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RELATIONSHIP BETWEEN LOWER URINARY SYMPTOMS AND SLEEP DISTURBANCE IN ELDERLY PEOPLE: RESULTS FROM THE FUJIWARA-KYO STUDY

Hypothesis / aims of study
Nocturia is considered to be strongly associated with sleep disturbance[1], but it is not clear if other lower urinary symptoms (LUTS) are involved in sleep disturbance. The aim of this study was to evaluate whether LUTS have adverse effects on sleep.

Study design, materials and methods
Baseline data were obtained from the Fujiwara-kyo study, which is a longitudinal community-based study that has been conducted in Nara prefecture in Japan since 2007. Subjects were volunteer men and women aged ≥65 years old who were living in their own homes and were able to walk independently. Baseline data included results for physical examinations, blood tests, medical history, and self-administered questionnaires including the International Prostate Symptom Score (IPSS), Pittsburgh Sleep Quality Index (PSQI), and Geriatric Depression Scale (GDS). A total of 4,427 individuals gave written consent for participation in the study and completed the baseline examination. The PSQI (score range, 0-21; cut-off, 5.5) was used to assess sleep disturbance. IPSS, age, gender, body mass index (BMI), history/comorbidities (cancer, stroke, myocardial infarction, type 2 diabetes, hypertension), depressive status evaluated by the GDS, metabolic syndrome, smoking status, alcohol intake, and daily activity were included as putative risk factors for sleep disturbance (Table 1).
In statistical analysis, intergroup comparisons were performed by Mann-Whitney U-test and Chi-square test. Logistic regression was used for analyses of risk factors. Variables with p<0.05 in intergroup comparisons were evaluated in multivariate models. The same analyses were performed in subjects without voiding symptoms (scores of 0 or 1 for intermittency, weak stream, and straining on the IPSS).

Results
After excluding 754 subjects because of incomplete questionnaires related to this study, 3673 subjects were included in the analysis. Of these subjects, 2851 did not have voiding symptoms. Diagnoses of sleep disturbance based on the PSQI were made for 1248 (34%) of all subjects and for 885 (31%) of the subjects without voiding symptoms. IPSS, age, gender, stroke, hypertension, depressive status, smoking status, and alcohol intake differed significantly between patients with and without sleep disturbance in all subjects and in subjects without voiding symptoms. Daily activity also showed a significant difference between patients with and without sleep disturbance in those without voiding symptoms (Table 1). Intermittency, weak stream, nocturia, gender, age, stroke and depressive status were independent risk factors for sleep disturbance in all subjects; and urgency, straining, nocturia, gender, stroke and depressive status were independent risk factors for sleep disturbance in subjects without voiding symptoms (Table 2).

Interpretation of results
This study showed that voiding symptoms such as intermittency and weak stream were independent risk factors for sleep disturbance in elderly subjects. Moreover, in elderly subjects without voiding symptoms, urgency was an independent risk factor for sleep disturbance. These results suggest that voiding symptoms and urgency in themselves can influence sleep disturbance independently of nocturnal frequency.

Concluding message
Treating voiding symptoms and urgency in elderly people may result in improvement of sleep disturbance.

