ABSTRACT

Background and objectives

Metabolic acidosis is associated with cardiovascular events, graft function and mortality in kidney transplant recipients (KTRs). We examined the effect of alkali therapy on vascular endothelial function, a predictor of cardiovascular events, in KTRs.

Methods

We performed an 18-week, randomized, double-blind, placebo-controlled crossover pilot study examining the effect of sodium bicarbonate therapy vs. placebo on vascular function in 20 adult KTRs at least one year from transplant with an eGFR ≥ 45 ml/min per 1.73m^2 and a serum bicarbonate level of 20-26 mEq/L. Each treatment period was 8 weeks in duration with a 2-week washout period between treatments. The primary outcome was change in brachial artery flow-mediated dilation (FMD) between sodium bicarbonate treatment and placebo. Secondary endpoints were used to identify potential mechanisms by which bicarbonate may affect FMD and included serum interleukin-6 (IL-6) and C-reactive protein (hs-CRP).

Results

Twenty patients completed the study and were included in the primary efficacy analysis. The mean (SD) baseline eGFR of participants was 75 ± 22 ml/min/1.73m^2, respectively. Serum bicarbonate levels did not increase significantly with treatment (0.3 ± 1.5 mEq/L, p=0.37). Sodium bicarbonate therapy was not associated with worsening blood pressure, weight gain, or hypokalemia. There was a trend towards a significant increase in FMD after 8 weeks of sodium bicarbonate therapy compared to placebo (mean change in FMD 2.2%, 95% CI -0.1 to 4.6, p=0.06). There were no significant changes in

hs-CRP, IL-6, eGFR or urinary albumin:creatinine ratio during treatment. Urinary ammonium decreased by 9 mmol/day (p=0.003), net acid excretion decreased by 12.5 mmol/day (p=0.008) and urine pH increased by 0.38 (p=0.03) with sodium bicarbonate.

Conclusions

Sodium bicarbonate therapy is safe and feasible in KTRs and there is a trend towards improvement in FMD, strengthening the need for a larger randomized controlled trial.