

## THE PRESENCE OF CIRCADIAN VARIATION IN URINE FLOW: A STUDY OF URINE FLOW USING A PORTABLE UROFLOMETER OVER A 24 HOUR PERIOD

### Hypothesis / aims of study

The pathophysiologic mechanisms which cause nocturia can be classified into four distinct categories: 1) overall increase of urine production (24hr polyuria); 2) increase in urine production only at night (nocturnal polyuria); 3) permanent or nocturnal reduced bladder capacity; and 4) any primary or secondary sleep disorder. Yet despite the high prevalence and clinical importance of nocturia, it remains unclear how to best manage nocturia. If need to void is not the primary cause of awakening, we need to treat it differently from the treatment of reduced bladder capacity and nocturnal polyuria.

In a previous study, we revealed, using portable EEG, that nocturnal awakening of the elderly with nocturia is longer, and in follow-up study we also showed that poor urine flow is a significant factor for sleep disorders. One of the cause of sleep disorders in elderly is the overactiveness of the sympathetic nerve. As is known, it influences not only the sleep cycle but also BOO. Thus, when it causes a sleep disorder, the urine flow of nocturnal micturition may be worsened. In this study, we investigated whether the elderly have differing urine flow between daytime and nighttime. If there is the circadian variation of urine flow, the causes of it will be examined.

### Study design, materials and methods

We recruited volunteers who were over 65 years old and lived in the city of Nara, Japan. They recorded IPSS, N-QOL and used a portable uroflometer at every voiding for 3 whole days. The portable uroflometer, developed by us, records all micturition data in an SD card. The daytime and nighttime data of each volunteer was evaluated using the Liverpool nomogram and compared. We noted the volunteers whose urine flow was worse at nighttime than at daytime, defining them as the circadian variation group, and noted those whose urine flow had no difference between at nighttime and at daytime voiding as the no circadian variation group. The background and scores of questionnaire of two groups were analyzed.

### Results

Thirty volunteers (76.2±5.1 years old) recorded their micturitions by the portable uroflometer for 3 days. 5 men (71.4±1.1 years old) had a circadian variation of urine flow (Fig.1) and 25 men (76.4±5.9 years old on average) did not. The mean urine flow all day was significantly lower for the circadian variation group than for the no circadian variation group (13.3±8.7 ml/s v.s. 14.0±5.7 ml/s). In addition, the total score of IPSS voiding symptom was significantly higher in the circadian variation group than the other. (1.87±1.60 v.s. 0.99±1.49) (p<0.005) The total score of IPSS storage symptom and the total score of N-QOL had no significant difference between two groups.

### Interpretation of results

This study revealed that there is circadian variation of urine flow in those who have voiding symptoms. Thus, it is possible that of all day dysuria may lead to overactivity of the sympathetic nerve in the nighttime and result in circadian variation of urine flow.

### Concluding message

If there is difficulty in the treatment of nocturia, overactivity of the sympathetic nerve might cause sleep disorder and poor urine flow in the nighttime. To treat of voiding symptoms might improve symptoms of an overactive the sympathetic nerve and refractory nocturia. In a further study, we intend to examine the relationship between the activity of the sympathetic nerve and the urine flow.

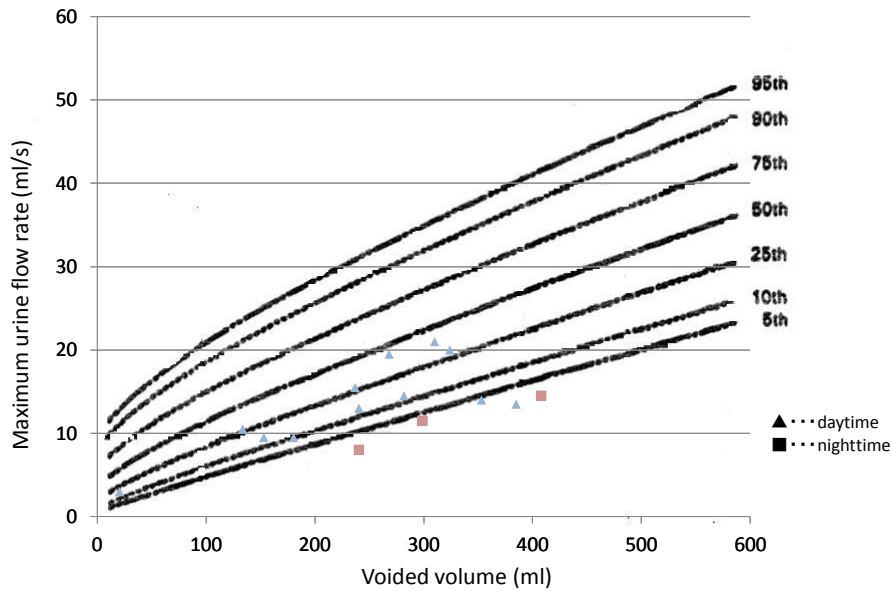


Fig.1 : Maximum urine flow rate nomogra (one of the circadian variation group)

References

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Disclosures

**Funding:** no **Clinical Trial:** Yes **Public Registry:** No **RCT:** No **Subjects:** HUMAN **Ethics Committee:** Nara Medical University **Helsinki:** Yes **Informed Consent:** Yes