Head of the Nephrology department, the study was carried out in Hemodialysis unit at a Multispecialty hospital in Chennai. The total of 153 (N =153) patients receiving hemodialysis were selected for the study based on non - probability convenient sampling method. A questionnaire was designed to assess the patient's awareness on dietary restrictions in particular to protein Sodium, potassium and fluids during Hemodialysis (HD). Educative pamphlets were formulated based on KDIGO guidelines 2020 and the same was used to subjects. The feedback about the effectiveness and usefulness of the handout was collected. Results: From the study it is evident that nutrition education/ diet counselling will help the patients adhere to the food restriction. This is also been statistically proven (p value – 0.00) for association of subjects following food restrictions for potassium rich foods post dietitian counselling. The percentage of the effectiveness of the nutrition counselling was 61% in patients undergoing hemodialysis.**

Keywords—: **chronic kidney disease (CKD), Hemodialysis (HD), Questionnaire, Nutritional counselling.**

I. INTRODUCTION

Decrease in renal functioning progress to irreversible renal failure known as end stage renal disease (ESRD) (Satyanarayana R. Vaidya et al 2021). Hemodialysis (HD), Peritoneal Dialysis (PD) or kidney transplantation are the renal replacement therapy that helps in filtering waste products from kidney as the kidney is impaired. Hemodialysis is an artificial replacement of kidney functioning that helps in removal of waste and extra water. Electrolyte imbalances such as hyperkalemia, hypernatremia and hyperphosphatemia are commonly seen in patients with CKD undergoing hemodialysis. Dietary restrictions are made in patients undergoing dialysis, nutrients emphasizing on potassium, sodium and phosphorous. Dietary restrictions often result in limited food choices and limited food intake which affects the nutritional status in dialysis patients.

Dialysis removes hazardous waste and loss of nutrients from the body. Malnutrition is common among dialysis patients due to loss of proteins and lean tissue. There might be increase in risk of mortality and morbidity due to loss of nutrients, hence nutrition therapy plays an important role in overcoming malnutrition among hemodialysis patients.

Important components of nutritional therapy for chronic kidney disease (CKD) on Hemodialysis (HD) are the right amount of calories, increased requirement of protein, adequate amount of electrolytes such as Potassium, Sodium, & Phosphorous and restriction of fluids.

Potassium is present in wide amount of foods from both animals and plants sources. Noori N. et al, has proved in a study that high protein intake in dialysis patients has direct correlation with hyperkalemia. Higher potassium consumption was associated with increased death risk in long term

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hemodialysis patients. Hence potassium is restricted in patients undergoing hemodialysis. According to a study by Adamasco Cupisti et al., (2018), the potassium intake for hemodialysis is 2.7 – 3.1 g / day, adjustments of the potassium can be made according to the individuals serum potassium level.

Sodium is one of the important extracellular cations and a major determinant osmolality, a necessary electrolyte involved in the control of blood pressure. Consumption of high sodium foods leads to higher water intake, thus leading to hypertension, which is one of risk factors for morbidity and mortality. According to Amanda Brito de Freitas et al., reducing sodium intake can lead to improvement in intra dialytic symptoms and better health outcome. Recommended sodium intake for HD patients is < 2g /day. Diet counselling should be given on adding little amount of salt in the cooking and avoid table salt, processed foods, canned foods and packed chips. (Amanda Brito de Freitas et al., 2020)

Phosphate homeostasis is a complex, highly regulated process in patients with hemodialysis. Patients with decreased renal function have lost the ability to excrete phosphorous. Phosphate overload (hyperphosphatemia) leads to vascular calcification, cardiovascular mortality and renal failure. Therefore, management of dietary phosphorous is important in patients undergoing hemodialysis. Foods such as egg white, poultry can be included due to its reduced potassium content compared to other meat products. (David E. St – Jules et al. 2021) Studies have proved that patients had poor phosphorous nutrition knowledge leading to imbalance in serum phosphorous. Despite patients consuming phosphate binders, phosphate restriction should be emphasized. (Adamasco Cupisti et al., 2012).

According to Joyita Bharathi et al. (2020) in India, about 1,75,000 number of patients are on chronic dialysis, giving a prevalence of 129 per million population.

The need of the study is:

(a) To assess the nutritional knowledge in Hemodialysis patients using a questionnaire.

(b) To educate the significance of nutrition using formulated educational pamphlets in Hemodialysis subjects.

(c) To assess the effectiveness of the nutrition counselling using a feedback form.

II. MATERIALS AND METHODS

(A) STUDY SUBJECTS

The study participants were patients with CKD Stage 3- 5 undergoing Hemodialysis (HD) treatment. The study was conducted for a period of 3 months (April 2022 - June 2022) at a multispecialty hospital in Chennai. The study was carried out with approval of Head of the Nephrology department.

