Low urinary aldosterone in pregnancy: a diagnostic tool for pre-eclampsia and superimposed pre-eclampsia?

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Introduction

- Women with chronic kidney disease (CKD) and chronic hypertension (CHT) are at increased risk of superimposed pre-eclampsia (SPE) and associated adverse pregnancy outcomes[1].
- Diagnosis of SPE using blood pressure and proteinuria is of limited use because they may develop in women with CKD or CHT without the condition.
- Inaccurate diagnosis may result in unnecessary iatrogenic preterm delivery and associated complications.
- Plasma and urinary aldosterone concentrations are elevated in patients with CKD and CHT, but in established pre-eclampsia (PE) are suppressed[2]. It is unknown if the same reduction is seen in women with SPE.

Aim

- The aim of the study was to determine urinary aldosterone concentrations in women with CKD and/or CHT with and without SPE compared with normotensive controls (NC) and those with PE without CKD/CHT.

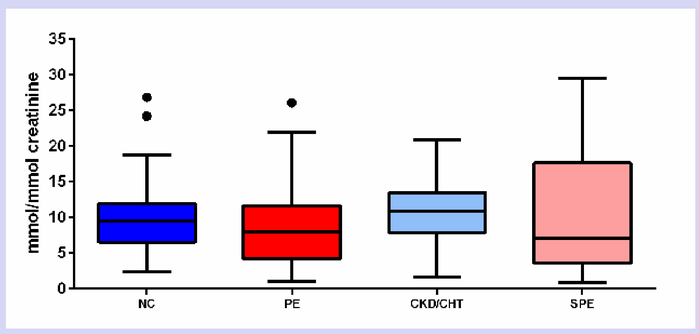
Methods

- NC women (n=25), women with PE (n=22), CKD or CHT without SPE (n=25) and with SPE (n=21) were recruited from two tertiary antenatal clinics (mean±SD 38±3 weeks').
- Creatinine (for normalisation) and sodium (Na) in urine were measured in urine using a standard clinical laboratory assays.
- Urinary tetrahydroaldosterone (THAldo) was measured by gas chromatography-mass spectrometry (GC-MS).
- Apparent aldosterone synthase activity was calculated by ratios of THAldo's immediate precursor – 18-OH-tetrahydrocorticosterone (18-OH-THA) and THAldo (18-OH-THA/ THAldo).

Results

- No differences were observed between the urinary Na: Creatine between all groups ($P > 0.05$; Fig. 1).

Figure 1: Urinary Na concentrations per creatinine



Results

- Aldosterone: creatinine ratios were significantly lower in both PE and SPE compared to the NC and CKD/CHT women (median [IQR], PE: 6.45 [2.95, 14.37]; SPE: 10.82 [5.42, 16.44]; NC: 13.75 [9.07, 29.80]; CKD/CHT: 24.18 [16.29, 37.88] µg/mmol creatinine; $P < 0.05$ for all).

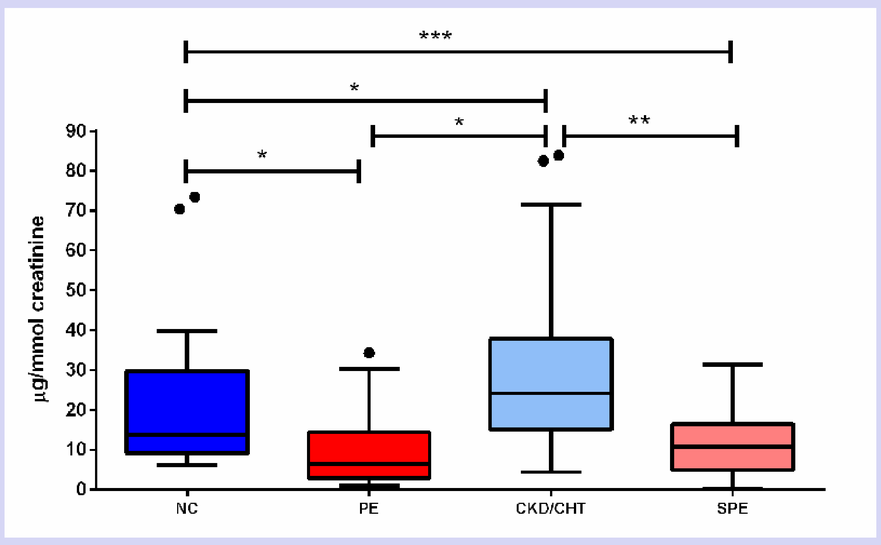


Figure 2: Urinary THAldo concentrations per creatinine. Both PE and SPE had significantly lower THAldo compared to NC and CKD/CHT groups; *$p < 0.05$; **$P < 0.001$; ***$P < 0.0001$.

- In addition, apparent aldosterone synthase activities were decreased in both PE and SPE groups compared to both NC and CKD/CHT groups ($P < 0.05$ for all; Fig. 3).

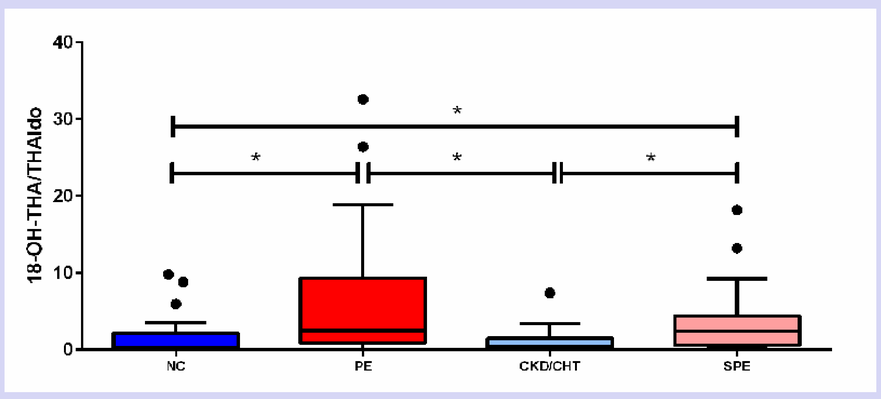


Figure 3: Urinary apparent aldosterone synthase activity. Both PE and SPE had significantly lower activity compared to NC and CKD/CHT groups; *$p < 0.05$; NB: high ratios represents low activities.

Conclusions

- Women with SPE have lower urinary THAldo and lower apparent aldosterone synthase activity than women with CKD/CHT in keeping with women with PE without pre-existing disease, suggestive of similar pathophysiology.
- Further exploration of the predictive value of low urinary THAldo for adverse pregnancy events in women with CKD and/or CHT and its role in cases of diagnostic uncertainty is required.

References

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2. Escher & Mohaupt, *Role of aldosterone availability in Pre-eclampsia.* Mol. Aspects Med. 2007. 28(2): p. 245-254.

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