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Results of salt intake restriction monitored with the new sodium control biosensor

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Short Title: Salt intake restriction monitored with automated Na control

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ABSTRACT

Introduction. Adherence to a low sodium (Na) diet is crucial in patients under hemodialysis, as it improves cardiovascular outcomes and reduces thirst and interdialytic weight gain. Recommended salt intake is lower than 5 g/day. The new 6008 CareSystem monitors incorporate an Na module that offers the advantage of estimating patients' salt intake. The objective of this study was to evaluate the effect of dietary Na restriction for 1 week, monitored with the Na biosensor.

Methods. A prospective study was conducted in 48 patients who maintained their usual dialysis parameters and were dialyzed with a 6008 CareSystem monitor with activation of the Na module. Total Na balance, pre/postdialysis weight, serum Na ($_{S}$Na), changes in pre- to post-dialysis $_{S}$Na (ΔsNa), diffusive balance, and systolic and diastolic blood pressure were compared twice, once after 1 week of patients' usual Na diet and again after another week with more restricted Na intake.

Results. Restricted Na intake increased the percentage of patients on a low-sodium diet (<85 Na mmol/day) from 8% to 44%. Average daily Na intake decreased from 149 ± 54 to 95 ± 49 mmol and interdialytic weight gain was reduced by in 460 ± 484 g per session. More restricted Na intake also decreased pre-dialysis $_{S}$Na and increased both intradialytic diffusive balance and ΔsNa. In hypertensive patients, reducing daily sodium by more than 3 g Na/day lowered their systolic blood pressure.

Conclusions. The new Na module allowed objective monitoring of Na intake, which in turn could permit more precise personalized dietary recommendations in patients under hemodialysis.

INTRODUCTION

Sodium (Na) is the most abundant extracellular ion and is the principal determinant of plasma osmolarity, extracellular volume, and blood pressure [1,2]. Several mechanisms are involved in tightly regulating their homeostasis to maintain the internal environment constant [3]. In healthy individuals, the kidney plays a major role in Na regulation. However, in patients under hemodialysis (HD) with minimal or no residual renal function, Na intake must be completely balanced with water intake because Na loads cannot be adequately excreted, and Na removal during dialysis is essential to maintain Na balance [4,5].

During HD, Na is removed primarily via convection (ultrafiltration related to interdialytic weight gain) and, to a lesser extent, via diffusion, in relation to the gradient between the patient's pre-dialysis serum sodium ($_S$Na) and the Na prescribed in the dialysis fluid [4]. A positive Na gradient during HD promotes hemodynamic stability and adequate perfusion of vital organs, as well as reducing the risk of intradialytic hypotension [6]. However, it also increases osmolarity, thirst and extracellular volume, —resulting in hypertension—and leads to greater left ventricular hypertrophy and adverse cardiovascular effects [1]. In contrast, a negative Na gradient has been associated with a reduction in interdialytic weight gain and blood pressure control but at the expense of more frequent episodes of intradialytic hypotension and tissue hypoperfusion [6].

Patients under HD are advised to restrict their salt intake to improve cardiovascular outcomes and reduce thirst and interdialytic weight gain [5,7]. Currently, the Kidney Disease Improving Global Outcomes (KDIGO) and the Kidney Disease Outcomes Quality Initiative (KDOQI) guidelines recommend a maximum daily salt intake of 5 and 6 g per day, respectively [8,9].

Salt intake can be determined by measuring Na excretion through 24-hour urine collection in patients without renal impairment but not in patients under HD [10]. Previously, monitors with the Diascan biosensor allowed non-invasive determination of ion mass transfer and, therefore, estimation of salt intake in the interdialytic period [11–13]. However, these monitors could not be used with certain dialysis techniques,

such as hemodiafiltration. The new 6008 CareSystem monitors can be used with all types of dialysis modalities, including hemodiafiltration, and also incorporate an Na module that quantifies the total Na balance by providing approximate information on salt intake in stable patients on HD without residual renal function, while ignoring other Na losses such as those in stool or sweat [14].

