

Impact of Corrected Medical Nutrition Therapy on Malnourished Peritoneal Dialysis Patients

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Abstract: Nutritional needs for patients on Peritoneal dialysis are different from those of normal population. As such dietary factors play an important component in the treatment of patients with kidney diseases. To study the impact of diet, sixty-eight patients with diabetes who shifted from hemodialysis to CAPD/APD were randomly selected from various hospitals and clinics in Hyderabad. Diet followed during hemodialysis and the blood profile was recorded. Diet Modifications are made as per blood profile. Hemoglobin, BP and fasting glucose levels were done monthly on the spot. Creatinine, urea, hemoglobin, potassium, urea, sodium, phosphorous was taken from the laboratory data. Diet, exercise and PD made significant impact on blood profile. Hemoglobin increased from 9.66 to 12.7mg/dl, creatinine reduced from 9.66 to 3.9 mg/day Urea from 138 to 57mg and fasting glucose from 187 to 107mg/dl.

Keywords: Peritoneal dialysis, chronic kidney diseases, medical nutrition therapy, hemodialysis, blood profile

1. Introduction

Assessing nutritional needs and designing modifications among chronic kidney disease patients are different from those of normal population. Estimation of nutrient requirement mandates a thorough understanding of the various physiological and pathological conditions. It is a challenging task. (1). Malnutrition in renal failure is a multifactorial but inadequate oral intake is a major contributing factor (2, 3) Nutritional status can be highly variable in geriatric population, menopausal women, patients who suffer from either acute or chronic renal pathology and as such their requirements have to be estimated on an individual basis (4, 5, 6, 7, 8, 9). The etiology of chronic kidney diseases varies considerably throughout India, with part of the states of undivided Andhra Pradesh, Odisha and Goa having high levels of chronic kidney diseases of unknown etiology (10) One Lakh twenty thousand patients are reported to be on dialysis of them around 85000 patients are on continuous peritoneal ambulatory dialysis (CAPD) and the rest are on Hemodialysis (11). Diet plays an important role if not properly monitored they may turn up with malnutrition especially anemia and calcium deficiency (12). There are studies on hemodialysis and diet but on corrected MNT diet on peritoneal dialysis are scanty. This study aims in studying the impact of diet for effective management of CAPD and APD patients with diabetes.

2. Methodology

Diabetic patients on hemodialysis (HD) shifting to CAPD were listed from hospitals and clinics in Hyderabad. Sixty-eight patients were randomly selected. Pregnant, lactating women and those with co morbidities were excluded. Diet followed during hemodialysis preceding CAPD was collected by 24 hour recall method for three days. Corrected diet chart was prepared and a purpose of diet plan was explained and was asked to follow the diet. The study was conducted for a period of three years. In the middle 38 patients discontinued for various reasons, by the end of three years 15 patients on CAPD and 15 on APD remained.

Clinical data: Monthly blood reports were recorded and three month average is presented. Hemoglobin, serum creatinine, urea, potassium, sodium, cholesterol, fasting blood sugar and glycosylated hemoglobin readings were recorded as per case reports. On the spot analysis was done for hemoglobin and fasting glucose level. Hemoglobin was done by filter paper technique and fasting blood glucose by one touch method. **Diet:** Nutrient chart followed during hemodialysis and modified diet for peritoneal dialysis patients is given in Table 1. **Calories:** calories for peritoneal dialysis patient are lesser than HD patients as calories contributed by dialysate (dextrose 1.5-2.0% solution) are considered.

Proteins: As protein end product urea is excreted through kidneys, if kidney is damaged it gets accumulated in blood. Dialysis removes urea and also good proteins, thus protein requirement is high (1.2 gm/kg-1.4gm/kg of ideal bodyweight). High quality protein is required- like chicken, fish and seafood, eggs and/or egg whites, milk. Low quality proteins-grains, vegetables should be minimum. Pulse intake had to be moderate as potassium content, is high. **Potassium:** high potassium level in blood affects heart. Potassium rich foods were restricted, they are - dried fruits, beans, peas, nuts, meat, milk, fruits, vegetables and salt substitutes.

Table 1: Nutrient Requirement

Nutrient	Hemodialysis	Peritoneal Dialysis
Protein	1g / kg ideal body weight	1.2g/kg – 1.4 kg ideal body weight-70gms
K Calories	1200	1500-2000
Potassium	2000mg /day	3000-4000mg
Phosphorous	800-1000/mg/day	800-1000/mg/day
Calcium	2000mg	2000mg/day
Fiber	20-25g	20-25gms/day
Sodium	1-2 g	1-2gms
Fluid	1-1.5 liters/ day	1-1.5 liters/ day

Sodium : Sodium intake is restricted due to increase in demand for water (thirst) leading to swelling, shortness of breath or high BP. Prepackaged foods, frozen meals,

frozen vegetables, sauces, canned foods, restaurant and fast foods are restricted.

