Effects Of Physical Activity On Patients With Chronic Nephropathy

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ABSTRACT
The research describes the concept of healthiness of the physical activity for patients with chronic kidney disease, moreover because the effect of 12-week physical training on physical activity in patients with chronic disease of stage 3-4 who are on a low-protein diet.
At the identical time, patients with variety of chronic diseases aside from CKD also suffer from poor physical performance and muscle atrophy, but more evidence has been accumulated of the positive effect of exercise in such patients [3].
Increased physical activity is related to improved ability to perform everyday activities, professional tasks. Therefore, regular exercise is usually recommended for such patients within the DOPPS study, patients who performed regular physical activity had the next quality of life related to health, good fitness and sleep quality indicators, with fewer patients with limited physical activity and lack of appetite [4].

Key words: chronic kidney disease, physical activity, low protein diet

1. INTRODUCTION

It is well known that patients with chronic kidney disease (CKD) exhibit limited physical function. Restricting exercise tolerance not only reduces quality of life, but also leads to increased morbidity and mortality.
Symptoms of CKD include symptoms like fatigue, muscle weakness, and decreased daily physical activity. Various varieties of physical activity, like exercise, improve the soundness of patients with CKD and increase their tolerance to physical activity [1-2].
The nutritional status of patients is one in every of the elemental conditions affecting mortality and the degree of rehabilitation of patients with CKD, including those undergoing renal replacement therapy [5-7].
Insufficient intake of protein and energy ends up in a violation of nutritional status: this ends up in a decrease in muscle mass and a decrease within the amount of fatty tissue.

Approximately 20-50% of patients with pre-dialysis stages of CKD show nutritional disorders [8].
Increased protein breakdown and slower elimination of nitrogenous toxins results in uremia. Elevated creatinine also includes a toxic effect on internal organs and tissues, where sarcosine is converted to methylguanidine. Additionally, changes in protein metabolism in uremia are closely related to impaired aminoalkanoic acid metabolism [9, 10].
With a low-protein diet, which is suggested at stages 3-4 of CKD, a decrease within the plasma concentration of essential amino acids is thanks to both insufficient intake of amino acids from food, low calorie intake and a violation of their endogenous synthesis, similarly as acidosis [10].
The aim of our study was to check the effect of 12-week training on physical activity in patients with 3-4 stages of CKD on a low-protein diet.

2. MATERIALS AND METHODS

The study included 119 patients with CKD C3 and C4 stages. Clinical data included anthropometric data: height, weight, body mass index (BMI), measurement of the circumference of the mid-thigh and circumference of the center shoulder, laboratory data: urea, creatinine, electrolytes, albumin, total protein, hemoglobin. Glomerular filtration rate (eGFR) was estimated using the formula CKD-EPI (2011) [11]. All patients underwent instrumental research methods: ECG, echocardiography, cardiopulmonary check.
The patients included within the study were offered three nutrition options - with an occasional and limited protein content, in addition as a coffee protein content with correction by keto-analogues (Ketosteril, manufacturer FRESENIUS, Germany, in a mean dose of 1 tab. / 5 kg of weight). Table 1 shows the nutritional forms of patients participating within the study.
To assess physical activity, we used tests: a six-minute walk test, an equilibrium test (the ability to stand along with legs). The assessment was dispensed on a scale of 0 to 4 points for every task. For not completed tasks patients were given 0 points per task. Summary the points, a final performance score was created for every participant (range from 0 to 12), with higher scores indicating better physical activity. counting on the full score, patients were divided into 3 groups with scores of 0–4, 5–8, and 9–12.
Within 12 weeks, all patients performed exercise programs that were selected individually for each patient. The program of physical exercises was compiled for independent homework and included cardiovascular exercises (primarily walking, morning exercises) and strength training exercises with dumbbells of 1, 3 kg. The frequency of coaching was a minimum of 3 times per week and had a duration of at least 20-30 minutes. Patients kept training diaries, which were studied by the doctor at each subsequent dose. The keep fit exercise was adjusted looking on the patients' self-awareness; if necessary, the training time was increased to an hour.

Table 1
Characteristics of the nutritional status of patients included in the study

	Diet type)	Protein intake (g / kg / day)	Main characteristics	Notes

1st group n = 38	Low protein diet	0.6 g / kg / day;	Mixed proteins, bread and other foods containing at glevody. Carbohydrates are the foundation of the diet	protein intake up to 0.6 g / kg / body weight
2nd group n = 42	Low protein diet	0.6 g / kg / day + keto analogs (ketosteril 1 tab. 5 / kg body weight)	Mixed proteins, bread, and other foods that contain carbohydrates. Carbohydrates are the foundation of the diet	Protein intake up to 0.6 g / kg / body weight
Group 3 n = 39	Protein restricted diet	0.6-0.8 g / kg / day;	Mixed proteins (animal and vegetable origin) adjusted by quantity: regular food based on traditional dishes.	Often corresponds to what patients are already eating.

For statistical data processing standard methods with usage of package of computer programs were used.

3. RESULTS.

The general clinical characteristics of patients are presented in Table 2. the primary group of patients (24% of patients) received a diet with an occasional protein content, the second group comprised 40% of patients, the third group comprised 37% of patients receiving a diet with a coffee protein content. The ratio of men and girls, the common glomerular filtration rate, daily proteinuria and BMI didn't differ significantly between the groups..

