Journal of Preventive Epidemiology

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See the original article by Jafari T; J Prev Epidemiol. 2016;1(1):e08.

# The nutritional status of hemodialysis patients admitted to Khoramabad's Shohadie Ashaier hospital, Korramabad, Iran

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**Received:** 19 November 2015
**Accepted:** 20 December 2015
**ePublished:** 28 December 2015

**Keywords:** Nutritional status, Minerals, Vitamins, Hemodialysis

**Citation:** Mardani M, Rezapour P, Baba H, Balavar S, Naghdi N. The nutritional status of hemodialysis patients admitted to Khoramabad's Shohadie Ashaier hospital, Korramabad, Iran. J Prev Epidemiol. 2016;1(1):e09.

## Abstract

**Introduction:** Malnutrition is a danger that many dialysis patients face, it increases their death risk, it decreases their quality of life, and it exacerbates malnutrition related side effects. Improving the intake and quality of macro- and micronutrients in dialysis patients improves their quality of life drastically. The current study aims to analyze the nutritional wellbeing of hemodialysis patients admitted to Khoramabad's Shohadie Ashaier hospital.

**Patients and Methods:** This descriptive cross-sectional study was carried out on 57 hemodialysis patients. To evaluate the patients' diet, 24-hour recall for 3 days was applied. Body mass index (BMI) of patients was calculated and also, serum albumin of them was measured. Food Processor N III was utilized to calculate the energy intake, amount of macro- and micronutrient intakes of all patients

**Results:** The underweight prevalence, based on the patient's BMI, was 10.4%. In 24.4% of the patients, the level of blood serum albumin was lower than normal. The patient's daily energy and protein intake was 17.5 kcal and 0.8 grams per kilogram of body weight respectively. Most of the patients suffered from deficiencies of micronutrients such as vitamins A and E, calcium, phosphor, zinc, magnesium, and potassium.

**Conclusion:** According to the findings of the present study among hemodialysis patients there is a high incidence of deficiency in the intake of energy, protein, and some micronutrients. Accordingly, more widespread etiology studies and instructing the patients about nutrition can improve their nutritional wellbeing.

## Introduction

Malnutrition is prevalent among patients suffering from chronic kidney diseases (CKD). Many studies point to the prevalence of nutritional insufficiencies among these patients. 30%-40% of patients undergoing dialysis have a low intake of energy and protein. Up to 15% of dialysis patients suffer from severe malnutrition (1-3).

Protein-energy malnutrition and micronutrient deficiency usually occur because of the insufficient food intake of dialysis patients. This lack of food intake can be because of many factors such as lack of appetite, nausea, reduction of tasting and smelling senses, being on a long term limited diet, hormonal damages, underlying diseases, inflammation, insufficient dialysis, improper acidosis control, loss of micronutrients during dialysis, and long-term dialysis (3,4). Additionally, dialysis patients can also suffer from a lack of some key vitamins and minerals (5,6). A deficiency of such as ascorbic acid and folic acid can lead to cardiovascular diseases (7,8). New studies carried out on hemodialysis patients, show that their diet is high in fat and they are atherogenic. In order to prevent the increase of blood potassium, a dialysis patient's diet includes very little fruit and vegetables, rich sources of fiber, vitamin C, and phytochemicals, this in turn increases the chance of atherogenic diseases among these patients (9,10). Without the sufficient intake of micronutrients, it will be impossible to successfully control the side effects of

**Core tip**
In a study on a group of hemodialysis patients a high incidence of deficiency in the intake of energy, protein, and some micronutrients was found. Accordingly, more widespread etiology studies and instructing the patients about nutrition can improve their nutritional wellbeing.

dialysis, anemia and lack of appetite (11).
Also, studies have shown that improving and correcting the intake of micronutrients, by food or supplements, can better the life quality of a dialysis patient (12-14). Considering the increasing number of people needing hemodialysis; the increase of malnutrition and vitamin and micronutrient deficiency among dialysis patients; and the lack of research in this regard (especially in Lorestan) the present study was carried out on hemodialysis patients admitted to Khoramabad's Shohadaie Ashaier hospital ascertain their nutritional status and the effects of nutrition on them and their lives.