This study aimed to evaluate the effects of a restrictive Na intake diet versus usual Na intake on interdialytic weight gain, $_{S}$Na, the difference between pre- and post-dialysis Na, known as delta Na (Δ_{S}Na), diffusive Na balance, and systolic and diastolic blood pressure.

PATIENTS AND METHODS

We performed a prospective single-center study in 48 patients with end-stage kidney disease in a chronic HD program. There were 33 men and 15 women, with a mean age of 66 ± 16 (range 25 to 91) years. The inclusion criteria were being adult, prevalent (i.e., > 3 months on hemodialysis), without residual kidney function (< 50 ml/day), and continuously assigned to the 6008 monitors. Excluded patients were those who could not understand dietary recommendations (e.g., those with dementia) or did not want to participate in the study. The patients were dialyzed through an autologous arteriovenous fistula in 77%, a prosthetic fistula in 2%, and a tunneled central catheter in the remaining 21%. The causes of end-stage kidney disease were vascular kidney disease (n = 12), diabetic kidney disease (n = 12), chronic glomerulonephritis (n = 8), interstitial nephritis (n = 3), autosomal dominant polycystic kidney disease (n = 3), urological disease (n = 3), systemic disease (n = 2), and undiagnosed nephropathy (n = 5). Net fluid removal was prescribed according to patients' clinical needs. All patients were anuric, i.e. with a urine volume of <50 ml/day. Comorbid conditions were hypertension in 26 (54%), diabetes mellitus in 16 (33%), dyslipidemia in 21 (44%), arrythmia in 7 (15%), heart failure in 12 (25%), ischemic heart disease in 8 (17%), stroke in 4 (8%), peripheral vascular disease in 12 (25%), history of malignancy in 7 (15%), morbid obesity in 5 (10%), respiratory disease in 10 (21%), and depression in 5 (10%).

The study protocol was reviewed and approved by the Hospital Clínic of Barcelona ethics committee (approval number HCB/2022/0382) and written informed consent was obtained from all participants. The study was conducted according to the Declaration of Helsinki.

The dialysis parameters were kept constant in each session: mean dialysis time was 349 ± 85 min (range 240-480, 14 patients on 8-hour nocturnal shift); blood flow was 416 ± 34 (range 350-450) ml/min; and dialysate flow was 338 ± 91 ml/min. Postdilution hemodiafiltration was used in all patients except one, who received HD with medium cut-off membranes (expanded HD). Fresenius 6008 CareSystem dialysis monitors (Fresenius, Bad Homburg, Germany) were used and all patients received their usual parameters. All patients followed 1 week of their usual Na intake and 1 week of more restrictive Na intake. To facilitate dietary adherence, all patients were given a sheet listing the high-salt foods they should avoid as far as possible and the low-salt foods they were allowed.

To compare the results, we calculated the average of the three sessions of each weekly period. The dialysis parameters collected in each session consisted of real duration, dialyser, Qb, replacement volume, pre- and post-dialysis systolic and diastolic blood pressure, initial and final body weight, and interdialytic weight gain. The new Na biosensor quantifies initial and final $_S$Na, diffusive Na balance, and total Na balance. Intradialysis Δ_SNa was calculated. Total Na balance represents the total amount of Na transferred into or out of the patient per dialysis session and can be split into two components: the diffusive component (depending on the dialysate to plasma Na gradient) and the net ultrafiltration component.

The total Na balance estimated by the model in a single dialysis session reflects only Na removal during the dialysis session. However, with a longer follow-up in clinically stable patients under HD without residual renal function and ignoring loss of Na in either stool or sweat, intradialytic Na removal must reflect Na intake. To assess daily Na intake, the only consideration needed is a correction in accordance with the

previous days without dialysis (i.e. the total Na balance on Mondays and Tuesdays must be divided by 3 days and the remaining days by 2 days).