(B) STUDY DESIGN & SAMPLING METHOD

The cross sectional non – probability convenient sampling method is used in this study.

(C) CRITERIA FOR SAMPLE SELECTION

Inclusion Criteria

a) Hemodialysis patients (HD)
b) >18 years of age
c) Outpatients
d) CKD stage 3- 5

Exclusion Criteria

a) Pediatrics (<18 years of age)
b) Inpatients

(D) STUDY VARIABLES

This study was carried out with a set of questionnaires that was framed to evaluate the awareness of nutrition among patients undergoing Hemodialysis (HD). The questionnaire (Fig. 1) consists of:

1) Name, age, sex
2) Comorbidities
3) General hemodialysis questions
4) Food frequency (all five food groups)
5) Awareness of nutrition emphasizing on potassium intake.
6) Awareness of fluid intake
7) Awareness of foods to be avoided
8) Have they already visited dietitian?

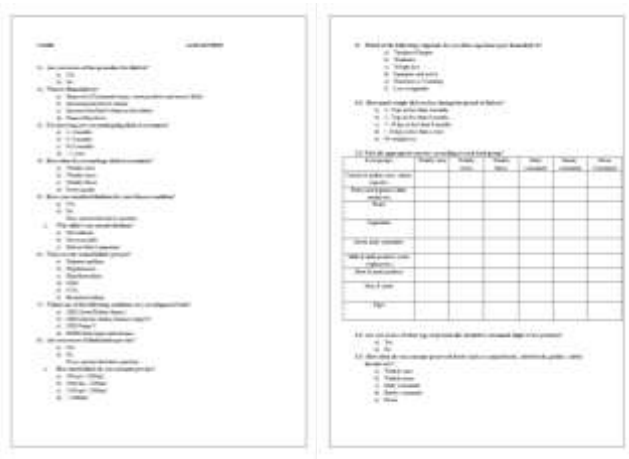

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Fig. 1. Questionnaire for the Hemodialysis subjects

The handouts (Fig. 2) were prepared using KDIGO 2020 guidelines that consist of foods to be included / restricted. The handout was provided to the patients who were not aware and had lack of nutritional knowledge. Thereby, a nutrition counselling was given emphasizing on significance of nutrition for HD patients. Nutritional counselling was also given to the subjects based on their serum levels (potassium, phosphorous and sodium).

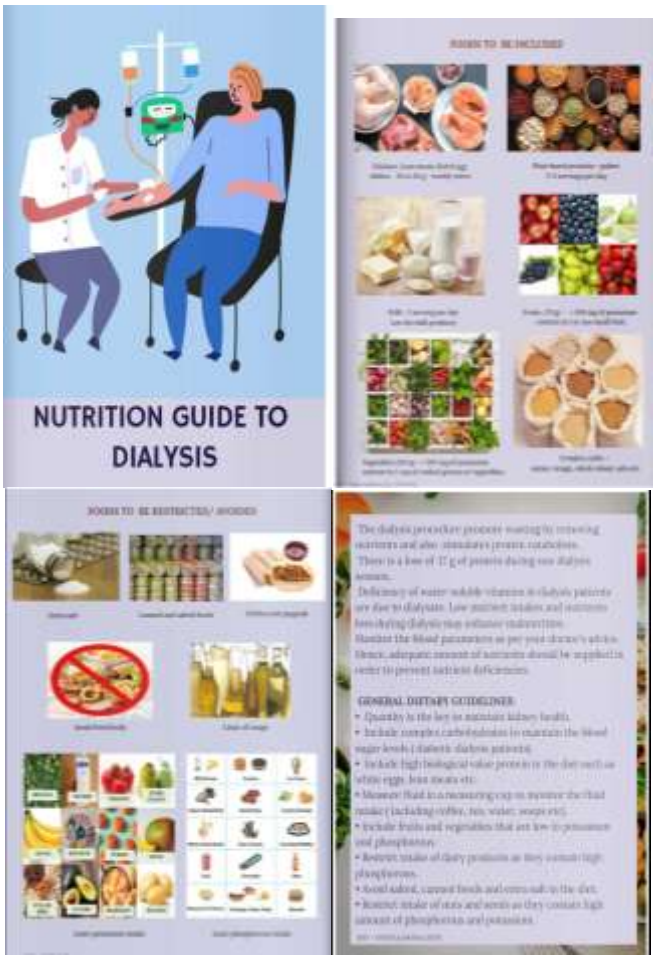

Fig. 2 Handouts provided to Hemodialysis patients

The feedback form (Fig. 3) was provided to the HD patients; the form consists of:

1) Usefulness of the nutrition counselling
2) Usefulness of the handouts provided.
3) Whether the patients were able to adhere to the food restrictions
4) Effectiveness of the nutrition counselling

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Fig. 3. Feedback form provided to the Hemodialysis patients

(E) STATISTICAL ANALYSIS

Chi square test using SPSS statistical analysis tool was used to find the association between dietitian and subjects following diet restrictions.

