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Urinary excretion of citrate and female steroid sex hormones: a study in healthy women

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Introduction and Objectives: Low levels of urinary citrate are correlated to increased risk of kidney stone formation. Previous studies have shown that men have lower urinary citrate excretion than women. The underlying mechanism for this is unknown. Differences in urinary citrate excretion might be part of the explanation why men have a 3-5 times higher incidence of kidney stones than women. The **aim** of the present study was to investigate the relationship between female steroid sex hormones and urinary citrate excretion in healthy women.

Materials and Methods: 24 hour urine samples and blood samples were collected from 20 healthy women with regular menstrual cycles (28-32 days). The women were without any medication. The urine samples were analysed for citrate using the citrate lyase method, and the blood samples were analysed for plasma oestrogen and progesterone levels. The samples were collected with regular intervals during menstrual cycle.

Statistical analyses were done using the software package Stata 11.2.

Results: Urinary citrate levels during the menstrual cycles of the different women showed no uniform pattern.

Using linear regression a weak but significant correlation between urinary citrate excretion and oestrogen ($r = 0.159$, $p=0.0169$), and progesterone ($r = 0.137$, $p=0.0361$) (respectively) were found (fig).

Conclusion: No uniform pattern of urinary citrate excretion during the menstrual cycle could be identified. Plasma levels of female steroid hormones do not seem to have a strong effect on urinary citrate excretion. Other factors must be involved for the explanation of the major differences in urinary citrate excretion between genders.

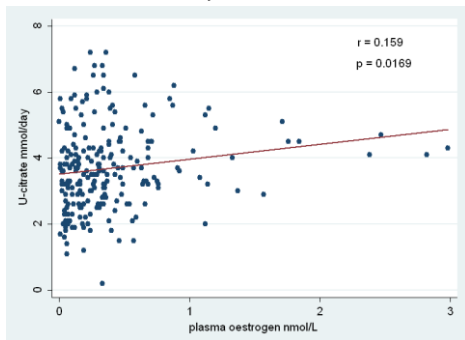


Figure 1. Oestrogen and citrate

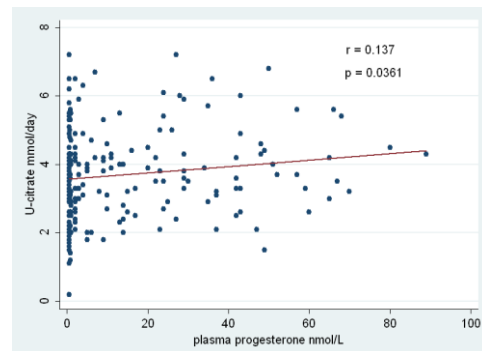


Figure 2. Progesterone and citrate