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*Original article*

## Nutritional Habits of Hemodialysis Patients

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### Abstract

**Introduction.** Nutrition for patients in end-stage renal disease (ESRD) is one of the most restrictive, owing to the numerous limitations in consuming certain foods, micronutrients as well as restriction in fluid intake. In the following study, we investigated dietary habits of hemodialysis patients and their changes after nutritional education.

**Methods.** 101 patients undergoing maintenance hemodialysis (HD) were included in the investigation. During the first educational visit every patient received individual recommendations for nutritional intake, necessity for enteral nutritional supplement or for phosphate binders (PB) depending on the anthropometric and laboratory assessment. Two months later, a questionnaire was carried out in order to identify if any changes in food intake were present after this specific nutritional and medical education.

**Results.** Of 101 patients who completed the initial nutritional screening and education, 76 patients who had all the required data were included in the final analysis. 77,6% of patients stated to had breakfast every day, while 22,4% of them had their first meal at lunch time. 79% of patients ate during or immediately before/after HD, while 18,42% refused a meal. The most common reasons for refusing a meal during HD were nausea and hypotension. 46% of patients had three meals a day, 21% ate only twice a day. In general, patients undergoing HD had three to four meals a day (including snacks). Only 23,7% of patients ate meat products every day, while 22,4% of them consumed meat twice a week. The significant correlation was found between the average age of patients and meat consumption-patients with low meat intake (once or twice per week) were significantly older (average 68.4 years) in comparison to patients with regular meat consumption (four or more times a week; average age of 53.8 years) ( $p < 0.01$ ). Regarding the use of PB, 72,4% were aware of their prescription, but despite the educational program, 4% of the patients were taking the medicine between

meals, while 2% of patients took PB at any time during the day.

63,2% of patients answered positively when asked whether they attempted to change their eating habits after nutritional education was carried out. 36,8% of them did not even try. When asked to mark the most disturbing problem they need to deal with on maintenance HD, 33% of patients stated blood pressure regulation. 14,5% of patients highlighted poor appetite as their largest problem.

**Conclusions.** The main intention of nutritional education should be raising the awareness among patients and helping them correct numerous disorders arising from inadequate nutritional intake such as hyperkalemia, hyperphosphatemia, excessive fluid intake, and protein-energy malnutrition. Continuous evaluation and adjustments of medical and nutritional therapy are needed along with permanently repeated aims of this specific treatment.

**Keywords:** hemodialysis, nutrition, habits, education, phosphorus

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### Introduction

Patients with end-stage renal disease (ESRD) have one of the most restrictive diets especially those who are diabetics also. Besides the restrictive intake of water, their nutrition should have low potassium and phosphorus content, but should be protein-rich. This aim is not easy to achieve while majority of food with high protein-content is also full of phosphorus [1]. Different therapeutic approaches are available for controlling hyperphosphatemia, such as dietary restrictions, adequate dialysis and use of oral phosphate binders [2]. However, despite these approaches, normalization of serum P levels is often difficult and frequently not obtained. Dialysis patients often have numerous comorbidities such as cardiovascular diseases, diabetes, chronic inflammation and infections. They are often with low income, have low level of physical activity and inadequate

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social support. Many ESRD patients have poor appetite especially when hemodialysis is not adequate. All these factors may negatively influence food intake and nutritional status. Nutritional guidelines suggest daily energy intake higher than 30-35 kcal/kg ideal b.w. and daily protein intake higher than 1.1-1.2 g/kg ideal b.w. [3,4]. The assessment of food intake is, together with anthropometric and laboratory evaluation, an important part of the management and treatment of ESRD patients [5,6]. It can help recognize patients with problems and individualized the approach in solving them.

In our study, we assessed the dietary habits and nutritional status in a cohort of stable hemodialysis patients treated in our institution.

### Materials and methods

One hundred-one hemodialysis patients were included in this prospective study. All patients gave their informed-consent for participation in the investigation. Patients were treated with hemodialysis for at least three months, two to four times a week with biocompatible synthetic membranes. All patients were seen individually by a nephrologist and a registered dietician. The seven-day recalls were collected by interviews. During the first educational visit every patient received individual recommendations for nutritional intake, necessity for enteral nutritional supplement or adequate use of phosphate binders depending on the anthropometric and laboratory assessment.

