

Physical activity and quality of life in chronic kidney disease patients in hemodialysis

Atividade física e a qualidade de vida de pacientes com doença renal crônica em hemodiálise

La actividad física y la cualidad de vida de pacientes con enfermedad renal crónica en hemodiálisis

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ABSTRACT | The objective of this study was to evaluate the physical activity level of chronic kidney disease (CKD) patients undergoing hemodialysis (HD) and correlate it to the quality of life (QOL). This is a cross-sectional study with a quantitative approach. Eight-four patients diagnosed with CKD participated in the study. The instruments used were: The International Physical Activity Questionnaire (IPAQ) to identify the level of physical activity and the 36-Item Short-Form Survey (SF-36) to assess health-related quality of life (HRQOL). Descriptive statistical analyzes were performed (mean and standard deviation). The Kolmogorov-Smirnov test was used, and the absence of data normality was observed. Mann-Whitney's U test was used to compare the HRQOL between groups (active and insufficiently active), and Spearman's correlation coefficient test was used to correlate the level of physical activity and the HRQOL. The significance level adopted was 5% ($p \leq 0.05$). It was found that 61.9% ($n=51$) of the participants were active. Regarding the comparison of groups, active patients presented better perception of HRQOL when compared to the insufficiently active ones. Additionally, from the Spearman's Correlation Coefficient, it was observed that the physical activity level is correlated with HRQOL, with significant statistics in several SF-36 dimensions. Thus, it is suggested that the regular practice of physical activity may contribute to a better perception of HRQOL of HD patients.

Keywords | Motor Activity; Renal Dialysis; Renal Insufficiency, Chronic; Quality of Life.

RESUMO | O objetivo deste estudo foi avaliar o nível de atividade física (NAF) de pacientes com doença renal crônica (DRC) em hemodiálise (HD) e correlacionar estes níveis à qualidade de vida relacionada à saúde (QVRS). Trata-se de um estudo correlacional, transversal, e com abordagem quantitativa. Participaram da pesquisa 84 pacientes com diagnóstico de DRC. Utilizou-se o questionário internacional de atividade física para identificar o NAF e o questionário genérico de qualidade de vida (SF-36) para avaliar a QVRS. Foram realizadas análises estatísticas descritivas. Utilizou-se o teste *Kolmogorov-Smirnov* e verificou-se ausência de normalidade nos dados. O teste *U* de *Mann Whitney* foi utilizado para a comparação da QVRS entre grupos (ativos e insuficientemente ativos), bem como o coeficiente de correlação de *Spearman* para correlacionar o NAF e a QVRS. O nível de significância adotado foi de 5%. Na comparação de grupos, verificou-se que os pacientes ativos apresentaram melhor percepção de QVRS se comparados aos insuficientemente ativos. Ainda, a partir do coeficiente de correlação de *Spearman*, observou-se que o NAF está correlacionado com a QVRS, com estatísticas significantes em diversas dimensões do SF-36. Sendo assim, sugere-se que a prática regular de atividade física (AF) pode contribuir para uma melhor percepção de QVRS de pacientes em HD.

Descritores | Atividade Motora; Diálise Renal; Insuficiência Renal Crônica; Qualidade de Vida.

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RESUMEN | El objetivo de este estudio ha sido evaluar el nivel de actividad física (NAF) de pacientes con enfermedad renal crónica (DRC) en hemodiálisis (HD) y correlacionar estos niveles a la calidad de vida relacionada a la salud (CVRS). Se trata de un estudio correlacional, transversal, y con abordaje cuantitativo. Han participado de la investigación 84 pacientes con diagnóstico de DRC. Se ha utilizado el cuestionario internacional de actividad física para identificar el NAF y el cuestionario genérico de calidad de vida (SF-36) para evaluar la CVRS. Han sido realizados análisis estadísticos descriptivos. Se ha utilizado la prueba Kolmogorov-Smirnov y se ha certificado la ausencia de normalidad en los datos. La prueba U de Mann Whitney ha sido utilizada para la comparación de la CVRS entre grupos (los activos y los insuficientemente

