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## DOES NOCTURIA INCREASE FALL-RELATED FRACTURES AND MORTALITY IN A COMMUNITY-DWELLING ELDERLY POPULATION AGED 70 YEARS AND OVER? : RESULTS OF A 3-YEAR PROSPECTIVE COHORT STUDY IN JAPAN

### Hypothesis / aims of study

Nocturia is a common problem for the elderly. Physiological conditions that may cause nocturia include cardiovascular disease, diabetes mellitus, sleep apnea syndrome, renal dysfunction, lower urinary tract dysfunction and sleep disorders. On the other hand, a previous study reported that nighttime falls of the elderly increased from 10 to 21% with 2 or more voids per night<sup>1</sup>. The incidence of fall generally results in fall-related fractures in the elderly. Furthermore, nocturia increases the risk of high mortality<sup>2</sup>. The objective of the present study was to evaluate the association between nocturia and fall-related fractures and the mortality rate in a community-based elderly population aged 70 years and over.

### Study design, materials and methods

We conducted a Comprehensive Geriatric Assessment of all residents who were ≥70 years of age in 2003 at an urban district in northern part of Japan. The population-based cross-sectional survey was conducted using an extensive health interview for each participant. We investigated the incidence of fall-related fractures and mortality for three years using the data from the national health insurance system. The cases that were relevant to fall-related fractures were abstracted from medical records of hospitals regarding the cause of fractures and the position of fracture. Differences in survival according to the presence or absence of nocturia (2 times per night or more) were assessed with Kaplan-Meier curves, and statistical significance was computed with the log-rank test. We also compared the risk of mortality and fall-related fractures with or without nocturia using a time varying multivariate Cox proportional hazard model, adjusted for age, sex, body mass index and physical activity.

### Results

Of the 788 Japanese people included (28.9% participation rate), 429 were female and 359 were male. The mean age was 74.9 ± 4.77 years (range 70 to 97). Prevalence of nocturia was shown in table 1. Cases with and without nocturia were 46 and 54%, respectively. There were significant differences with age and sex. Fractures were observed in 28 cases and fall-related fractures were observed in 23 cases. Arm fractures occurred in 30%, lower limb fractures in 40% and lumbar spine and pelvic fractures in 20%. The odds ratio and 95% confidence intervals of the risk of fractures among those elderly who were with or without nocturia are given in Table 2. The multivariate odds ratios (95% confidence intervals) regarding nocturia among all fractures and fall-related fractures were 2.45 (1.08-5.54) and 2.63 (1.05-6.57), respectively. Mortality was indicated with Kaplan-Meier curves in Figure 1. There were significant differences between with and without nocturia (p<0.0002). Nevertheless, with multivariate Cox proportional hazard model there was no significant difference between those with and without nocturia.

**Table 1. Prevalence of nocturia by age and sex**

night time frequency	nocturia	n(%)	p
<b>Age</b>			
70-74	165 / 402 (41.0%)		
≥75	211 / 386 (54.7%)	0.0001	
<b>SEX</b>			
male	180 / 359 (50.1%)		
female	178 / 429 (41.5%)	0.015	

**Table 2. Hazard ratios of fracture according to nocturia**

night time frequency	≤1	≥2
<b>Fall-related fractures</b>	(N=426)	(N=362)
Person-years of follow up	1641	1357
No. of cases	8	15
Crude model	1.00	2.28(0.97-5.38)
Multivariate adjusted HRs*	1.00	2.63(1.05-6.57)
<b>All fractures</b>	(N=426)	(N=362)
Person-years of follow up	1641	1357
No. of cases	10	18
Crude model	1.00	2.19(1.01-4.75)
Multivariate adjusted HRs*	1.00	2.45(1.08-5.54)

\*Adjusted for age, sex, body mass index, physical activity.

### Interpretation of results

In a previous study report, nocturia was an independent risk factor for hip fracture over 5 years<sup>3</sup>. In this study we did not limit the fractures only to hip fractures because all fractures also reduce the quality of life for elderly people. In this study we revealed the increasing risk of fall-related fractures with 2 or more episodes of nocturia. Nocturia also increased the mortality for elderly people, but nocturia was not an independent risk factor. Nocturia may arise from many physiological conditions. Thus, the possibility exists that the cause of the increased nocturia raises the mortality rate.

### Concluding message

We conclude that there is a significant increase in the risk of fractures and mortality associated with the presence of two episodes of nocturia or more. Nevertheless, with the multivariate Cox proportional hazard model, nocturia is an independent risk factor for fall-related fractures, but is not an independent risk factor for high mortality.

### References

- 1) J Am Geriatr Soc. 40 1217, 1992
- 2) Br J Urol. 84 297-301, 1999

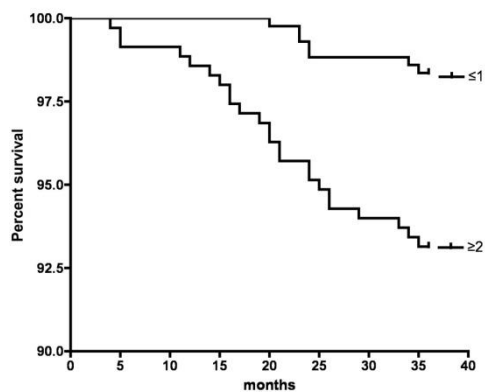


Fig. 1 Survival with/without nocturia

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<b><i>Is this a clinical trial?</i></b>	<b>No</b>
<b><i>What were the subjects in the study?</i></b>	<b>HUMAN</b>
<b><i>Was this study approved by an ethics committee?</i></b>	<b>Yes</b>
<b><i>Specify Name of Ethics Committee</i></b>	<b>Ethics Committee Tohoku University School of Medicine</b>
<b><i>Was the Declaration of Helsinki followed?</i></b>	<b>Yes</b>
<b><i>Was informed consent obtained from the patients?</i></b>	<b>Yes</b>