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ORIGINAL RESEARCH

Physical activity level of patients on hemodialysis: a cross-sectional study

Nível de atividade física de pacientes em hemodiálise: um estudo de corte transversal

Nivel de actividad física en pacientes en hemodiálisis: estudio de corte transversal

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ABSTRACT | The level of physical activity of patients under hemodialysis treatment was assessed, noting its relation with sociodemographic and laboratory variables. A cross-sectional study comprised of 108 individuals with chronic kidney disease under hemodialysis divided into "active" and "sedentary" groups was conducted. Socioeconomic data (semi-structured questionnaire), characteristics of kidney disease, level of physical activity (International Physical Activity Questionnaire – IPAQ) and laboratory data (hematocrit, hemoglobin, creatinine, albumin, urea) of past examinations taken from medical records were assessed. 8% of the patients in the sample were identified as sedentary and 70.4% did not receive guidance for performing physical activity (p=0.013). Correlations between the level of physical activity and socioeconomic, clinical data and biochemical parameters were not observed. It was concluded that individuals with chronic renal disease under hemodialysis therapy have low level of physical activity. This finding is related to the frequency of guidance in that regard for the population on dialysis, not being related to the demographic, clinical and biochemical data evaluated.

Keywords | Renal Insufficiency, Chronic; Renal Dialysis; Motor Activity.

RESUMO | Este estudo avaliou o nível de atividade física de pacientes em tratamento hemodialítico, verificando sua relação com variáveis sociodemográficas e laboratoriais. Foi realizado estudo de corte transversal composto por 108 sujeitos com doença renal crônica sob hemodiálise, sendo constituídos os grupos "ativo" e "sedentário". Foram avaliados dados socioeconômicos (questionário semiestruturado), características da doença renal, nível de atividade física (International Physical Activity Questionnaire – IPAQ) e dados laboratoriais (hematócrito, hemoglobina, creatinina, albumina, ureia) dos últimos exames registrados em prontuários. 8% dos pacientes da amostra foram identificados como sedentários, e 70,4% não receberam orientação para a realização de atividade física (p=0,013). Não foram observadas correlações entre o nível de atividade física e os dados socioeconômicos, clínicos e os parâmetros bioquímicos. Concluiu-se que indivíduos doentes renais crônicos em terapia renal substitutiva do tipo hemodiálise apresentam baixo nível de atividade física. Este achado está relacionado com a frequência de orientações a esse respeito para a população em diálise, não estando relacionado a dados sociodemográficos, clínicos e bioquímicos avaliados.

Descritores | Insuficiência Renal Crônica; Diálise Renal; Atividade Motora.

RESUMEN | En esta investigación se evalúa el nivel de actividad física en pacientes que hacían hemodiálisis, y lo asocia a variables sociodemográficas y de laboratorio. Se trata de un estudio de corte transversal con 108 individuos con enfermedad renal crónica en tratamiento

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con hemodiálisis, los cuales pertenecían a los grupos "activo" y "sedentario". Se evaluaron datos socioeconómicos (cuestionario semiestructurado), características de la enfermedad renal, nivel de actividad física (International Physical Activity Questionnaire – IPAQ) y datos de laboratorio (hematocrito, hemoglobina, creatinina, albúmina, urea) de los últimos estudios registrados en el historial de los pacientes. Se registró que los 8% de los pacientes de la muestra son sedentarios, y 70,4% de ellos no fueron orientados a practicar ejercicios físicos (p=0,013). No se observaron correlaciones entre el nivel de actividad física y los datos socioeconómicos, de laboratorio y los patrones bioquímicos. Se concluyó que los individuos con enfermedad renal crónica con terapia renal de tipo hemodiálisis tienen poca costumbre de practicar actividad física. Este resultado se relaciona con la frecuencia de orientaciones acerca de este tema a los pacientes en diálisis, pero no se relaciona con los datos sociodemográficos, clínicos y bioquímicos evaluados.

Palabras clave | Insuficiencia Renal Crónica; Diálisis Renal; Actividad Motora.

