

## LETTER TO THE EDITOR

## Reduced frequency hemodialysis in times of COVID-19: A prospective study in prevalent patients

To the Editor:

According to the World Health Organization, transmission of the COVID-19 virus has been linked to close contact between individuals within closed settings.<sup>1</sup> Two endorsed measures to reduce transmission, lockdown and social distancing, are difficult to accomplish in hemodialysis patients. Many of them travel long distances to the dialysis center, where they are treated simultaneously in the same area. One option to reduce the exposure of these vulnerable patients is to reduce the frequency of dialysis.<sup>2</sup> However, inadequate dialysis and higher interdialytic weight gain<sup>3</sup> (IDWG) could outweigh the potential benefit of this option. Furthermore, the effects of reduced frequency on anemia and nutrition have not been comprehensively studied.

In the context of several measures to reduce transmission, some patients were switched from three to two sessions per week. Our aim is to compare these patients- the twice-weekly group (2wG) - to patients dialyzing thrice-weekly (3wG). The primary outcome measure is mortality at 12 months. Here, we report the secondary outcomes after 6 months of having started the study.

This is a prospective, observational study ClinicalTrials.gov ID:NCT04374058. It is performed in accordance with the Declaration of Helsinki. Informed written consent was required from all patients before they entered the study. Clinical and laboratory variables of the first quarter of 2020 were averaged and considered baseline. During the following semester, we determined the monthly average of: IDWG, ultrafiltration rate (UFR), predialysis systolic blood pressure (SBP), difference between postdialysis weight and prescribed dry weight (PoW - DW), spKt/V, and nPCR. At Month 6, we evaluated the nutritional surrogates albumin (ALB) and geriatric nutritional risk index<sup>4</sup> (GNRI), and the anemia variables hemoglobin (Hb), subcutaneous weekly erythropoietin (EPO), and erythropoietin resistance index (ERI).

Predialysis blood samples of the first weekly session were processed at a local laboratory. Data are reported as mean and (95% CI) and are available at request. Differences were compared using the Student's t test. Funding came from within the unit. Overall, 48 out of a total population of 52 patients were included in this study; two

**TABLE 1** Secondary outcomes of the study

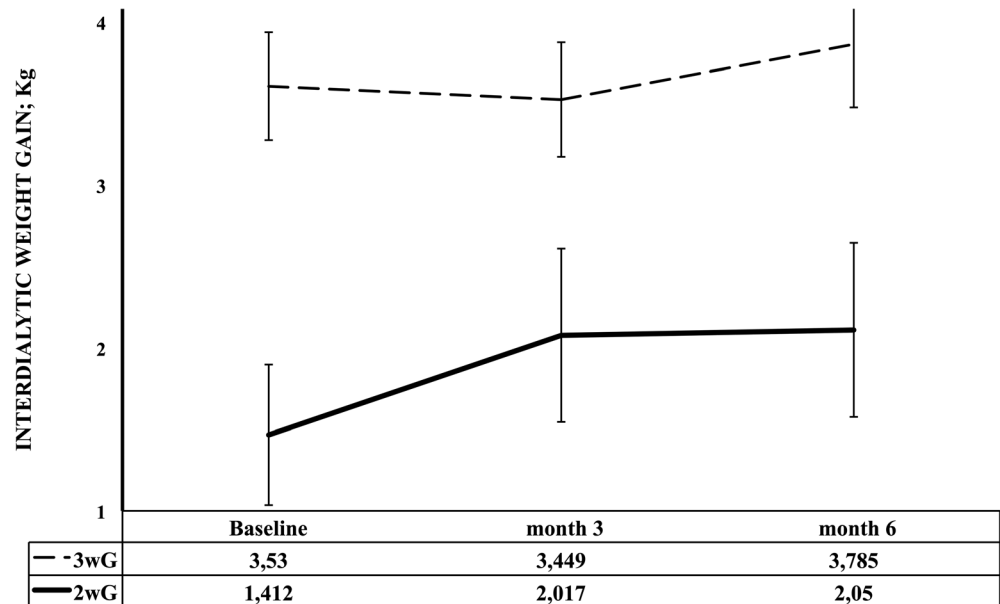
	Twice-weekly HD	Thrice-weekly HD
spKt/V		
Baseline	1.59 (1.44–1.73)	1.55 (1.54–1.56)
Month 6	1.55 (1.44–1.67)	1.76 (1.65–1.87)
nPCR (g/kg/day)		
Baseline	0.72 (0.65–0.79)	0.91 (0.8–0.92)
Month 6	0.70 (0.64–0.79)	1.02 (0.9–1.1)
UFR (ml/kg/h)		
Baseline	5.3 (3.7–6.9)**	12.9 (10.6–15.2)
Month 6	7.9 (5.7–10.3)**	12.4 (11.8–14.2)
Predialysis SBP (mmm.Hg)		
Baseline	152 (139–166)	155 (145–165)
Month 6	160 (145–172)	156 (147–165)
PoW - DW (kg)		
Baseline	0.8 (0.3–1.3)	0.5 (0–1)
Month 6	0.41 (0.1–0.7)	0.21 (0.0–0.4)
Albumin (g %)		
Baseline	3.8 (3.7–3.9)	3.7 (3.6–3.8)
Month 6	3.9 (3.8–4.0)	3.8 (3.7–3.9)
GNRI		
Baseline	98 (96–100)	97 (96–98)
Month 6	99 (96–102)	98 (97–99)
Hemoglobin (g %)		
Baseline	10.5 (9.9–11.1)	10.9 (10.4–11.4)
Month 6	10.4 (9.9–10.9)	10.9 (10.5–11.4)
ERI (unit/kg/week)		
Baseline	11.9 (7.5–16.2)*	7.3 (5.1–9.5)
Month 6	9.4 (6.4–12.4)	7.4 (4.0–10.8)
Potassium		
Baseline	4.4 (4.3–4.5)	4.4 (4.3–4.5)
Month 6	4.9 (4.6–5.2)	4.9 (4.7–5.1)
Phosphorus		
Baseline	4.8 (4.3–5.2)	4.8 (4.6–5.1)
Month 6	5.8 (5.3–6.4)	5.9 (5.6–6.2)

