

## Nutritional Status of Hemodialysis Patients in a Developing Economy: A Case Study in Nigeria

B. A. Odufuwa and G. T. Fadupin\*

*Department of Home Economics, Tai Solarin College of Education, Ogun State Nigeria*  
*E-mail: bolarem22@yahoo.com*

*\*Department of Human Nutrition, University of Ibadan, Ibadan, Nigeria*  
*E-mail: fagtan2000@yahoo.com*

**KEYWORDS** Nutrition. Hemodialysis. Renal Failure. Dialysis and Therapy

**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 nutritional status 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 20 patients with chronic renal failure, undergoing dialysis at the Renal Unit of the Male and Female Medical Wards (South West 3 and North West 3 and Owena renal Wards) University College Hospital, Ibadan Oyo State, Nigeria. The reliability of the research instrument was conducted using test-retest method and this gave a reliability coefficient of ( $r$ ) = 0.82. 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, diarrhea, 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- habit. 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.

### INTRODUCTION

Over the course of last decade, chronic renal failure in relation to nutritional deficiency is becoming a major issue in nutritional studies among the health professionals (Ogun et al. 2000). Nutritional assessment is an inevitable process towards sustenance of patients with chronic renal failure. It is a process that helps to identify patients at nutritional risk, particularly among those with systemic disease that can adversely affect prognosis and outcome of disease (Charney 2000). It is imperative to note that inadequate nutrition before dialysis contributes to the prognosis of the patients. Seres (2003) reported that altered nutritional status accounts for 50% of the responses to any therapy. This implies that undernutrition has notable impact on the prognosis and outcome of the disease. It is, however, disheartening to note that little attention is paid to the nutritional status of hemodialysis patients particularly in developing countries, like Nigeria.

Reviewed literature pointed to the fact that hemodialysis has different effects on both catabolic rate and clearance of toxins, and also have different effects on the nutritional status of the patients. While different studies have examined various aspects of nutrition and health of patients, there are scanty studies in the developing coun-

tries; and in Nigeria in particular that has empirically examined the nutritional status of hemodialysis patients. Yet such a study is very pertinent in developing strategies to prevent malnutrition and also to provide affordable health care services for hemodialysis patients in the developing countries. In this paper, an attempt is made to fill this identified gap using the patients receiving treatment at the University College hospital, Ibadan. It is anticipated that data presented will be useful to policymakers in formulating sustainable nutrition and health policies for the people, specifically hemodialysis patients in Nigeria and the world at large.

### A Brief Review of Literature

There has been global increase in the incidence and prevalence of end stage renal failure over the past 50 years (Ogun et al. 2000; Jerin et al. 2003; Alebiosu et al. 2006).

Nutritional support in recent time is becoming a standard and expected health care for many hospitalized patients. To corroborate this, Konstantinides (1992) reported that there is a distinct relationship between nutritional support; decreased morbidity; mortality and length of stay in the hospital. The USRDS Annual Report (1991) reported that ESRD disproportionately affects people in developing countries as well as

ethnic and racial minorities in United States. The report also demonstrated that African American make up to 29% of the ESRD cases; yet represent only 12% of the United States population, with predominance in males. The exact prevalence rate of chronic renal disease (CRD) in Nigeria is unknown but hospital based data in Nigeria have reported prevalence rates expressed as ratio of hospital admissions of between 16% and 8% (Oyediran and Akinkugbe 1970; Akin-sola et al. 1989; Ogun et al. 2000).

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), and Wolfson (1999) 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.

### METHODOLOGY

The target populations for this study were the hemodialysis patients who were able to undergo six sessions of hemodialysis. The study was based on primary and secondary data. It is a descriptive retrospective cross-sectional study of patients with severe Chronic Renal Failure undergoing hemodialysis at the University College Hospital, Ibadan Oyo State, Nigeria. The study was carried out at the Renal Unit of the Male and Female Medical Wards (South West 3 and North West 3 and Owena renal Wards) of the University College Hospital (UCH) Ibadan, Oyo State, Nigeria. The choice of this hospital (The University College Hospital, Ibadan) was based on the fact that UCH is a tertiary hospital and the biggest hospital in Nigeria. It is a centre of excellence in the medical field; and attracts patients especially those with renal failure from every part of Nigeria.

