

Dietary Awareness in Patients with kidney Disease

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Abstract:

Nutrition is an important part of the treatment of many diseases, including chronic kidney disease.

The objective of our study was to investigate haemodialysis patients' awareness of nutritional principles before and after the initiation of their dialysis treatment. Other objectives were to find out whether they were aware of the position of nutritional therapists and about their compliance with dietary measures and technological modifications.

Results: 64 questionnaires were evaluated. 41 (64.06%) respondents were informed about the principles of a low protein diet, and there was the greatest lack of information about the need to restrict sodium, potassium and vegetable protein, inappropriate meat products, milk and dairy products. 56 (87.5%) probands were informed about diets after being involved in

haemodialysis treatment. However, based on their implementation in practice, we found that this instruction was insufficient, especially in terms of limiting phosphorus and potassium intake. A positive finding was the strong awareness of egg consumption, as 41 (60%) respondents eat eggs only 1-2 times a week due to the high phosphorus content in the yolk; they do not have any restrictions when it comes to the consumption of egg whites. A negative finding was that 39 (60%) participants consume dark bread, pastries, rye or buckwheat flour, but 15% of them were diabetics. Strikingly, it was found that the patients did not know a nutritional therapist, which significantly influenced the lack of awareness of the respondents about the correct principles of nutrition in different stages of the disease and forms of treatment.

Conclusion: Proper nutrition is an important part of the comprehensive management of chronic kidney disease. Dietary measures must take into consideration the stage of the disease, comorbidities and the current dietary pattern. This clearly demonstrates the important role of a nutritional therapist in the treatment management of patients with kidney disease. By informing patients early on about the principles of nutrition, disease progression, overall morbidity and mortality can be significantly influenced.

„The food you eat can be either the safest and most powerful form of medicine or the slowest form of poison.“

(Ann Wigmore)

Introduction

Chronic kidney disease (CKD) is a heterogeneous disorder of renal structure and function (estimated glomerular filtration rate (eGF) < 60ml/min/1.73m²) with variable clinical manifestations and the potential for progressive loss of function and/or complications resulting from reduced function lasting more than 3 months. It significantly increases both cardiovascular (CV) and general morbidity and mortality.

The prevalence of CKD is on an increasing trend and is reported to be 9-10% (15%) of the population, and globally about 850 million people have some category of CKD. In Slovakia in 2021, 159,882 patients were seen in nephrology clinics, which means that every 10th- 15th Slovak citizen suffers from some degree of CKD. 4,458 patients were enrolled in regular dialysis treatment, 105 patients underwent kidney transplantation and 343 patients were on the waiting list (1).

The basis of CKD treatment is to influence the underlying causative factor as well as all the

factors of nephropathy progression, which may accelerate the progression of renal disease independently of the underlying nephrological diagnosis.

Treatment modalities include regime and dietary measures, pharmacological measures, active elimination and transplantation therapy. The therapeutic nutrition of patients in the pre-dialysis period as well as those undergoing haemodialysis therapy forms an integral part of the therapy to minimise the risks associated with kidney disease and the development of a secondary disease. It should be individually designed based on the stage of CKD and consider individual patient specificities (2, 3, 4, 5).

Objectives The primary objective of our study was to determine whether haemodialysis patients have sufficient information about diet in the pre-dialysis phase and after the initiation of dialysis treatment.

Other objectives were:

- to find out the awareness about nutritional therapists and the possibility of consulting a nutrition plan with a nutritional therapist,
- to find out whether patients follow the dietary measures as prescribed by their physician and whether they had been instructed about these

measures before being placed on dialysis treatment,

- to find out whether they have information on low-protein flours, breads and pastries in terms of limiting vegetable sources of protein in the pre-dialysis phase,
- to find out whether haemodialysis patients adhere to the dietary measures during dialysis treatment and whether they were instructed to change their dietary measures after starting dialysis treatment,
- to find out whether they have sufficient information about increased animal protein intake during dialysis treatment,
- to find out whether they have information on the need for potassium restriction and the possibility of technological modification to reduce the potassium content of foods, also on the need for phosphorus restriction in milk, dairy products, eggs and pastries,
- to find out whether they accept their diet as part of their treatment and obey the dietary instructions of the dialysis physician when their results deteriorate,
- to find out how patients perceive the dietary instructions they receive and what they would suggest to improve the awareness of dietary interventions for chronic kidney disease.

