COVID-19 IS MORE LETHAL IN HEMODIALYSIS CHRONIC KIDNEY DISEASE PATIENTS WITH LOWER SCORE IN THE SIX MINUTES WALK TEST

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1. INTRODUÇÃO

Chronic kidney disease (CKD) is a risk factor for severe COVID-19 and these patients usually add other risk factors such as advanced age, diabetes, and cardiovascular disease (CDC, 2021). Thus, patients with end-stage renal disease (ESRD), which requires dialysis treatment, have shown a high incidence of severe COVID-19, and high mortality rates according to TOMANOSKI V. et al. (2021).

Another risk factor for the severe form of COVID-19 that has been pointed out is a sedentary lifestyle or low level of physical activity (SALLIS R. et al., 2021). Physical inactivity and sedentary behaviors are often seen in patients with CKD in dialysis (MORISHITA S. et al., 2017). They have a high prevalence of disabilities, like as, impairments at work, walking, cognition, lower limb mobility, difficulties in activities of daily living (ADL), and general physical activity (PLANTINGA LC. et al., 2011).

In CKD patients, poor physical function has been associated with mortality (MORISHITA S. et al., 2017). The functional capacity is widely evaluated by the six minutes walking test (6MWT) and this test shows an important survival predictor in CKD patients as was shown in SIETSEMA KE. et al. (2004) and KOHL L de M et al (2012). Other functional tests to measure muscle strength (MATSUZAWA R et al. and ISOYAMA N et al., 2014) also have been used to predict mortality in CKD patients.

Thus, considering that patients with CKD treated by hemodialysis are a vulnerable category at high risk for a fatal outcome (CDC, 2021) and that they have physical and functional deficits, (TOMANOSKI V. et al., 2021) and the lack of knowledge about the relationship between functional capacity and the risk of severe COVID-19 among hemodialysis patients, our aim was to compare the difference in functional capacity between patients who tested positive for Sars-Cov-2 and survived and those who did not survival and to evaluate the association of functional capacity and exercise performance with the risk of death from Covid-19.

2. METODOLOGIA

This study was a retrospective cohort study that included all HD patients from an in-hospital dialysis center. The inclusion criteria were CKD patients with a positive RT-PCR test for SARS-CoV-2 and that had been submitted at least to one test of functional capacity evaluation at beginning of November/2020. During this period, patients

were not yet immunized against SARS-CoV-2. The following functional parameters were compared between the two groups of patients (deceased and alive): 6MWT and Hand Grip Strength (HGS). The association between the risk of death and performance in functional tests in a period before the first Sars-Cov-2 infection was performed.

The Diagnosis of Covid-19 was tested with RT-PCR. The data were collected from electronic medical records. These assessments are structured and recorded for patient follow-up. All patients able to walk, with or without assistance, were evaluated by the multidisciplinary team, trained by senior professors before the test battery application.

The statistical analysis was performed using the STATA 14 software. The Shapiro-Wilk test was used to verify the normality of the data. To compare the groups (alive and deceased), parametric data were analyzed using the t-test for independent samples, with means and standard deviations being presented. Mann-Whitney was used for analysis of data with non-parametric distribution, and the median and minimum / maximum values of the sample were presented. The Fisher's exact test was used for categorical variables. Due to the disparity in the number of male subjects between the groups, we carried out a subgroup analysis including only men. Analyzes of binary logistic regression models considering death as dependent variables were created for each variable of functional capacity to associate them with the risk of death after infection after Sars-Cov-2.

3. RESULTADOS E DISCUSSÃO

Thirty-one CKD patients, 20 recovered and 11 died, were analyzed. The mean survival time post positive diagnosis for SARS-Cov-2 of the deceased patients was 17,5± 8,3 days. There was no difference in age, HD vintage, BMI, and diabetes mellitus between the groups at baseline. However, in the deceased group 91% of the patients were male, there was only one woman among that group. Furthermore, we found that physical capacity variables are associated with the risk of post-Covid-19 death in this vulnerable population.

At the time of the analysis, the proportion of men in this hemodialysis service was approximately 58%, but, nearly a third of our sample men who died from Covid-19, and we had only one woman among the deceased. The higher number of severe cases and deaths from COVID-19 among men has been previously described in other populations, perhaps related to unhealthy lifestyle, lower anti-inflammatory estrogen protection, lower innate and adaptive immune system response, and higher expression of ACE2 receptors, as shown in Peckham H et al. (2020).

The 6MWT has been widely used to assess the functional capacity of patients with CKD and to predict the risk of mortality. Kohl et al., showed that the rate of survival increased approximately 5% for every 100 meters walked. We found a protection against fatal outcome post Covid-19 of 6% for each percentual unit of percent of predicted distance (at logistic regression). Confirming this, the distance in meters covered in the 6MWT and the percentage of the predicted distance was low in both groups, as expected for these patients and the average distance traveled by survivors was greater by approximately 89 meters The difference in functional capacity between the two groups is more evident when we analyze only men in the sample, with the difference between the means of survivors and no+n-survivors being almost 130 meters, with deceased presenting a 20% smaller percentage of the predicted distance compared with survivors.

Our findings show no difference in HGS between groups sample, the analysis with only men showed a value (25.8 kg) above the cut-off point described by Xu et al. for the alive group and below (20.9 kg) for the deceased group. We believe that the small sample size and the large variance of means did not allow us to find statistically significant differences.

Table 1 - Results of physical evaluation in November 2020.

Test	n	Alive	n	Deceased	p
6MWT (m)	19	386.1 ± 112.8	11	296.9 ± 103.3	0.04*
%6MWT of PD (%)	19	68.7 ± 18.4	11	51.3 ± 17.7	0.01*
D-HGS(Kg)	17	18.7 (10.6- 39.9)	11	14.7 (9.4- 46.1)	0.34
% D-HGS of PS (%)	17	59.7 ±18.0	11	44.8 ± 20.2	0.052
ND-HGS (Kg)	16	18.2 ± 6.3	10	17.7 ±10.8	0.88

6MWT= Six Minutes Walking Test; m= meters; PD= Predicted Distance; % = Percentual; Kg= Kilograms; D-HGS= Dominant -Handgrip Strength; PS= Predicted Strength; ND-HGS= Non-Dominant- Handgrip Strength; *Significant difference between groups.

Table 2 - Results of physical evaluation in November 2020 including only male sex.

	n	Alive	Deceased	n	p
6MWT (m)	7	412.4 ± 109.5	282.8 ± 97.1	10	0.02*
%6MWT of PD	7	69.8 ± 18.3	49.8 ± 17.9	10	0.04*
D-HGS(Kg)	6	25.8± 7.5	20.9± 10.96	10	0.36
% D-HGS of Ps	6	57.4 ±10.9	46.9 ± 20.0	10	0.26
ND-HGS (Kg)	5	23.9 ± 4.1	18.6 ±11.0	9	0.33
% ND-HGS of PS	5	65.8 ±10.1	48.5 ± 24.1	9	0.15

6MWT= Six Minutes Walking Test; m= meters; PD= Predicted Distance; % = Percentual; Kg= Kilograms; D-HGS= Dominant -Handgrip Strength; PS= Predicted Strength; ND-HGS= Non-Dominant- Handgrip Strength; *Significant difference between groups.

4. CONCLUSÕES

Patients with CKD after infection by the new-coronavirus, predominantly men with very low values of functional capacity, poor performance in the sit-to-stand test, and low functional mobility, had high risk of dead. Physical performance can predict mortality for infections caused by SARS-coV-2.

4. REFERÊNCIAS

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