



The effects of substitution of acetate dialysate by citrate dialysate in central delivery hemodialysis system: a retrospective observational study

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INTRODUCTION AND AIMS

- Citrate dialysate (CD) contains citric acid as the acidifying agent in bicarbonate hemodialysis instead of acetic acid.
- It is reported that the use of citrate dialysate is expected to reduce intradialytic heparin demand, intradialytic blood pressure drops and induction of proinflammatory cytokines.
- The objective of this study was to compare the impact of citrate hemodialysis and acetate hemodialysis on heparin demand, blood pressure and variable dialysis related biomarkers.

METHODS

➤ We retrospectively evaluated 75 patients on maintenance hemodialysis with central delivery system three times per week at one outpatient facility.

● Baseline characteristics

- The mean age of subjects was 60.5±14.7 years, and 62.7% of subjects were male.
- Each subject underwent hemodialysis with acetate dialysate over a six-month period (8 mEq/L acetic acid, 2.65 mEq/L calcium), followed by hemodialysis with citrate dialysate over another six-month period (2 mEq/L citric acid, 2.5 mEq/L calcium).
- Mean heparin dose, hsCRP, CaxP, intact parathyroid hormone (iPTH), the change of intradialytic blood pressure and URR were analyzed.

RESULT

Table 1. Baseline characteristics.

Parameters	Mean± SD
Age - years	60.5±14.7
Male sex - no./total no. (%)	48/75 (62.7%)
Body mass index (kg/m ²)	23.3 ± 3.9
Medical history - no./total no. (%)	
Diabetes mellitus	67/75 (89.3%)
Hypertension	45/75 (60.0%)
Myocardial disease	19/75 (25.3%)
Cerebrovascular accident	6/75 (8.0%)
The cause of end-stage renal disease - no./total no. (%)	
Diabetes mellitus	42/75 (56.0%)
Hypertension	45/75 (60.0%)
Glomerular disease	8/75 (10.67%)
Autosomal dominant polycystic kidney disease	3/75 (4.0%)
Unknown	5/75 (6.7%)
Kt/V	1.57 ± 0.28
hsCRP (mg/L)	3.84 ± 6.07
Parathyroid hormone (pg/ml)	376.40 ± 287.36
Calcium (mg/dl)	8.30 ± 0.78
Phosphate (mg/dl)	5.99 ± 1.67
Calcium-phosphate product ; CaxP (mg ² /dl ²)	49.95 ± 15.45

RESULT

Table 2. The change of parameters after 6 months citrate dialysate.

	Baseline	After 6Mo Citrate dialysis	P-value
Systolic BP	141.00 ± 15.72	137.00 ± 11.70	0.080
hsCRP (mg/L)	3.99 ± 6.31	2.23 ± 3.66	0.040
Ca (mg/dL)	8.30 ± 0.78	8.54 ± 0.66	0.006
P (mg/dL)	5.99 ± 1.67	5.30 ± 1.34	0.000
CaxP (mg/dL) ²	49.85 ± 15.71	45.18 ± 12.84	0.011
iPTH (pg/mL)	379.24 ± 290.74	271.66 ± 232.30	0.001
Total CO ₂ (mmol/L)	19.56 ± 2.54	21.07 ± 2.63	0.000
Albumin (g/dL)	3.96 ± 0.23	3.89 ± 0.31	0.004
URR	72.33 ± 6.87	72.00 ± 5.55	0.506
Mean heparin per session (IU/session)	1128.89 ± 1033.08	786.67 ± 754.53	0.000

