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Effect of Dietary Counseling on Protein Energy Wasting in Hemodialysis Patients

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Abstract: *Protein Energy Wasting (PEW) is a state of decreased body stores of protein energy in the most advanced stages of chronic kidney disease maintaining hemodialysis. The main objective of this study is to assess the PEW in hemodialysis patients and to reduce the mortality rate and to improve the patient quality of life by providing dietary counselling through information leaflets. It is a hospital based concurrent interventional study was conducted for a period of six months on 60 hemodialysis patients having PEW in chronic renal failure condition. Patient demographics and laboratory data like Albumin, Cholesterol, BMI, Hemoglobin, Muscle mass was periodically collected and reviewed. Patient information leaflets, diet chart was provided along with counselling at baseline and during follow-ups. These study results were analyzed by descriptive statistical analysis like Student t-test to find out the significance of study parameters at baseline and follow-ups. The parameters like Albumin, Cholesterol, BMI, Hemoglobin, Muscle mass were increased after providing nutritional counselling in CKD patients. Finally it was concluded that, Patients undergoing hemodialysis are at high risk for developing PEW. Early detection and conducting effective dietary counselling was found to be more effective and beneficial for CKD patients in reducing the risk of PEW.*

Keywords: *Chronic kidney disease (CKD) ,Hemodialysis(HD) ,Protein Energy Wasting(PEW)*

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I. Introduction

Chronic kidney disease, also known as chronic renal insufficiency, progressive kidney disease, or nephropathy, is defined as the presence of kidney damage or decreased glomerular filtration rate for 3 months or more. Generally, CKD is a progressive decline in kidney function (a decline in the number of functioning nephrons) that occurs over a period of several months to years.(1) Chronic kidney disease (CKD), often leading to a gradual and irreparable loss of renal function, is common enough to be considered a worldwide public health threat.(2) Long relatively unnoticed, the worldwide trend of increasing body weight, hypertension and insulin resistance in the population has been followed by a similar but delayed increase in CKD prevalence (3).

Patients who progress to ESRD require renal replacement therapy (RRT). The modalities that are used for RRT are dialysis, including HD and peritoneal dialysis (PD), and kidney transplantation.

In medicine, **dialysis** (from Greek "dialusis", meaning dissolution, "dia", meaning through, and "lysis", meaning loosening) is a process for removing waste and excess water from the blood, and is primarily used to provide an artificial replacement for lost kidney function in people with renal failure. Dialysis may be used for those with an acute disturbance in kidney function (acute kidney injury, previously acute renal failure) or for those with progressive but chronically worsening kidney function–a state known as chronic kidney disease stage 5 (previously chronic renal failure or end-stage kidney disease).(4)

Protein requirement increases due to the dialysate losses and catabolism in hemodialysis patients. In research, it is emphasized that the inadequate protein intake increases mortality. The net effect of hemodialysis is loss of nitrogen in skeletal muscle. Protein synthesis and degradation increases by 50-100% of normal values. Hemodialysis causes to increase in catabolic indicators such as interleukin-1 (IL-1), interleukin-6 (IL-6) and tumor necrosis factor alpha (TNF-α). This increasing in the production of cytokines causes in protein degradation.Reasons for increased protein requirement; amino acid losses into the dialysate, increased protein catabolism, metabolic and hormonal changes. There are 0.2-0.3 g/kg or 6-8 g/day of protein, amino acids (aa) and peptide losses with the dialysis fluid during hemodialysis. Protein catabolism increases with these losses

due to metabolic disorders. According to ESPEN, adjusted diet protein should be consumed as 1.1-1.2 g / kg / day and should be high in the biological value (of animal origin) of 50 % protein in hemodialysis patients.[5]
With the start of dialysis, some of these abnormalities are improved, but others remain or worsen, while new factors also likely contribute to increase the prevalence of malnutrition and protein-energy wasting (PEW) in this population.[6]

As protein wasting and energy wasting may occasionally occur separately from each other, the term 'protein wasting' or 'energy wasting' may be used to indicate the isolated occurrence of only one of these phenomena. In recent times, the word 'cachexia' has been suggested as a term to denote PEW included in the setting of kidney disease.The ISRNM(International Society for Renal Nutrition and Metabolism) expert panel has suggested the use of cachexia for a severe form of protein-energy wasting. Cachexia refers to a very severe form of PEW, often associated with profound physiological, metabolic, psychological, and immunological disorders. The difference in PEW compared to cachexia is that the latter encompasses only severe forms of metabolic depletion, whereas, PEW can refer to mild degrees of depleted protein and energy mass.[7] The net protein breakdown has been related to ;(1) An absolute decline in amino acid levels due to dialysis losses (2) Imbalances in amino acid levels.(3) Activation of the inflammatory cascade.[8] In addition, decreased functional capacity due to metabolic stresses is often present. Also, the described state is not merely caused by an inadequate dietary intake, but rather the result of disease processes such as acidosis[9,10] inflammation-driven catabolism[11], nutrient losses in the dialysate[12,13] along with endocrine disturbances, such as hyperparathyroidism[14], hyper-glucagonemia[15] and peripheral insulin resistance [16].
Fortunately, concurrent amino acid supplementation can prevent or reverse these adverse effects in HD patients, providing an opportunity for the treatment of PEW[8]