INTRODUCTION

The number of patients with chronic kidney disease (CKD) in the world has increased in alarming proportions, causing a major public health problem[1]. According to the 2011 Dialysis Census of the Brazilian Society of Nephrology, the number of patients on dialysis treatment in this country grew from 42,695 to 91,314 in 11 years[2].

Individuals with CKD deal with a series of comorbidities and risk factors, such as being more likely to have cardiovascular diseases[3-5] which represent approximately 50% of the fatal outcomes in patients with chronic kidney disease[5]. Fatigue is also a very prevalent symptom in these patients – about 90% of them report feeling tired and low level of energy[6-7], having difficulties in performing daily life regular activities[8-9]. This fatigue associated with CKD is attributed to several factors, including abnormal levels of hemoglobin and urea, psychological factors such as depression and sleep dysfunction and nutritional deficits, in addition to the factors associated with the dialysis treatment (low sodium in the body and excessive ultrafiltration)[10].

In addition to fatigue, advanced and fast muscle loss is another symptom expected in these patients, being one of the biggest predictors of mortality for chronic kidney disease[11]. This loss of muscles occurs due to nutritional imbalance, sedentary lifestyle, obesity and is concurrent with decreased oxygen extraction by the tissues, reduced protein synthesis, systemic inflammation and resistance to insulin[12].

Studies have been conducted on the importance of physical activity in patients with chronic kidney disease. Specifically for those under hemodialysis therapy, it was noted that the level of physical activity was lower than for healthy sedentary individuals[8]. This was attributed to the physical and psychological changes caused by uremia, as well as to the period of inactivity during the hemodialysis procedure, since activity can be up to 24% lower in those days[1-8].

It is interesting to note that a sedentary lifestyle in addition to possibly being related to CKD caused by hypertension and diabetes, negatively influences cardiovascular diseases, the functional capacity and quality of life of patients, contributing to the CKD high rates of mortality.[1] It was noted, for example, that sedentary patients under dialysis treatment had a risk of death approximately 62% higher compared to the non-sedentary.[13] This risk was reduced to about 33% or 29% in patients who were exercising three to five times a week, respectively[14]. For patients with acceptable regular physical activity level, other benefits related to physical limitations were found: increased heart rate variability, with reduction of approximately 33% of cardiac arrhythmias; increase in the muscle strength of the quadriceps measured through dynamometry of 12.7% to 42%;[15,16] increase in the muscle strength of the lower limbs of 53%;[17] reduction in muscle atrophy, noted by the increase in the average size of type I and II muscle fibers, of 25.9% and 23.7% respectively, and of the number of capillaries and mitochondria.[16]

Corroborating this data, Segura-Orti and Johansen described the increase in cardiovascular endurance, decrease in heart rate and systolic and diastolic blood pressure while resting, decrease in total body fat and triglycerides, improvement of glucose tolerance and decrease in the platelet aggregation as benefits of aerobic training in patients on hemodialysis[18]. This article also describes as benefits from the resistance muscle training the increase in strength, stamina and muscle power

and the improvement in the performance of functional activities (climbing stairs; getting up from a chair, among others). In addition to these benefits, resistance muscle training had significant effects on the Physical Function, Pain, Physical Aspects and General State of Health dimensions of the quality of life questionnaire SF-36[9].

Considering that individuals with chronic kidney disease who are undergoing hemodialysis treatment deal with several comorbidities related also with a sedentary lifestyle, it is important to evaluate their level of physical activity to elaborate strategies for encouraging and monitoring it, especially during the intradialytic period. Thus, the objective of this research was to evaluate the level of physical activity of patients under hemodialysis treatment, noting its relation with sociodemographic and laboratory variables.

METHODOLOGY

This is a cross-sectional study of descriptive nature and quantitative approach. Patients of both sexes, 18- 69 years old, under hemodialysis therapy from the Prontorim clinic at the Santa Casa de Misericórdia of Recife were included. Patients incapable of performing regular physical activity or walking without assistance, due to neuromusculoskeletal comorbidities, serious visual impairment, as well as those with a cognitive deficit that prevented them from answering the questionnaires and those who did not want to participate were excluded. The data were collected between June and November of 2012.