activos), así como el coeficiente de correlación de Spearman para correlacionar el NAF y la CVRS. El nivel de significancia que ha sido adoptado ha sido del 5%. En la comparación de grupos, se ha certificado que los pacientes activos han presentado mejor percepción de CVRS si comparados a los insuficientemente activos. Todavía, desde el coeficiente de correlación de Spearman, se ha observado que el NAF está correlacionado con la CVRS, con estadísticas significantes en diversas dimensiones del SF-36. Siendo así, se sugiere que la práctica regular de actividad física (AF) puede aportar para una mejor percepción de CVRS de pacientes en HD.

Palabras clave | Actividad Motora; Diálisis Renal; Insuficiencia Renal Crónica; Calidad de Vida.

INTRODUCTION

Chronic kidney disease (CKD) is a serious public health problem and presents rising prevalence and incidence rates in Brazil and around the world¹. The 2016 Brazilian Chronic Dialysis Survey estimated that there are 122,825 dialysis patients in Brazil, and this number has been growing gradually over the years (92,091 in 2010 and 97,586 in 2012)^{1,2}. CKD consists of structure and/or function abnormalities in the kidneys for more than three months, causing health implications^{1,2}.

The most common treatment for advanced stages is hemodialysis (HD)³. There is no doubt that dialysis, peritoneal or HD, can prolong a patient's life⁴. However, a new lifestyle, with severe changes, associated with different comorbidities or involving being connected to a machine, can lead to negative feelings, in addition to not ensuring the preservation of the patient's quality of life (QOL)⁴.

Scientific literature shows that inadequate blood pressure control, abuse of anti-inflammatory and pain medication or exposure to other nephrotoxins, diabetes, smoking, obesity, among others, are traditional risk factors for the development and progression of CKD^{5,6}. In contrast, combating precarious and inadequate nutrition, physical inactivity and smoking can control the modifiable risk factors for CKD, assisting in the lowering of blood pressure and risks associated with the development of cardiovascular diseases, in addition to optimizing metabolic control, QOL and promoting weight loss of obese patients⁷.

In this sense, the practice of physical activity (PA) is considered a protective factor capable of mitigating

changes caused by the disease and its treatment, as well as decreasing the progression rate or maintenance of renal function⁸. According to Brazilian and foreign researchers, practicing aerobic or resistance PA generated significant effects on functional capacity, muscle function, physical performance and QOL⁹⁻¹¹ of CKD patients. However, despite the benefits from the regular practice of PA, there is evidence that dialysis patients show low PA levels, contributing to and favoring sedentary behaviors and functional impairment¹²⁻¹⁶, two variables that have been proven to be associated with increased mortality in this population¹⁷⁻²⁰.

Considering that dialysis patients present comorbidities related to physical inactivity that may lead to the worsening of health-related quality of life (HRQOL), identifying the physical activity level (PAL) and HRQOL is critical so CKD patients can be involved in encouragement and monitoring strategies for regular and guided physical activity practices. Thus, this study aimed to evaluate the PAL of CKD patients undergoing HD and correlate it with HRQOL.

METHODOLOGY

This is a correlational and cross-sectional study with a quantitative approach. The sample was obtained through convenience sampling and the inclusion criteria were: (1) age greater than or equal to 18 years old, (2) all genders, (3) having a medical diagnosis of CKD and (4) being under hemodialysis treatment for at least 3 months in one of the renal substitution therapy units

located in the countryside of the state of São Paulo, Brazil. Data collection was performed from January to April 2016. During the data collection period, there were 177 patients in São Carlos, São Paulo and 120 patients in Araraquara, São Paulo, and, from these, 46 and 38 patients, respectively, agreed to participate in the study by signing the informed consent form. Thus, respecting the criteria established, the sample was composed of 84 patients.

