**International Journal of Advanced Education and Research**
**ISSN: 2455-5746, Impact Factor: RJIF 5.34**
**www.alleducationjournal.com**
**Volume 1; Issue 7; July 2016; Page No. 69-72**

# A study on biochemical measurements and clinical assessment of hemodialysis patients

**[1] R Selvarani, [2] Dr. S Parameshwari**

[1] Research scholar, Department of Home science, Mother Teresa women's university, Kodaikanal, Tamil Nadu, India
[2] Assistant professor, Department of Home Science, Mother Teresa women's university Kodaikanal, Tamil Nadu, India

**Abstract**
An important indicator of the well-being of any individual is the status of his/her nutrition. Apart from being a notable pointer of quality of life, nutrition is an inevitable agent for sustainable well-being of all individuals. This paper examined the Biochemical measurements and clinical assessment of hemodialysis patients before and after dialysis. The study was based on primary and secondary data. A purposive sampling procedure was adopted to administer structured questionnaires on 50 patients with chronic renal failure, undergoing dialysis at the Renal Unit of the Male and Female Medical Wards. Data collected were analyzed using simple percentage distribution mean with their standard deviations and the cross tabulation of key variables were performed. The study revealed that nutritional status of the patients has serious impacts on the prognosis of the disease. Also, clinical symptoms such as nausea, vomiting, diarrhoea, and oedema were common among the subjects. The study, however, recommends that the public should be enlightened on the causes of renal failure, healthy eating- habits. It also calls on government to subsidize the cost of health care for the patients undergoing hemodialysis. Dieticians were also sensitized to improve the energy and micronutrient intake of patients undergoing maintenance hemodialysis.

**Keywords:** Hemodialysis patient, Biochemical profile, clinical assessment

## 1. Introduction
It is pertinent to note that malnutrition is a serious concern in a patient with end-stage renal disease (ESRD) who is treated with maintenance dialysis. Lowrie *et al*. (1990) [8], ascertained that reduced serum concentration of albumin, creatinine and packed cell volume were associated with an increased relative risk of death to hemodialysis patients receiving treatment
The patients nutritional status is inversely associated with increased risk of hospitalization and mortality; thus constituting an important risk factor for the outcome of these patients. Therefore, assessing the biochemical measurements and nutritional status of patients is essential to prevent malnutrition and to indicate appropriate intervention in malnourished patients, as well as success of dialysis is dependent on adequate nutrition.
Hemodialysis is the long term form of mechanical renal replacement therapy, used to remove waste products from the blood of patients with end-stage renal disease (Ahmad *et al*., 2002) [1]. Haemodialysis substitutes for functions of the kidney, by cleaning and filtering blood to temporarily rid body of harmful wastes, extra salt and extra water. It helps control blood pressure and keeps the proper balance of important electrolytes in the body. In patient with chronic renal failure who are not undergoing dialysis, if protein-energy malnutrition develops or persists despite vigorous attempts to optimize protein and energy intake and there is no apparent cause for malnutrition other than low nutrient intake, initiation of hemodialysis or renal transplant is recommended (NKF, 2002).
According to Laville. M, (1998) [9] the result of cross sectional studies throughout the world indicate the maintenance of hemodialysis patients are at risk of malnutrition. Longitudinal studies show that malnutrition is associated with a reduced life expectancy mainly because of cardiovascular disease and infections. Hemodialysis causes loss of water soluble vitamins. Vitamin C, vitamin B6 and folic acid should be supplemented reach a total intake of 60-90mg, 10mg and 1mg or more daily respectively. (Gibney. J., *et al*., 2015) [4]
According to Howard. B., *et al*., (1997) [5] iron supplementation are given to make up for blood loss during hemodialysis, which may amount to 5 litres one year. Patients receiving erythropoietin treatment also need iron supplements. Iron overload can occur in patients who have received multiple blood transfusions.
Dry skin or itchy skin is experienced by many people undergoing hemodialysis, especially in the winter. The most common reason for itchy skin is high phosphorus, so it is important to follow the diet plan and take phosphate binders regularly as prescribed. (Khalid. K.E, *et al*., 2008) [7]
Muscle cramping causes extremed discomfort to many patients. Healthcare provider advice stretching the cramp muscles to release the pain or applying hot packs to the affected area to help increased circulation. (Berns. J.S. 2013) [2]
Restless leg syndrome is another common effect of hemodialysis that causes patients to keep moving their leg as a result of the leg nerves and muscles creating crawly or prickly sensation. Restless leg syndrome can be tied to some forms of kidney disease, diabetes mellitus and B vitamins deficiency. (Zawada. E., 2008) [17]
Chronic kidney disease is a progressive loss of kidney functions, defined as kidney damage or an estimated glomerular flirtation rate of less than 60 ml/min/1. 73m2. It is a major public health problem which affects over 500 million people worldwide. The national health and nutrition examination survey has estimated the prevalence of chronic kidney disease in the United States as 26 million. Among risk factors diabetes is the leading cause, accounting for about 30% to 40% of the disease. Other factors including hypertension, smoking, hypercholesterolemia, obesity, age, gender and