Ethical considerations

This research was approved by the Research Ethics Committee of the Federal University of Pernambuco, CAEE 01259312.8.0000.5208, according to the standards for conducting research with human beings, provided in Resolution 466/2012 from the National Research Ethics Committee. The participants of this study were told about its objective, its risks and benefits and signed an Informed Consent Form.

Study sample

According to the records of the site of study, currently there is an average of 250 patients under treatment. To calculate the sample a confidence level of 95% was considered, and an event frequency of 80% (number of patients under hemodialysis treatment considered sedentary) was used[5]. A relative error of 10% was considered, which resulted in a sample of 96 patients. By adding 10% to the possible losses, the sample resulted from the sample size calculation was of 106 patients. For this calculation the EpiInfo software version 3.4.3 of 2007 was used.

Evaluation methods

The participants were interviewed and answered two semi-structured questionnaires, anthropometric and socioeconomic variables, characteristics of kidney disease and laboratory data of recent exams (hematocrit, hemoglobin, albumin, creatinine and urea) having been collected[19].

The physical activity level of patients was verified through the short version of the International Physical Activity Questionnaire – IPAQ[20]. It considers the criteria of frequency and duration of each activity in the last week, classifying people in very active, active, irregularly active A, irregularly active B and sedentary categories. For the data analysis, patients were classified as either Active (very active and active categories of the IPAQ) or Sedentary (irregularly active and sedentary categories).

Statistical analysis

The descriptive analysis of the sociodemographic and anthropometric variables was conducted through frequency distribution. The distribution of normality of the continuous variables was carried out through the Shapiro-Wilk's test and the assumption of equal variances through Levene's F-test. The dependent variable (level of physical activity) was dichotomized in active (very active and active categories of the IPAQ) and sedentary (insufficiently active and sedentary categories of the IPAQ), followed by the analysis of the association between this categorization and sociodemographic variables and clinical data, using Pearson's Chi-square and Fisher's exact tests. For the comparison between active and sedentary groups Student's t-test and the Mann-Whitney's test were used. The results were considered significant with p value < 0.05.

RESULTS

158 patients from the clinic were contacted, but considering the inclusion and exclusion criteria, a

total of 108 patients were evaluated, as shown in the flowchart in Figure 1.

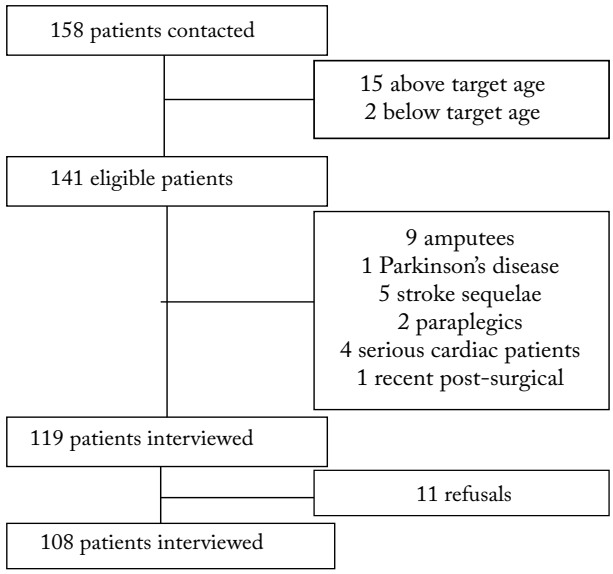

Figure 1. Flowchart of the study participants

The characteristics related to demographic data and level of physical activity of the patients involved in the study are described in Tables 1 and 2.