A purposive sampling technique was used to select 20 patients who came for hemodialysis and were willing to participate in the study. Patients with other systemic disease apart from severe renal failure were excluded. It should be noted that purposive sampling method is appropriate when members of a special population are difficult to locate. For this study however, it seems reasonable to consider hemodialysis patients as a kind of group which is quite difficult to have a large lists. The study protocol involved obtaining the consent of the Head of Renal Unit, De-

partment of Medicine, College of Medicine, University College Hospital, Ibadan and obtaining the UCH/UI Ethical Clearance, for permission to conduct the study.

A semi- structured questionnaire was used to collect information on the socio-economic data of respondents. The biochemical data of serum urea, creatinine, and electrolyte and packed cell volume levels of respondents and the clinical symptoms such as nausea, vomiting, diarrhea, oedema of respondents were retrieved from the hospital records of patients. Nutritional intake assessment was performed using 24-hour dietary recall household measurement and food model were used to estimate the quantity of food consumed by respondents and anthropometric measurement of height, weight, mid-upper arm circumference and body mass index were assessed. The body mass index of the subject were classified according to WHO classification as suggested by WHO Expert Committee on Obesity, the National Heart, Lungs and Blood Institutes (NHLBI), Obesity Clinical Guidelines, The Guidelines for Americans and Healthy People (2001).

The reliability of the research instrument was conducted using test-retest method and this gave a reliability coefficient of  $(r) = 0.82$ . Data collected were analyzed using range, simple percentage, mean with their standard deviations, and cross tabulation of the key variables.

### RESULTS

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 (65.0%) of the respondents were males. The distribution of respondents based on marital status shows that seventy- five percent and ten percent were married and single respectively. About a third (30.0%) of the subjects had either no formal or primary education while (70.0%) had either secondary or tertiary education. Seventy percent of the subjects were also either business men/women or civil servants while the remaining (30.0%) were students, farmers, artisans or pensioners. It is worth mentioning that, due to the disease most respondents became jobless, and were forced to depend on their children and relatives for sustenance; par-

ticularly footing the hospital bills. Stem on the importance of income to this study, analysis reveals that about eighty percent of the respondents earned between ₦10, 000- ₦20, 000 per month, while a proportion (15.0%) earn about ₦31, 000 above. The hospital bills of the respondents were mostly the responsibility of the respondents' children or relatives.

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

| Patient               | Percentage |
|-----------------------|------------|
| <i>Gender</i>         |            |
| Male                  | 65         |
| Female                | 35         |
| <i>Age</i>            |            |
| 20-29 years           | 15         |
| 30- 39 years          | 30         |
| 40- 49 years          | 45         |
| 50- 59 years          | 5.0        |
| Above 60 years        | 5.0        |
| <i>Education</i>      |            |
| Primary school        | 25         |
| Secondary school      | 30         |
| Tertiary              | 40         |
| No formal education   | 5.0        |
| <i>Income</i>         |            |
| Less than ₦ 5,000     | -          |
| ₦ 5,000 - ₦ 10,000    | 85         |
| ₦ 11,000 - ₦ 15,000   | 5.0        |
| ₦ 16,000 - ₦ 20,000   | 5.0        |
| Above ₦ 20,000        | -          |
| <i>Marital Status</i> |            |
| Single                | 10         |
| Married               | 75         |
| Divorced              | 10         |
| Widowed               | 5.0        |
| <i>Occupation</i>     |            |
| Student               | 5.0        |
| Farmer                | 10         |
| Artisan               | 10         |
| Pensioners            | 5.0        |
| Business/ Trader      | 40         |
| Civil servant         | 30         |

As shown in Table 2, glomerulonephritis (45%), closely followed by hypertensive nephrosclerosis (35%) and diabetic neuropathy (20%) were the main causes of chronic renal failure among the subjects.

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

| Clinical diagnosis           | Percentage |
|------------------------------|------------|
| Chronic glomerulonephritis   | 45         |
| Hypertensive nephrosclerosis | 35         |
| Diabetic neuropathy          | 20         |
| Obstructive uropathy         | 5          |

Table 3 indicates the main symptoms experienced by the respondents. It is interesting to note that high percentage of the respondents experienced nausea (90%), vomiting (100%), diarrhea (60%), dizziness (100%), oliguria (100%) and oedema (75%). However, significant numbers of respondents were relieved of the symptoms after dialysis.