Patients' data were obtained through questionnaires that were specifically designed for this study. The questionnaire consisted of items corresponding to socioeconomic status, level of education, dietary habits of the patients, namely breakfast, number of meals per day, number of meals containing meat and number of skipped meals.

Two months later, a questionnaire was carried out in order to identify if any changes in food intake were present after this specific nutritional and medical education.

Descriptive statistics are given as mean  $\pm$  standard deviation. Statistical analysis was performed by Student's t test for unpaired and paired data. Linear correlation analysis was performed by Pearson's test. Differences were considered statistically significant when  $p < 0.05$ .

### Results

#### Patients' characteristics

Of 101 patients who completed the initial nutritional screening and education, 76 patients who had all required data were included in the final analysis.

57 were male (56,4%) and 44 were female (43,6%) patients, with mean age of 60,8 $\pm$ 16,15 years. The leading cause of ESRD was chronic glomerulonephri-

tis (27,7%), followed by diabetic nephropathy (21,8%) and nephroangiosclerosis (14,8%). The mean time spent on HD was 96,03 $\pm$ 102,521 months/weeks?, with a minimum treatment time of 3 hours for 2-4 times a week, blood flow rate was 290.8 (250-350) ml/min and average Kt/V 1.32. Bicarbonate HD and ultrapure dialysate fluid with a flow rate of 500 ml/min was used for all patients, as well as high-flux polysulphone dialysers. Baseline characteristics of the study population ( $n=101$ ) are given in Table 1.

**Table 1.** Baseline characteristics of the study population ( $n=101$ ). Values are presented as mean $\pm$ SD and percentage

<b>Characteristics</b>	
<i>Demographic variables</i>	
Mean age (yr)	60.8 $\pm$ 16.15
Men (%)	56.4
Arteriovenous fistula (%)	62.37
Renal residual function > 300 ml/d (%)	44.55
<i>Type of primary kidney disease (%)</i>	
Glomerulonephritis	27.72
Diabetic nephropathy	21.78
Nephroangiosclerosis	14.85
Polycystic kidney disease	8.92
Pyelonephritis	2.97
Other	23.76
<i>Mean hemodialysis variables</i>	
Vintage (yr)???	96.03 $\pm$ 102.521 ???
Sessions per week (%)	
2	8.91
3	88.12
4	2.97
Mean dose (Kt/V)	1.320 $\pm$ 0.295
Duration (%)	
3-3.5 hours	34.65
$\geq$ 4 hours	65.34
Blood flow rate (%)	
200-250 ml/min	10.89
270-300 ml/min	71.29
> 320 ml/min	17.82
Ultrafiltration (kg)	2.637 $\pm$ 0.941
Decreasing body weight during hemodialysis (%)	3.857 $\pm$ 1.435
<i>Mean laboratory values</i>	
Hemoglobin (g/L)	107.594 $\pm$ 12.233
Leucocytes (*10 <sup>9</sup> /L)	6.240 $\pm$ 2.078
Creatinine ( $\mu$ mol/L)	771.089 $\pm$ 198.317
Urea (mmol/L)	20.895 $\pm$ 5.415
Triglycerids (mmol/L)	1.747 $\pm$ 0.934
Cholesterol (mmol/L)	4.176 $\pm$ 1.135
Phosphate (mmol/L)	1.434 $\pm$ 0.439
Potassium (mmol/L)	4.913 $\pm$ 0.660
C-reactive protein (mg/L)	8.159 $\pm$ 12.753
Iron ( $\mu$ mol/L)	11.802 $\pm$ 4.835
Total iron binding capacity ( $\mu$ mol/L)	40.257 $\pm$ 8.196
Ferritin ( $\mu$ g/L)	388.327 $\pm$ 189.198

#### Nutritional habits

46% of the patients had three meals a day, 21% ate only twice a day. In general, patients undergoing HD had three to four meals a day (including snacks) (Figure 1).