family history also potentially contribute to the development of chronic kidney disease. According to William, (2011) [11] creatinine is a waste product that eliminates from normal metabolism of the body. It is removed from the body by the kidney. Low creatinine levels may thus reflect normal kidney function.

## 2. Materials and Methods

The methodology pertaining to "A study on Biochemical measurements and clinical assessment of hemodialysis patients "was discussed under the following headings:

### 2.1 Selection of area

In this study the area selected by the researcher was Viruthunagar. This type of selection was based on convenience sampling method.

### 2.2 Sample size

The Sample size was 100 samples undergoing hemodialysis from either sex in the age group of 50-85 years.

### 2.3 Formulation of tools

**Interview schedule**

Interview schedule is a tool in which the researcher has a face to face contact with the interviewee for the collection of the necessary information. (Mohan. S., 2007) [10].

The researcher used a self prepared interview schedule for the collection of primary and secondary data. The schedule comprised details pertaining to the following: General background information, Socio economic status, medical history, Biochemical parameters and dietary pattern.

### 2.4 Conduct of the study

a. Anthropometric assessments
b. Biochemical Assessments
c. Clinical Assessments
d. Dietary Assessments

**a. Anthropometric measurements**

Measurements of body mass index (BMI), (height, body weight and skin fold thickness) were done after completion of the dialysis session. Triceps skin fold (TSF) thickness was measured using skin fold calliper. Mid arm circumference (MAC) was measured using an inch tape. Measurements were performed three times on the non-access arm of each dialysis patient and the average result of the three measurements was registered as the final MAC value. MAMC was calculated using the formula MAMC=MAC-(3.14×TSF).

**Height**

The samples should on bare foot in a flat floor against wall, with their feet parallel comfortably and a mark made on the wall. By using stadiometer reading were recorded in centimetres.

**Weight**

Weight may be recorded in pounds or kilograms. Weight measurement is the best indicators of growth failure in all the age groups. Ordinary simple clothes must be worn while weighing. (Joshi. S.A, 2012) [6]

The researcher was asked to stand on a weighing balance. The reading was recorded in kilograms.

**Body Mass Index**

By using height and weight Body Mass Index was calculated**.** Body Mass Index is a measurement of body fat based on height and weight that applies to both men and women. The BMI was calculated by using formula and to know the obesity and under nutrition grades.

**b. Biochemical assessment**

The researcher collected the biochemical parameters in blood such as Heamoglobin, WBC, RBC, Pottasium, Sodium, Creatinine, Urea.

**c. Clinical assessment**

Clinical examination assesses levels of health of individuals or of population groups in relation to the food they consume. In this study the researcher note the muscle wasting, anaemia, itchy skin, nails, legs and hands for their abnormality.