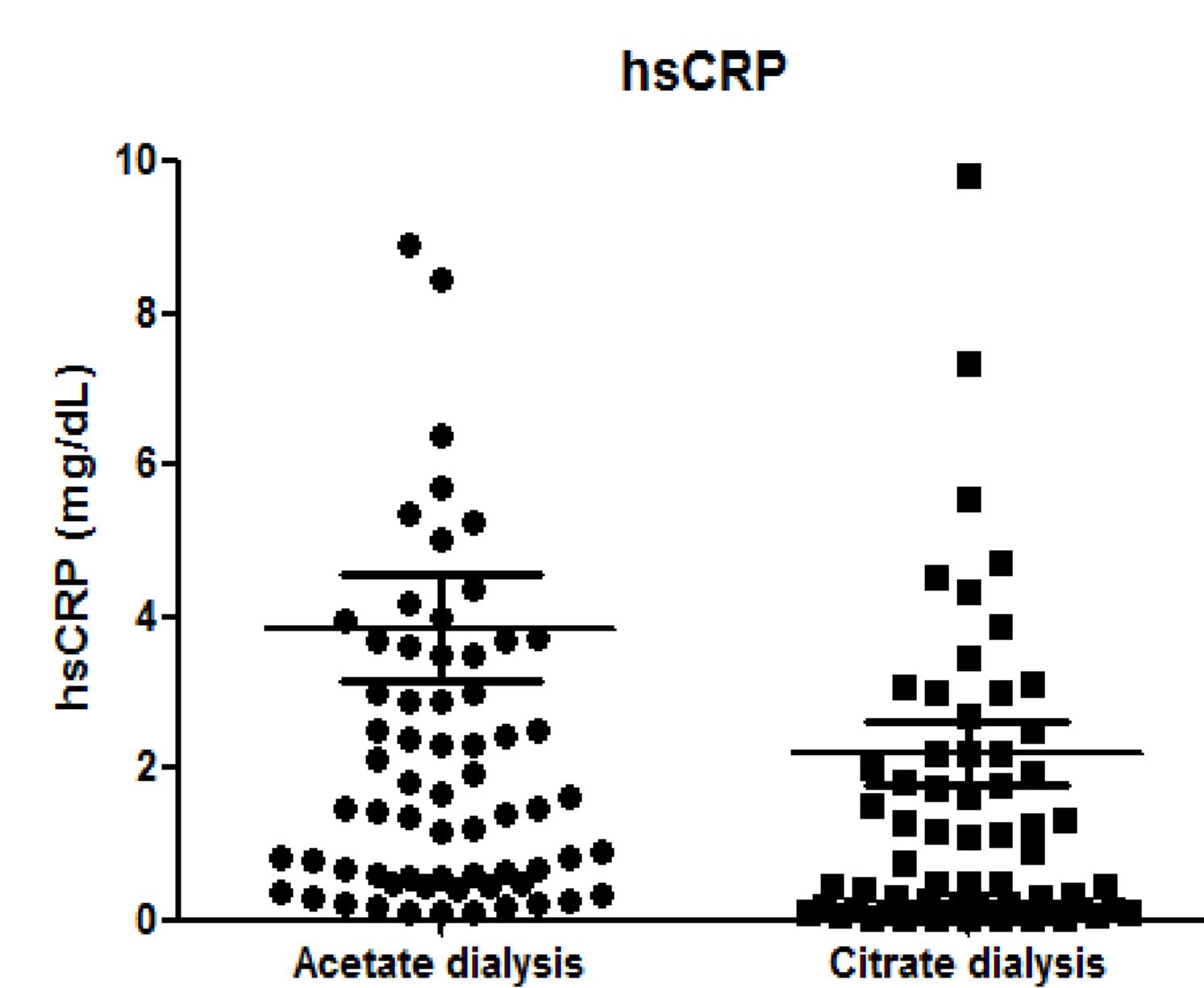


Figure 1. hsCRP levels decreased in citrate hemodialysis compared with acetate hemodialysis (P=0.040)