Probands and methods

Characteristics of the set of respondents

70 haemodialysis patients of the East Slovak Institute of Heart and Vascular Diseases, Inc. in Košice, Slovak Republic, who were treated in the institute for secondary diseases were approached for participation. The survey was conducted from 01.09.2022 to 31.12.2022.

We used the method of quantitative research through an anonymous questionnaire consisting of 16 questions of our own design, of which 15 questions were closed and 1 was open-ended. The first part of the questionnaire was focused on patients' diet and dietary instructions in the pre-dialysis period, and the second part was focused on information about patients' instructions regarding a haemodialysis diet and the patients' current diets.

Microsoft Excel was used for statistical analysis and the processing of the collected data.

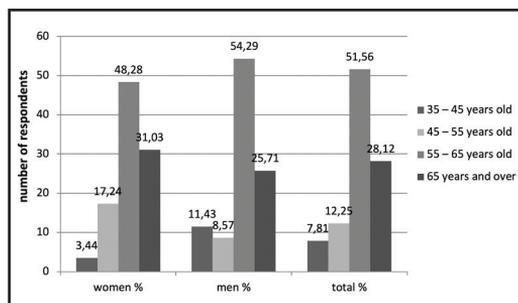
Results

The return rate was 91.43% (64 questionnaires out of 70 distributed).

Demographic data

The evaluated set consisted of 29 (45%) women and 35 (55%) men. The age distribution of the probands is shown in Graph 1.

Graph 1 Age of the respondents

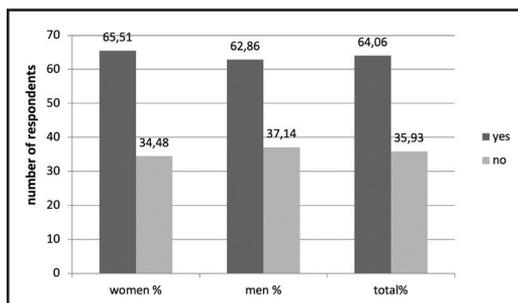


Source: own compilation

Most of the respondents 42 (65.63%) had high school education and the least 10 (15.63%) had university education. 18 (28.13%) of the respondents have been enrolled in a dialysis program for less than 5 years but more than 2 years, 16 (25%) for less than 1 year, 12 (18.75%) for 2 years, 16 (7.19%) for 1 year and only 7 (10.90%) for more than 5 years.

41 (64.06%) of the respondents were aware of the low-protein diet (Graph 2).

Graph 2 Instructions for a low-protein diet



Source: own compilation

Instruction by a healthcare professional other than a nutritional therapist took on average 10- 15 minutes, and only 11 (17.07%) respon-

Table 1 Evaluation of the diet of patients in the pre-dialysis stage and their adherence to a low-protein diet

meat/fish	women	%	men	%	total	%
a) daily	27	93,10	32	91,43	59	92,19
b) 2x per week	0	0,00	0	0,00	0	0,00
c) 1x per week	1	3,49	2	5,71	3	4,69
d) occasionally	1	3,49	1	2,86	2	3,13
e) never	0	0,00	0	0,00	0	0,00
amount of meat / day	women	%	men	%	total	%
a) 1 slice	26	89,66	20	57,14	46	71,88
b) 2 slices	3	10,34	12	34,29	15	23,44
c) 3 or more slices	0	0,00	3	8,57	3	4,69
meat products	women	%	men	%	total	%
a) daily	4	13,80	19	54,29	23	35,94
b) 2x per week	13	44,83	8	22,90	21	32,81
c) 1x per week	5	17,24	4	11,43	9	14,06
d) occasionally	5	17,24	4	11,43	9	14,06
e) never	2	6,90	0	0,00	2	3,13
milk intake	women	%	men	%	total	%
a) daily	6	20,69	7	20,00	13	20,31
b) 2x per week	2	6,90	4	11,43	6	9,38
c) 1x per week	9	31,03	2	5,71	11	17,19
d) occasionally	6	20,70	16	45,71	22	34,38
e) never	6	20,70	6	17,14	12	18,75
dairy products and cheese	women	%	men	%	total	%
a) daily	15	51,72	16	45,71	31	48,44
b) 2x per week	7	24,14	8	22,90	15	23,44
c) 1x per week	2	6,90	3	8,57	5	7,81
d) occasionally	2	6,90	3	8,57	5	7,81
e) never	3	10,34	5	14,29	8	12,50
salt	women	%	men	%	total	%
a) I have salted when cooking	6	20,70	15	42,90	21	32,81
b) I have salted after cooking	1	3,49	1	2,86	2	3,13
c) I have not salted when cooking	18	62,09	17	48,57	35	54,69
d) I have not salted after cooking	4	13,80	2	5,71	6	9,38
canned vegetables	women	%	men	%	total	%
a) daily	0	0,00	1	2,86	1	1,56
b) 2x per week	1	3,49	4	11,43	5	7,81
c) 1x per week	1	3,49	4	11,43	5	7,81
d) occasionally	17	58,62	23	65,71	40	62,50
e) never	10	34,49	3	8,57	13	20,31
foods high in sodium	women	%	men	%	total	%
a) I have restricted	16	55,17	11	31,43	27	42,19
b) I have excluded	1	3,49	3	8,57	4	6,25
c) I have not restricted	12	41,38	16	45,71	28	43,75
d) I have not excluded	0	0,00	5	14,29	5	7,81
foods high in potassium	women	%	men	%	total	%
a) I have restricted	17	58,62	12	34,29	29	45,31
b) I have excluded	1	3,49	3	8,57	4	6,25
c) I have not restricted	9	31,03	11	31,43	20	31,25
d) I have not excluded	2	6,90	9	25,71	11	17,19
fluid intake	women	%	men	%	total	%
a) I have restricted	3	10,34	3	8,57	6	9,38
b) I have not restricted	26	89,66	32	91,43	58	90,63