**Procedure:** An approval for the study was granted before starting the subject's recruitment process. The approval was obtained from the administrators of the selected hospitals. Explaining the purpose of the study and assuring the confidentiality of all participants, a verbal informed consent was obtained from each participant. Data were collected in two phases: pre-dialysis and post-dialysis. During the pre-dialysis phase the patient was asked questions from the Personal, Diet, and Health Questionnaire. With the patient's permission, the patient's file was examined to acquire the necessary anthropometric and biochemical data such as height, pre-dialysis weight, and post-dialysis dry weight from the previous dialysis treatment, as well as serum albumin. The second phase of the data collection commenced after dialysis. A pilot study was carried out on ten patients from patient to ensure the clarity and applicability of the tool or make any modification and those not included in the study.

**d. Dietary assessment**

The nutritional needs of the individual or group are influenced by dietary practices, eating habits, economic situations, and agricultural practices. In this study the researcher collect their food pattern, frequency of food intake, type of food consumption etc.

### 2.5 Analysis, compilation interpretation of the data:

According to Paliwar, (2011) [12] transforming data into information, interpretation and analysis is equally tedious task. Each data is compiled with a particular view point and hence often get biased.

In this study the collected data was compiled, tabulated and statistically analysed. The results were interpreted and concluded.

## 3. Results and Discussion

The analysis of socio-economic characteristics of respondents (Table 1), revealed that majority of the respondents were in the age range of 40 – 49 years ((45.0%). Closely related to the age variable is the gender dimension. The study shows that most (70.0%) of the respondents were males. The distribution of respondents based on marital status shows that 90 percent and 10 percent were married and single respectively. About a third (21.0%) of the subjects had either no formal or primary education while (31.0%) had either secondary or tertiary

(28.0%) education. Stem on the importance of income to this study, analysis reveals that about eighty percent of the respondents earned between Rupees 2500-7000 per month, while a proportion (15.0%) earn about above 7000. The hospital bills of the respondents were mostly the responsibility of the respondents' children or relatives

**Table 1:** Socio-economic characteristics of hemodialysis patients

| Patients | Percentage |
|---|---|
| **Gender** | |
| Male | 70 |
| Female | 30 |
| **Age** | |
| 30-35 | 17 |
| 36-40 | 15 |
| 41-45 | 20 |
| Above 45 | 48 |
| **Education** | |
| Primary | 21 |
| Secondary | 31 |
| Higher secondary | 28 |
| Graduate | 19 |
| **Income** | |
| Rupees 2500 | 22 |
| Rupees 2501 -4000 | 20 |
| Rupees 4001 -7000 | 14 |
| Above 7000 | 44 |
| **Marital Status** | |
| Single | 10 |
| Married | 90 |

**Table 2:** Causes of chronic renal failure among hemodialysis patients

| S.NO | Particular | In Percentage |
|---|---|---|
| 1 | Oedema | 42 |
| 2 | Vomiting | 32 |
| 3 | Hypertension | 18 |
| 4 | Increased urination | 2 |
| 5 | Decreased urination | 2 |
| 6 | Ascites | 4 |

42 percent of the samples have oedema in legs which is one of the main symptom used to diagnose renal failure.
When glomerular filtration rate falls below 5 ml per minute, oedema, high blood pressure, irregular heart beat and pericarditis occur. The symptoms of gastrointestinal symptom may be loss of appetite, vomiting, and hiccups. (Joshi. Y.K, 2003)

