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LOW BODY MASS INDEX IS AN INDEPENDENT RISK FACTOR FOR FEMALE NOCTURIA

Hypothesis / aims of study
Increased frequency of nocturnal voiding is one of the most bothersome urinary tract symptoms. Epidemiologic studies have shown that obesity is a risk factor for nocturia. There is little information concerning the relationship between a low BMI and nocturia. The purpose of this study is to evaluate the relationship between body mass index (BMI), including low BMI, and nocturia in Japanese women.

Study design, materials and methods
We collected data on 18,952 women who participated in a multiphasic health screening in Fukui, Japan, in 2006. Participants were asked to report any current or previous disease. Self-reported current body weight and height were used to calculate BMI (body weight in kilograms divided by the square of height in meters).
We analyzed the relationships between nocturia (two or more voids/night), as assessed by a questionnaire, and other variables including age, BMI, hypertension, sleep disturbance, cardiovascular disease, arteriosclerosis, cerebrovascular disease, chronic pulmonary disease, chronic hepatic disease, chronic renal failure, and diabetes mellitus (DM). A logistic regression model was used for statistical analysis. P-values <0.05 were considered statistically significant.

Results
The mean age was 60.6 y (18-97 y, SD 13.5). The mean BMI was 22.4 kg/m^2 (13.5-53.1 kg/m^2, SD 3.1), and the percent distributions of BMI were 8.5% for <18.5 kg/m^2 (underweight), 72.6% for 18.5-24.9 kg/m^2 (Non-overweight), 11.0% for 25.0-26.9 kg/m^2 (overweight), and 7.9% for ≥27.0 kg/m^2 (obesity). Overall, the prevalence of nocturia was 4.3%. The age-specific overall prevalence of nocturia was 0.6% for ≤39 years, 0.8% for 40-49 y, 2.1% for 50-59 y, 5.5% for 60-69 y and 7.3% for ≥70 y, with an increasing proportion in older groups. In the multivariate analysis, a significant association was found between nocturia and the following: age (55-59 y: Odds ratio [OR] 2.9; 60-64 y: OR 5.0; 65-69 y: OR 5.0; 70-74 y: OR 8.4; 75-79 y: OR 7.7; and ≥80 y: OR 13.3; reference group, women aged ≤39 y), BMI <18.5 (OR 1.5; reference group, women with BMI 18.5-24.9), BMI 25.0-26.9 (OR 1.4), BMI ≥27.0 (OR 1.8), sleep disturbance (OR 6.0), arteriosclerosis (OR 2.1), cerebrovascular disease (OR 1.7), chronic pulmonary disease (OR 1.7), DM (OR 1.4), and hypertension (OR 1.3) (Table).

Interpretation of results
We examined the prevalence and risk factors for female nocturia in Japan. We demonstrated that age and sleep disturbance had the strongest impact on the prevalence of nocturia in Japanese women, in addition to factors previously reported to be associated with nocturia, such as cerebrovascular disease, chronic pulmonary disease, DM, and hypertension [1]. Moreover, low BMI was a new independent risk factor for female nocturia in this study. As previous studies found that obesity was related to nocturia or lower urinary tract symptoms in Western countries [2], differences in BMI distribution among countries or ethnicities may explain our findings. Because of the relatively low percentage of participants with BMI <18.5 kg/m^2, the underweight (BMI <18.5) and non-overweight groups (BMI 18.5-24.9) were combined in previous studies; therefore, the relationship between low BMI and nocturia could not be elucidated. However, we were able to distinguish a low BMI group from normal and obesity groups among Japanese women. To the best of our knowledge, this is the first study to demonstrate that low BMI is an independent risk factor for female nocturia.

Concluding message
Our findings suggest that, in addition to obesity, low BMI is an independent risk factor for nocturia in women. Because nocturia is associated with various factors, multiple approaches are required for the treatment of patients with nocturia.

References
1. J Urol (2000) 163: 5-12
2. Endocrinology (1984) 114:1426-1432

Table. Multivariate analysis of risk factors for noctuira (two or more voids/night) in Japanese women.

	Odds ratio	95%CI	p-value
Age [y]:			
≤39	Ref.		
40-44	-	-	0.839
45-49	-	-	0.310
50-54	-	-	0.059
55-59	2.9	1.5-5.3	0.001
60-64	5.0	2.7-9.2	<0.001
65-69	7.0	3.8-12.6	<0.001
70-74	8.4	4.6-15.3	<0.001
75-79	7.7	4.2-14.3	<0.001
≥80	13.3	7.2-24.8	<0.001
BMI [kg/m^2]			
18.5-24.9 (normal)	Ref.		
<18.5 (underweight)	1.5	1.1-1.9	0.005

25.0-26.9 (overweight)	1.4	1.1-1.8	0.007
≥27.0 (obesity)	1.8	1.4-2.4	<0.001
Sleep disturbance	6.0	3.3-10.8	<0.001
Arteriosclerosis	2.1	1.1-4.1	0.029
Chronic pulmonary disease	1.7	1.3-2.3	0.001
Cerebrovascular disease	1.7	1.2-2.4	0.004
Hypertension	1.3	1.1-1.6	0.002
Diabetes mellitus	1.4	1.0-1.8	0.083
Cardiovascular disease	-	-	0.920
Hepatic disease	-	-	0.826
Renal disease	-	-	0.362

95%CI= 95% Confidence Intervals; BMI= body mass index