Table 1. Evaluation of the IPAQ according to the demographic data

Variable	Sedentary		Active		Value of *p*
	n	%	n	%	
Total group	84	77,8	24	22.2	–
Age group					
19 to 39	25	83.3	5	16.7	0.052
40 to 49	19	63.3	11	36.7	
50 to 59	21	75.0	7	25.0	
60 or more	19	95.0	1	5.0	
Gender					
Male	45	78.9	12	21.1	0.757
Female	39	76.5	12	23.5	
Marital status					
Has a partner	49	83.1	10	16.9	0.148
Does not have a partner	35	71.4	14	28.6	
Education level					
Has never studied	7	77.8	2	22.2	0.616
Up to 8 years	26	83.9	5	16.1	
More than 8 years	51	75.0	17	25.0	
Socioeconomic classification					
Upper class	13	81.3	3	18.7	0.768
Middle class	59	78.7	16	21.3	
Lower class	12	70.6	5	29.4	

Notes: through Pearson's Chi-square test. p<0.05

Table 2. Evaluation of the IPAQ according to the clinical data

Variable	Sedentary		Active		Value of *p*
	n	%	n	%	
Total group	84	77.8	24	22.2	–
Arterial hypertension	52	78.8	14	21.2	0.752
Diabetes mellitus	10	76.9	3	23.1	1.000
Polycystic kidney disease	9	81.8	2	18.2	1.000
Nutritional status					
Obesity	7	70.0	3	30.0	0.064
Overweight	21	87.5	3	12.5	
Normal	50	80.6	12	19.4	
Low weight	6	50.0	6	50.0	
Hemodialysis time (years)					
Up to 1	17	85.0	3	15.0	0.311
Between 1 and 3	26	76.5	8	23.5	
Between 3 and 6	17	89.5	2	10.5	
More than 6	24	68.6	11	31.4	
Guidance					
Yes	20	62.5	12	37.5	0.013
No	64	84.2	12	15.8	

Notes: Pearson's Chi-square test and/or Fisher's exact test. p<0.05

The assessment of the level of physical activity (IPAQ) showed that the active and sedentary groups were compatible concerning age, most of them been classified as sedentary (77.8%), the prevalent age group being 60 years old or more (95%). There was no difference between the active and sedentary groups concerning distribution by gender and marital status. Those with up to 8 years of education and those considered middle class were more sedentary; however, there was no difference between these variables and the level of physical activity (Table 1).

Regarding clinical data, most hypertensive, diabetic patients and those with polycystic kidney disease were classified as sedentary. Regarding nutritional status, overweight participants were more sedentary, along with those with 3 to 6 years of hemodialysis. Of the patients who did not receive guidance for performing physical activity, 84.2% of them were classified as sedentary, compared with 62.5% of the patients who did receive it. There was a significant association between guidance for performing physical activity and exercising (p=0.013). No differences were found between the sedentary and active groups with regard to the other variables mentioned above (Table 2).

Table 3 shows the characteristics of patients concerning weight, hematocrit (HT), hemoglobin

(HB), creatinine, albumin, and urea of the sedentary and active individuals in the interdialytic period. No correlation between these variables and the level of physical activity was found.

Table 3. Data of interdialytic and biochemical weight gain according to the level of physical activity (IPAQ)

Variables	IPAQ			
	Sedentary M ± SE	Active M ± SE	Total group M ± SE	Value of *p*
Weight gain (kg/L)	2.65±0.13	2.56±0.23	2.63±0.11	0.801
Hematocrit (%)	34.68±0.64	34.45±0.89	34.63±0.53	0.557
Hemoglobin (g/dL)*	11.18±0.22	11.10±0.27	11.16±0.18	0.863
Creatinine (mg/dL)	11.88±1.43	10.33±0.63	11.53±1.12	0.936
Albumin (g/dL)*	4.08±0.08	4.20±0.03	4.11±0.07	0.467
Urea (mg/dL)	150.64±3.85	149.88±8.13	150.47±3.48	0.927

Data presented as mean ± standard error. Mann-Whitney's test and Student's t Test for independent samples. p<0.05.

DISCUSSION

The analysis of the results showed that 77.8% of the patients in this study are sedentary, and that 70.4% did not receive guidance for physical activities. It was also observed that the groups were comparable among themselves concerning socioeconomic and demographic data, clinical and biochemical data.