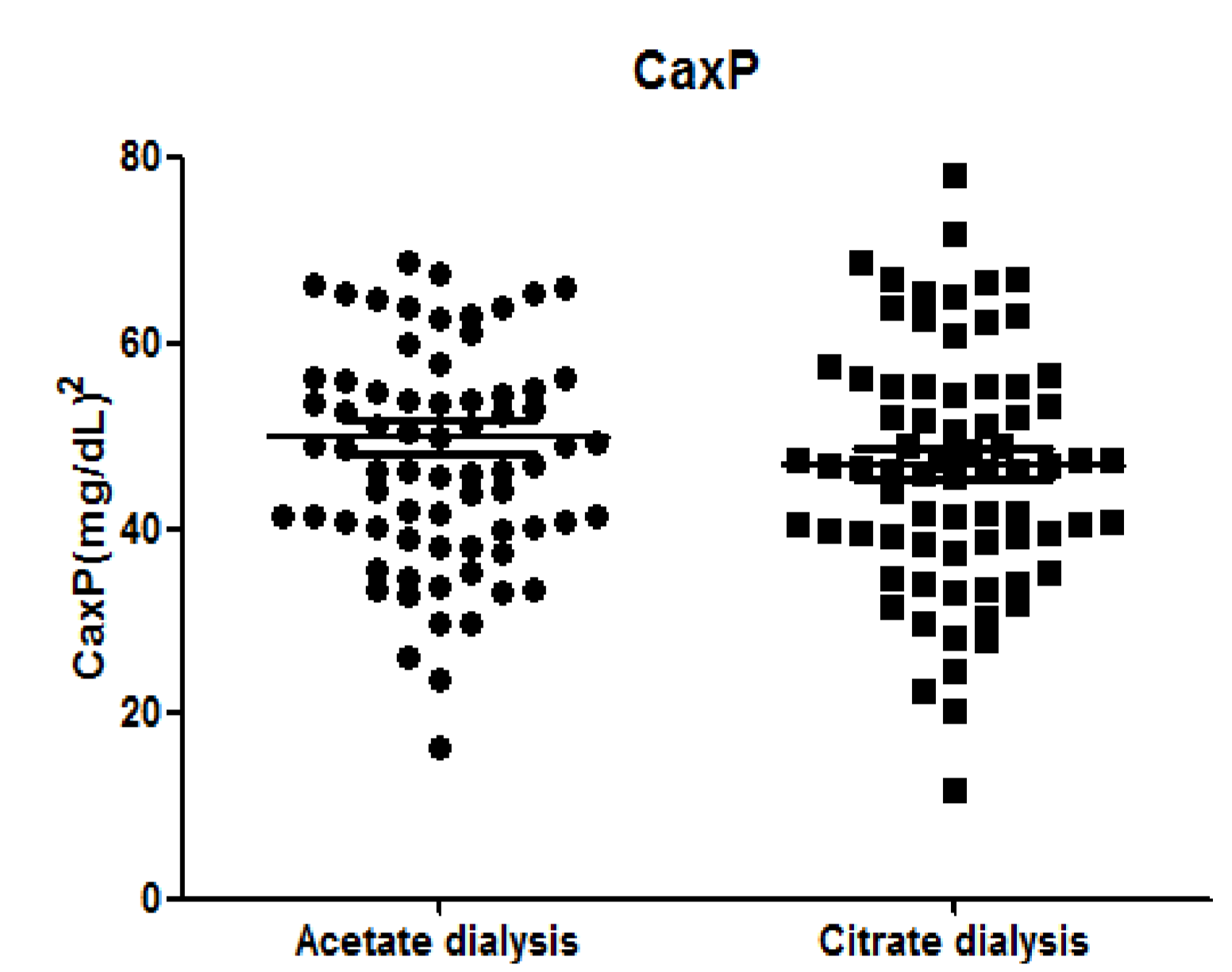


Figure 2. CaxP concentrations decreased in citrate hemodialysis compared with acetate dialysis (P=0.011)

SUMMARY

● Mean heparin dose

➤ Mean heparin dose decreased in citrate hemodialysis compared with acetate dialysate (1128.89±1033.01 IU/session vs. 786.67±754.53 IU/session, p<0.0001).

● URR

➤ URR remained stable (72.33 ± 6.87 vs. 72.00 ± 5.55, p=NS).

● iPTH

➤ iPTH decreased in citrate hemodialysis (379.24 ± 290.74 pg/mL vs. 271.66 ± 232.30 pg/mL, p=0.001)

● CaxP

➤ CaxP concentrations decreased in citrate hemodialysis. (49.85 ± 15.71 mg²/dL² vs. 45.18 ± 12.84 mg²/dL², p=0.011)

● hsCRP

➤ hsCRP levels decreased in citrate hemodialysis (3.99 ± 6.31 mg/L vs. 2.23 ± 3.66 mg/L, p=0.040).

● Blood pressure

➤ There was no significant difference of intradialytic blood pressure drops between citrate and acetate dialysate.

CONCLUSION

- The use of citrate dialysate in central delivery hemodialysis system required lower heparin dose compared to the use of acetate dialysate, without any significant effects on dialysis adequacy. In addition citrate dialysate reduced intradialytic blood pressure drops and induction of proinflammatory cytokines.