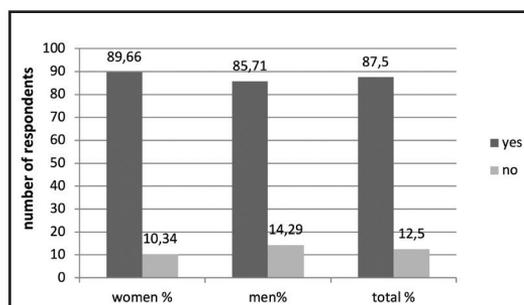
dents reported being instructed for more than 15 minutes but less than 45 minutes. Instruction by a nutritional therapist took on average 90 minutes, and repeated re-educations took one hour.

Despite the dietary instruction conducted, other survey results regarding dietary adherence show the opposite (Table 1).

When asked specifically about the recommendation to consume low protein flour and bakery products (bread and pastries) and whether they followed this recommendation, 50 (72.12%) respondents stated that they had not been informed about low protein flour, bread and pastries. 7 (10.94%) respondents stated that they included such bakery products in their diet and that it was costly to buy this kind of flour, bread and pastries.

The next question concerns the instruction given by a healthcare professional about dietary change after starting dialysis treatment. 56 (87.50%) of the respondents reported that they had been instructed about a haemodialysis diet (Graph 3).

Graph 3 Instructions on a haemodialysis diet



Source: own compilation)

51 (91.07%) people were instructed by a dialysis physician, 12 (21.43%) by a dialysis nurse, 2 (7.14%) looked up the information on the Internet or in books, 1 (1.76%) was thoroughly instructed by a physician from the family, and only 1 (1.76%) was thoroughly instructed by a friend - a nutritional therapist. On average, the instruction lasted 10-15 minutes for 42 (66.07%) respondents, and 17 (26.79%) respondents reported that they were instructed for a few minutes during the visit. Respondents who were attended to by a nutritional therapist or had a physician in the family reported an av-

erage time of 180 minutes or more of education or repeated re-education at an average time of 180 minutes. 8 (12.50%) respondents stated that they had not been educated about a haemodialysis diet.

Other survey questions focused on the consumption of animal protein, especially meat, during dialysis treatment. 54 (84.38%) respondents reported having knowledge about the need for an increased consumption of animal protein, and 10 (15.63%) did not have this information. 60 (93.75%) respondents consumed chicken and turkey the most frequently, 55 (85.94%) pork and 48 (75%) beef, while calf meat had the lowest frequency of 6 (9.34%). Consumption of rabbit meat and pigeon meat was also reported. Of the meat products, ham made up a higher proportion of the meat and was reported the most frequently by 51 (79.68%) respondents, and ham for children was at 25 (39.06%). The probands, of whom there were 6 more (20%) males than females, consumed dry salamis, bratwurst, wiener sausages, frankfurters, pates, cracklings, bacon, sausages and entrails. 23 (35.94%) respondents reported consuming home-made spreads or pates.