Na balance was calculated by 6008 dialysis machines, which rely on the dialysate conductivity cells of the online clearance monitor. Since the clearance of other electrolytes, such as potassium and bicarbonate, modifies the composition of spent dialysate and influences the relationship between conductivity and Na concentration, the 6008 machine uses a patient kinetic model. This model approximates changes in plasma electrolyte concentrations during dialysis and allows estimation of Na concentration based on dialysate conductivity. Full details on the model can be found in the appendix "transition from conductivity to concentration balancing" in Ságová et al. [15]. The Na control biosensor continuously monitors the side Na balance of the dialysate, based on measurements of fresh and spent dialysate conductivities and the application of a kinetic model to account for the typical influence of other ions on dialysate conductivity. In activated Na control modes, such as the zero diffusive mode, dialysate Na is adjusted continuously to minimize diffusive Na transfer [15–17].

Quantitative variables are expressed as mean ± standard deviation and qualitative variables as absolute and relative frequencies. Differences in qualitative variables were analyzed with the χ^2 test. Quantitative parameters were analyzed with the Student t-test for paired data. $P<0.05$ was considered statistically significant. A Pearson correlation coefficient was computed to assess the linear relationship between dietary Na intake and interdialytic weight gain. Analyses were performed using SPSS software version 23 (SPSS, Chicago, IL, USA) and graphics were prepared with GraphPad Prism version 8 (GraphPad Software).

RESULTS

All dialysis sessions were performed without notable clinical incidents or serious adverse events. Despite constant activation of Na control, patients experienced no cramps or episodes of hypotension.

Total Na balance / Na intake

Total Na balance significantly decreased from 324 ± 103 mmol Na/session with usual Na intake to 210 ± 96 mmol Na/session with restrictive Na intake. When calculated as daily Na intake, total Na balance was 149 ± 54 mmol Na/day (8.76 ± 3.2 g salt/day) with usual Na intake and 95 ± 49 mmol Na/day (5.59 ± 2.88 g salt/day) with restrictive Na intake. With usual Na intake, daily Na intake was < 85 mmol Na/day (<5 g/day) in four patients (8%), 85 to 150 mmol Na/day in 26 (54%), and > 150 mmol/day in 18 patients (38%). With restricted Na intake, these percentages were 44% (<5 g salt/day), 48% (5-9 g salt/day), and 8% (> 9 g salt/day). Individualized values of daily Na intake are shown in Figure 1.

Interdialytic weight gain

Pre-dialysis body weight was significantly higher in the usual Na intake period while post-dialysis body weight was similar in both periods (Table 1).

The restricted Na intake diet significantly reduced interdialytic weight gain (Table 1). The average reduction was 460 ± 484 g per session.

Total Na balance was significantly correlated with interdialytic weight gain in both periods (Figure 2):

$$Interdialytic\ weight\ gain = 0.006\ x\ Total\ Na\ balance\ + 0.341;\ R^2 = 0.733$$

Initial and final plasma Na

The percentage of patients with hyponatremia was 12.5% (n=6) with usual Na intake and 29.2% (n=14) with restricted Na intake. The mean pre-dialysis $_S$Na was 138.11 ± 2.33 (range 133 to 142) mmo/L with usual Na intake and was significantly reduced to 136.29 ± 2.87 (range 130 to 144) mmo/L with restricted Na intake. There were no significant differences in postdialysis $_S$Na (Figure 3).

Diffusive Na balance

Diffusive Na balance differed between the two study periods (Table 1), despite activation of the Na biosensor in both periods with a similar Na dialysate margin of variability allowed (133-142 mmol/L). During the restricted Na diet, the percentage of dialysis sessions achieving a zero diffusive balance (0-30 mmol) decreased from 69% to 23%, dialysis sessions with diffusive balance from 31 to 100 mmol increased from

21% to 46%, and dialysis sessions with a diffusive balance > 100 mmol increased from 10% to 31%.