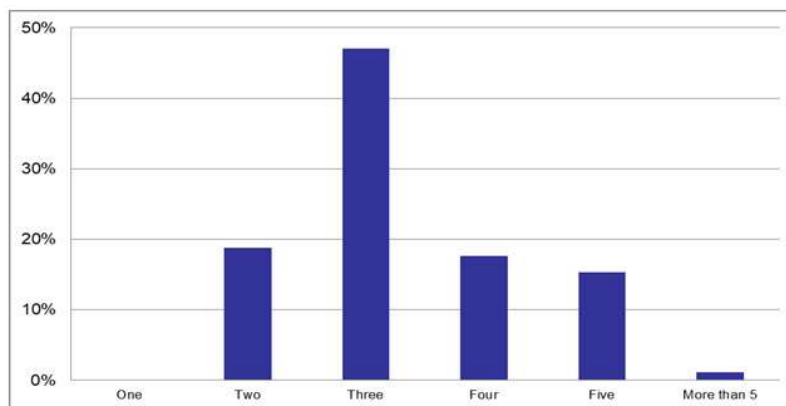


Fig. 1. Number of meals per day.

77,6% of patients stated to have breakfast every day, while 22,4% of them did not eat until lunch time. 79% of patients ate during or immediately before/after HD, while 18,42% refused a meal. The most common reasons

for refusing a meal during HD were nausea and hypotension. Only 23,7% of patients ate meat products every day, while 22,4% of them consumed meat twice a week (Figure 2).

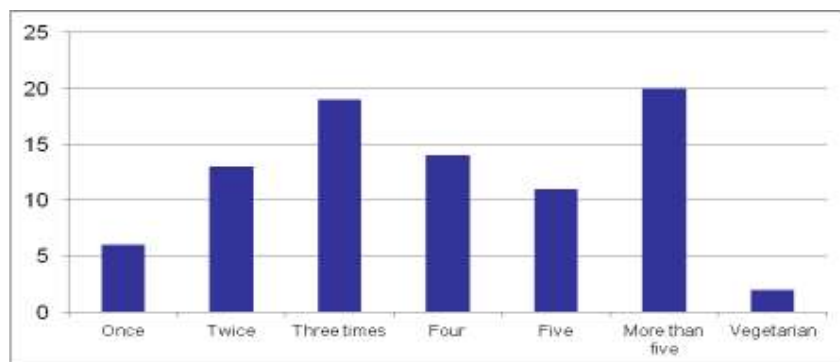


Fig. 2. Consumption of meat-containing meals over 7 days (%)

The significant correlation was found between the average age of patients and meat consumption-patients with low meat intake (once or twice per week) were significantly older (average 68.4 years) in comparison to patients with regular meat consumption (four or more times a week; average age of 53.8 years) ( $p < 0.01$ ).

Regarding the use of phosphate binders, 72% were aware of their prescription, but despite the educational program, 4% of patients were taking the medicine between meals, and 2% of patients took phosphate binders at any time during the day (Figure 3).

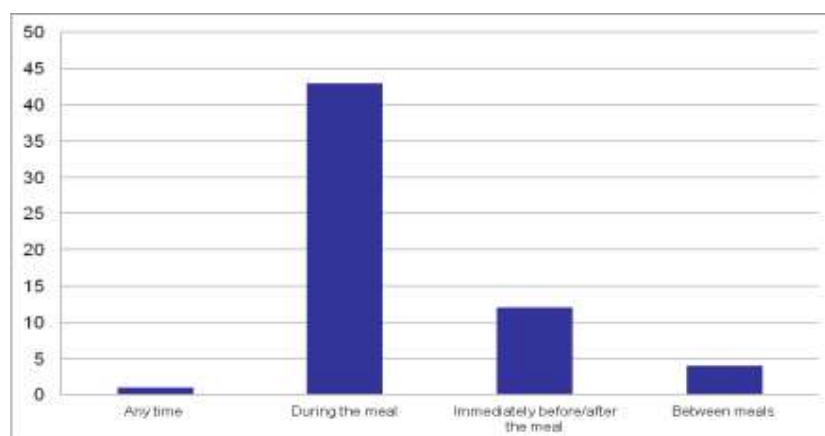


Fig. 3. Use of phosphate binders. % is missing

When patients were asked to mark the most disturbing problem they need to deal with during maintenance HD, 33% of them stated blood pressure regulation. Afterwards followed hyperphosphatemia (27%), hyperkalemia

(22%) and excessive fluid intake (22%). Interesting to note is that 15% of patients highlighted poor appetite as their biggest concern (Figure 4).