Phosphorous: Phosphorous level in blood increases and is not removed in peritoneal dialysis, it gets accumulated. Increased Phosphorous levels can remove calcium from bones and bones become weak and brittle and itching. Foods with low phosphorous are given like milk, yoghurt, meat, cheese, legumes, whole grains. Phosphorous binders are prescribed. Colas, bottled canned beverages processed meat, cheese, instant puddings and sauces, other processed foods are avoided.

Table 2: Foods given for Peritoneal dialysis patients

Foods	Quantity (g)	Foods	Quantity (g)
Cereals	250	Fruits	100
Pulses *	75	Nuts *	50
Leafy vegetables	100	Oil	30
Other vegetables	100 or	Spices	
Root vegetables	100	Fluid	1 to 1.5 liters
Milk		Fiber	20-25

*In Place of 50gms of pulses/nuts, eggs, chicken or fish was included

Vitamins and Minerals: Minerals and vitamin supplements are sparingly used as it may be harmful to dialysis patients. Only prescribed supplements are allowed. **Fiber:** for fiber fruits and vegetables and whole grains and spouted grains are included.

Modifications are made in nutrient requirement and diet plan as per age, sex, activity and extent of dialysis. Nutrient and food intake was monitored weekly for every patient, adjustments made accordingly. Food intake was liberal. Pulses were given sparingly to keep potassium under control. Fruits- papaya, apple, kala Jamun, guava, watermelon only was suggested. Blending of oils was recommended (saffola, groundnut, gingelly, or olive oil) Ghee, butter, cream, paneer was sparingly given.

Foods avoided: Salty seasonings like soy sauce, teriyaki sauce, garlic or onion salt canned foods, frozen foods, processed meats, ham, bacon, sausage, salted snacks like chips, crackers, canned and dehydrated soups. . Deep fried foods like vada, poori, bajji, chips fries etc.

3. Results and Discussions

Special diets are required to provide right amount of proteins, calories, vitamins and minerals because kidneys are not in a condition to remove waste products (10). Table 3 gives the influence of diet and PD on blood parameters. Initially hemoglobin level was 9.10mg/dl after switching over to modified diet and CAPD, readings slowly improved by the end of third year it increased to 12.7mg/dl. With respect to creatinine both diet and

dialysis could not bring blood levels to normal, although there is significant decrease from 9.6mg/dl to 3.9mg/dl. In case of urea the reduction is phenomenal from 180mg/d to 45mg/d close to normal. Potassium decreased from 6.2mg/dl to 5.3mg/dl. Sodium and cholesterol levels are within limits from the beginning, Fasting blood glucose level decreased from 190mg/dl to 107mg/dl, glycosylated hemoglobin level from 10.9 % to 8.5 %. On the whole modified diet and dialysis made a significant contribution on blood parameters. Patients on PD responded to diet than those on HD. It may be due to the fact that HD is not done daily while PD is done daily. Moreover patient are on PD were more relaxed than those on HD.

Responses of Hemodialysis, Continuous Automated Peritoneal Dialysis (CAPD) and Automated Peritoneal Dialysis (APD) patients is given below.

Hemodialysis: All Patients on Hemodialysis felt that 3 times per week for 4-6 hours coupled with irregular timings was strenuous both for the patient and attendant. Timings were irregular. Thirty four percent Patients felt exhausted after dialysis, 30 percent explained that they were comfortable only that day, on other days they had multiple problems like weakness, edema, fluctuating blood glucose levels. They had to take leave on the day of dialysis which is not always possible. Diet restrictions are stringent. A low calorie, low protein diet, with low potassium food, with fluid and water restriction was allowed.

Continuous Ambulatory Peritoneal Dialysis (CAPD) a method that can be done at home by the patient or by any attendant of the patient. Fifty percent of patients felt happy as it can be done at home and that too by themselves, 43 percent of patients had attendants or a family member who is trained. Patients could perform their daily routine without any trouble. Bags had to be changed for 3 times a day, which was felt continuous monitoring and had scope for infection. Although it was comfortable some expressed that it requires lot of pre-preparation and cleanliness, difficult when houses are small and for those from low income families.

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Table 3: Quarterly Blood Profile of CAPD/ APD Patients

Year	Month	Hb	Creatinine	Urea	Potassium	Sodium	Chole sterol	Fasting sugar	GlyHb
Unit		gm/dl	mg/dl	mg/d	m. mol/L	m. mol/L	mg/dl	mg/dl	%
1 st	Jan	9.10	9.66	138	4.86	129	130	179	10.9
	April	12.70	9.35	215	6.42	135	130	190	10.8
	July	8.10	4.30	49	4.90	135	157	189	11.7
	Dec	12.90	2.60	56	4.60	137	255	181	11.7
2nd	Jan	11.60	2.60	58	5.80	146	170	183	9.6
	April	11.20	3.20	59	4.60	138	246	119	9.2
	July	12.70	3.60	50	4.50	125	219	139	11.7
	Dec	12.20	3.80	53	5.20	141	138	137	9.4
3rd	Jan	12.00	3.60	50	5.40	139	214	111	7.3
	April	11.60	4.10	47	4.60	137	157	109	7.1
	July	12.00	3.67	65	5.20	140	182	114	8.4
	Dec	12.70	3.90	57	5.30	142	166	107	8.5
Ref. Std Range		M: 13-17	M 0.9-1.4	15-40	3.5-5.0	135-145	150-200	60-100	4.0-6.0