Table 2
General clinical characteristics of patients with CKD

Options	Low protein diet 0.6 g / kg / day	Low Protein Diet 0.6 g / kg / day + keto analogs	Protein restricted diet 0.6-0.8 g / kg / day	R

n (%)	38 (31.9)	42 (35.3)	39 (32.8)	
Men, n (%)	23 (60.5)	25 (59.5)	22 (58)	
Women n (%)	15 (39.5)	17 (40.5)	17 (42)	
Age (years)	49 ± 2.2	47 ± 2.3	46 ± 1.4	<0.01
Wed BMI (kg / m2)	26.6 ± 2.32	27.0 ± 2.6.	25.8 ± 0.66	0.207
Serum creatinine (μmol \ L)	218.74 ± 16	221.74 ± 19.3	215.7 ± 11.1	<0.01
eGFR (ml / min)	30 ± 2.5	29 ± 3.6	31 ± 2.84	<0.01
Proteinuria (g / day)	0.67 ± 0.13	0.69 ± 0.26	0.68 ± 0.12	0.140
Glomerulonephritis , n (%)	19 (50)	20 (47.6)	19 (48.7)	
Nephroangiosclerosis , n (%)	10 (26.4)	12 (28.5)	13 (33.3)	
Hypertension n (%)	9 (23.6)	10 (23.8)	7 (18)	

Physical activity data of patients was determined before the start of physical training in the dynamics of 12 weeks of training.

Table 3
Physical activity of patients before the start of physical training and in the dynamics of 12 weeks of training.

	1 group n = 38		Group 2 n = 42		3 group n = 39		p
	original	12 week change	original	12 week change	original	12 week change	
mid-thigh circumference (cm)	46.5 ± 6.0	+ 0.3-1.2	47.3 ± 5.9	+ 0.6-1.1	47.8 ± 5.9	+ 0.7-1.1	0.0385
mid-shoulder circumference (cm)	29.1 ± 3.0	+ 0.4-0.9	29.8 ± 2.0	+ 0.4-1.1	30.1 ± 3.0	+ 0.6-0.9	0.0 03

VO2 peak (ml / kg / min)	22.56 ± 1.84	+ 1.4-1.56	23.68 ± 0.98	3.37-3.58	24.36 ± 0.95	+ 2.66-2.98	<0 .00 01
Patients with 9-12 points n (%)	4 (11%)	7 (18.2 %)	6 (15%)	10 (23.9 %)	8 (20.5%)	10 (25.6 %)	0.001
Patients with 5-8 points n (%)	19 (50%)	21 (55.4 %)	21 (50%)	24 (57.1%)	22 (56.4%)	25 (64.2 %)	0.001
Patients with 0-4 points n (%)	15 (39%)	10 (26.4 %)	15 (35%)	8 (19%)	9 (23.1%)	4 (10.2 %)	0.001

In all examined patients, a rise within the circumference of the center of the thigh and shoulder was recorded within the dynamics of 12-week training sessions.
The indicator of maximum oxygen consumption (MIC) increased altogether groups (by 1.4, 3.37 and 2.66 ml / min * kg, respectively). Patients from the group with a coffee performance score were redistributed and partially transferred to the groups with high performance indicators.
A study of the physical activity of patients with differing kinds of diets showed that in patients of the first group, even with an occasional nutritional status within the dynamics of 12 weekly training, there was an improvement in such physical indicators because the circumference of the center of the thigh and shoulder, as well as a rather improved BMD. When comparing groups of patients who received and failed to receive ketosteryl (group 2 and three, respectively), physical training for 12 weeks led to a major improvement in indicators like the circumference of the center of the shoulder and BMD. However, in the group receiving ketosteryl, an indicator like BMD significantly improved.

4. DISCUSSION

Our study shows that a decrease in renal function is related to a deterioration in physical performance.

During a meta-analysis of Gaiqin Pei, et al. the authors, when studying the results of physical training in 1305 patients with CKD of the pre-dialysis stages, there was a major improvement in cardiorespiratory function (peak VO2) [12].

In a study by Guralnik JM, Ferrucci L et al. (2000) found that physical activity test scores correlate with renal function in patients with CKD. Available data indicate that the utilization of objective indicators of physical performance can help identify early signs of disability [13].

The inverse relationship between the indicator of tests of physical activity and therefore the decrease in physical activity observed in previous studies suggests that the tests for assessing physical activity reflect a measurement of physical performance, which can be useful for determining the danger of a further decrease in physical performance in patients with CKD [13,14] . Our study suggests that a similar conclusion applies to physical disorders related to CKD, but further prospective study is needed.

Eating disorders can underlie the connection between renal function and impaired physical activity.

The relationship between kidney function and muscle strength probably reflects sarcopenia associated with nephrosis. Results of physical activity tests for muscle strength were related to lower albumin, and low levels of albumin, even within the traditional range, were independently related to weaker muscle strength [15]. Similarly, anemia has been described as another factor related to lower levels of muscle activity physical activity tests in patients with CKD [16].

With CKD, patients with a low-protein diet have muscular depletion. A muscle is tissue that's affected by diet, exercise, and hormones which will affect protein metabolism. in step with the results of studies, keto analogs, specifically, ketoleucine, reduce the degradation of muscle protein [17]. A study of the results of ketoleucine showed that adaptation to protein restriction within the diet includes a decrease in leucine oxidation, which ends up in more efficient use of dietary amino acids and postprandial inhibition of protein breakdown with a decrease in ureagenesis. These results were similar in patients with CKD on a low-protein diet [18]. Moreover, the decrease in aminoalkanoic acid oxidation during the low-protein diet with the addition of keto-analogs was maintained during the 16-month observation [19].

5. CONCLUSION:

Regular dosed physical training incorporates a positive effect on the strength of patients with CKD on a low-protein diet. Correction of keto-analogue nutrition improves the cardiorespiratory status of patients.

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