

**Introduction**

Nocturia has been identified as having a significant impact on a quality of life (QOL). Although night-time frequency is not equal to nocturia, a previous study in Japan reported that night-time frequency is the most bothersome symptom among lower urinary tract symptoms (LUTS) [1]. Recent study reported that QOL index of international prostate symptom score (IPSS), nocturnal urinary volume and maximum flow rate were related with sleep condition [2]. However, it is unclear how LUTS affects patient's sleep. We investigated the impact of LUTS on the degree of satisfaction to sleep condition using IPSS and simple sleep-satisfaction questionnaire.

**Methods**

New male outpatients with LUTS who visited our facility from January 1, 2015 to December 31, 2015 were investigated. Patients who were diagnosed as malignant neoplasms, urolithiasis, urinary tract infection or other metabolic diseases were excluded. Their IPSS, IPSS-QOL index and sleep-satisfaction questionnaire scores were investigated. Sleep-satisfaction questionnaire was simply consisted of five-grade evaluation (Table 1). Relationship of each item of questionnaires was examined by Pearson's correlation coefficient or partial correlation analysis. Statistical analysis was performed using IBM® SPSS® version 19. P values less than 0.05 were considered statistically significant. All values were indicated as mean ± standard deviation.

Table 1. sleep-satisfaction questionnaire

score	degree of satisfaction
1	very satisfied
2	satisfied
3	moderately satisfied
4	unsatisfied
5	strongly unsatisfied

**Results**

During the research period, 776 new male patients visited our facility and 345 complained of LUTS. One hundred and thirty nine patients who did not complete questionnaires were excluded from analysis. A total of 206 patients were eligible for investigation (Figure 1). Mean age of patients was 68.6 ± 11.3 years old (Figure 2) and mean score of sleep questionnaire was 3.0 ± 1.1 (Figure 3). Mean scores of each item of IPSS and QOL index were 1.8 ± 1.7, 2.5 ± 1.8, 1.8 ± 1.8, 1.6 ± 1.8, 2.6 ± 1.9, 1.5 ± 1.8, 2.2 ± 1.4, 3.8 ± 1.6, respectively (Figure 4).

IPSS total score and nocturia were significantly correlated with score of sleep questionnaire (Table 2). Patient's age was not correlated with sleep score, but weakly correlated with nocturia ( $r = 0.275, P < 0.001$ ). Age-adjusted partial correlation analysis revealed that nocturia was the most significant correlate with sleep satisfaction (Table 3). Frequency, urgency and IPSS-QOL index were significantly correlated with nocturia ( $r = 0.484, r = 0.448$  and  $r = 0.428$ , respectively). A significant but weak correlation was recognized between sleep satisfaction and voiding symptoms or storage symptoms.