III. . RESULT AND DISCUSSION

Hyperkalemia, hyperphosphatemia and hypernatremia is commonly seen in hemodialysis subjects.

1) AGE & GENDER

The total subjects were 153 (N= 153), 60 % were male and 39% were female respectively. Majority of the subjects were from the Age group of 40 – 59 years (38%) followed by > 60 years (37%) and 18 – 39 years (25%).

2) COMORBIDITIES PRESENT IN THE SUBJECTS:

CAD	40 %
Type 2 DM	30%
Hypertension	28%
Hypothyroidism	1.3%

Table 1 - Comorbidities

From the above table (Table 1), it is clear that the highest percentage of comorbidities among the total subjects were found to be coronary artery disease (CAD) (40%) followed by Type 2 Diabetes Mellitus (30%), hypertension (28%) and Hypothyroidism (1.3%). CKD is associated with coronary artery disease (CAD) which is an independent risk factor and a leading cause of morbidity and mortality rate**. (Cai. Q. Mukku et al., 2013).**

3) HEMODIALYSIS AWARENESS QUESTIONS

Awareness of the procedure of Hemodialysis	
Yes	100%
No	0%
What is hemodialysis?	
Removal of unwanted toxins, waste products and excess fluids.	100 %
Increasing blood volume	0%
Increases the fluid volume in the kidney	0%
None of the above	0%
Duration of hemodialysis treatment	
1 – 4 Months	4.6 %
4- 8 months	0%
8– 12 months	0%
>1 year	95.4%
Frequency of dialysis	
Weekly once	2.6%
Weekly twice	85.6%
Weekly thrice	11.8%
Every month	0%

Table 2 – General hemodialysis questions

From the above table, it is clear that the subjects were aware of the hemodialysis procedure (100%). About 95.4% of total subjects were undergoing hemodialysis treatment for > 1 year followed by 4.6% of subjects were undergoing Hemodialysis for 1 – 4 months. About 85.6% of hemodialysis subjects were undergoing treatment twice a week, 11.8% of subjects for three times a week and 2.6% of subjects once a week.

4) FOOD FREQUENCY

Food groups	Weekly once	Weekly twice	Weekly thrice	Daily consumed	Rarely consumed	Never Consumed
Cereals	-	-	-	100%	-	-
Pulses	-	-	-	100%	-	-
Fruits	24.8 %	5.2%	21.6%	39.2%	3.3%	5.9%
Vegetables	3.3 %	4.6%	9.8%	82.4 %	-	-
Green leafy vegetables	7.8%	3.9%	-	-	3.3%	85.6%
Milk & milk products (curd, yoghurt etc.)	1.3%	1.3%	3.3%	91.5%	-	2.6%
Meat & meat products	52.9%	15.7%	7.8%	0.7%	-	22.9%
Nuts & seeds	12.4%	-	3.9%	6.5%	0.7%	76.5%
Eggs	12.4%	4.6%	15.7%	45.8%	0.7%	20.9%

Table 3 – Food Frequency

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From the above table, it is evident that, daily consumption of cereals and pulses is 100%. Daily consumption of fruits and vegetables were 39.2 % and 82.4 %. 91.5% of the subjects consumed milk and milk products daily. Meats were consumed daily by 0.7 % of the subjects. Daily consumption of nuts & seeds and eggs were 6.5% and 45.8%. 24.8 % and 3.3 % of the subjects consumed fruits and vegetables once a week. Green leafy vegetables were consumed by 7.8 % of the subjects once a week. 1.3% of the subjects consumed milk and milk products weekly once. Meat and meat products were consumed by 52.9%. 12.4 % of the subjects weekly once consumed nuts & seeds and eggs. 5.2 % and 4.6 % of the subjects consumed fruits and vegetables thrice a week. 3.9 % of the subjects consumed green leafy vegetables thrice a week. Meat and meat products were consumed by 15.7 % of the subjects three times a week. 4.6 % of the subjects consumed eggs three times a week.
3.3 % and 0.7 % of the subjects rarely consumed fruits and nuts & seeds. 3.3% of the Subjects rarely consumed green leafy vegetables and 0.7% of the subjects rarely consumed eggs. 85 % of the subjects did not consume green leafy vegetables due to its potassium rich content. 76.5 % subjects did not consume nuts and seeds as they are rich in phosphorous and potassium content. 20.9% and 22.9% of the subjects never consumed eggs and meat products. Fruits were not consumed by 5.9 % of the subjects. 2.6 % of the subjects did not consume milk and milk products.