Table.1 Comparison of characteristics between with or without sleep disturbance group						
	All Subjects PSQI			Subjects without voiding symptoms PSQI		
	5.5> n=2425	5.5≤ n=1248	p	5.5> n=1966	5.5≤ n=885	p
IPSS						
Incomplete empting	0.4 ± 0.9	0.6 ± 1	0.00	0.2 ± 0.5	0.3 ± 0.6	0.01
Frequency	0.9 ± 1.2	1.2 ± 1.3	0.00	0.7 ± 1	0.9 ± 1.1	0.00
Intermittency	0.5 ± 1	0.7 ± 1.3	0.00	0.1 ± 0.3	0.2 ± 0.4	0.00
Urgency	0.4 ± 0.8	0.6 ± 1	0.00	0.2 ± 0.6	0.4 ± 0.7	0.00
Weak stream	0.8 ± 1.3	1.1 ± 1.6	0.00	0.3 ± 0.4	0.3 ± 0.5	0.00
Straining	0.4 ± 1	0.7 ± 1.3	0.00	0.1 ± 0.3	0.2 ± 0.4	0.00
Nocturia	1.5 ± 1	1.7 ± 1.1	0.00	1.4 ± 0.9	1.5 ± 1	0.00
Gender(%)			0.00			
Men/Women	55/45	44/56		48/52	34/66	0.00
Age(%)			0.00			0.03
65-69	37	31		38	33	
70-79	54	56		53	55	
80-	9	12		9	11	
BMI(%)			0.06			0.29
<25	22	20		22	20	
25-29	74	75		74	76	
30-	4	5		3	4	
Physical activity(%)			0.08			0.02
<100	35	38		36	40	
100-249	32	32		32	32	
250-	32	28		30	26	
Alchol drinking(%)			0.00			0.00
Never	59	64		62	68	
1-4times/week	10	13		10	12	
every day	31	23		27	20	
Smoking status(%)			0.00			0.00
Never	54	63		60	70	
Previous	35	30		30	24	
Current	11	8		10	6	
History/comorbidities(%)						
Cancer	10	10	0.46	9	9	0.70
Storoke	5	7	0.01	5	8	0.01
Myocardiac infarction	2	3	0.48	2	2	0.83
Type 2 diabetes	11	12	0.46	10	11	0.46
Hypertension	37	42	0.02	37	42	0.01
depressive status(%)	9	21	0.00	8	18	0.00
Metabolic syndrome(%)	31	31	0.78	31	33	0.16

Table.2 Multivariate analysis of variables correlating with sleep disturbance							
	All Subjects			Subjects without voiding symptoms			
	odds	p	95%IC		odds	p	95%IC
IPSS							
Incomplete empting	0.9	0.17	(0.9 - 1.0)		1.0	0.89	(0.9 - 1.2)
Frequency	1.1	0.18	(0.9 - 1.1)		1.1	0.19	(1.0 - 1.2)
Intermittency	1.1	0.04	(1.0 - 1.2)		1.1	0.34	(0.9 - 1.5)
Urgency	1.0	0.35	(0.9 - 1.1)		1.2	0.04	(1.0 - 1.3)
Weak stream	1.1	0.00	(1.0 - 1.2)		1.1	0.21	(0.9 - 1.4)
Straining	1.1	0.08	(0.9 - 1.2)		1.4	0.02	(1.0 - 1.8)
Nocturia	1.2	0.00	(1.1 - 1.3)		1.1	0.00	(1.0 - 1.3)
Gender							
Men	1.0				1		
Women	2.0	0.00	(1.6 - 2.5)		2.1	0.00	(1.6 - 2.7)
Age							
65-69	1.0				1		
70-79	1.1	0.1	(1.0 - 1.8)		1.1	0.09	(1.0 - 1.8)
80-	1.4	0.02	(0.9 - 1.3)		1.3	0.23	(0.9 - 1.3)
Physical activity							
<100					1		
100-249					0.9	0.13	(0.7 - 1.1)
250-					1.0	0.80	(0.8 1.2)
Alchol drinking							
Never	1.0				1.0		
1-4times/week	1.3	0.11	(1.1 - 1.7)		0.9	0.56	(0.7 - 1.2)
every day	0.9	0.37	(0.8 - 1.1)		1.3	0.08	(1.0 - 1.7)
Smoking status							
Never	1.0				1.0		
Previous	0.9	0.91	(0.7 - 1.3)		0.9	0.57	(0.6 - 1.3)
Current	1.0	0.60	(0.8 - 1.3)		1.1	0.38	(0.9 - 1.5)
History/comorbidities							
Storoke	1.5	0.01	(1.1 - 2.1)		1.5	0.02	(1.1 - 2.2)
Hypertension	1.1	0.11	(0.9 - 1.3)		1.2	0.08	(1.0 - 1.3)
depressive status	2.2	0.00	(1.8 - 2.7)		2.3	0.00	(1.8 - 2.9)

References
1. Asplund R. Nocturia, nocturnal polyuria, and sleep quality in the elderly. J Psychosom Res. 2004 May;56(5):517-25.

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Is this a clinical trial?	**Yes**
Is this study registered in a public clinical trials registry?	**No**
Is this a Randomised Controlled Trial (RCT)?	**No**
What were the subjects in the study?	**HUMAN**
Was this study approved by an ethics committee?	**Yes**
Specify Name of Ethics Committee	**the Medical Ethics Committee of Nara Medical University.**
Was the Declaration of Helsinki followed?	**Yes**
Was informed consent obtained from the patients?	**Yes**