Difference between initial and final Na or delta Na (Δ_SNa)

Values of Δ_SNa significantly differed between the two study periods (Figure 3). Δ_SNa was negative in the usual Na intake period with activated Na module biosensor and was positive in the restricted Na period. During the second period, the number of patients with Δ_SNa ≥4 mmol/L rose from 1 to 3 patients (2%-6%), and those with Δ_SNa 2 to 4 mmol/L rose from 5 to 9 (10%-19%). The number of patients with Δ_SNa < 2 mmol/L decreased from 42 (88%) to 36 (75%).

Blood pressure

Mean pre- and postdialysis systolic and diastolic blood pressures are shown in Table 1. We found no significant differences in either study period. When patients were divided into groups according to normal or high (≥ 130 mmHg) systolic blood pressure and daily Na reduction, systolic blood pressure decreased significantly in those with a daily Na reduction > 3 g/day (Table 2).

DISCUSSION

The present study shows that a restrictive Na diet, with a mean of 3.17 g salt/day, was associated with lower interdialytic weight gain and pre-dialysis $_S$Na and higher ΔsNa and diffusive Na balance.

Sodium intake is closely related to fluid volume. Interdialytic weight gain is a crucial predictor of morbidity and mortality in HD patients due to a directly proportional increase in the risk of cardiovascular events, including hypertension, left ventricular hypertrophy, and congestive heart failure [18,19]. Previous studies have shown that intradialytic weight gain can be significantly reduced by a hypotonic diet [20,21]. Indeed, a systematic review reported that a hypotonic diet reduced interdialytic weight gain by 1.5 kg compared to a regular diet [22] and these data are supported by our results.

Patients on HD need to adhere to a wide range of dietary restrictions that can negatively impact their long-term quality of life and nutritional status [23]. In these patients, international guidelines recommend a diet low in potassium, phosphorus and salt [24,25]. Despite the well-established benefits of salt restriction in these patients, its implementation in clinical practice has been challenging mainly due to poor patient adherence to dietary recommendations, and it has been estimated that half of patients under HD cannot adhere to the recommended salt intake [26]. Our study supports these data as only 8% patients on the usual Na diet met these recommendations. However, when the reduction of salt intake was insisted by these dietary recommendations, in a short period of time, compliance was achieved in 44% of the patients, basically by 46% of the patients who reduced more than 3 grams of salt/d.

Pre-dialysis plasma Na fluctuations in patients are normally small, supporting the hypothesis of an individual Na setpoint [4,27]. However, interindividual variability in pre-dialysis $_{S}$Na is very high, reflecting differences in diet, lifestyle and [28]. In the present study, interindividual variability in pre-dialysis $_{S}$Na ranged from 130 to 144 mmol/L. Hyponatremia has been associated with increased mortality. In 2013, a study of 6127 patients on HD reported that $_{s}$Na <135 mEq/L was associated with hypercalcemia, elevated alkaline phosphatase, hypoparathyroidism, and a higher risk of 1-year mortality [29]. Three years later, another study of 8883 patients from European countries in the international MONDO initiative found that hyponatremia was predictive for all-cause mortality [30]. At the same time, a study of 27180 incident patients reported a U-shaped mortality risk, suggesting that hyponatremia increased with both lower (<138 mEq/L) and higher (≥ 144mEq/L) sNa [31]. In 2021, a systematic review and meta-analysis showed that hyponatremia predicted all-cause and cardiovascular mortality in the dialysis population [32]. A subsequent analysis of 184 patients reported that pre-dialysis time-averaged hyponatremia was independently associated with an increased risk of all-cause mortality and cardiovascular events in patients under HD [33]. In our study, reduced Na intake was associated with an increase in the percentage of patients with hyponatraemia from 12% to 29%, indicating that the risk of mortality could increase in this subgroup. It is therefore important to individualize dietary recommendations. Hyponatremia has been associated with

functional and cognitive decline [34], risk of bone fractures [35], risk of infection-related hospital admissions [36], and malnutrition.