Ambulatory Peritoneal Dialysis (APD) is done by a machine, they expressed that it is convenient and can be done during night that too at home. During daytime they can attend office or can do various activities like a normal healthy person. Complications and infections are less, as the machine does the process of manual exchanges. They can travel and can take a break off a day or two in between. They can lead a normal life. There is a lot of mental relaxation, and are happy mainly because others do not that the patient is on dialysis.

For government employees and those governed by insurance APD machine and fluids are given free. APD fluids and recurring costs are expensive. Normal person not governed by any medical insurance could not opt for APD.

The difference between CAPD and APD in the three-year long study is that in APD urine volume is more (100ml/8hrs), serum creatinine (0.3 mg/dl) is less, hemoglobin level increased from 9.6mg to 12.7mg/dl. The main difference is that in APD peritonitis and other ailments are not there at all while in CAPD it is among 67% (10) and 53% (8) patients respectively. Urine was 100ml /8hrs was more and hemoglobin raised from 9.6mg to 12.7mg/dl which was due to the diet. (Table 3). Those who opted for APD were Patients from economically stronger background and could afford the treatment. It is also possible that better economic status might have led to better hygienic practices, better diet and lower incidence of infections.

Table 3: Comparison of APD and CAPD

Particulars	APD	CAPD	Particulars	APD	CAPD
No. of Patients	15	15	Hemoglobin	12.7mg/dl	12.6mg/dl
Diabetes	15	15	S. Creatinine	3.9	4.2
Urine Vol/day	1150	1050	Peritonitis	0	10
Monthly Income	98,000	48000	Other ailments	0	8

4. Conclusion

The corrected diet worked very well, Hemoglobin level could be increased, which the major deficiency was found. Other parameters also could be tackled as there was continuous monitoring of the diet and changes made based on patients performance. It is found certain patients on Hemodialysis had to undergo hemodialysis as there was no option, for those who had an option, preferred APD if they can afford, as APD was easy to monitor and can be done in the night and can be free throughout the day. Diet restrictions are not many and could lead a comfortable life except for the cost involved. The Recommendation is that there is a need to reimburse the expenditure for patients on APD.

Reference

- [1] Mitch WE, Remuzzi G. (2004) Diets for patients with chronic kidney disease, still worth prescribing. *J Am Soc Nephrol*, 15: 234-7. [PUBMED]
- [2] Mehrotra R, Kopple JD (2001). Nutritional management of maintenance dialysis patients: Why aren't we doing better? *Annu Rev Nutr* 21: 343-79. [PUBMED]
- [3] Bajwa SK, Bajwa SS, Singh A. Nutritional facts and menopausal symptomatology: The role of nutraceuticals. *J Med Nutr Nutraceut* 2012; 1: 42-9.
- [4] Bajwa SK, Bajwa SJ, Kaur J, Singh K, Kaur J. Is intensive care the only answer for high risk pregnancies in developing nations? *J Emerg Trauma Shock* 2010; 3: 331-6, [PUBMED]
- [5] Bajwa SK, Bajwa SJ. Delivering obstetrical critical care in developing nations. *Int J Crit Illn Inj Sci* 2012; 2: 32-9, [PUBMED]
- [6] Bajwa SJ, Jindal R, Kaur J, Singh A. Psychiatric diseases: Need for an increased awareness among the anesthesiologists. *J Anaesthesiol Clin Pharmacol* 2011; 27: 440- [PUBMED]
- [7] Bajwa SS, Kaur J, Bajwa SK, Kaur G, Singh A, Parmar SS, *et al.* Designing, managing and improving the operative and intensive care in polytrauma. *J Emerg Trauma Shock* 2011; 4: 494-500. [PUBMED]

- [8] Strid H, Simren M, Stotzer P. Patients with chronic renal failure have abnormal small intestinal motility and a high prevalence of small intestinal bacterial overgrowth. *Digestion* 2003; 67: 129-37.
- [9] Kopple JD. Pathophysiology of protein-energy wasting in chronic renal failure. *J Nutr* 1999; 129 (1S Suppl): 247S-51S.
- [10] Santosh Varghese and Georgi Abraham (2018) Chronic kidney disease in India –a clarion call for change. *CJASN*, 13: (5): 802.
- [11] Jayasekhar KB. , Disanayake DM, Sivakesan Retalala (2015), Epidemiology of CKD with special emphasis on CHD of uncertain etiology in North Central Region of Sri Lanka. *J. Epidemiology*, 25, 275.
- [12] Jain N, Simoyi P. (2008) An overview of CKD management and CAPD in the homes *Br. J. of Com. Nursing* : May 13 (5), 213