

NOCTURIA AND BLOOD PRESSURE IN HEALTHY ELDERLY VOLUNTEERS

Hypothesis / aims of study

Nocturia, waking up in the night to void may occur at any age, even in infants, where it is physiologically normal. The prevalence in adults increases with age (1). Today nocturia is recognized as a clinical entity of its own. The ICS guidelines attribute nocturia to an overproduction of urine (nocturnal polyuria), a decreased functional bladder capacity, or a combination of both (2). Despite age-related changes, obviously not all the elderly have nocturia, and why?

This study was designed to elucidate the mechanisms of the circadian fluid regulation in healthy elderly males defined as persons without significant nocturia according to the ICS (less than two voids/night based upon a seven days frequency/volume chart (FVC)), and to explore some of the mechanisms of non-pathological nocturia. Specifically the mechanisms of the dry and the nocturia nights in the elderly as well as the differences in the urine output regulating hormones and functional bladder capacities were addressed in this selected group.

Study design, materials and methods

Eighteen males aged 55-73 years (mean 61.1 years) were included in the study. Their voiding habits were assessed by completion of a 7-days frequency/volume chart (FVC) recording fluid intake and urine output on diurnal basis. The subjects were then hospitalized. The diurnal rhythm of blood pressure, Arginine vasopressin (AVP), Atrial Natriuretic Peptide (ANP), angiotensin II, aldosterone, and urine excretion were studied.

Results

According to the FVC, all participants substantiated fewer than seven nocturnal voids/week (mean less than one void/night), and were classified as non-nocturics according to the accepted definition (less than two voids per night). During admission 12 of the 18 participants had nocturnal voiding. These subjects were characterized by a significantly higher night time blood pressure (fig. 1), a higher sodium excretion at night and a decreased day-to-night ratio in urine output (1.81 (1.56-2.06) versus 2.83 (2.54-3.02)) (table 1).

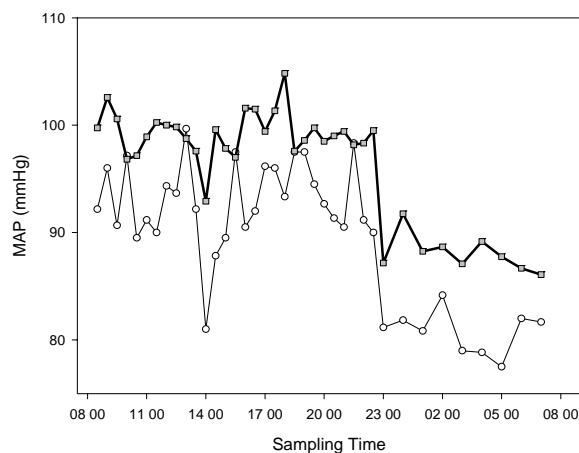


FIG 1: Nocturnal voiding: Squared dark line.
No nocturnal voiding: circled grey line

Hospitalisation N = 18	Urine volume (ml/kg body wt.)
Nocturnal voiding n = 6	
Day	19.2 ± 1.9
Night	12.2 ± 1.1
24-Hr-total	32.1 ± 2.0
Day-to-night ratio	1.81 ± 0.25
No nocturnal voiding n = 12	
Day	21.5 ± 1.4
Night	8.22 ± 0.9
24-Hr-total	29.8 ± 2.2
Day-to-night ratio	2.83 ± 0.19

TABLE 1: Urine volume parameters.

Interpretation of results

The main findings of this study were the significant differences in mean arterial blood pressure (MAP) between the dry and wet nights. We found that the participants, who voided at night both had a higher nighttime blood pressure. We demonstrated a circadian rhythm of ANP and aldosterone. As expected, we were not able to show a circadian variation in the concentration of AVP. Finally, we noted an elevated level of plasma angiotensin II in the dry nights, not quite reaching statistical significance though. This may partly be a result of too few participants.

The higher blood pressure in the voiding group leads to a decreased day-to-night ratio of urine output in the elderly. The reduced day-to-night ratio is strongly associated with nocturia. This agrees well with other studies (3). In elderly patients with benign hypertrophy of the prostate (BHP) and hypertension, collecting disorders as frequency and nocturia were more severe than in normotensive BHP-patients.

Concluding message

Blood pressure differences in this selected group of "non-nocturics" leads to a decreased day-to-night ratio in urine output and subsequently to nocturia.

References:

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- 3) Sugaya K, Kadekawa K, Ikehara A, Nakayama T, Gakiya M, Nashiro F, Goya M, Hatana T, Ogawa Y: Influence of hypertension on lower urinary tract symptoms in benign prostatic hyperplasia. Int. jour. Urol 2003, 10: 569-574