

THE DIURNAL RHYTHM OF URINE OUTPUT AND AVP SECRETION IN ELDERLY NOCTURNAL POLYURICS, ELDERLY AND YOUNG CONTROLS.

Aims of Study

An age-associated defect in AVP secretion during night time has been documented and may explain the increased nocturnal diuresis experienced by the elderly (1) although others have shown a disturbed circadian rhythm in AVP secretion independent of the level of nocturnal urine output (2). Generally elderly women seem to have lower values of AVP than men irrespective of nocturnal voiding (1;3). This study attempts to enlighten the age-related changes in the diurnal AVP secretion and a possible association to changes in diurnal urine output.

Methods

Elderly and young healthy volunteers were included in the study. Exclusion criteria were anamnestically LUTS with the exception of nocturia, any clinically significant disease, concomitant medication except oral contraceptives, abnormal uroflowmetry including significant residual urine, haematuria, leucocyturia, bacturia, abnormal blood chemistry, excessive fluid intake and an abnormal ECG. The participants were admitted to the hospital for 24 hours. From two days prior to hospitalisation and during the hospital stay the amount and type of fluid intake were standardized. During the hospital stay a diary was kept to register time and volume of fluid intake and voiding episodes. The participants were asked to empty their bladder at least every 3 hours from 8 a.m. to 11 p.m. (daytime) in a separate bottle for each 3 hour period. The nighttime (11 p.m. to 8 a.m.) was represented by only one collection comprising any voiding during the night and the first morning void at 8 a.m. From the individual urine samples urine volume (U_{voi}) was measured. Samples for plasma AVP analysis were obtained at predetermined hours. Repeated measurement analysis, one way ANOVA and ttests were used when appropriate. Results were considered significant when $p < 0.05$.

Results

A total of 34 elderly (11?, 23?) and 23 young (12?, 11?) healthy volunteers were included. Post-investigation the group of elderly participants was sub-grouped according to the nocturnal urine output in a group of elderly nocturnal polyurics (> 33% urine excretion during nighttime) (N=14, mean age 71.0 ± 1.6 years) and a group of elderly controls (N=20, mean age 68.9 ± 0.89 years). The group of young participants served as a young control group (N=23, mean age 27.1 ± 0.65 years). In the control groups there was a significant diurnal variation in AVP secretion ($p_{time} < 0.001$) but in the elderly nocturnal polyurics this circadian variation was missing ($p = 0.172$) (fig.1).

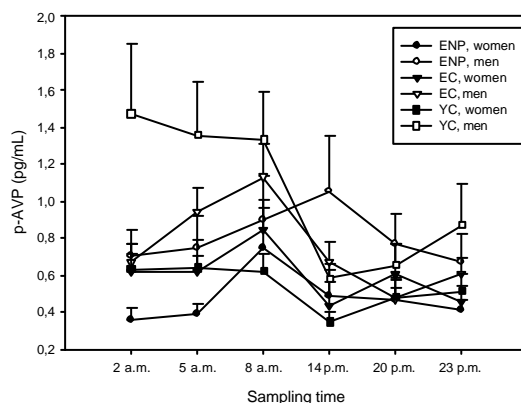


Fig. 1. The diurnal plasma AVP concentration (ENP=elderly nocturnal polyurics, EC=elderly controls, YC=young controls).

In general men had higher nocturnal levels of plasma AVP than women. Likewise the daytime levels were higher in the elderly nocturnal polyuric men and in the young control men than in the respective women. Only in the group of young controls there was a significant difference in the diurnal AVP secretion between sexes ($p=0.01$).

The mean baseline day/night urine excretion ratio in the elderly nocturnal polyurics was <1 (0.81 ± 0.088) and significantly lower than the corresponding values in the control groups. The young controls had a mean day/night urine excretion ratio of 2.36 ± 0.16 , almost three times the value in elderly nocturnal polyurics, whereas the elderly controls had a mean day/night urine excretion ratio of approximately twice the value of the nocturnal polyurics (1.89 ± 0.14). There was no within group gender difference in the day/night urine excretion ratio and we found no correlation between nocturnal plasma AVP and nocturnal urine output.

Conclusions

Young women have low nocturnal plasma AVP levels compared to young men in spite of comparable levels of nocturnal urine output. Elderly women had plasma AVP levels close to the levels measured in the elderly nocturnal polyuric women. A diminished diurnal variation in AVP secretion in young women have been reported elsewhere and similar results have been presented in elderly women indicating that women in general have increased sensitivity and/or affinity of AVP at kidney receptor level. Other factors such as oestrogen status may play an important role in the maintenance of water homeostasis in young women.

References

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