A 2018 analysis of data from the Japanese dialysis registry, which included 88115 patients under HD, showed that low Na intake was associated with all-cause mortality [37]. Unfortunately, it is known that efforts to intensify Na restriction may increase the risk of compromising energy intake [38]. A retrospective cohort study demonstrated that low salt intake was related to high all-cause mortality in HD patients, possibly due to malnutrition in the context of excessive salt restriction [39]. Along the same line, another study reported that hyponatremia was associated with malnutrition, inflammation, and fluid overload [30], while a review of recommended dietary regimens in patients under HD showed that, since Na is used in a wide variety of foods, Na restriction could increase the risk of malnutrition and energy-protein loss. More recently, a study of 127 patients demonstrated the association between a low daily Na intake and inadequate intake of calories, proteins, minerals, trace elements and, vitamin B_1 [40]. These studies suggest that the benefit of a low-Na diet recommendation should be balanced against the risk of malnutrition.

Another advantage of the Na module is that it allows dialysate Na prescription to be customized automatically according to patients' needs. Several authors have proposed a goal of zero diffusive balance as a starting point, as it provides an adequate option for most patients under HD [15–17]. In our study, the low Na diet was associated with increased diffusive balance. As previously reported by our group[14] the determining factor in achieving a neutral diffusive balance was the pre-dialysis $_{s}$Na value. As in the present study, the pre-dialysis $_{s}$Na decreased by almost 2 mmol/L, which would explain this change.

Changes in $_{s}$Na concentration from pre- to postdialysis may lead to organ damage and have been associated with independent risk factors for all-cause, cardiovascular, and infectious disease-related mortality. A study based on data from the Japanese dialysis and transplant registry reported that pre-dialysis concentrations of $_{s}$Na <136 mEq/L and Δ_{S}Na > 4 mEq/L were related to higher mortality in patients under HD, particularly when both were present [41]. The results of the International

MONitoring Dialysis Outcome Initiative showed that increased mortality was associated with higher pre-dialysis $_{s}$Na variability [42]. In our study, reducing Na intake doubled the number of patients with a Δ_{S}Na > 2 mEq/L (12% to 25%), which again emphasizes the importance of individualizing dietary Na recommendations.

Overall, reducing Na intake can be an important component of a comprehensive approach to managing hypertension in individuals undergoing HD [10,43]. However, a low-Na diet may not be appropriate for all patients under HD, particularly those with malnutrition or hyponatremia. To individualize recommendations and dietary plans for such patients, it is essential to distinguish between dilution hyponatremia, nutritional hyponatremia, depletion hyponatremia, and dilution hyponatremia associated with Na wasting or malnutrition [44]. Moreover, a strict low-Na diet is no longer recommended in ambulatory patients with heart failure, as a result of the publication of the clinical trial SODIUM-HF, which failed to demonstrate a reduction in cardiovascular events, regardless of a modest improvement in quality of life [45] . This result raises new doubts about this general recommendation in other entities such as end-stage kidney disease and emphasizes that one size does not fit all.

Overall, reducing Na intake can be an important component of a comprehensive approach to managing hypertension in individuals undergoing HD. Previous research has shown that the patients deriving the greatest benefit from a restricted Na diet are those with hypertension [46]. In our study, we found statistically significant differences only in the subgroup of hypertensive patients who adhered to the low Na dietary recommendations.

A limitation of our study is the absence of long-term clinical follow-up of restricted Na intake (1 week). Another limitation is that not all patients strictly adhered to the dietary recommendations, although we analyzed the data per intention to treat.