## Patients and Methods

In this descriptive cross-sectional study, carried out on hemodialysis patients admitted to Khoramabad's Shohadaie Ashaier hospital in the year 2013, 57 patients (33 male and 24 female) were analyzed. The patients chosen for the study were 18 years of age or older, they had to have been hemodialyzed for at least 6 months and twice a week. The necessary information about the 57 subjects was gathered and then were imported into the questionnaire. Information about the patients were gathered by referring to the patient's medical history and by directly questioning the patients. The information gathered was age, marital status, sex, income status, domicile status, the number of dialysis the patient underwent each week, their history with smoking, how long they had been under dialysis treatment, and their family medical history.
In order to access the nutritional status of the patients a 24 recall food questioner was used. In the questionnaire the three day food intake of the patients (2 normal days and one weekend) was collected and analyzed. All the dietary items the patients had eaten during the three days were noted, and then by using the N III software the energy, protein, vitamins, and minerals intake of the patients was calculated. The patient's daily physical activities were assessed by using the international physical activity questionnaire. The patients were weighed using the double zero seca scale (during weighing the patients had to wear the least amount of clothing and no shoes). The patients heights were measured using a cloth meter, during this the patients had to be bare foot and they had to stand parallel to the wall the back of their feet, shins, and their hips sticking to the wall and their heads looking straight forward. The patients body mass indexes were calculated by this formula: weight (in kilograms) divided by height squared (in meters), finally the patients BMI's were compared to standard sources. According to the standard source BMI under 18.5 $kg/m^2$ is categorized as underweight, 18.5-24.9 $kg/m^2$ is categorized as normal, 25-29.9 $kg/m^2$ as overweight, and above 30 is categorized as fat (15).

### Ethical issues

1) The research followed the tenets of the Declaration of Helsinki; 2) informed consent was obtained, and they were free to leave the study at any time; and 3) the research was approved by the ethical committee of the Lorestan University of Medical Sciences (200/58951).

### Statistical analysis

Descriptive statistical methods such as frequency and percentage, and indexes such as mean and standard deviation (SD) were used to analyze the gathered data. The data was computed by using SPSS software version 18. The correlation coefficient and chi-square test were also used.

## Results

This study was carried out on 33 male and 24 female hemodialysis patients. Their average age was 58.4, most of the hemodialysis patients were in the age group 60-69, the youngest age group was 18-30. 24.7% of the subjects were single, 75.3% of them were married. All the patients in this study had an income below 800 thousand tomans each month. 41.9% of the patients earned between 400 to 800 thousand tomans a month, 58.1% earned less than 400 thousand tomans a month.
The findings of this research showed that 85.2% of the subjects lived in urban areas and the rest lived in rural areas. Also, the subjects analyzed in this study had been undergoing dialysis for an average of 2.92 years. Most of the patients, 61.7%, underwent dialysis three times a week and 1.2% of the patients were dialyzed once a week. 41.1% of the subjects either smoked or had the history of smoking. Most of the subjects (78.8%) in mild daily physical activities, 21.2% of the subjects indulged medium daily physical activities, none of the subjects did heavy physical activities. The average weight of the subjects was $62.6 \pm 2$ kg. The body mass index (BMI) of most of the subjects (54.5%) was normal, and according to the analysis of their BMI 10.4% of the subjects suffered from low energy intake malnutrition (Table 1).
The blood serum albumin of the most patients analyzed was in the normal range (75.6%). The average energy intake of the patients was 1093 kcal, only 1.75% of the patients had a daily higher than 2000 kcal energy intake. The patients had an average daily intake of 50.35 g of protein per day and average protein of them was 0.8 g/kg of bodyweight. The daily average carbohydrate, fat, and fiber intake of the patients was 153.5, 35.5, and 3.9 g, respectively (Table 2).
The average blood serum cholesterol of the patients was 127.5 mg/dl, most of the patients (86%) had a cholesterol below 200 mg/dl.
The percentage of micronutrients intake of hemodialysis patients referred to Khoramabad's Shohadaie Ashaier hospital in comparison to the recommended usage (RDA) is