Figure 1. Flow diagram of progress

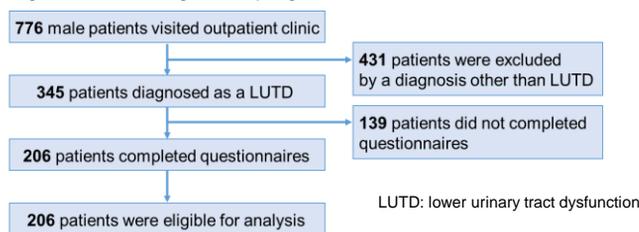


Figure 2. Patient distribution by age

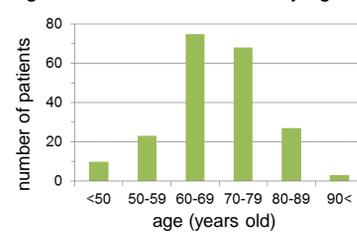


Figure 3. Patient distribution by sleep satisfaction

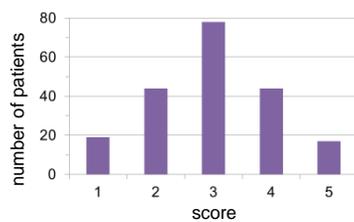


Figure 4. Patient distribution by each item of IPSS and QOL index

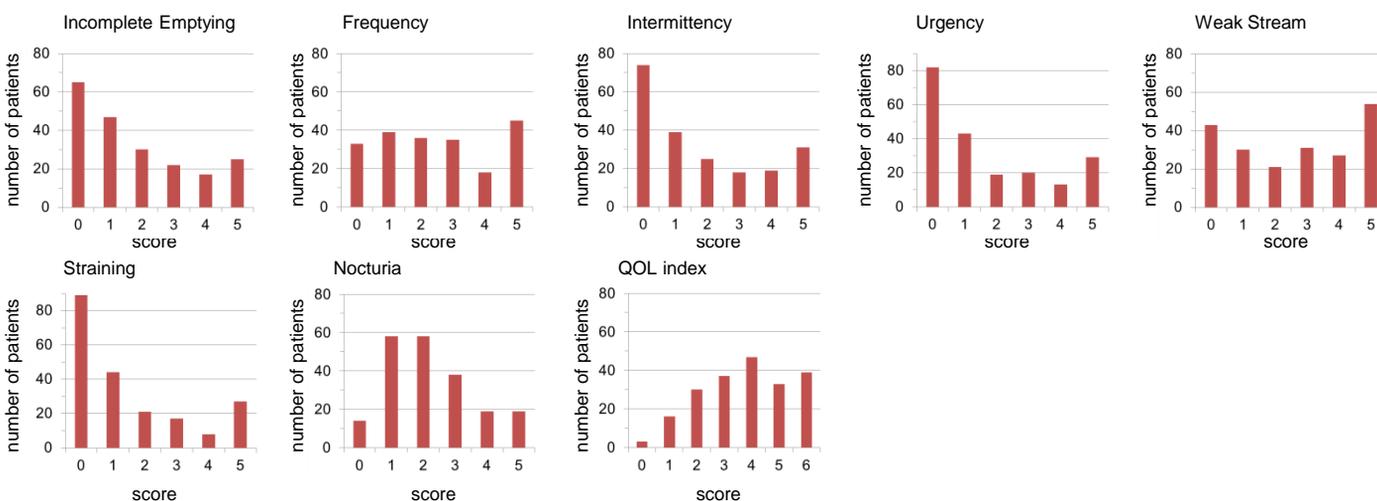


Table 2. Correlation between sleep questionnaire and IPSS

	correlation coefficient	P value
Incomplete Emptying	0.224	0.001
Frequency	0.283	< 0.001
Intermittency	0.337	< 0.001
Urgency	0.259	< 0.001
Weak Stream	0.285	< 0.001
Straining	0.295	< 0.001
Nocturia	0.414	< 0.001
Voiding Symptoms	0.368	< 0.001
Storage Symptoms	0.382	< 0.001
Total IPSS score	0.419	< 0.001
QOL index	0.363	< 0.001

Table 3. Age-adjusted correlation between sleep questionnaire and IPSS

	correlation coefficient	P value
Incomplete Emptying	0.219	0.002
Frequency	0.282	< 0.001
Intermittency	0.332	< 0.001
Urgency	0.266	< 0.001
Weak Stream	0.291	< 0.001
Straining	0.293	< 0.001
Nocturia	0.451	< 0.001
Voiding Symptoms	0.367	< 0.001
Storage Symptoms	0.394	< 0.001
Total IPSS score	0.422	< 0.001
QOL index	0.359	< 0.001

**Discussions**

The present study reveals a significant correlation of night-time frequency with low sleep-satisfaction, suggesting a significance of treating nocturia. A recent post-hoc analysis of a randomized clinical trial in Japan reported that anticholinergic drug can improve nocturia and sleep quality [3]. As both urinary frequency and urgency correlate with night-time frequency, treatment of overactive bladder with anticholinergics may be beneficial for ameliorating both nocturia and dissatisfaction to sleep. There are several limitations in the present study. Our study population was small and did not completely represent the residents of the communities we studied. Further study which compares the changes in questionnaires after medical intervention is needed for more detailed analysis.

**Conclusions**

Nocturia impairs sleep satisfaction in men.

**References**

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**Disclosures Statement**

All authors have no relevant financial relationships to disclose with respect to this presentation.