

may be associated with a lower risk of hospitalisations for heart failure (and oedema) compared to SZC in real clinical practice.¹⁰

Finally, we could not agree more with the conclusions. Clinical judgement is essential to choose between therapeutic options with slight differences in their profiles and to offer patients a treatment which is as tailored as possible to their needs, in order not to deny them the benefits of one of the essential pillars of treatment.

Funding

No funding has been received for the contents of this letter.

REFERENCES

- Ortiz A, del Arco Galán C, Fernández-García JC, Gómez Cerezo J, Ibán Ochoa R, Núñez J, et al. Documento de consenso sobre el abordaje de la hiperpotasemia. *Nefrología*. 2023, <http://dx.doi.org/10.1016/j.nefro.2023.05.004>.
- Lott C, Truhlář A, Alfonzo A, Barelli A, González-Salvado V, Hinkelbein J, et al. European Resuscitation Council Guidelines 2021: cardiac arrest in special circumstances. *Resuscitation*. 2021;161:152–219, <http://dx.doi.org/10.1016/j.resuscitation.2021.02.011>.
- Álvarez-Rodríguez E, Olaizola Mendibil A, Burzako Sánchez A, Esteban-Fernández A, Sánchez Álvarez E. Recomendaciones para el manejo de la hiperpotasemia en urgencias. *Emergencias*. 2022;34(4).
- Bushinsky DA, Budden JJ, Kalra PA, Yuan J, Quinn CM, Epstein M. Patiromer treatment in patients with CKD, hyperkalemia, and hyperphosphatemia: a post hoc analysis of 3 clinical trials. *Am J Kidney Dis*. 2023;82(1):97–104, <http://dx.doi.org/10.1053/j.ajkd.2023.01.444>.
- Bakris GL, Pitt B, Weir MR, Freeman MW, Mayo MR, Garza D, et al. Effect of patiromer on serum potassium level in patients with hyperkalemia and diabetic kidney disease. *JAMA*. 2015;314(2):151, <http://dx.doi.org/10.1001/jama.2015.7446>.
- Weir MR, Bakris GL, Bushinsky DA, Mayo MR, Garza D, Stasiv Y, et al. Patiromer in patients with kidney disease and hyperkalemia receiving RAAS inhibitors. *N Engl J Med*. 2015;372(3):211–21, <http://dx.doi.org/10.1056/NEJMoa1410853>.
- Agarwal R, Rossignol P, Romero A, Garza D, Mayo MR, Warren S, et al. Patiromer versus placebo to enable spironolactone use in patients with resistant hypertension and chronic kidney disease (AMBER): a phase 2, randomised, double-blind, placebo-controlled trial. *Lancet*. 2019;394(10208):1540–50, [http://dx.doi.org/10.1016/S0140-6736\(19\)32135-X](http://dx.doi.org/10.1016/S0140-6736(19)32135-X).
- Bushinsky DA, Rossignol P, Spiegel DM, Benton WW, Yuan J, Block GA, et al. Patiromer decreases serum potassium and phosphate levels in patients on hemodialysis. *Am J Nephrol*. 2016;44(5):404–10, <http://dx.doi.org/10.1159/000451067>.
- Kovesdy CP, Rowan CG, Conrad A, Spiegel DM, Fogli J, Oestreicher N, et al. Real-world evaluation of patiromer for the treatment of hyperkalemia in hemodialysis patients. *Kidney Int Rep*. 2019;4(2):301–9, <http://dx.doi.org/10.1016/j.ekir.2018.10.020>.
- Zhuo M, Kim SC, Paterno E, Paik JM. Risk of hospitalization for heart failure in patients with hyperkalemia treated with sodium zirconium cyclosilicate versus patiromer. *J Card Fail*. 2022;28(9):1414–23, <http://dx.doi.org/10.1016/j.cardfail.2022.04.003>.

Antoni Lorente*

Director Médico, CSL Vifor, Barcelona, Spain

*Corresponding author.

E-mail address: antoni.lorente@viforpharma.com

2013-2514/© 2023 Sociedad Española de Nefrología. Published by Elsevier España, S.L.U. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

<https://doi.org/10.1016/j.nefro.2023.09.005>

Effectiveness of intradialytic semi-supervised exercise on patients' functional capacity: An exploratory study

Eficacia del ejercicio intradiálitico semisupervisado en la capacidad funcional de los pacientes: Un estudio exploratorio

Dear Editor,

Physical exercise during haemodialysis (HD) sessions has a positive impact on patients' functional capacity.¹ However, this strategy is not widespread, among other factors, due to

the financial cost of hiring staff to supervise them.² One possible solution would be the development of semi-supervised programmes, which would reduce the need for constant presence of an exercise professional and therefore reduce costs. We present the results of an uncontrolled comparative study on the effects of a semi-supervised intradialytic physical exercise programme on functional capacity in patients on HD.