**Table 1.** Number and percentage of the patients' BMI ($kg/m^2$ )

| BMI category | Number | Percent |
|---|---|---|
| 1 (under 18.5) | 6 | 10.5 |
| (18.5-24.9) | 31 | 54.5 |
| 3(25-29.9 ) | 14 | 24.5 |
| 4 (30-34.9) | 6 | 10.5 |
| Total | 57 | 100 |

**Table 2.** Number and percentage of the daily energy and macro nutrients intake of the patients

| Variables | Percent | Total patient | Mean |
|---|---|---|---|
| Energy (kcal) | | 57 | 1093.1 |
| Under 1000 | 47.36 | | |
| 1000-2000 | 50.87 | | |
| Over 2000 | 1.75 | | |
| Protein (g) | | 57 | 50.35 |
| Under 44 | 49.14 | | |
| 44-63 | 31.57 | | |
| Over 63 | 19.29 | | |
| Carbohydrate (g) | | 57 | 153.5 |
| Under 200 | 21.05 | | |
| 200-300 | 57.9 | | |
| Over 300 | 21.05 | | |
| Fat (g) | | 57 | 35.5 |
| Under 50 | 73.8 | | |
| 50-100 | 22.8 | | |
| Over 100 | 3.4 | | |
| Fiber | | 57 | 3.9 |
| Under 4 | 60 | | |
| ≥ 4 | 40 | | |

**Table 3.** Percentage of the analyzed patients' daily micronutrient intake in comparison to RDA

| Micronutrients | Percent | |
|---|---|---|
| | Low intake | Adequate intake |
| Vitamin A (µg) | 60 | 40 |
| Vitamin E (mg) | 98 | 2 |
| B1 (mg) | 0 | 100 |
| B2 (mg) | 9 | 91 |
| B3 (mg) | 0 | 100 |
| B6 (mg) | 5 | 95 |
| B12 (µg) | 16 | 84 |
| Folic acid (µg) | 49 | 51 |
| Vitamin C (mg) | 21 | 79 |
| Calcium (mg) | 93 | 7 |
| Iron (mg) | 26 | 74 |
| Phosphorous (mg) | 79 | 21 |
| Magnesium (mg) | 100 | 0 |
| Zinc (mg) | 96 | 4 |
| Sodium (mg) | 98 | 2 |
| Potassium (mg) | 100 | 0 |

shown in Table 3. According to this table, in most of the studied patients the intake of water soluble vitamins, thiamin, riboflavin, niacin, pyridoxine, cobalamin, folic acid, vitamin C, and iron was appropriate based on the RDA. On the other hand, the patients had a lower intake of vitamins A and E, calcium, phosphorous, zinc, magnesium, sodium, and potassium in respect to the recommended RDA level.

## Discussion

In this study the nutritional status of 57 dialysis patients was examined. The results show that the patients' daily average energy intake was 17.5 kcal/kg of bodyweight per day; this is far lower than the recommended daily average energy intake of 35 kcal/kg of bodyweight per day (9). Also, the daily average protein intake of the patients was 0.8 g/kg of bodyweight; again, this is lower than the recommended 1.2 g/kg of bodyweight recommended for hemodialysis patients (9).

Overall, because the energy intake of hemodialysis patients is low, it is expected that their micronutrient intake be lower too (16). In the current study, 93%, 100%, 96%, 98%, and 100% of the patients analyzed had a deficiency of calcium, magnesium, zinc, sodium, and potassium respectively. The analysis of food absorbed water soluble vitamins of the subjects showed that 5%-50% of them had a lower than recommended intake of riboflavin, pyridoxine, B12, folate, and vitamin C. Ninety-eight percent and 60% of the subjects had deficient amounts of fat soluble vitamins E and A, respectively. However, by comparing the average micronutrient intake with the recommended amount for hemodialysis patients (17) a higher frequency of deficiency was calculated.