he diagnostic criteria for PEW (proposed by ISRNM) fall into four distinct categories. They are:
(1) Biochemical criteria which includes:
a.Serum albumin <3.8g/dl(3.5-5.0g/dl),
b.Prealbumin/transthyretin <30mg/dl(16-40mg/dl)
c.Serum cholesterol <100mg/dl
(2) Body mass which includes**:**
a.Body mass index <23kg/m^2
b.Non-intentional weight loss of >5% of weight in 3 months or 10% in 6 months. **c.**Body fat <10% of body mass
(3) Muscle mass which includes
a.Muscle mass loss >5% in 3 months or >10 % in 6 months
b.Decrease of the muscle area of the arms >10 % in relation to the 50th percentile of the reference population.
c.Generation/occurrence of creatinine.
(4) Dietary intake includes:
a.Protein intake measured by the protein catabolism rate <0.8g/kg/day in dialysis or <0.6g/kg/day in patients with stages 2-5 CKD
b.Calculated energy wasting <25kcal/kg/day for at least 2months.
At least 3 of the 4 listed categories (and at least 1 test result in each of the selected categories) must be satisfied for the diagnosis of CKD-related PEW.[7]

II. Aim & Objectives

Aim:
To find out the effect of dietary counseling on reducing Protein Energy Wasting (PEW) in hemodialysis patients.
Objectives:
- ✓ To assess the PEW in hemodialysis patients.
- ✓ To improve the patients health condition and reduces the disease severity.
- ✓ Patients who are maintaining hemodialysis, in order to reduce the PEW and to improve the quality of life.
- ✓ Providing patient counseling through leaflets and oral counseling.
- ✓ To reduces the hospitalization rate.
- ✓ To publish results in plan of work.

III. Research Methodology

- **Study Design:** A hospital based Concurrent interventional study.
- **Study Site (Dialysis Unit):** Dialysis department of Rajiv Gandhi institute of medical science (RIMS), Kadapa. (A 750 bedded multidisciplinary tertiary care teaching hospital).
- **Study Duration:** 6 months study**.**

- **Sample Size:** Approximately 60.
- **Study Population:** Hemodialysis patients.
- **Patient Enrollment:** Patients were enrolled in the study based on inclusion and exclusion criteria.

Inclusive criteria:
1. CKD Patient who were willing to participate in the study.
2. Patients who were undergoing hemodialysis regularly
3. Patients of age groups between 25 to 75 years with both genders.

Exclusive criteria:
1. CKD Patients who were not willing to participate in this study.
2. Patients with acute inflammatory illness. Ex: AIDS, active hepatitis B or C Malignancy.
3. Patients of age less than 25 years.

Ethical approval:

This study got approval from Institutional Review Board, P.Rami Reddy Memorial College of Pharmacy,Kadapa.(PRRMCP/IRB/2016/003)

Statisticalmethod: Student t-test was used for analyzing the data. For calculating Mean, Standard deviation, Percentage difference, and Averages in Ms excel sheet were used.
Graph pad prism software was applied to analyze the data.

IV. Materials

1. Patient data collection form (Annexure-I):
A well structured patient data collection sheet was prepared and in which patient details was recorded.
2. Patient inform consent form (Annexure-II):
The details of the patient and laboratory parameters were collected after inform consent taken from the patient.
3. Questionarrie form (Annexure-III)
4. Dietary chart for hemodialysis patients (Annexure-IV).

V. Method

We had collected the demographic details of chronic kidney disease patients who are admitted in hemodialysis department. After collecting the patient demographic details, we were diagnose the severity of protein energy wasting(PEW) in Hemodialysis patients by using the 4 main categories recognized for the diagnosis of PEW by ISRNM (International Society of Renal Nutrition and Metabolism).Each criteria should be documented on at least 3 occasions, preferably 2-4 weeks apart. After finding the severity of the PEW by using the specific criteria, patient counseling was given regarding the nutritional requirements in CKD. Finally the effect of patient counseling on PEW status was assessed once again by using the criteria's in order to find out the positive effects of patient counseling on reducing the severity of Protein Energy Wasting.

And follow-ups was done on every 45days for assessing the reduction of protein energy wasting and at each hemodialysis of the patient and then patient counseling was provided.

VI. Results

A total of 60 subjects were recruited for our study as per eligibility criteria after obtaining inform consent form (ICF). We have screened 80 dialysis patients to recruit 60 study subjects (Patients) in Dialysis department. The demographic parameters of the study patients were collected through a structured data collection form.