In conclusion, the automated dialysate Na control module is a highly useful tool to objectively monitor Na intake, confirming that patients on a more restricted Na diet did indeed reduce their salt intake. Moreover, lower Na intake was accompanied by less interdialytic weight gain, a decrease in pre-dialysis $_{s}$Na, and a trend to lower blood pressure. On the other hand, the low Na diet was also associated with a greater

percentage of patients with pre-dialysis hyponatraemia and higher diffusive Na balance and Δ_SNa. Therefore, the advantage of this new Na control biosensor is that it allows objective non-invasive monitoring of estimated Na intake and adherence to Na dietary recommendations in each HD session without additional costs. The biosensor thus allows dietary recommendations to be individualized with greater precision according to patients' needs. New studies and algorithms are needed to adapt Na dietary prescription with maximum precision in the presence of distinct clinical situations, such as natremia, fluid overhydration, and hypertension.

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STATEMENT OF ETHICS

This study protocol was reviewed and approved by the Hospital Clínic of Barcelona ethics committee (approval number HCB/2022/0382) and written informed consent was obtained from all participants. The study was conducted according to the Declaration of Helsinki.

CONFLICTS OF INTEREST STATEMENT

F.M. has received consultancy fees and lecture fees from Baxter, Fresenius Medical Care, Medtronic, Nipro, Toray and Vifor. The other authors declare no conflicts of interest.

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AUTHOR CONTRIBUTIONS

F.M. conceived the study. L.M., E.Ch., J.B., J.O., V.E., M.M-Ch, LM.R., M.A-G., M.V., and N.F. acquired the data. L.M., E.Ch., J.B, and F.M. analysed the data, created the

figures, and drafted the paper. All authors have revised the drafts and approved the final manuscript.

DATA AVAILABILITY STATEMENT

The data supporting the findings of this study are available from the corresponding author, F.M., upon reasonable request. All data generated or analysed during this study are included in this article. Further enquiries can be directed to the corresponding author

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LEGENDS

Figure 1: Comparison of individualized values of daily Na intake between usual Na intake and restricted Na intake.

Figure 2: Correlation between total Na balance and interdialytic weight gain (IWG) in both two periods.

Figure 3: A: Comparison of pre- and postdialysis $_{s}$Na with usual Na intake and restricted Na intake. B: Comparison of the difference between the initial and final $_{s}$Na (Δ_{s}Na) in the two study periods.

Table 1: Comparison of pre/postdialysis body weight, interdialytic body weight gain, HDF replacement volume, pre/postdialysis serum Na, diffusive Na balance, and pre/postdialysis blood pressure in the two study periods

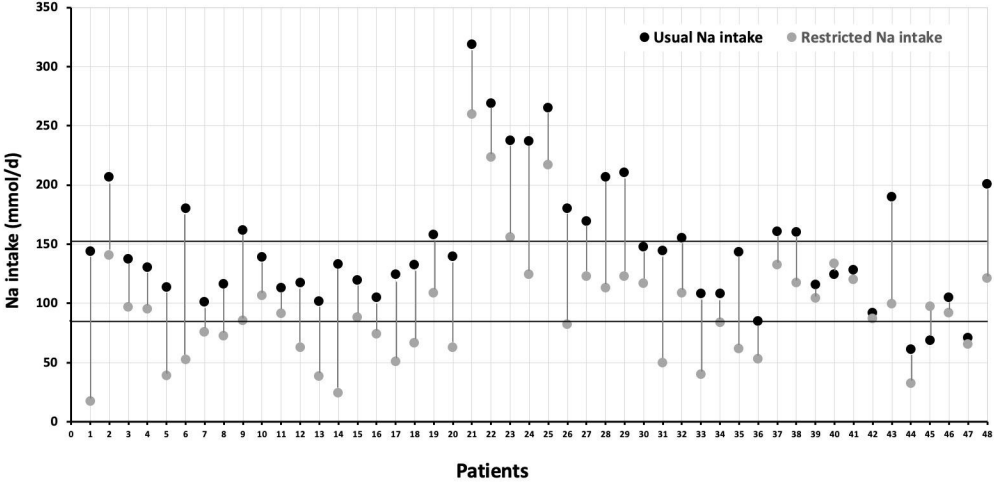
	Usual Na intake	Restricted Na intake	P value
Pre-dialysis body weight (kg)	70.112 ± 16.77	69.525 ± 16.66	<0.001
Postdialysis body weight (kg)	67.896 ± 16.60	67.779 ± 16.58	N.S.
Interdialytic weight gain (g)	2210 ± 816	1750 ± 776	<0.001
HDF replacement volume (L)	32.6 ± 10.9	32.4 ± 10.6	N.S.
Pre-dialysis serum Na (mmol/L)	138.11 ± 2.33	136.29 ± 2.87	<0.001
Postdialysis serum Na (mmol/L)	137.61 ± 1.64	137.08 ± 1.73	0.018
Diffusive Na balance (mmol/L)	31.85 ± 41.0	73.67 ± 53.1	<0.001
Pre-dialysis SBP (mmHg)	134.4 ± 23.1	132.2 ± 22.4	N.S.
Pre-dialysis DBP (mmHg)	68.4 ± 12.6	68.0 ± 12.7	N.S.
Postdialysis SBP (mmHg)	128.1 ± 20.4	131.1 ± 21.1	N.S.
Postdialysis DBP (mmHg)	65.7 ± 12.9	66.7 ± 13.5	N.S.