Andrew et al study showed that the frequency of micronutrient intake deficiency in comparison to recommended nutrient intake/recommended dietary intake (RMI-RRI) was respectively as follows: Thiamin (0% to 67%), riboflavin (29% to 83%), niacin (0% to 13%), pyridoxine (21% to 100%), folate (54% to 100%), B12 (8% to 33%), vitamin C (38% to 50%), and zinc (54% to 96%) (18). The frequency of micronutrient intake deficiency of the subjects of the current study was lower in comparison to reference nutrient intakes (RNI).

Raimundo et al study, carried out in Portugal, showed that the intake of two micronutrients in 92% of dialysis patients studied was lower than the recommended amount (19).

Wang et al study, carried out in Hong Kong, showed that in continuous ambulatory peritoneal dialysis (CAPD) patients, the average intake of vitamin A, thiamin, riboflavin, niacin, pyridoxine, B12, folic acid, vitamin C, calcium, iron, zinc, and magnesium was meaningfully lower than healthy individuals (20).

Cho et al study showed that the intake of dietary vitamins and minerals in hemodialysis patients was not sufficient, 60% to 80% of the patients were not taking the recommended amount of vitamins B1, B2, and C (21).

Some of the studies express that vitamin C deficiency in dialysis patients is due to the fact that the patients are frequently told to limit the amount of fruits and vegetables in their diets, so as to reduce the chances of hyperkalemia. Additionally, when vegetables are washed or boiled too much, in order to reduce the amounts of their potassium, the vitamin C of the vegetables is deactivated (22,23).

The lack of appetite and low dietary intake of protein can

be likely reasons why dialysis patients have a lower than recommended levels of some vitamins and micronutrients (24). Meats, bean, and dairy products are not only rich sources of thiamin and vitamin B groups, but also proteins and phosphorous, this makes them dangerous to patients suffering from chronic diseases because they worsen kidney diseases and can also increase limited uremia (24,25). Another reason that vegetables are limited in a dialysis patient's diet is because vegetables are rich sources of folic acid, this makes them increase blood potassium levels - this is dangerous to dialysis patients (24). The blood acid folic levels of dialysis patients is good in comparison to recommended standards, this can be because dialysis patients take ample acid folic supplements.

Lower than normal intake of iron and zinc in dialysis patients can be linked to the limits these patients have on eating foods rich in micronutrients (meats and sea foods) or because of their loss of appetite (24). Most of the kidney disorder symptoms (lack of appetite and taste) of dialysis patients can be linked to their blood zinc deficiency (26). In order to reduce the risk of the increase of potassium and phosphorus in the patients' blood serum, dialysis patients are told not to eat foods rich in magnesium, foods such as nuts, whole grain, green leafy vegetables, beans, and peas (24).

## Conclusion

The findings of the present study show that there is a high incidence of deficiency in the intake of energy, protein, and some micronutrients in hemodialysis patients. The current studies' findings advocates that hemodialysis patients take supplements for water soluble vitamins and for minerals, supplements such as zinc, iron, calcium, and magnesium.

## Recommendations

In accordance to the findings of the current study and because of the prevalence of protein, energy, and micronutrient malnutrition among hemodialysis patients, it is recommended that more widespread research (researches with more test subjects or researches evaluating the effective causes of malnutrition) be carried out. Moreover, nutritional teaching programs for the patients, their families, and for medical staff be carried out in different parts of the country.

## Limitations of the study

Small proportion of the patients was a limitation of our investigation.

### Acknowledgements

Authors are grateful to Research Deputy of Lorestan University of Medical sciences for their financial support of this project.

### Authors' contribution

All authors contributed to design of the research. HB, SB and PR conducted the research. FE analyzed the data. MM, PR and NN prepared the manuscript. All authors read, revised, and approved the final manuscript.

### Ethical considerations

Ethical issues (including plagiarism, misconduct, data fabrication, falsification, double publication or submission, redundancy) have been completely observed by the authors.

### Conflict of interests

The authors declared no competing interests.

### Funding/Support

This study was financially supported by the Lorestan University of Medical Sciences (Grant# 30316 program, series 1244101, ID: 9938).

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