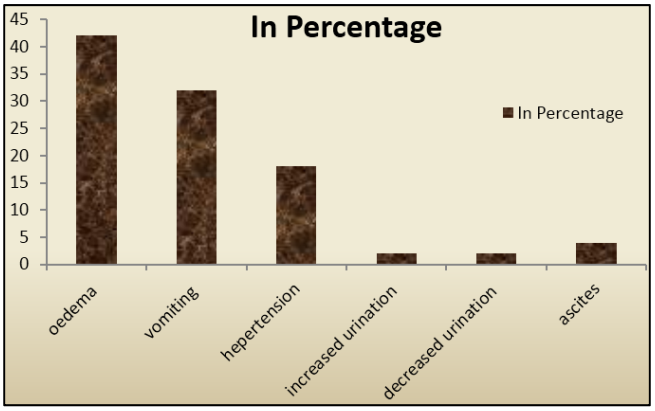


**Fig 1:** Causes of chronic renal failure among hemodialysis patients

**Table 3:** Biochemical assessment of the samples

| S.No | Particulars | Obtained value | Reference value |
|---|---|---|---|
| 1. | Urea | 78.64±62.26 | 10-50mg/dl |
| 2. | Creatinine | 384.14±o.614 | 0.5-1.4mg/dl |
| 3. | Sodium | 160.546±18.0348 | 135-145 m mol/L |
| 4. | Potassium | 6.6504±2.3648 | 3.5-5 m mol/L |
| 5. | Red blood cells | 2.6932±1.20148 | 4.5-5.5 MI/109 |
| 6. | White blood cells | 7732±3474.36 | 4.5-5.5 MI/109 |
| 7. | Platelets | 327992.06±83651.32 | 14000-40000 cells/cumm |
| 8. | Haemoglobin | 6.923±2.1205<br>7.7436±5.0927 | Women12- 5g/dl<br>Men 12-17g/dl |

Table -3 shows that platelet, haemoglobin, red blood cell, level was very low compared with normal values. Due to less amount of red blood cells in blood which is a common complication of hemodialysis, poor absorption of iron and frequent blood test. Similarly urea, creatinine, sodium, potassium levels of the samples were found to be high when compared with normal values due to diet restrictions and removal of micronutrients during hemodialysis.

**Table 4:** Disturbances during dialysis among the samples

| S.NO | Particulars | In percentage (N=50) |
|---|---|---|
| 1 | Nausea, vomiting and muscle, cramps | 24 |
| 2 | Hypertension, Diabetes mellitus, shivering | 36 |
| 3 | Hypertension, hiccups | 30 |
| 4 | Hypotension | 10 |
| | Total | 100 |

36 percent of the hemodialytic samples were hypertensive during hemodialysis due to altered blood circulation

**Table 5:** Other health complications faced by the samples

| S.No | Particulars | In percentage (N=100) |
|---|---|---|
| 1. | Hypertension | 28 |
| 2. | Diabetes mellitus with hypertension | 26 |
| 3. | Lung disorder | 22 |
| 4. | Heart disease with hypertension | 14 |
| 5. | Heart disease | 10 |
| | Total | 100 |

28 percent of hemodialytic samples have hypertension and 26 percent of hemodialytic samples have hypertension along with diabetes mellitus. Due to uncontrolled Hypertension and diabetes mellitus, their kidneys get failed to excrete the waste products like urea, creatinine, sodium, potassium.

## 4. Conclusion

The assessment of Biochemical measurements and clinical assessments should be based Questionnaire method including history of weight loss, per cent standard weight, body mass index, muscle mass, subcutaneous fat mass, and plasma albumin, creatinine, bicarbonate and cholesterol. Co-morbid conditions should be assessed and C-reactive protein (CRP) measured as a marker of inflammation as there is a close

relation between malnutrition, on one side, and co-morbid conditions and inflammation on the other. For a more detailed assessment, subjective global assessment of nutritional status is a well-validated tool, and dual-energy X-ray absorptiometry (DEXA) is a useful method for routine assessment of lean body mass. Majority of the Haemodialysis patients had very low Haemoglobin.