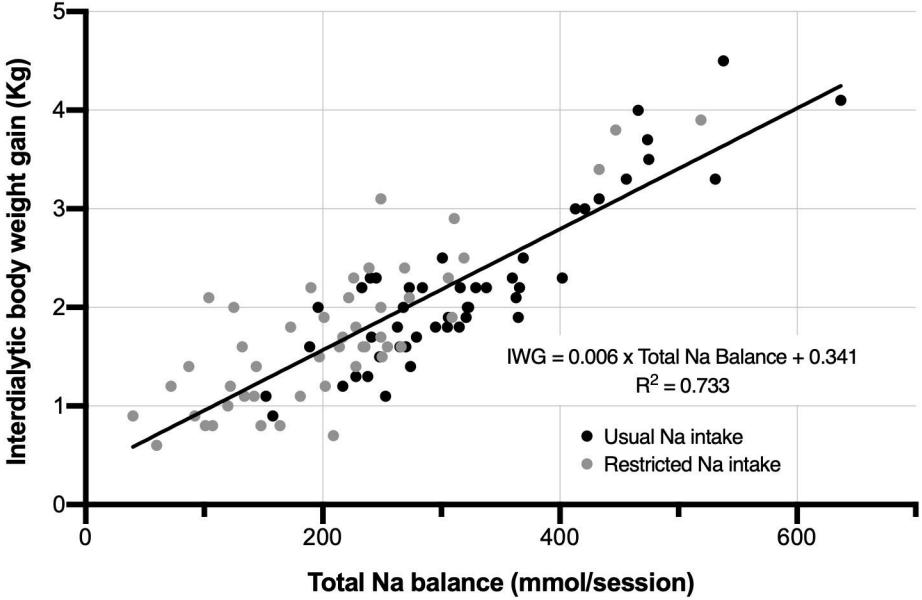
HDF: hemodiafiltration; Na: sodium; SBP: systolic blood pressure; DBP: diastolic blood pressure;