Although the groups were comparable concerning sociodemographic and economic variables, there was a predominance of middle class individuals and sedentariness in the sample. Unlike the results seen in this study, Reis found that individuals with a high socioeconomic status were more inactive, and attributed this to the fact that individuals of lower economic classes use active commuting more often, such as riding a bicycle or walking, which represents a major portion of the overall physical activity of these persons[21].

Regarding dialysis time and physical activity, it was observed that regardless of the number of years of the process of hemodialysis, most patients in this study were sedentary. Although the presence of fatigue[23] and symptoms related to depression were not evaluated as likely causes for not performing physical activity due to changes in self-image, lifestyle and chronicity of the kidney disease[22], it is recognized that these factors may in some way contribute to the decrease in the level of physical activity among those on hemodialysis. Thus, the assessment of fatigue and symptoms related to depression could be incorporated in the evaluation of these patients to provide more conditions for understanding the causes that could lead them to a sedentary lifestyle.

Regarding the practice of regular physical activity in patients on hemodialysis, 29.6% of the patients in this study received guidance for performing physical activity, corroborating the study by Painter et al[24]. These authors noted that 34% of the patients with CKD who received guidance achieved the recommended levels of physical activity[24]. Regarding the patients in this study who received guidance for the practice of regular physical exercises, only 37.5% did exercise.

The guidance for the practice of exercises does not always mean patients will comply with it, especially if the professional guiding them is unaware of the benefits of such activities or does not believe they can promote improvements, according to the study by Delgado and Johansen[25]. According to the study by Johansen et al., only a small proportion of nephrologists evaluate the level of physical activity of their patients, providing them guidance for the practice of exercises[26]. These authors noted that these professionals did not guide their patients because they felt not so confidence in providing guidance on the subject, and they also did not believe that individuals on hemodialysis would increase their level of physical activity if they were told to do so and did not consider exercise as important as other aspects related to kidney disease[27]. These same authors, in another study[25], reported that 96% of patients under hemodialysis showed interest in the regular practice of physical activity, suggesting receptiveness to possible interventions.

Despite guidance for physical activity not being part of the clinical practice of nephrologists, the forwarding of these patients to physical therapists, health professionals qualified to prescribe and monitor exercises for these patients, can benefit them, considering their risks[28].

In 2005 the National Kidney Foundation developed a practical guide related to physical activity in patients with chronic kidney disease, which had a set of recommendations for the practice of exercises – all patients on hemodialysis should be advised and regularly encouraged by nephrologists to increase their levels of physical activity[29]. This document highlights the importance of early identification of patients with physical limitations, cardiovascular problems and demotivation, in order to forward them to professionals who can develop such activities, especially during the

intradialytic period, so the time of hemodialysis may be optimized for their performing[29-31].

In our study no associations were observed between laboratory parameters (hematocrit, hemoglobin, creatinine, albumin, urea), weight gain and BMI and physical activity level, corroborating the study by Bonfim[32]. Stack and Murthy, however, noted that low levels of serum albumin, BMI and serum creatinine were correlated with a low level of physical activity.[22] Bonner et al. found that individuals with higher levels of urea and albumin levels below 4 g/dL had more fatigue and lower level of physical activity[23].

Although the IPAQ is a questionnaire that relies on the participants' memory, it is still an instrument used to verify the level of physical activity when there are no other reliable instruments available to this end, such as accelerometers. It is recognized that the use of the latter would allow measuring the metabolic equivalent of the activities developed by the patients, reflecting more precisely the energy expenditure. Thus, this study presents limitations regarding the use of this instrument due to its high cost. Other limitations to be considered and that were not part of the assessment instruments of this study concern the use of instruments to evaluate symptoms of depression and fatigue levels in these patients. By acknowledging that a chronic and disabling disease contributes to a negative self-image and that fatigue is one of the symptoms of patients under hemodialysis, this study suggests new studies that may verify their occurrence to incorporate these aspects into their routine examination.

CONCLUSION

Individuals with chronic renal disease under hemodialysis therapy have low level of physical activity. This finding is related to the frequency of guidance in that regard for the population on dialysis, not being related to the demographic, clinical and biochemical data evaluated.

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