Diurnal urine regulation in healthy boys and girls – the effect of puberty and sleep

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This PhD dissertation was accepted by the Faculty of Health Sciences of the University of Aarhus, and defended on September 18, 2009.

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Dan Med Bull 2009;56:214

ABSTRACT

The PhD dissertation was conducted at the Pediatric department and the Institute of Clinical Medicine Aarhus University hospital, Skejby.

The aim of the study was to investigate the diurnal urine regulation with special reference to the effect of gender, puberty and sleep deprivation.

The studies were conducted on healthy volunteers' during admission at the Pediatric department Aarhus University Hospital, Skejby.

We found a significant diurnal rhythm in diuresis in healthy boys and girls aged 7-15 years with a marked nocturnal decrease in urine output. During a 24 hour period the onset of the changes in diuresis, plasma hormone levels of sodium and water regulating hormones and hemodynamics were independent of age and sex. Acute sleep deprivation significantly increased the nocturnal diuresis, mainly on the basis of increased natriuresis. Plasma levels of renin, angiotensin II, aldosterone and antidiuretic hormones were suppressed and the normal reduction in hemodynamic parameters was impaired. The effect of acute sleep deprivation was similar in boys and girls.

The prominent nocturnal polyuria observed during sleep deprivation in healthy children was comparable to the nocturnal polyuria observed in children with enuresis, both regarding volume and sodium contents. These findings emphasize the need for a reevaluation of sleep as part of the pathophysiology behind enuresis. Sleep induction or blood pressure lowering treatment are potentially new concepts in enuresis research and treatment.