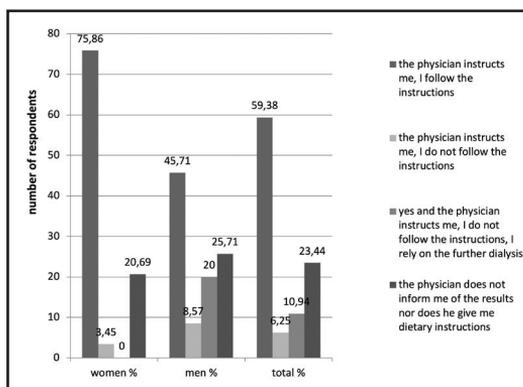
Since it is necessary to restrict/eliminate foods with high potassium content during dialysis treatment, we investigated whether patients practice these restrictions and follow the recommended technological treatment of vegetables and potatoes aimed at reducing potassium. 23 (34.94%) respondents reported that they restricted themselves from consuming these foods only after being alerted by their physician about elevated potassium levels in their blood. 28 (43.7%) said they restrict the consumption of these foods and 13 (20.31%) do not restrict. Unfortunately, 33 (51.56%) of the respondents had not been informed about the technological treatment of potatoes and vegetables in order to leach potassium into the water, a process that reduces the amount of potassium in the food. Only 20 (31.25%) prepare potatoes and vegetables in this way, and 11 (17.19%) do not know this method at all.

We also investigated the respondents' awareness of limiting the intake of foods high in phosphorus (canned foods, milk, dairy products, meat, entrails, whole-grain breads, legumes, nuts, chocolate, cocoa, beer, cola drinks) and egg consumption. 31 (48.44%) patients limit their

intake of high phosphorus foods, 21 (32.81%) do not limit it as they take phosphate binders, and 12 (18.75%) do not limit it. Among dairy products, 53 (82.81%) consume white and fruit yogurt the most frequently, and 48 (76.56%) of the respondents consume cheese with a preference for melted cheeses and fresh cream cheeses. Fresh cheese was predominant among females, and melted cheeses were shown to be more popular with men. Mouldy and smoked cheeses are more likely to be consumed by men. Both sexes also consume cottage cheese, cream, acidophilic milk, kefir and hard cheeses. 41 (64.06%) respondents consume an egg 1-2 times a week, 21 (32.81%) 3-4 times a week and only 2 (3.13%) consume more than 5 eggs a week.

Haemodialysis patients are regularly laboratory checked and dietary changes may be recommended according to the results. Therefore, we wanted to find out if the physician informed the patients about the results and recommends diet modification after the tests (Graph 4).

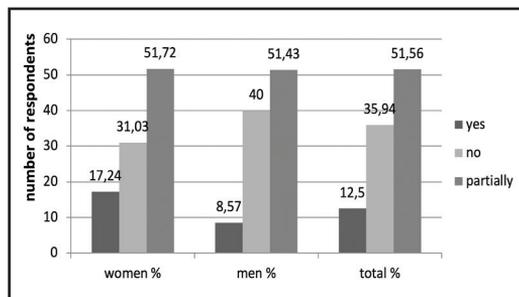
Graph 4 Compliance with dietary instructions provided by the dialysis physician



Source: own compilation)

We asked the probands whether they considered the dietary instruction during kidney disease to be sufficient (Graph 5).

Graph 5 Sufficiency of instructions provided before and after the start of dialysis treatment



Source: own compilation

Since nutrition is a very crucial component in the treatment of CKD, adequate time should be devoted to instructing patients as well as implementing these instructions given by nutritional therapists, who are highly professional health-care professionals. Therefore, we asked patients if they had ever met a nutritional therapist during their hospital stay. Unfortunately, 31 (48.44%) of the respondents said that they did not know what a nutritional therapist was, and 23 (35.94%) said they had not met or sought one out during their hospitalization. Only 10 (15.63%), 7 (24.14%) women and 3 (8.57%) men, had sought one out during their hospitalization.

Discussion

Diet has an essential place in the treatment of patients with CKD. A properly adjusted diet, according to the stage of the disease, comorbidities and form of treatment, can significantly influence the progression of renal disease as well as the overall morbidity and mortality of the patient (6, 7, 8, 3, 4, 5, 9).

In the pre-dialysis period, a low-protein diet with potassium and phosphorus restriction is a key dietary measure (10, 5).

