

## **NOCTURNAL POLYURIA IN ELDERLY PATIENTS IS SUGGESTED TO BE CAUSED BY BRAIN NATRIURETIC PEPTIDE BUT A LITTLE ATRIAL NATRIURETIC PEPTIDE**

### **Aims of Study**

Wein et al. reported that the factors that may lead to nocturia are sleep disturbance (time spent in bed), bladder storage problems, psychological problems and nocturnal polyuria. Of these factors, sleep disturbance, bladder storage problems and nocturnal polyuria often appear in elderly patients. Nocturnal polyuria is frequently present in the elderly though it is less highlighted as a cause of nocturia than bladder storage problems or sleep disturbance. Elderly people are often instructed to consume much water to prevent the blood from becoming too concentrated. BNP (brain natriuretic peptide) and hANP (human atrial natriuretic peptide) are reported to exhibit a diuretic function that lighten cardiac burden. To clarify the causes of nocturnal polyuria in the elderly we evaluated the relation between nocturnal polyuria and the serum levels of BNP and hANP as functional cardiac factors in the present study. BNP, a circulation peptide hormone consisting of 32 amino acids, is mainly secreted from the cardiac ventricle, whereas hANP, also a circulation peptide hormone, consists of 28 amino acids and is mainly secreted from the atrium. These peptide hormones have a strong diuretic sodium-water function and a vasodilatory function. BNP is reported to improve the symptoms of cardiac insufficiency by suppressing the sympathetic nervous system, the rennin-angiotensin system and the serum vasopressin (AVP) level, so it is considered an adequate assessment factor of the severity of cardiac insufficiency in circulatory internal medicine.

### **Methods**

Forty-five outpatients aged an average of 73.9 years (male:32, female:13) with nocturnal polyuria were enrolled. The assessment index was as follows: Serum levels of BNP, hANP, creatinine, sodium and potassium, and voided urinary volume per day, voided volume per night, urinary voiding rate per night, frequency per day, nocturia per night, QOL index and CTR. Underlying diseases were as follows: 4 angina, 4 stroke, 4 diabetes, 2 atrial fibrillation, 2 Parkinson's diseases and 2 proctectomy, etc. Eleven of the 32 male patients enrolled had a prostate of over 30g. Twelve patients had no clear underlying disease. The following concomitant drugs were continuously administrated during the study: 11 Tamsulosin, 8 Naftopidil, 8 Propiverine Hydrochloride, 4 Ethizoram and 3 Aspirin. Patients who received diuretic agents were excluded.

### **Results**

BNP levels in all patients were 5.5-118.0 pg/mL (average 56.5 pg/mL) and 8 patients (17.8%) had a lower than normal level of 18.4 pg/mL, while the hANP levels of all patients were 7.2-65.2 pg/mL (average 31.8 pg/mL) and 35 patients (77.8%) had a lower than normal level of 43.0 pg/mL. BNP was correlated with the voided volume per night and the urinary voiding rate per night, but had no relation with daytime voided volume or frequency. However, hANP had no correlation with any parameters.

### **Conclusions**

Most elderly patients with diabetes or circulatory complications usually consume much water during daytime. That causes nocturnal rather than daytime polyuria. Reduced daytime renal blood flow is considered to cause nocturnal polyuria due to a tense sympathetic nervous system and the extended period of assuming a standing and sitting posture. Accordingly, the water that accumulates in the body during the daytime increase the load on the heart and accelerates the cardiac secretion of circulatory hormones such as BNP and hANP, which have a diuretic function. BNP and hANP suppress the sympathetic nervous system and rennin-angiotensin system, therefore it is suggested that an increase in renal blood flow causes nocturnal polyuria.

In conclusion, in elderly patients, a slight deterioration in cardiac function is considered to cause nocturnal polyuria. In these patients treatment with drugs such as anti-diuresis hormone, which induce a decrease in the voiding volume, is suggested to heighten the risk for congestive cardiac failure or hyponatremia.

### **References**

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