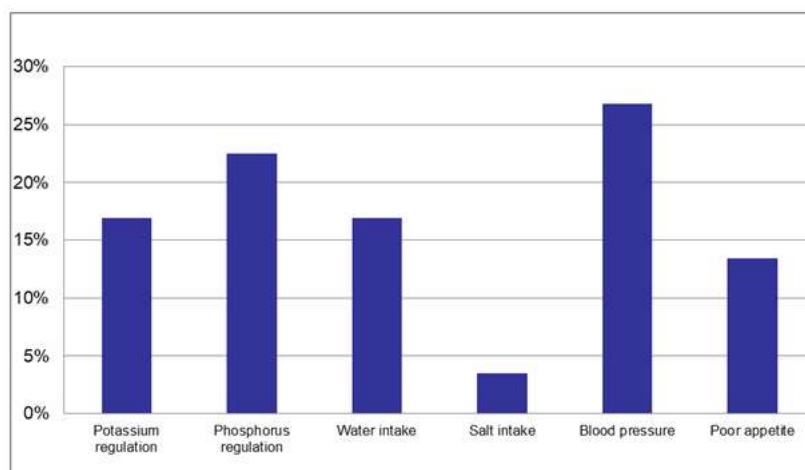


Fig. 4. Self-percieved major health problems

Oral nutritional supplements (ONS) were prescribed for 101 patient. However, only 51% of patients used them as prescribed. Among the reasons which they gave for not using ONS were forgetfulness (10 patients) and barriers from their general practitioners restricting prescriptions (14 patients). Many of them were unable to pick the necessary ONS from the pharmacy due the lack of caregiver (12 patients). Other patients refused to use ONS (dull taste, bowel problems).

We further evaluated their attitude after the specific nutritional education which involved a dietitian and a nephrologist. 63% of patients answered positively when asked whether they attempted to change their eating habits after nutritional education was carried out. However, 37% of them did not even try. Their explanation was that they did not consider nutrition as an important part of their treatment. There was no correlation in regard to the level of education with other parameters.

## Discussion

This study showed inadequate nutritional habits in hemodialysis patients. Our data came from the whole cohort of dialysis patients, and not only from those who were in stable condition and free from severe comorbidities. It is well known that severe comorbidities as well as acute complications negatively affect dietary intakes and nutritional status. Thus, many studies on nutrition in maintenance hemodialysis patients are confined? from important biases [7].

78% of our patients had breakfast every day and 19% refused a meal during or immediately after the hemodialysis session. Just 24% of patients ate meat-containing products every day, while 22% of them consu-

med meat twice a week. There was a strong correlation of meat intake with age which is in concordance with other studies. Namely, available population studies have demonstrated a decline in food intake with aging, predominantly due to a decrease in fat intake [8-10].

Regarding the use of phosphate binders, 72% were aware of their prescription, but despite the educational program, 4% of patients were taking the medicine between meals, and 2% of patients took phosphate binders at any time during the day. In a two-months study of 135 hemodialysis patients, about half of patients were adherent every week, but over the entire 8-week period, only 22 % were totally adherent [11].

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Recent studies have highlighted the contribution of socio-economic inequalities in health and mortality [12]. Patients with lower socio-economic status have higher serum phosphate concentrations and higher likelihood

of hyperphosphatemia. These data suggest that a low socio-economic status is a novel risk factor for increased serum P concentrations in ESRD [13].

### Conclusion

The main intention of nutritional education should be raising the awareness among patients and helping them correct numerous disorders arising from inadequate nutritional intake such as hyperkalemia, hyperphosphatemia, excessive fluid intake, and protein-energy malnutrition. Continuous evaluation and adjustments of medical and nutritional therapy are needed along with permanently repeated aims of this specific treatment. A multidisciplinary team consisted of nephrologists and nutritionists along with other medical specialties, represents a constant need in every dialysis center and should not be perceived as luxury.

*Conflict of interest statement.* None declared.

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