The reduced intake of iron, vitamin C, folic acid, and potassium is in keeping with reduced food intake, including vegetables and fruit, to limit the risk of hyperkaliemia and of fluid overload. Finally, as expected, HD patients also reported a reduced fluid intake, aiming to limit inter dialytic weight gain Renal replacement therapy such as hemodialysis, peritoneal dialysis and transplantation are accepted and successful modalities for maintenance of life of patients with end–stage renal disease. This paper, however, establishes the correlates between hemodialysing patients before and after six sessions of dialysis. The socio- economic status of patients and their social support has significant effect on their nutritional and health care.

## 5. Reference


1. Ahmad A, Rahim A, Ghulam K, Mustafa, Khan MI. The frequency of complications during haemodialysis. 2002; 41(3):90-93
2. Berns JS Wang T, Lindholm B. Factors contributing to catabolism in end-stage renal disease patients. Miner Electrolyte Metab. 2013; 24(1):92-101.
3. Deyoung S, Akinsola W, Odusanmi WO, Ogunniyi J, Ladipo G. Diseases causing chronic renal failure in Nigeria – A prospective study of 100 cases. Afri Med Sci, 1996; 18:131-137.
4. Gibney J, Chan JC. Late complications of long-term hemodialysis in children: Clinical aspects and some measurable variables concerning parathyroid hormone, divalent ions, acid-base metabolism, anemia, nutrition, growth and survival data. 2015; 120:578-585.
5. Howard B, Ebben J, Ma JZ, Collins AJ. "Hematocrit levels and hospitalization risks in hemodialysis patients." Journal of the American Society of Nephrology. 1997; 10(6):1309-1316.
6. Joshi SA, Bossola M, Muscatiroli M, Tazza L, *et al*. Variables associated with reduced dietary intake in hemodialysis patients. J Ren Nutr. 2012; 15:244-252.
7. Khalid KE, Yang FL, Lee RP, Wang CH, Fang TC, Hsu BG. A cohort study of subjective global assessment and mortality in Taiwanese hemodialysis patients. Renal failure. 2008; 29(8):997-1001.
8. Lowrie Jerin L, Ladavac R, Kuzmanovic G, Dodic D, Ciriparic D. Subjective general assessment of nutritional status in patients with chronic renal failure and regular hemodialysis. Acta Med Croatica, 1990; 57(1):23-28.
9. Laville Mal, Saran K, Elsayed S, Molhem A, Aldrees A, Alzara H. "Nutritional assessment of patients on hemodialysis in a large dialysis center." Saudi Journal of Kidney Diseases and Transplantation. 1998; 22(4):675.
10. Mohan Mardare NG, Ungureanu S, Busuioc M, Nistor I, Enache R, Covic A. Nutritional status evaluation and survival in haemodialysis patients in one centre from Romania. Nephrology Dialysis Transplantation. 2007, 110.
11. National kidney foundation (NKF). Kidney disease quality outcomes initiative (K/DOQI). 2010. http://www.kidney.org/professionals/kdoqi/guidelines.cfm (last accessed 2 June, 2010).
12. Paliwar, Saxena A, Sharma RK. An update on methods for assessment of nutritional status in maintenance dialysis patients. Indian J Nephrol. 2011; 14:61-66.
13. Pupim LB, Cuppari L, Ikizler TA. Nutrition and metabolism in kidney disease. In Seminars in nephrology. 2006; 26(2):134-157.
14. Roy Linda Grace, Manjunath S Shetty, Asna Urooj. Effect of nutritional intervention on malnutrition indicators in patients on haemodialysis. Journal of renal care. 2013; 39(1):39-46.
15. Srilakshmi B. Fourth edition, Nutrition Science ; new age international puplisher private limited. 2014, 349-332.
16. William C, Steiber AL, Kalantar-Zadeh K, Secker D, *et al.* Subjective global assessment in chronic kidney disease: A review. J Ren Nutr. 2011; 14:191-200.
17. Zawada E, Kalantar-Zadeh K, Kopple JD, Deepak S, *et al.* Food Intake Characteristics of Hemodialysis Patients as Obtained by Food Frequency Questionnaire. J Ren Nutr. 2002, 2008; 12:17-31.