Two instruments were used for sample characterization, the Brazilian version of the MOS 36-item short-form health survey (SF-36), which includes demographic (gender, age and education) and clinical (time under hemodialysis treatment) data, and the Brazilian version of the International Physical Activity Questionnaire (IPAQ). The instruments were applied by a single researcher, in a private room of whichever unit they were.

The SF-36 is a generic questionnaire developed by Ware, Jr. and Sherbourne in 1992, to evaluate HRQOL²¹. This instrument was translated and validated in Brazil²². It is a multidimensional instrument organized in 36 items divided into 8 categories: functional capacity, physical aspects, pain, general health status, vitality, social aspects, and emotional and mental health aspects. Each component has items, and, after the evaluation, the scores are encoded, summed and transformed into a scale from 0 to 100, in which the higher the score, the better the HRQOL.

The IPAQ was developed by researchers in the areas of physical education and health for international use. In Brazil, the study on its validity and reproducibility was developed by Matsudo et al.²³. This study used the long version, which is composed of 27 questions divided into 5 domains (job-related, transportation, housework, leisure and time spent sitting). For analysis purposes, the PAL was divided into active and insufficiently active. Both instruments, SF-36 and IPAQ, were adequate, being reproducible and valid for the evaluation of HRQOL²² and PAL²³, respectively.

Statistical analysis was performed using the software Statistical Package for the Social Sciences (SPSS). Descriptive statistical analyses were performed (mean \pm standard deviation). The Kolmogorov-Smirnov test found the absence of normality in the data. For such, Mann-Whitney's U-test was used to compare the HRQOL between the two groups (active and insufficiently active), as well as Spearman's correlation coefficient between PAL and HRQOL. The significance level adopted was 5% ($p \leq 0.05$).

RESULTS

From socio-demographic data, the prevalence of men (69%) was found, with schooling up to complete high school (52.4%), 52.6 ± 14.3 years as the mean age, and 39.2 ± 50.3 months as the mean time undergoing HD. As shown in Table 1, 61.9% of respondents were found to be active according to the total IPAQ. However, when analyzing the Table considering each domain, the predominance of insufficiently active respondents is found in all of them.

Table 1. Data on the practice of physical activity.

| Physical Activity | | n | % |
|--------------------------|-----|----|------|
| Active total | Yes | 51 | 61.9 |
| | No | 32 | 38.1 |
| Active on work | Yes | 5 | 7.1 |
| | No | 78 | 92.8 |
| Active on transportation | Yes | 21 | 26.2 |
| | No | 62 | 73.8 |
| Active on housework | Yes | 35 | 42.8 |
| | No | 48 | 57.1 |
| Active on leisure | Yes | 13 | 16.7 |
| | No | 70 | 83.3 |

Table 2 shows the mean scores of each SF-36 dimension. In this study, all domains achieved satisfactory Cronbach's alpha values (≥ 0.6)²⁴.

Table 2. Mean score of the SF-36 dimensions.

| Dimensions | Mean | SD* |
|-----------------------|------|------|
| Functional capacity | 77.5 | 23.6 |
| Physical aspects | 74.7 | 40.2 |
| Pain | 79.2 | 27.2 |
| General health status | 58.3 | 18.6 |
| Vitality | 80.6 | 17.6 |
| Social aspects | 85.0 | 25.8 |
| Emotional aspects | 86.5 | 32.8 |
| Mental health | 79.2 | 19.2 |

*Standard deviation

Considering Table 3, it is verified that the mean scores of the active group were higher in all SF-36 dimensions than those of the insufficiently active group. This result suggests that active patients have a better perception of HRQOL parameters when compared to insufficiently active patients, with significant differences in the dimensions "functional capacity" and "general health status".