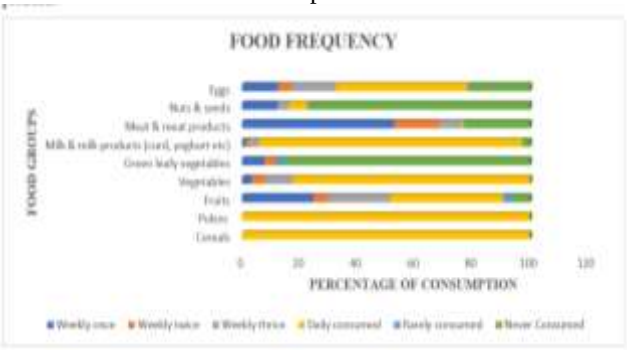

Fig. 4 Food Frequency

5) ASSOCIATION OF SUBJECTS FOLLOWING RESTRICTIONS POST DIETITIAN COUNSELLING (POTASSIUM RICH FOODS)

POTASSIUM FOODS	SIGNIFICANCE
Muskmelon	0.00
Pumpkin	0.972
Banana	0.718
Soy milk	-
Tender coconut	-
Potatoes	0.125

Table 4 – Statistical significance in Potassium rich foods

From the above table, the significance is calculated using SPSS Statistical analysis tool. The potassium rich foods were selected based on KDIGO guidelines 2020. Muskmelon had been avoided by the subjects due to its potassium content (p value – 0.00). Pumpkin, banana and potatoes was not statistically significant as they were consumed by the subjects due to individual preferences.
Tender coconut and soymilk values were computed as constant as all of the subjects did not consume due to its potassium content.

6) AWARENESS OF FLUID INTAKE:

Aware	93.5 %
Not aware	6.5%

Table 5 – Awareness of Fluid Intake in Hemodialysis subjects

The above table clearly states, 93.5% of the subjects were aware of the fluid intake and 6.5% of subjects were not aware of the fluid intake.

7) AWARENESS OF THE FOODS TO BE AVOIDED

CONSUMPTION OF FRIED FOODS	
Weekly once	11. 8 %
Never consumed	88.2 %
CONSUMPTION OF CARBONATED BEVERAGES	
Weekly once	6.3 %
Never consumed	93.5 %

Table 6 – Awareness of the foods to be avoided among HD subjects.

88.2 % of subjects did not consume fried foods due to its sodium content and 11.8% of the subjects consumed fried once a week. According to Jimena Rey et al., 2021, consumption of fried foods is associated with increased risk CKD associated CVD. 93.5% of the subjects did not consume carbonated beverages, whereas 6.3 % of the subjects consumed once a week.

8) FEEDBACK FORM

After assessing and educating the HD patients, feedback form was provided to the patients or the care taker. The feedback form questions consist of how effectiveness was the nutritional counselling.

Nutrition counselling	61.7% (very useful)
Helps to adhere food restriction	63.6% (yes)
Handout provided	58.4% (very useful)
Effectiveness of the nutrition therapy	61% (yes)

Table 7 - Feedback from the HD patients

61.7 % of Hemodialysis subjects found nutrition counselling very useful, whereas 38.3 % of subjects found the nutrition counselling less useful. 63.6 % of the subjects were able to adhere to food restrictions whereas 36.4 % of the subjects were not able to adhere to the food restrictions. The handout provided were very useful in 58.4% of the subjects, the remaining 41.6% found the handouts partially or less useful. 61% of the subjects felt the effectiveness of the nutritional therapy very useful and the 39 % of the subjects found less or partially effective.

IV. CONCLUSION

The present study summarizes on how various nutrients play an important role in Hemodialysis patients. Nutrition education in patients undergoing hemodialysis help in improving their nutritional knowledge. This study is evident that diet counselling helps in hemodialysis subjects to adhere to the food restrictions. Establishing rapport also helps in achieving individual nutrition goals.

In patients with hemodialysis, it is a challenging task to adhere to the restrictions and change to right choice of food. Difficulty of food consumption increases as the duration of dialysis increases. Therefore, the education of nutrition among Hemodialysis patients should be continued for better health outcomes.

V. LIMITATIONS

Few patients were not willing for the nutritional counselling session and others lost interest during the nutritional counselling session.

Assessing the nutritional awareness data from the patients was time consuming.

VI. SUGGESTION FOR FUTURE STUDIES

Educational pamphlets emphasizing on iron, vitamin B12 and magnesium can be provided to the hemodialysis patients in the upcoming research studies

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