- **Gender wise distribution:** Out of 60 patients, 44(73.34%) were males and 16(26.66%) were females.
- **Age wise distribution:** Out of 60 Patients, 11(18.34%) were from the age group of years 25-35, 18(30%) were from 36-45, 18(30%) were from 46-55 and 13(21.66%) were from 56-65.
- **Disease wise distribution:** Out of 60 Patients, 15(25%) patients with only CKD, 35(58.33%) patients were having CKD WITH HTN, 3(5%) were from CKD WITH DM and 7(11.67%) were from CKD WITH HTN WITH DM.
- **Dialysis visit wise distribution:** Out of 60 Patients, 26 patients were attending for dialysis twice in a week and 34 were attending thrice in a week.
- **Hemoglobin wise distribution:** Out of 60 Patients, 14(23.33%) patients were having 5-7.0 g/dl Hemoglobin levels, 39(65%) were having 7.1-9 .0g/dl, 6(10%) were having 9.1-11.0 g/dl and 1(1.67%) were having 11.1-13.0 g/dl.

Patient Distribution Based On Albumin Level

Out of 60 Patients, In Baseline, 16(26.67%) patients were having 2-3g/dl albumin levels, 43(71.66%) were having 3-4 g/dl and 1(1.67%) were having 4-5 g/dl. In Follow up-1, 6(10%) were having 2-3 g/dl, 50(83.33%) were having 3-4 g/dl, 4(6.67%) were having 4-5 g/dl. In Follow up-2, 2(3.33%) were having 2-3 g/dl,49(81.67%) were having 3-5 g/dl, 9(15%) were having 4-5 g/dl. In Follow up-3, 1(1.67%) were having 2-3 g/dl, 37(61.67%) were having 3-4 g/dl, 22(36.66%) were having 4-5 g/dl albumin levels. It is represented in

Table 1 and Fig. 1

Table No.1: Patient Distribution Based On Albumin Level

S.No.	Albumin Levels	No. Of Patients			
		Baseline	Follow Up-1	Follow Up-2	Follow Up-3
1	2-3	16(26.67)	6(10)	2(3.33)	1(1.67)
2	3-4	43(71.66)	50(83.33)	49(81.67)	37(61.67)
3	4-5	1(1.67)	4(6.67)	9(15)	22(36.66)
4	**Total**	**60(100)**	**60(100)**	**60(100)**	**60(100)**

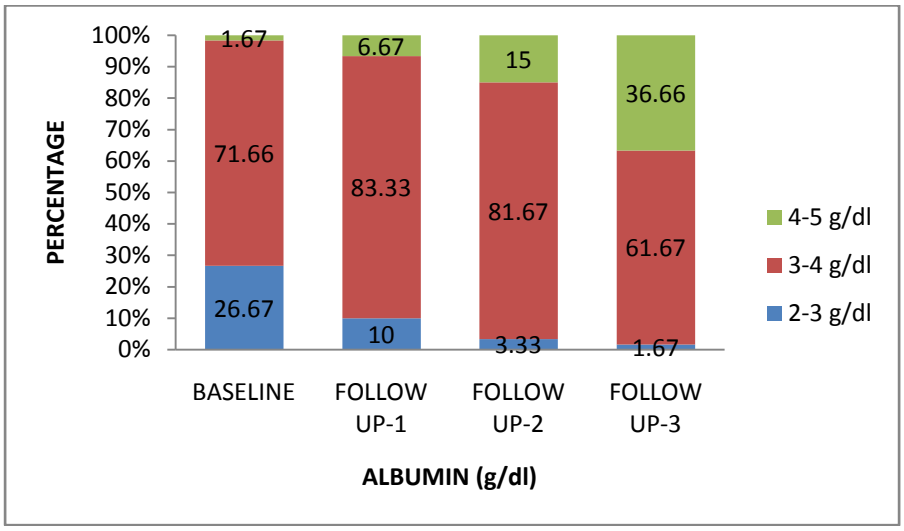

Fig. No. 1: Patient Distribution Based On Albumin Level

Patients Distribution Based On Chloesterol Level

Out of 60 Patients, In Baseline, 20(33.33%) patients were having 80-110mg/dl cholesterol levels, 35(58.34%) were having 110-140mg/dl and 5(8.33%) were having 140-170mg/dl. In Follow up-1, 17(28.33%) were having 80-110 mg/dl, 37(61.67%) were having 110-140 mg/dl, 6(10%) were having 140-170 mg/dl. In Follow up-2, 10(16.67%) were having 8-110 mg/dl, 39(65%) were having 110-140 mg/dl, 11(18.33%) were having 140-17mg/dl. In Follow up-3, 5(8.33%) were having 80-110 mg/dl, 38(63.33%) were having 110-140 mg/dl, 17(28.34%) were having 140-170 mg/dl cholesterol levels. It is represented in **Table 2 and Fig. 2**

Table No.2: Patient Distribution Based On Cholesterol Level

S.No.	Cholesterol	No.Of Patients			
		Baseline	Follow Up-1	Follow Up-2	Follow Up-3
1	80-110	20(33.33)	17(28.33)	10(16.67)	5(8.33)
2	110-140	35(58.34)	37(61.67)	39(65)	38(63.33)
3	140-170	5(8.33)	6(10)	11(18.33)	17(28.34)
4	**Total**	**60(100)**	**60(100)**	**60(100)**	**60(100)**