DOI of original article:
<https://doi.org/10.1016/j.nefro.2021.09.022>.

Table 1 – Baseline characteristics in the sample.

	Supervised n = 11	Semi-supervised n = 10	p
Male, n (%)	4 (36.4)	2 (20)	0.083
Age (years)	72 (66; 77)	75.5 (61.5; 78)	0.809
Time on dialysis (months)	74 (27; 137)	38 (25; 49.25)	0.114
Hypertension, n (%)	10 (90.91)	7 (70)	0.311

The patients, recruited from two centres located in southern Galicia, met the following inclusion criteria: (a) having chronic kidney disease (CKD) and having been on HD treatment for at least three months; (b) stable clinical status and adequate dialysis (ktv \geq 1.3) for the last three months; (c) anaemia under control within normal CKD parameters (10.5–12 g/dl); (d) having functioning vascular access. Exclusion criteria were: (a) having had a cardiac event in the last six months; (b) having had a stroke in the last six months; (c) having uncontrolled blood pressure; (d) having a left ventricular ejection fraction (LVEF) of 35% or less; (e) having episodes of hypoglycaemia at 60 mg/dl or below. The study design was approved by the Ethics Committee of the Faculty of Education and Sport Sciences, Universidad de Vigo.

Two exercise programmes, supervised (SP) and semi-supervised (SS), were randomly assigned to each of the two HD units, involving three 40-min training sessions per week (first session aerobic, the other two focused on muscle strength development) for 12 weeks. In the SP group, all sessions were supervised, while in the SS group only the first session of each week was supervised. The effects of the programme on the patients' functional capacity were determined by the application of the "Six-minute walk test(6MWT)", "Handgrip test(HG)", "10-Sit-to-stand test(STS10)", "Timed up and Go test(TUG) and "Short Physical Performance Battery(SPPB), one week before and one week after the intervention.

For comparison between the two groups, we used Fisher's exact test for qualitative variables, and Student's t-test or

Mann–Whitney U test for quantitative variables. For the pre-post intragroup comparison, we also used Student's t-test for related data or the Wilcoxon rank test.

Out of a total of 36 participants, 11 patients in the SP group and 10 in the SS group completed the study (Table 1). After the intervention, significant changes were found in the STS10 and SPPB tests in the SP group and in the 6MWT in the SS group. In comparisons between the two groups post-intervention, there was only a difference in 6MWT in favour of the SS group (Table 2).

The physical exercise programme developed was based on a combination of aerobic and muscular strength-endurance activities, an approach found to have positive effects on functional capacity in patients on HD,³ although the results obtained were somewhat contrary to expectations. Patients in the supervised programme experienced improvements in their strength levels, but not in their cardiorespiratory fitness, contrary to what was found after other similar interventions.⁴ Notably, we also found improvements in agility and balance in the supervised programme, an effect of intradialytic exercise previously reported in the literature.⁵

We found no studies on the effects of semi-supervised intradialytic exercise, although the efficacy of semi-supervision has been analysed in patients on HD who were encouraged to do combined exercise at home. In that respect, Ortega-Pérez de Villar et al.⁶ found no significant changes in any of the variables we included in our study. These results show that prescribed semi-supervised intradialytic exercise appears to be more effective than home-based exercise, at least in terms of its effect on cardiorespiratory efficiency. In summary, our study suggests that the prescribing of semi-supervised exercise in HD units is feasible. However, the impact on functional capacity of such a programme differs from that of a fully supervised protocol and calls into question its effectiveness. The lack of randomisation of participants

Table 2 – Comparison in physical tests in both groups, before and after the intervention.