Note: Mean and (95% Confidence Interval) are showed for all data. Abbreviations: ERI, erythropoietin resistance index; GNRI; geriatric nutritional risk index; nPCR, normalized protein catabolic rate; POW - DW, postdialysis weight minus dry weight; UFR, ultrafiltration rate; SBP, systolic blood pressure.

\* $p < 0.04$  from the thrice weekly group.

\*\* $p < 0.0001$  from the thrice weekly group.

**FIGURE 1** Interdialytic weight gain (IDWG) of both groups. Dashed line illustrates the three sessions a week group (3wG) and solid line the two sessions per week group (2wG). Points and error bars represent point estimates and 95% confidence intervals, respectively. IDWG was lower ( $p < 0.0001$ ) in the two sessions per week group during the entire period



patients with an amputation of both lower limbs and two undergoing four sessions per week were excluded. Patients were assigned to either the 2wG or the 3wG according to their baseline average UFR. Those with a UFR  $< 8.5$  ml/kg/h comprised the 2wG ( $n = 16$ ) and were compared to 32 patients with a higher UFR, who comprised the 3wG.

Vintage was shorter in patients of the 2wG: 1.8 (0.8–4.8) versus 4.5 (2.4–6.7) years ( $p < 0.001$ ). However, they were older than patients in the 3wG: 70 (65–75) versus 50 (46–55) years ( $p < 0.001$ ). Women (37% and 31%) and diabetics (25% and 19%) were similarly distributed. Average body mass index (BMI) was also similar (24.5 and 26.5). Calcium-based binders were prescribed to patients with phosphorus levels above 5 mg/dl and Carvedilol to those with SBP.

All but two of the 2wG patients presented residual diuresis: 1130 (707–1554) ml/day. A minimum spKt/V of 1.4 was prescribed for all patients. Therefore, an eKt/V of 1.2 could be predicted.<sup>5,6</sup> This target was achieved (Table 1) in most patients with a treatment time of 240 min session. However, it had to be increased to 300 min for 3wG patients with BMI  $> 35$  ( $n = 3$ ) and for 2wG patients without residual diuresis ( $n = 2$ ).

Figure 1 depicts the IDWG of both groups throughout the study and Table 1 shows the remaining outcomes at Month 6. Despite an initial increase of 43%, IDWG of the 2wG was lower ( $p < 0.0001$ ) during the entire period. UFR was also lower ( $p < 0.001$ ). Predialysis SBP, which was moderately elevated at baseline in both groups, did not change throughout the study. Prescribed dry weight did not differ from the postdialysis weight and was well tolerated in all patients. No symptoms of hypervolemia were detected.

Whereas phosphorus increased in both groups, potassium, ALB, GNRI, and Hb remained stable. The EPO resistance index was higher at baseline in the 2wG ( $p < 0.04$ ) but gradually diminished throughout the study (Table 1).

None of the patients presented COVID-19 disease nor did they require hospitalization or emergency dialysis.

Emerging evidence indicates that twice-weekly hemodialysis is a safe option for most incident patients. Recently, this modality was also reported for a short time in prevalent patients.<sup>7</sup> In the current study, we focused our analysis on the handling of hypervolemia in patients with significant residual diuresis, who had switched from the standard thrice-weekly to a twice-weekly schedule. The results suggest that the control of hypervolemia was appropriate. Of particular note, despite being older and having a higher baseline ERI than the 3wG patients, nutrition surrogates and anemia variables did not show major changes in the 2wG patients.


A recent perspective article advocated the use of twice-weekly hemodialysis for many dialysis patients in this stressful time.<sup>2</sup> However, its counterpoint argued that this should be a last resort approach.<sup>3</sup> The limitations of our single center, small study are obvious and we agree that, based on their high IDWG and/or a residual urea clearance below 2 ml/min,<sup>5</sup> most dialysis patients must undergo hemodialysis three times per week. Nevertheless, our data provide support for the notion that selected patients could be safely transferred to a twice-weekly schedule in times of dialysis unit stress.

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## DISCLOSURE

None of the authors had any financial or personal relations with people or organizations that could have inappropriately influenced their work. The corresponding author states that he had full access to all the data in the study and had final responsibility for the decision to submit for publication.

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