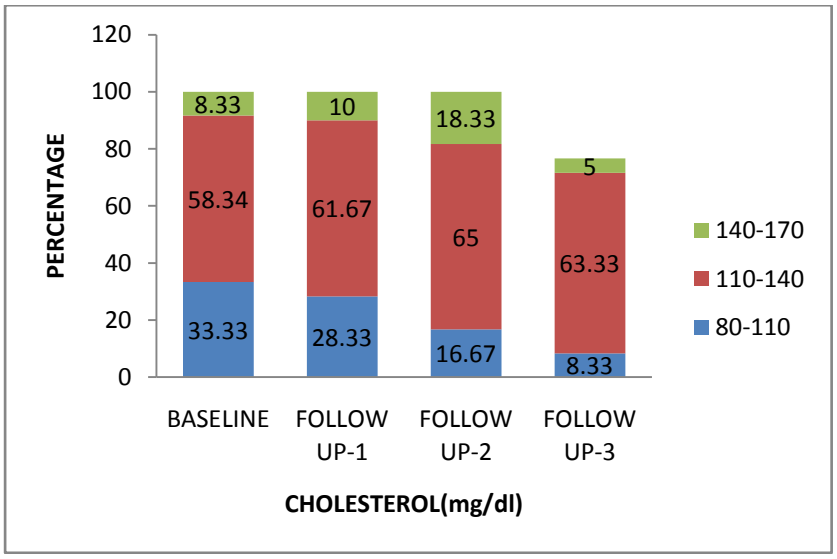

Fig. No.2: Patient Distribution Based On Cholesterol Level

Patients Distribution Based On Bmi Level

Out of 60 Patients, In Baseline, 14(23.33%) patients were having 15-20 kg/m^2 BMI levels, 43(71.66%) were having 20-25 kg/m^2 and 3(5%) were having 25-30 kg/m^2. In Follow up-1, 8(13.33%) were having 15-20 kg/m^2, 49(81.67%) were having 20-25 kg/m^2, 3(5%) were having 25-30 kg/m^2. In Follow up-2, 8(13.33%) were having15-20 kg/m^2,41(68.34%) were having 20-25 kg/m^2, 11(18.33%) were having 25-30 kg/m^2. In Follow up-3, 3(5%) were having15-20 kg/m^2, 42(70%) were having 20-25 kg/m^2, 15(25%) were having 25-30 kg/m^2 BMI levels. It is represented in ***Table* 3 and *Fig. No:3.***

Table No.3: Patient Distribution Based On BMI Level

S.No.	Bmi	No. Of Patients			
		Baseline	Follow Up-1	Follow Up-2	Follow Up-3
1	15-20	14(23.33)	8(13.33)	8(13.33)	3(5)
2	20-25	43(71.67)	49(81.67)	41(68.34)	42(70)
3	25-30	3(5)	3(5)	11(18.33)	15(25)
4	**Total**	**60(100)**	**60(100)**	**60(100)**	**60(100)**

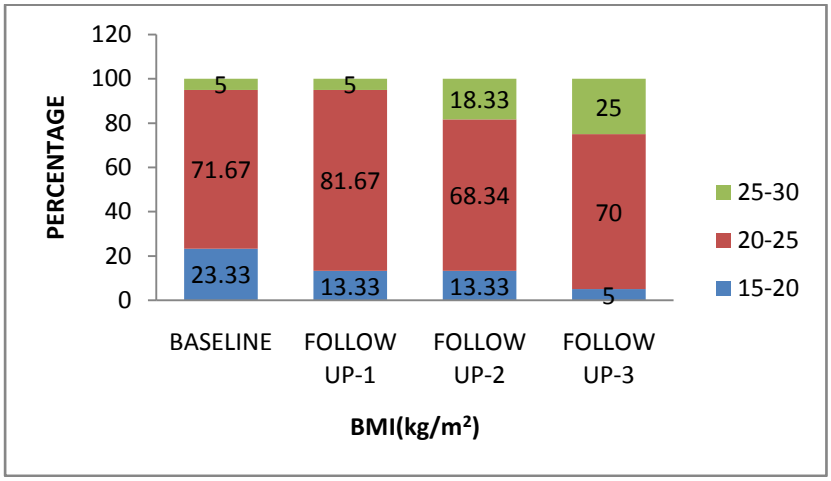

Fig.No.3: Patient Distribution Based On BMI Level

Patients Distribution Based On Muscle Mass Level

Out of 60 Patients, In Baseline, 35(58.34%) patients were having 8-11 mm Muscle Mass levels, 23(38.33%) were having 12-15 mm and 2(3.33%) were having 16-19 mm. In Follow up-1, 21(35%) were having 8-11 mm, 35(5.33%) were having 12-15 mm, 4(6.67%) were having 16-19 mm. In Follow up-2, 8(13.33%) were having8-11 mm,39(65%) were having12-15 mm, 13(21.67%) were having 16-19 mm.