Regarding Table 4, weak-to-moderate correlations are observed according to Spearman's rank correlation coefficient, with statistically significant results in the following SF-36 dimensions: "functional capacity", "general health status", "pain", "vitality", "social aspects", and "mental health". Demonstrating that the PAL was correlated directly with HRQOL. In other words,

practicing and achieving satisfactory levels of physical activity can contribute to a better perception of HRQOL in hemodialysis patients. The following classification was adopted to analyze the strength of correlations: weak (up to 0.299), moderate correlation coefficient (from 0.300 to 0.599) and strong correlation coefficient (0.600 or more).

Table 3. Comparison between active and insufficiently active and QOL.

| Instrument | Domains | Mean Active | SD* | Mean Insufficiently active | SD | p-value |
|------------|-----------------------|-------------|------|----------------------------|------|---------|
| SF-36 | Functional capacity | 85.3 | 14.9 | 66.1 | 29.2 | 0.003 |
| | Physical aspects | 77.5 | 37.8 | 72.7 | 43.9 | 0.815 |
| | Pain | 83.4 | 26.2 | 73.0 | 27.9 | 0.064 |
| | General health status | 62.5 | 19.1 | 52.6 | 16.0 | 0.012 |
| | Vitality | 83.4 | 16.5 | 76.6 | 18.6 | 0.091 |
| | Social aspects | 84.0 | 28.9 | 83.0 | 20.3 | 0.870 |
| | Emotional aspects | 87.6 | 30.5 | 87.5 | 36.4 | 0.783 |
| | Mental health | 80.2 | 19.5 | 78.4 | 18.9 | 0.535 |

*Standard deviation

Table 4. Spearman's correlation coefficient between the variables physical activity level and quality of life.

| Instrument | | Functional capacity | Physical aspects | Pain | General health status | Vitality | Social aspects | Emotional aspect | Mental health |
|--------------------------------|---|---------------------|------------------|-------|-----------------------|----------|----------------|------------------|---------------|
| IPAQ total (min/week) | r | 0.429 | 0.114 | 0.227 | 0.186 | 0.246 | 0.144 | 0.095 | 0.204 |
| | p | <0.001 | 0.302 | 0.038 | 0.090 | 0.024 | 0.192 | 0.389 | 0.062 |
| IPAQ work (min/week) | r | 0.394 | 0.196 | 0.209 | 0.263 | 0.360 | 0.228 | 0.074 | 0.312 |
| | p | <0.001 | 0.074 | 0.056 | 0.016 | 0.001 | 0.037 | 0.503 | 0.004 |
| IPAQ transportation (min/week) | r | 0.353 | 0.011 | 0.148 | 0.166 | 0.126 | 0.081 | 0.083 | 0.177 |
| | p | 0.001 | 0.920 | 0.178 | 0.131 | 0.253 | 0.466 | 0.453 | 0.108 |
| IPAQ housework (min/week) | r | 0.224 | 0.114 | 0.132 | 0.074 | 0.101 | 0.111 | 0.154 | 0.077 |
| | p | 0.041 | 0.302 | 0.230 | 0.505 | 0.360 | 0.314 | 0.162 | 0.488 |
| IPAQ leisure (min/week) | r | 0.290 | 0.123 | 0.134 | 0.128 | 0.426 | 0.182 | 0.070 | 0.243 |
| | p | 0.008 | 0.265 | 0.223 | 0.247 | <0.001 | 0.098 | 0.524 | 0.026 |

DISCUSSION

Among 84 participants, males (69%) were the most common. The Brazilian Society of Nephrology (SBN) confirmed in the 2014 Brazilian Chronic Dialysis Survey that 58% of CKD patients on a dialysis program are males, considering dialysis units registered on the SBN². Regarding age, the mean value was 52.56 ± 14.27 years. Several studies that investigated socio-demographic characteristics of CKD patients present the same information regarding gender and the mean age of