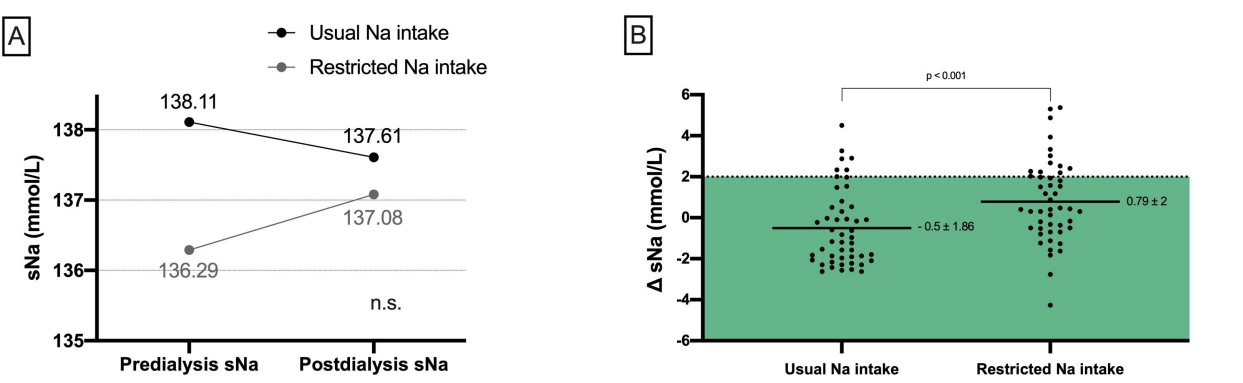
Table 2. Systolic and diastolic blood pressure grouped by normal or high (≥ 130 mmHg) systolic blood pressure and daily sodium reduction in the two study periods.

Patient groups	SBP			DBP		
	Na intake			Na intake		
	Usual	Restricted	p	Usual	Restricted	p
Normal BP with daily Na reduction > 3 g (n = 8)	114.1 ± 19.6	111.7 ± 22.6	N.S.	58.1 ± 10.4	58.5 ± 13.3	N.S.
Normal BP with daily Na reduction ≤ 3 g (n = 14	116.7 ± 9.30	116.6 ± 10.8	N.S.	62.9 ± 9.30	61.4 ± 10.7	N.S.
High BP with daily Na reduction > 3 g (n = 14)	148.2 ± 14.1	141.4 ± 9.60	0.029	76.4 ± 12.5	75.5 ± 10.5	N.S.
High BP with daily Na reduction ≤ 3 g (n = 12)	152.5 ± 20.1	153.4 ± 18.8	N.S.	72.2 ± 10.4	73.3 ± 9.20	N.S.

SBP: systolic blood pressure; DBP: diastolic blood pressure; BP: blood pressure; Na: sodium.


Usual Na intake
Restricted Na intake
Na intake (mmol/d)
Patients
350
300
250
200
150
100
50
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48


Interdialytic body weight gain (Kg)
5
4
3
2
1
0
0
200
400
600
Total Na balance (mmol/session)
IWG = 0.006 x Total Na Balance + 0.341
R2 = 0.733
Usual Na intake
Restricted Na intake


A
Usual Na intake
Restricted Na intake
138.11
137.61
137.08
136.29
n.s.
sNa (mmol/L)
138
137
136
135
Predialysis sNa
Postdialysis sNa
B
p < 0.001
Δ sNa (mmol/L)
6
4
2
0
-2
-4
-6
- 0.5 ± 1.86
0.79 ± 2
Usual Na intake
Restricted Na intake

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Salt intake restriction monitored with automated Na control

Methods

Prospective single-cohort study

48 patients in hemodialysis

- One week usual Na intake. Automated Na control.
- One week restricted Na intake. Automated Na control.

Objectives

To evaluate changes in:

- Interdialytic weight gain (IWG)
- Delta Na
- Systolic and diastolic blood pressure
- Diffusive Na balance

Results

	Usual Na intake	Restricted Na intake		
Daily Na intake	8.8	5.6	g/day	↓
IWG	2210	1750	g	↓
Predialysis sNa	138.1	136.3	mmol/L	↓
Difussive Na balance	32	74	mmol/ses	↑
ΔsNa	-0.5	0.79	mmol/L	↑

Conclusion

The new Na module allowed objective monitoring of Na intake, which in turn could permit more precise personalized dietary recommendations in patients under hemodialysis.

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