In Follow up-3, 3(5%) were having8-11 mm, 38(63.33%) were having 12-15 mm, 19(31.65%) were having16-19 mm Muscle Mass levels. It is represented in ***Table 4* and fig *.no.4.***

Table No. 4: Patient Distribution Based On Muscle Mass Level

S.No	Muscle Mass	No. Of Patients			
		Baseline	Follow Up-1	Follow Up-2	Follow Up-3
1	8-11	35(58.34)	21(35)	8(13.33)	3(5)
2	12-15	23(38.33)	35(5.33)	39(65)	38(63.33)
3	16-19	2(3.33)	4(6.67)	13(21.67)	19(31.67)
4	**Total**	**60(100)**	**60(100)**	**60(100)**	**60(100)**

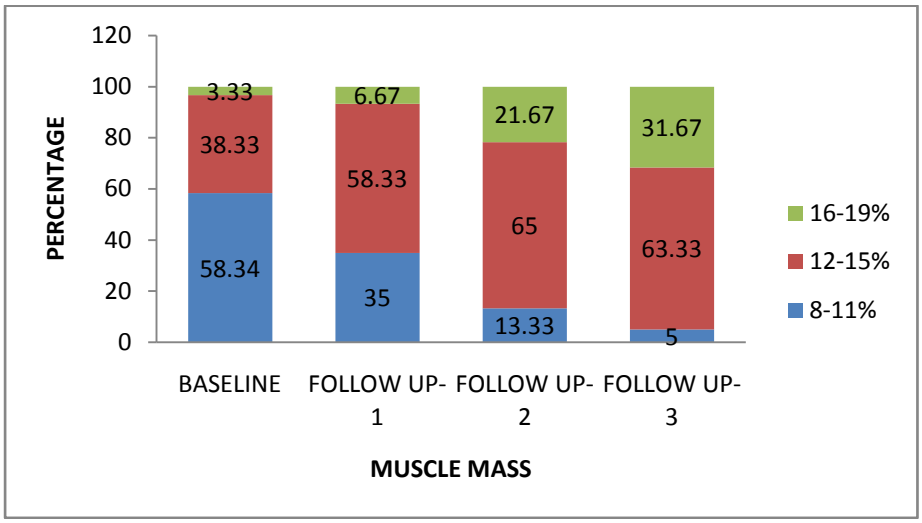

Fig. No.4: Patient Distribution Based On Muscle Mass Level

PEW assessment parameters and follow up details:

S.No.	Values	Albumin		Cholesterol		Bmi		Muscle Mass	
		Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	**Average**	**3.27**	**4.03**	**116.55**	**133**	**21.58**	**27.12**	**11.1**	**14.78**
2	**P-Value**	**<0.0001**							