	Baseline			Post-intervention		
	Supervised	Semi-supervised	p	Supervised	Semi-supervised	p
6MWT (m)	223.15 \pm 53.99	276.54 \pm 92.99	0.132	226.41 \pm 37.49	309.33 \pm 99.51 ^c	0.040
TUG (s)	13.61 (11.06; 16.32)	12.34 (9.95; 20.22)	0.622	12.16 (11.01; 20.82)	13.03 (9.16; 13.74)	0.888
HG left (kg)	21.57 \pm 2.83	25.94 \pm 11.67	0.265	21.87 \pm 5.01	25.38 \pm 9.09	0.281
HG right (kg)	21.85 \pm 6.81	25.62 \pm 8.97	0.288	22.37 \pm 5.33	25.45 \pm 9.89	0.380
STS10 (s)	41.79 \pm 10.23	33.14 \pm 7.69	0.051	36.33 \pm 6.82 ^a	32.33 \pm 6.88	0.210
SPPB	7.78 \pm 1.2	7.86 \pm 1.77	0.916	9.33 \pm 1.37 ^b	9 \pm 1.53	0.689

6MWT: Six-minute walk test; TUG: Timed up and Go test; HG: Handgrip test; STS10: 10-Sit-to-stand test; SPPB: Short Physical Performance Battery.

^a p = 0.011 (intra-group comparison).

^b p = 0.042 (intra-group comparison).

^c p = 0.006 (intra-group comparison).

and the small sample size mean that these results need to be interpreted with caution.

Funding

No funding was received for this study.

Conflicts of interest

The authors have no conflicts of interest to declare.

Acknowledgements

The authors of this study would like to thank the Fundación Renal Íñigo Álvarez de Toledo [Íñigo Álvarez de Toledo Renal Foundation] for their collaboration in this research.

REFERENCES

- Jhamb M, Weisbord SD, Steel JL, Uruh M. Fatigue in patients receiving maintenance dialysis: a review of definitions, measures, and contributing factors. *Am J Kidney Dis.* 2008;52:353–65, <http://dx.doi.org/10.1053/j.ajkd.2008.05.005>.
- Parra-Moncasi E, Jiménez A, Alonso M, Martínez MF, Gámen-Pardo A, Rebollo P, et al. Estudio multicéntrico de costes en hemodiálisis. *Nefrología.* 2011;31:299–307, <http://dx.doi.org/10.3265/Nefrologia.pre2011.Apr.10813>.
- Zhao J, Qi Q, Xu S, Shi D. Combined aerobic resistance exercise improves dialysis adequacy and quality of life in patients on maintenance hemodialysis. *Clin Nephrol.* 2020;93:275–82, <http://dx.doi.org/10.5414/CN110033>.
- Huang M, Lv A, Wang J, Zhang B, Xu N, Zhai Z, et al. The effect of intradialytic combined exercise on hemodialysis efficiency in end-stage renal disease patients: a randomized-controlled trial. *Int Urol Nephrol.* 2020;52:969–76, <http://dx.doi.org/10.1007/s11255-020-02459-1>.
- Dam M, Weijts PJM, van Ittersum FJ, van Jaarsveld BC. Physical performance in patients treated with nocturnal hemodialysis — a systematic review of the evidence. *BMC Nephrol.* 2019;20:317, <http://dx.doi.org/10.1186/s12882-019-1518-4>.
- Ortega-Pérez de Villar L, Antolí-García S, Lidón-Pérez MJ, Amer-Cuenca JJ, Benavent-Caballer V, Segura-Ortí E. Comparación de un programa de ejercicio intradiálisis frente a ejercicio domiciliario sobre capacidad física funcional y nivel de actividad física. *Enferm Nefrol.* 2016;19:45–54, <http://dx.doi.org/10.4321/S2254-28842016000100005>.

Adrián González^a, José C. Diz^{b,c}, Óscar García^d, Daniel Carbajales^e, Eva Diz-Ferreira^f, Carlos Ayán Pérez^{c,*}

^a Servicio de Hemodiálisis, Fundación Renal Íñigo Álvarez de Toledo, Madrid, Spain

^b Unidad de Cuidados Intensivos, Hospital Álvaro Cunqueiro, Vigo, Pontevedra, Spain

^c Well-Move Research Group, Facultad de CC de la Educación y del Deporte, Universidad de Vigo, Vigo, Pontevedra, Spain

^d Healthy-Fit Research Group, Facultad de Ciencias de la Educación y del Deporte, Universidad de Vigo, Vigo, Pontevedra, Spain

^e Facultad de Ciencias de la Educación y del Deporte, Universidad de Vigo, Vigo, Pontevedra, Spain

^f Facultad de Medicina, Santiago de Compostela, Santiago de Compostela, A Coruña, Spain

* Corresponding author.

E-mail address: cayan@uvigo.es (C. Ayán Pérez).

2013-2514/© 2021 Sociedad Española de Nefrología. Published by Elsevier España, S.L.U. This is an open access article under the CC BY-NC-SA license (<http://creativecommons.org/licenses/by-nc-sa/3.0/>). <https://doi.org/10.1016/j.nefro.2021.09.014>