**Table 3: Symptoms experienced by hemodialysis patients**

| Symptom    | Before dialysis (%) |        | After dialysis (%) |        |
|------------|---------------------|--------|--------------------|--------|
|            | Present             | Absent | Present            | Absent |
| Nausea*    | 90                  | 10     | 60                 | 40     |
| Vomiting*  | 100                 | 0.0    | 70                 | 30     |
| Diarrhea*  | 60                  | 40     | 40                 | 60     |
| Dizziness* | 100                 | 0.0    | 80                 | 20     |
| Oliguria*  | 100                 | 0.0    | 80                 | 20     |
| Oedema *   | 75                  | 25     | 55                 | 45     |

\*(p<0.05)

The mean packed cell volume (PCV) of respondents (both sexes) (Table 4) were lower than the normal range before and after completion of the six sessions of hemodialysis. In other words, the PCV of the respondents reduced significantly after dialysis (p<0.05). Analysis also reveals that packed cell volume before and after dialysis was below (25%), which is an indication of serious anemia among the respondents.

**Table 4: Mean Packed Cell Volume (PCV) in hemodialysis patients**

| PCV    | Before dialysis |      |     | After dialysis |       |      |
|--------|-----------------|------|-----|----------------|-------|------|
|        | %               | Mean | SD  | %              | Mean  | SD   |
| Male   | 65              | 23   | 4.5 | 65             | 20.33 | 3.20 |
| Female | 35              | 22.2 | 5.4 | 35             | 20    | 2.68 |

The body mass index of the respondents is present in Table 5. Underweight increased among the respondents from 40 percent to 50 percent before and after dialysis respectively. This reflects that hemodialysis is associated with reduction of weight among the respondents. Invariably, significant reduction was observed in the weight and the mid-upper arm circumferences (MUAC) of the subjects. It is instructive to note that the body mass index (BMI) is a well recognized indicator of energy reserves in adults and a low BMI indicates chronic energy deficiency.

**Table 5: The Body Mass Index (BMI) distribution in hemodialysis patients**

| Description       | BMI       | Before dialysis | After dialysis |
|-------------------|-----------|-----------------|----------------|
| Underweight*      | <18.5     | 40%             | 50%            |
| Normal Weight*    | 18.5-24.9 | 60%             | 50%            |
| Overweight        | 25 -29.9  | -               | -              |
| Class I obesity   | 30 -34.9  | -               | -              |
| Class II obesity  | 35 -39.9  | -               | -              |
| Class III obesity | >40       | -               | -              |

(\*p&lt;0.05)

### Nutritional Assessment

The mid-upper arm circumference (MUAC) of respondents before and after dialysis was examined based on the classification of Ismail and Manandhar (1990) into normal, mild, moderate and severe malnutrition. As shown in Table 6, majority (75% and 65%) of the subjects MUAC were normal before and after dialysis. However, there was a significant reduction in the number of respondents with normal MUAC. The percentage of respondents that were mildly, moderately and severely malnourished increased from (25%) before dialysis to ((35%) after dialysis.

**Table 6: Classification of Mid Upper Arm Circumference (MUAC) in hemodialysis patients**

| Description           | MUAC (cm) | Before dialysis (%) | After dialysis (%) |
|-----------------------|-----------|---------------------|--------------------|
| Normal                | >24       | 75                  | 65                 |
| Mild-malnutrition     | 23.1-24.0 | 15                  | 25                 |
| Moderate-Malnutrition | 22.1-23.0 | 5                   | 5                  |
| Severe                | <22.1     | 5                   | 5                  |