Table No.5: PEW assessment parameters and follow up details

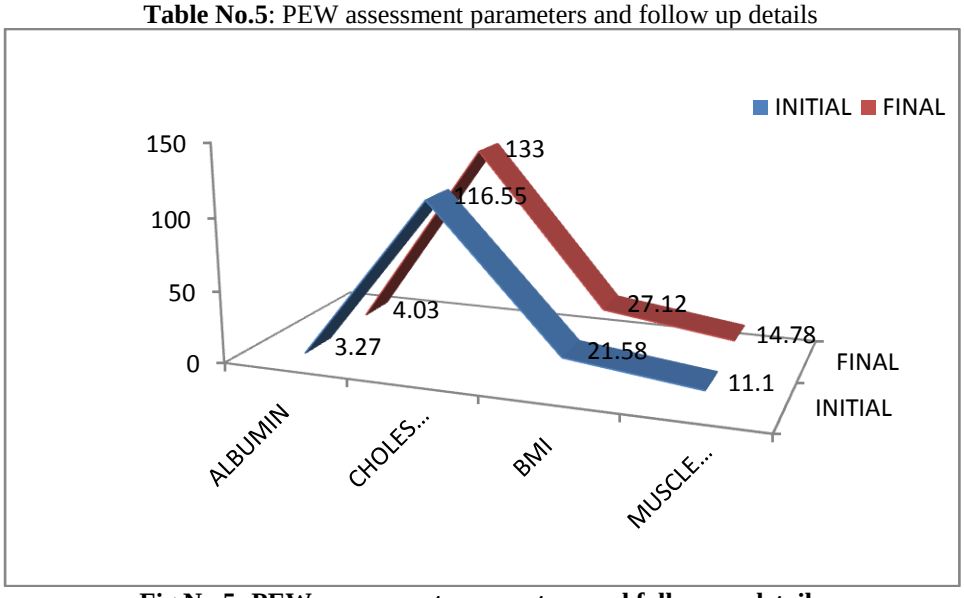

Fig.No.5: PEW assessment parameters and follow up details

VII. Discussion

Nutritional health is one of the most importance considerations in patient with CKD (Chronic Kidney Diseases). Advanced kidney and renal replacement therapy lead to a number of metabolic and nutritional dearrangement, which can be termed as PEW (Protein Energy Wasting) of chronic kidney diseases. PEW Characterized by a decline in body protein mass, energy reserves, including muscle and fat wasting & vascular protein pool concentration, is an underappreciated condition in early to moderate stage of CKD & strong predictor of adverse outcome. Patient undergoing HD (Hemodialysis) commonly develop PEW, which is associated with poor survives Dialysis remove protein waste accumulated in the blood some important Amino acids are removed during dialysis & these a higher protein intake is needed to replace the lost protein. Nutritional support, counseling and regular follow up helps to improve the clarions and protein intake in CKD patient monitoring HD and reduces the morbidity and mortality and this was supported by **Cheenam B et al.,** In our study, we had recruited Hemodialysis patient based on inclusion & exclusion criteria. Out of 60 HD patient's 44(73.64%) patients accounted as Males & 16 (26.6%) was Females from this study we concluded that males are more vulnerable to hemodialysis when compared to female is supported by **Wian A.A et al.** Out of 60 patient, 11 (18.34%) were from the age group 25-35yrs, 18 (30%) were from 36-45yrs, 18 (30%) from this study we concluded that the elderly age group patient were more prone to the CKD due to the decline in the GFR with ageing is universally accompanied by changes in renal structure which is supported by **Eman Shokry et al.**

Out of 60 patient, 15(25%)patients with only Chronic kidney disease (CKD),35(58.33)patient were having chronic kidney disease(CKD)with Hypertension (HTN),3(5%)were having CKD with(DM) diabetic mellitus and 7%(11.67%) were having CKD with HTN with DM .This data shows that HTN is the major risk factor for causing chronic kidney failure .From the study we concluded that the leading cause for hemodialysis are HTN (58.33%) and HTN+DM (11.67%) is supported by **Ahmed Zahran et.al.** We have estimated serum albumin level by collecting a blood samples from the hemodialysis patient periodically (i.e., every 45 days) and provided patient counseling regarding the nutritional diet alternatively. Average albumin levels at base line was 3.27 follow up-1 was 3.50, follow up-2 was 3.75, follow up-3 was 4.03, which happened in 6 months duration with extremely statistical significant **(P<0.0001)** is supported by **Neha Srivasatava et .al.**

Serum cholesterol levels was estimated by collecting a blood samples from the hemodialysis patient periodically (i.e., every 45 days) and provided nutritional counseling in order to reduce the PEW (Protein energy wasting). Average base line was 116.55, follow up-1 was 121.95, follow up-2 was 126.83, follow up-3 was 133, which was happened in 6 month duration of study with extremely statistical significance **(P<0.0001)**. By improving the serum albumin and cholesterol levels. We can reduce the risk of protein energy wasting (PEW) and improve the patients quality of life which is supported by **Neha Srivasatava et .al.** Reduced muscle mass appear to be most valid criterion for the presence of PEW in Chronic kidney disease. In our study we used skinfold caliper instrument for the measuring of muscle mass in hemodialysis patient .We concluded that providing nutritional counseling in CKD patients shows gradually improvement in the muscle mass. Average muscle mass levels at base line was 11.1, follow up-1 was 12.26, follow up-2 was 13.53, follow up-3 was 14.78 with extremely statistical significance **(P<0.0001)** which is supported by **Neha Srivasatava et.al**

In this study, it was showed that the Body Mass Index (BMI) was significantly lower in patient with CKD at initial follow-ups. The reduced Body mass index value in CKD patients might be due to changes in fat mass, muscle mass or extracellular fluid. After providing the dietary counseling ,improvement in their BMI value was observed as fallows ,average BMI levels at base line was 21.58,follow up-1 was 22.28, follow up-2 was 22.97, follow up-3 was 27.12 with extremely statistical significance **(P <0.0001)** which is supported by **Mette Koefoed et.al.**

In this study we assessed the nutritional status of CKD patient on HD by the use of different nutritional assessment methods which includes biochemical parameters, body mass, muscle mass, BMI and dietary intake, established by ISRNM expert panel. After dietary intervention and nutritional support to CKD patients, we observed improvement in serum albumin, serum cholesterol, muscle mass, bodyweight, and BMI value, which indirectly shows the risk of PEW was reduced in this CKD patients maintaining hemodialysis with statistical significance difference (p=<0.001) which happened in 6 months duration which proves that the importance of patient education/counseling in reducing PEW in CKD patients under hemodialysis.

VIII. Conclusion

Protein Energy Wasting (PEW) is common in CKD patients associated with adverse outcome. The importance of patient education/counseling, Dietary interventions and Nutritional support seem to be effective in reducing& improving the outcome of PEW in CKD patients under hemodialysis. Patient's with CKD should be assessed periodically for the presence of PEW and should be offered oral Nutritional support when ever required. Providing meals or oral nutritional supplement and other nutritional interventions to the patient with

CKD is the most processing way to increase serum albumin concentration and improve longevity and quality of life in this patient Population.