Once patients are enrolled in dialysis treatment, there are significant changes in diet, especially in terms of protein intake, that need to be communicated to the patient so they can reflect this by changing the food they eat. Patients with CKD are at risk of developing sec-

ondary sarcopenia, which is characterised by the progressive loss of muscle mass, strength and function, and it is associated with reduced physical performance, immobility, falls, repeated hospital admissions, a reduced quality of life and even death. It is generally associated with organ failure (11). During the first year of dialysis treatment there is a risk of developing Protein Energy Malnutrition (PEM). Due to insufficient phosphorus and potassium excretion, it leads to hyperphosphatemia and hyperkalaemia, which can be influenced by diet. Malnutrition is a risk factor for higher morbidity, prolonged hospitalizations, increased need for rehospitalizations, prolonged recovery and higher mortality (9). In addition, it reduces immunity (12, 13) and adversely affects some renal functions (14). In the early stages of CKD, its prevalence is similar to the general population, whereas in the later stages up to 40% of patients are at risk of developing malnutrition. It is important to note that PEM can also occur in obese patients (15).

In order to prevent the development and to identify malnutrition early in patients with CKD, it is recommended to assess the nutritional status of the patient prior to their enrolment in the dialysis programme and repeat this at 6-monthly intervals for patients over 50 years of age. With younger patients undergoing haemodialysis therapy for more than 5 years, we monitor their nutritional status every 3 months (16).

In the pre-dialysis period, a low-protein diet with potassium and phosphorus restriction is crucial (3, 4, 5, 17, 18). In our set, patients' awareness of the principles of a low-protein diet was lower at 41 (64.06%) compared with 56 (87.5%) after their enrolment in haemodialysis treatment. There was an absence of information about the need to limit sodium, potassium and vegetable protein, inappropriate meat products, milk and dairy products. Only 7 (10.94%) of the respondents reported having introduced a low protein diet and low protein bakery products into their diets. The reasons people gave for not doing so was that they had not been informed about them or because these things were beyond their financial means.

In practice, it often happens that haemodialysis patients do not have enough information about the dietary measures that are part of the treatment process. In our set, 56 (87.5%) said

they had been informed, but based on their implementation in practice, we found that this instruction was insufficient, especially in terms of limiting phosphorus and potassium intake. Even though the patients increased their protein intake after starting treatment, the composition of protein did not match the dialysis treatment recommendations. The majority consumed meat products, smoked meats, salamis and canned foods and did not eat meat itself. Meat products are not suitable, as they contain small amounts of protein but a lot of fat, salt, phosphates and preservatives (19). More than half of the respondents do not know the correct way to prepare vegetables and potatoes. We attribute the observed deficiencies to the education about these topics, as it is insufficiently long, typically only lasting several minutes, and this information is often not repeated again. This is supported by Šváč's (15) observation that proper patient education cannot be implemented in minutes, but rather in hours, and repetitions are necessary.

A positive finding is the strong awareness of patients about egg consumption. 41 (60%) of the respondents reported consuming eggs only 1-2 times a week due to the high phosphorus content in the yolk, and they do not limit themselves when it comes to egg whites. We were negatively surprised to learn that 39 (60%) of the respondents consumed dark bread, pastries, rye or buckwheat flour, but 15% of them were diabetics. The reasons given were not only about a lack of information, but also about the higher prices of whole-grain breads and pastries. Only 25 (40%) of the respondents consumed white bread, pastries and flour, which are more suitable alternatives for haemodialysis patients in terms of phosphorus content.

A striking, though unfortunately expected finding was that patients do not know or see a nutritional therapist in the hospital, despite the fact that the role of a nutritional therapist is indispensable in most chronic diseases, including kidney disease (20).

When evaluating the education they received, patients reported such shortcomings as the absence of more space for instruction, a lack of information regarding diet, and an insufficient amount of information given to them, requiring them to supplement it through acquaintances of physicians and health professionals or

by studying books and the Internet. Otherwise they would not be given any instruction at all. In addition, they lack direct consultation on their meal plans and consequent adjustments to them. During the dialysis treatment they would like to see more communication from the medical staff with the patient to inform them about the results and dietary adjustments that should be implemented after analysing the laboratory results. They recommend the inclusion of a nutritional therapist and a psychologist while on dialysis. The implementation of these recommendations would result in increased patient awareness as well as the practical application of this information in the dietary management of patients with CKD (21).

Conclusion

Proper nutrition is an important part of the comprehensive management of chronic kidney disease. Dietary measures must take into account the stage of the disease, comorbidities and the current treatment modality. By informing patients early on about the principles of nutrition, it is possible to significantly influence disease progression as well as overall morbidity and mortality.

Conflict of interests

None declared

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