The energy and nutrient intake of the subjects are presented in Table 7. The mean energy, protein and fat intake of the male subjects were 1198.0kcal, 24.7g and 31.4g respectively. It is worth noting that the male respondents satisfied 43.3%, 44.1% and 37.7% of the energy, protein and fat requirements respectively. Also, the female respondents satisfied 50.0%, 41.4% and 52.1% of their RDA. It is interesting to note that

the mean calcium, iron and phosphorus intake of the subjects were 159.5mg, 1.74mg and 470.8mg. The male respondents satisfied 15.9%, 21.8% and 67.0% of their RDA for calcium, iron and phosphorus, and the female respondents satisfied 15.9%, 11.9% and 32.2% of their RDA respectively. Analysis reveals that respondents satisfied their RDA for potassium and sodium. The male respondents satisfied 3.45%, 7.86% and 13.2% of their RDA for thiamin, riboflavin and pyridoxine respectively, while the female respondents satisfied 48.5%, 5.60% and 10.5% of their RDA for thiamin, riboflavin and pyridoxine respectively. Furthermore, findings reveal that male respondents satisfied only 10.9% and about 4.12% of their RDA for niacin and folic acid respectively. Meanwhile, female respondents satisfied 18.9% and 6.87% of their RDA for niacin and folic acid respectively.

### DISCUSSION

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 hemodialysis in Nigeria and the nutritional status of hemodialysing patients before and after six sessions of dialysis. Charney (2000) posited that the socio- economic status of patients and their social support has significant effect on their nutritional and health care. This fact was corroborated by the findings of this study. Most respondents were either students, farmers, petty traders or retired civil servants, with a significantly low income level. This level of economic status has shown to impose a heavy economic burden and setback on the ability of the patients to manage their illness, as many of them were not able to pay for the hemodialysis, biochemical tests complemented by recommended drugs and diet prescribed for them. It was observed in the course of this study that, most of the patients with end stage renal failure

**Table 7: Mean energy, protein and fat intake**

|       | Energy (kcal) |        | Protein (g) |        | Fat (g) |        |
|-------|---------------|--------|-------------|--------|---------|--------|
|       | Male          | Female | Male        | Female | Male    | Female |
| Mean  | 1198.0        | 1051.2 | 24.7        | 23.6   | 31.4    | 30.4   |
| RDA   | 2700          | 2100   | 56          | 57     | 83.3    | 58.3   |
| % RDA | 44.3          | 50.0   | 44.1        | 41.4   | 37.7    | 52.1   |

found it difficult to pay for three sessions of hemodialysis and only a few who were able to complete the six sessions of hemodialysis were reported in this study.

It was also observed in this study that the cost of the dialysis was mostly borne by the children and the relations of the affected person in Nigeria unlike in developed countries where the cost of dialysis are borne by the government. The age of the patients in this study is worth noting as the patients age was between 30 to 50 years, which is similar to the earlier studies of Oyediran et al. (1970), Akinsola et al. (1989), Arije et al. (2000), Alebiosu et al. (2006). It can be deduced that the highest incidence of ESRD in Nigeria is between the 3<sup>rd</sup> and 5<sup>th</sup> decade of life which is known to be the productive years of life. The disease occurring at this age is likely to cause economic and human resources wastage in countries like Nigeria. In developed countries however, Feest et al. (1990) and Geown (1990) expatiated that the incidence of ESRD is 6 to 10 times higher in patients between 70 and 90 years of age. Similarly, Iseki et al. (1993) and Kurokawa (2002), reported that in Japan, two-thirds of the total dialysis patients were > 60 years and 50.0% were > 65 years. This information calls for information on the causes of renal in Nigeria and the need to develop strategies to prevent its occurrence.

Similar to Alebiosu et al. (2006), chronic glomerulonephritis, hypertensive, nephrosclerosis and diabetic neuropathy were observed to be the major causes of the disease among the patients and symptoms such as oedema, dizziness, nausea vomiting were commonly experienced by the patients. However, the patients were relieved of these symptoms after the six sessions of dialysis. Although the patients had very high serum urea and creatinine before and after dialysis, a significant reduction in these indices was observed after dialysis. This observation also supports the report of Alebiosu et al. (2006) on similar patients attending another University Teaching Hospital in Nigeria. The packed cell volume (PCV) of the male and female subjects was significantly lower than the normal values before and after dialysis respectively. This implies that anemia is a common problem among the patients with ESRD and hemodialysis appear to make it worse. Kopple et al. (2000) report indicates that patients with poor nutritional status have increased mortality.

It is instructive to note that, using the MUAC

and BMI categories malnutrition was common among the patients on maintenance hemodialysis as majority of the patients studied had mild to severe malnourished before dialysis which became worse after dialysis. It can be deduced from this study that the MUAC and the BMI of the patients correspond well with each other as no significant difference was observed between the prevalence of malnutrition using MUAC or BMI categories ( $p > 0.05$ ).