References

[1]. Renal failure: Its treatment in current systems of medicines by Dr. Mansoor Ahmad. Pg.no.25, 26, 107-110.
[2]. Levey AS, Coresh J, Balk E, Kausz AT, Levin A, Steffes MW, et al. National Kidney Foundation practice guidelines for chronic kidney disease: evaluation, classification, and stratification. Ann Intern Med. 2003; 139(2):137-47.
[3]. Ruan X, Guan Y. Metabolic syndrome and chronic kidney disease. J Diabetes. 2009;1(4):236-45.
[4]. Pendse S, Singh A, Zawada E. Initiation of Dialysis. In: Handbook of Dialysis. 4th edition, New York, NY; 2008:14–21
[5]. F. Esra Gunes-Medical Nutrition Therapy for Hemodialysis Patients.
[6]. Carrero JJ, Stenvinkel P, Cuppari L, Ikizler TA, Kalantar-Zadeh K, Kaysen G, et al. Etiology of the protein-energy wasting syndrome in chronic kidney disease: a consensus statement from the International Society of Renal Nutrition and Metabolism (ISRNM). J Ren Nutr. 2013; 23(2):77-90.
[7]. Yashpal P. Jadeja et al., Protein energy wasting in chronic kidney disease: An update with focus on nutritional interventions to improve outcomes. Indian Journal of Endocrinology and Metabolism / Mar-Apr 2012 / Vol 16 | Issue 2 pg.no:247-257.
[8]. Kosaku Nitta et al., Recent advances in the pathophysiology and management of protein-energy wasting in chronic kidney disease. Nitta and Tsuchiya Renal Replacement Therapy (2016) 2:4, Page 1-12
[9]. Bailey JL, Wang X, England BK, Price SR, Ding X, Mitch WE. The acidosis of chronic renal failure activates muscle proteolysis in rats by augmenting transcription of genes encoding proteins of the ATP-dependent ubiquitin- proteasome pathway. J Clin Invest. 1996;97(6):1447-53.
[10]. Kalantar-Zadeh K, Mehrotra R, Fouque D, Kopple JD. Metabolic acidosis and malnutrition-inflammation complex syndrome in chronic renal failure. Semin Dial. 2004; 17(6):455-65.
[11]. Grodstein GP, Blumenkrantz MJ, Kopple JD. Nutritional and metabolic response to catabolic stress in uremia. Am J Clin Nutr. 1980; 33(7):1411-6.
[12]. Wolfson M, Jones MR, Kopple JD. Amino acid losses during hemodialysis with infusion of amino acids and glucose. Kidney Int. 1982; 21(3):500-6.
[13]. Ikizler TA, Flakoll PJ, Parker RA, Hakim RM. Amino acid and albumin losses during hemodialysis. Kidney Int. 1994; 46(3):830-7.
[14]. Kopple JD, Cianciaruso B, Massry SG. Does parathyroid hormone cause protein wasting? Contrib Nephrol. 1980; 20:138-48.
[15]. Sherwin RS, Bastl C, Finkelstein FO, Fisher M, Black H, Hendler R, et al. Influence of uremia and hemodialysis on the turnover and metabolic effects of glucagon. J Clin Invest. 1976; 57(3):722-31.
[16]. Mak RH. Insulin resistance but IGF-I sensitivity in chronic renal failure. Am J Physiol. 1996; 271(1 Pt 2):F114-9.
[17]. Neha Srivastava et al., Protein energy wasting in chronic kidney patients: A hospital based study. Indian J.Prev.Soc.Med.Vol.43 No.4,2012, Pg.no:389-395.
[18]. Cheenam B et al., Dietary intervention and protein supplementation in chronic kidney disease patients undergoing hemodialysis. Asian J Pharm Clin Res, vol 8, issue 4, 2015. Pg. no: 230-232.
[19]. Eman Shokry Abd Allah et al., Effect of Diet Therapy Program on Dietary Knowledge and Practice of Elderly Patients on Regular Hemodialysis. American Journal of Nursing Science. Vol. 4, No. 3, 2015, pp. 131-137.
[20]. Mette Koefoed et al., Nutritional Status of Maintenance Dialysis Patients: Low Lean Body Mass Index and Obesity Are Common, Protein-Energy Wasting Is Uncommon. Journal pone.0150012 February 2016. Pg.no

Dietary Chart(As Per 100gms)

The Requirement of proteins in Hemodialysis patients is 77 to 105gms/day.