patients^{15,25-29}. With regard to schooling, the prevalence of respondents with up to complete high school (52.4%) was found, as was evidenced in some other studies^{26,28,30}. Unfortunately, in this sense, it is possible to infer that low levels of schooling can be considered a factor that favors social vulnerability, possibly compromising health care and adherence to the chosen treatment³¹. On this reasoning, the authors³¹ clarify that there is strong influence of social determinants on the occurrence of CKD, as well as in the development of cirrhosis and tuberculosis. Therefore, it is suggested that the multi-professional team

to have knowledge of the patient's schooling level so the proper approach to the case is chosen, to ensure better acceptance of the diagnosis and improve the adherence to the recommended treatment²⁶. Regarding the time undergoing HD, 39.24±50.27 months were found as the mean, which is similar to other studies^{27,29,32}. A study on the factors associated with HRQOL of dialysis patients, developed with 223 older adults undergoing HD³³, found that the increase in the mentioned diseases and longer treatment periods were significantly associated with decreased HRQOL scores. In addition, from each IPAQ domain, the predominance of insufficiently active patients was observed, a finding that corroborates several other Brazilian and foreign studies developed with CKD patients undergoing a HD program^{12,14,15,34}. Thus confirming that the profile of this population presents low adherence to the practice of PA, which may favor the reduction in mean HRQOL scores. It must be stressed that the assessment of HRQOL is extremely important, since CKD and its treatment have negative impacts on the life of this population³⁵.

Regarding the comparison of groups, according to SF-36 mean scores, it was observed that the active group showed better mean scores, with significant differences in the dimensions "functional capacity" and "general health status". Still considering the correlation test, PAL presented direct correlation with HRQOL, with significant correlations in the following SF-36 dimensions: "functional capacity", "general health status", "pain", "vitality", "social aspects", and "mental health".

Studies highlight the importance of researching functional capacity, precisely because it is, assuredly, reduced in dialysis patients and has impacts on his/her QOL³⁶⁻³⁸. Thus, some authors propose the regular practice of PA as a therapeutic resource to reduce impairments on HRQOL, as observed in some studies^{39,40} conducted in Minas Gerais, Brazil. The first was developed with 14 and the second with 286 patients undergoing HD. After 12 and 16 weeks of aerobic training, respectively, a significant increase in the following SF-36 dimensions was found: "functional capacity", "pain", "physical aspects" and "general health status". In addition, a 2009 research with 27 HD patients found that, after 24 weeks of aerobic and resisted exercises, there were improvements on functional capacity⁴¹. A program developed in the Netherlands with 96 HD patients, consisting of 12 weeks of intradialytic aerobic training, found significant changes in "general health status" and "vitality" SF-36 dimensions⁴². In Porto Alegre, Rio Grande do Sul, Brazil,

a study with 18 patients found that, after 20 weeks of peripheral muscle training during dialysis, there were improvements in the dimensions "physical aspects", "pain", "general health", and "vitality"⁴⁴. In São Paulo, Brazil, a study with 60 CKD patients who underwent eight weeks of intradialytic resisted physical exercises, found that the HRQOL had significant improvements in all parameters, such as "functional capacity" and "general health status". In China, HD patients who maintained an active lifestyle presented better HRQOL perception^{13,14}.

The evidence from the literature shows that active dialysis patients tend to achieve better scores in HRQOL and, consequently, optimizing global health^{13,14,36-44}.

As a possible limitation of this study, the cross-sectional design can be highlighted, since it does not allow the establishment of cause and effect relationships.

CONCLUSION

This study concludes that active patients presented better HRQOL perception in all dimensions when compared to those insufficiently active. From Spearman's correlation coefficient, it can be suggested that the practice and good levels of PA tend to contribute to better HRQOL scores of HD patients.

It is recommended that multi-professional teams responsible for renal substitution therapy units seek alternatives to motivate or encourage patients to adopt an active lifestyle, following the recommendations and guidelines of physical education and physical therapy professionals. This research is expected to contribute to future studies, given the great importance of promoting QOL, an active lifestyle and the well-being of dialysis patients.

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