### POLICY IMPLICATIONS AND CONCLUSION

It was observed in this study that the incidence of ESRD was high during the productive stage of life and the burden of hemodialysis and the hospital bills were beyond the patient's ability. The burden of the medical care was mostly borne by children and relations. Hemodialysis was observed to significantly reduce the nutritional status of hemodialysing patients. The burden of illness caused by renal failure, and the limitations of the existing treatments for renal insufficiency in relation to the nutritional status of the patient's intake in Nigeria all point to the need for clinical and population-based intervention aimed at preventing the End-Stage Renal Disease (ESRD). There is need for public enlightenment on the causes of renal failure, how the disease can be prevented, and the need to have medical care early. The government should help in subsidizing the cost of health care services for the patients undergoing hemodialysis in Nigeria as the cost of management is beyond the ability of the people affected. Finally, dieticians should apply their skills to ensure normal nutritional status of patients undergoing maintenance hemodialysis.

### REFERENCES

- Akinsola W, Odusanmi WO, Ogunniyi J, Ladipo G 1989. Diseases causing chronic renal failure in Nigeria - A prospective study of 100 cases. *Afri Med Sci*, 18: 131-137.
- Alebiosu O, Olugbenga OA, Adigun A, Ina OA 2006. Pattern of chronic renal failure in Nigeria. *African Health Sciences*, 6(3): 132-138
- Charney P 2000. Nutrition screening assessment in older adults. *Today's Dietician*, 5: 5 - 10.
- Feest TG, Mistry CD, Grimes DS, Mallick NP 1990. Incidence of advanced chronic renal failure and the need for end stage renal replacement therapy. *Br Med J*, 301: 897-900.
- Geown MG 1990. Prevalence of advanced renal failure in Northern Ireland. *BMJ*, 301: 900-903.
- Iseki K, Kawazco N, Osawa A, Fukiyama K 1993. Survival

- analysis of dialysis patients in Okinawa, Japan. *Kidney Int*, 43:404-409.
- Jerin L, Ladavac R, Kuzmanovic G, Dodic D, Ciriparic D 2003. Subjective general assessment of nutritional status in patients with chronic renal failure and regular hemodialysis. *Acta Med Croatica*, 57(1): 23-28.
- Konstantinides FN 2001. Nutritional assessment of the hospitalized patient. A team approach. *Monograph*, 8: 300-310.
- Kopple J, Greene T, Chimlea W 2000. Relationship between GFR and nutritional status results from the MDRD study. *Kidney Int*, 57: 1688-1703.
- Kurokawa K, Nangaku M, Saito A, Inagi R, Miyata T 2002. Current issues and future perspectives of chronic renal failure. *J Am Soc Nephrol*, 13: S3-S6.
- Lowrie EG and Lew NL 1990. Death risk in hemodialysis patients: The plasma amino acid levels in chronic renal insufficiency. Result from the feasibility phase of the modification of diet in renal disease study. *Am J Kidney Disease*, 23: 504-513.
- Ogun SA, Adelowo OO, Familoni O B, Jayesimi ATA, Fakoya EAO 2000. Pattern and outcome of medical admissions at the Ogun State University Hospital, Sagamu – A three years review. *WAJM*, 1914: 304-308.
- Oyediran A, Akinkugbe O 1970. Chronic renal failure in Nigeria. *Trop Geog Med*, 22: 41-45.
- Seres R 2003. Nutritional assessment of patients with chronic renal failure. *Clinical Nutrition Practices*, 8: 300-12.
- US Renal Data System (USRDS) 1991. *Annual Data Report*. National Institutes of Diabetes and Digestive and Kidney Diseases. Bethesda, Md.: National Institutes of Health.
- WHO 2001. *WHO'S Expert Committee on Obesity, the National Heart, Lungs and Blood Institutes (NHLBI), Obesity Clinical Guidelines: The Guidelines for Americans; Healthy People*. Geneva: WHO.
- Wolfson Marshal 1999. Management of protein and energy intake in dialysis patients. *J Am Soc Nephro*, 10: 2244-2247.