DAYS	MORNING (Break fast) (7:30 AM- 10-30 AM)	AFTERNOON (Lunch) (12-30 to 5-00pm)	NIGHT(Dinner) (7-30 to 9-30pm)
SUNDAY Totalproteins-100.86gms Total energy-403.44kcal	1.MILK(150ml)5.2gms(20.8kcal) 2.ALMONDS(4)1.4gms(5.6kcal) 3.DOSA(2) 200gms10.6gms (40.24kcal) 4.EGG (2)-13.3gms (53.2kcal)	5. RICE-2.7gms (10.8kcal) 6.MEAT CARRI-37 gms (133.6 kcal) (Cardamon,Coriandерseeds,Garlic,Tomato, Onion) 7.PAPAYA- 10 Peases 0.6gms (2.4kcal) 8.CURD -3.1gms (12.4kcal).	9. WHEAT FLOUR-11.3gms (45.2kcal) 10.FENUGREEKLEAVES-3.2gms (12.8kcal) 11.RICE- 1 CUP-(2.7gms) (10.8kcal) 12.CURD-1CUP (3.1gms) (12.4kcal)
MONDAY Totalproteins-104.7gms Total energy-418.8kcal	1.ALMONDS (4)-1.4gms(5.6kcal) 2. EGG(2)-13.3gms (53.2kcal) 3.MILKGLASS(150ml)5.2gms (20.8kcal) 4.IDLY(4) -16gms (64 kcal)	5.RICE -2.7gms (10.8kcal) 6.RED LENTILS- 25.1gms (100.4kcal) 7.DRY PEA -19.7gms (78.8kcal) 8.CURD -3.1gms (12.4kcal) 9.APPLE – 1 (0.2gms) (0.8kcal)	10. WHEAT -2ROTI (11.3gms) (45.2kcal) 11.AMARANTH LEAVES-4gms (16kcal) 12.RICE-2.7 gms (10.8kcal)
TUESDAY Totalproteins-90.5gms	1.ALMONDS (4)-1.4gms(5.6kcal) 2. EGG(2)-13.3gms (53.2kcal) 3.MILK(150ml)-5.2gms(20.8kcal)	5.RICE-2.7gms (10.8kcal) 6. FINGER MILLET -7.7gms (30.8kcal) 7 . GREEN GRAM -24.5gms (98kcal) 8.CARROT -2gms (8kcal)	11.SORGHUM -11.3gms (45.2kcal) 12.RICE -2.7gms (10.8kcal) 13.CURD -3.1gms (12.4kcal)

Total energy-362kcal	4.WHEAT-11.3gms (45.2kcal)	9. APPLE -0.2gms (0.8kcal) 10. CURD -3.1gms (12.4kcal)	14.SPINACH-2gms (4kcal)
WEDNESDAY Totalproteins-105gms Total energy-420kcal	1.MILK(150ml)-5.2gms (20.8kcal) 2.DATES-1.2gms (4.8kcal) 3. EGG(2)-13.3gms (53.2kcal) 4. IDLY(4) -16gms (64 kcal)	5. RICE-2.7gms (10.8kcal) 6. LADIES FINGER -1.9gms (7.6kcal) 7. SOYA BEENS(50gms)-21.8gms (87.2kcal) 8. ONION-1.2gms (4.8kcal) 9. CURD -3.1gms (12.4kcal) 10.SAPOTA -0.7gms (2.8kcal)	11. SORGHUM -11.3gms (45.2kcal) 12.BENGAL GRAM -20.8gms (83.2kcal) 13.RICE -2.7gms (10.8kcal) 14.CURD -3.1gms (12.4kcal)
THURSDAY Totalproteins-93.9 gms Total energy-375.6 kcal	1.MILK(150ml)-5.2gms (20.8kcal) 2.DATES-1.2gms (4.8kcal) 3. EGG(2)-13.3gms (53.2kcal) 4. WHEAT-11.3gms (45.2kcal)	5. RICE-2.7gms (10.8kcal) 6. CAULIFLOWER -2.6gms (10.4kcal) 7. PEA DRY -19.7gms (78.8kcal) 8.FISH -17gms (68kcal) 9. GUAVA -1.8gms (7.2kcal)	10. WHEAT FLOUR -11.3gms (45.2kcal) 11. CARROT-2gms (8 kcal) 12.RICE -2.7gms (10.8kcal) 13.CURD -3.1gms (12.4kcal)
FRIDAY Totalproteins-89gms Total energy-356 kcal	1.MILK(150ml)-5.2gms (20.8kcal) 2.DATES-1.2gms (4.8kcal) 3. EGG(2)-13.3gms (53.2kcal) 4..URAD DAL -24gms (96kcal)	5. RICE-2.7gms (10.8kcal) 6.RED GRAM -22.3gms (89.2kcal) 7.CABBAGE -1.8gms (7.2kcal) 8.CURD -3.1gms (12.4kcal) 9.SAPOTA -0.7gms (2.8kcal)	10. RAGI FLOUR -7.7gms (30.8kcal) 11.RICE -2.7gms (10.8kcal) 12.CURD -3.1gms (12.4kcal) 13.ONION-1.2gms (4.8kcal)
SATURDAY Totalproteins-105.5gms Total energy-422kcal	1.MILK(150ml)-5.2gms (20.8kcal) 2.DATES-1.2gms (4.8kcal) 3. EGG(2)-13.3gms (53.2kcal) 4.GREENGRAM 24.5gms(98kcal)	5. RICE-2.7gms (10.8kcal) 6. FINGER MILLET7.7gms (30.8kcal) 7.RED GRAM -22.3gms (89.2kcal) 8.BRINJAL-1.4gms (5.6kcal) 9. CURD -3.1gms (12.4kcal) 10.GUAVA -1.8gms (7.2kcal)	11. SORGHUM -11.3gms (45.2kcal) 12.FENUGREEKLEAVES3.2gms (12.8kcal) 13. RICE -2.7gms (10.8kcal) 14.CURD -3.1gms (12.4kcal) 15.CARROT-2gms (4kcal)

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Dr.S.Parveen "Effect of Dietary Counseling on Protein Energy Wasting in Hemodialysis Patients." IOSR Journal of Pharmacy and Biological Sciences (IOSR-JPBS) 13.1 (2018): 51-59.