COVID-19 IS MORE LETHAL IN HEMODIALYSIS CHRONIC KIDNEY DISEASE PATIENTS WITH LOW FUNCTIONAL CAPACITY

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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, sedentary and difficulties in activities of daily living (ADL) behaviors are often seen in patients with CKD in dialysis (MORISHITA S. et al, 2017 and PLANTINGA LC. et al, 2011).

In CKD patients, poor physical function has been associated with mortality (MORISHITA S. et al, 2017). The functional tests used to measure muscle strength (ISOYAMA N et al, 2014), gait speed (KUTNER NG et al, 2015) and balance (HELLBERG M et al, 2014) have been used to predict mortality in CKD patients.

Thus, considering that patients with CKD treated by hemodialysis (HD) are a vulnerable category at high risk for a fatal outcome (CDC, 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 who had been submitted to at least one test of functional capacity evaluation at the 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) 30 Second Sit to Stand Test (30CST), Berg balance scale (BBS) and Timed Up and Go test (TUG). 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 analysed 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.

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.

Surviving patients presented more sits-to-stand during the 30 seconds and needed less time in the up-and-go test, before acquiring the viral infection. Furthermore, we found that physical capacity variables are associated with the risk of post-Covid-19 death in this vulnerable population.

The 30 seconds Chair Stand Test (30CST) are widely used to evaluate lower body strength and physical muscle performance. In our study, the mean of repetitions in the both groups, as when we compare male and female, as well in analysis of only male demonstrates low muscle physical capacity in these patients, but the 30CST score was higher in the survivor group, and the predicted percentage also showed less loss of strength and functionality of the lower limbs in the patients who survived.

The TUG test is an important tool to assess the functional mobility. The time needed for TUG test in our sample was higher than the mean for age, as described by Bohannon. However, the TUG time for the deceased group was even bigger when compared with the survivor group. Villar et. al calculated the confidence interval of 2.9 seconds and reported a median of 9 seconds among DCK patients. This can demonstrate a clinically significant difference between the groups.

About body balance, we found a lower score for non-surviving patients only in the subgroup analysis of male patients. Some authors described BBS' cut-off points for predicting the risk of falls as a score 46. The median values of the individuals for the two groups studied here were higher than this cut-off point. The difference between the alive and deceased groups in our study was around 6 points, suggesting a greater impaired balance and physical frailty in the deceased group.

Table 1 - Results of physical evaluation in November 2020.

Test	n	Alive	n	Deceased	p
30CST (score)	18	11.7 ±3.1	11	7.7 ±4.1	0.006*
%30CST of cut-off point (%)	18	97.6 ± 33.4	11	60.0 ± 31.9	0.001*
Berg Balance Scale (score)	18	53 (32-56)	11	50 (37-56)	0.11
TUG (s)	18	9.4 (6.2-16.3)	11	13.6 (8.7- 25.4)	0.009*
% TUG of cut-off point (%)	18	111.1(77.5- 177)	11	143.3 (93-318)	0.02*

% = Percentual; 30CST =30-second sit-to-stand-up test; s = Seconds; TUG =Timed Up and Go Test. *Significant difference between groups.

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

	n	Alive	Deceased	n	p
30CST (score)	6	12.3 ± 3.1	7.7 ± 4.4	10	0.04*
%30CST of cut-off point(%)	6	96.1 ± 28.6	59.3 ± 33.3	10	0.04*
Berg Balance Scale (score)	6	54.5 (52-56)	48.5 (37-56)	10	0.03*
TUG (s)	6	8.9± 2.6	14.5± 4.8	10	0.02*
% TUG of cut-off point	6	92.8(77.5- 140)	147.3(93-318)	10	0.01*

% = Percentual; 30CST =30-second sit-to-stand-up test; s = Seconds; TUG =Timed Up and Go Test. *Significant difference between groups.

Table 3 – Logistic regression

	OR	(95% CI)	p
30CST (score)	0.59	(0.37- 0.95)	0.03*
%30CST of cut-off point (%)	0.94	(0.89- 0.99)	0.02*
Berg Balance Scale (score)	0.81	(0.64-1.03)	0.07
TUG (s)	1.89	(1.04- 3.42)	0.03*
% TUG of cut-off point	1.04	(1.00-1.08)	0.04*

OR= Odds Ratio; CI= Confidence Interval; % = Percentual; 30CST =30-second sit-to-stand-up test; s = Seconds; TUG =Timed Up and Go Test. *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.

5. REFERÊNCIAS

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