

Strong Impact of Nocturia on Sleep Quality in Patients with Lower Urinary Tract Symptoms

Seung Whan Doo¹, Hong Jun Lee^{2,3}, Jin Ahn^{1,2}, Jae Heon Kim¹, Jong Hyun Yun¹, Won Jae Yang¹, Yun Seob Song¹

¹Department of Urology, Soon Chun Hyang University College of Medicine, ²Medical Research Institute, Chung-Ang University School of Medicine, Seoul, Korea, ³Division of Neurology, Department of Medicine, University of British Columbia, Vancouver, Canada

Purpose: Nocturia is a bothersome symptom that impacts sleep quality in patients with lower urinary tract symptoms (LUTS)/benign prostatic hyperplasia (BPH). This study was performed to evaluate the impact of nocturia on sleep quality.

Materials and Methods: A total of 58 male patients with LUTS/BPH were enrolled. LUTS/BPH patients without nocturia were included in the control group. The inclusion criteria were eight or more points on the International Prostate System Score (IPSS) including more than one episode of nocturia and a prostate volume larger than 20 ml. IPSS, prostate volume, uroflowmetry, and the Pittsburgh Sleep Quality Index (PSQI) from each patient were recorded.

Results: Patients with nocturia showed a higher mean global PSQI (8.5 ± 0.4) than patients without nocturia (4.82 ± 0.4) ($p < 0.01$). Patients with nocturia showed a higher percentage of severe sleep disorders (74.1%) than patients without nocturia (35.3%) ($p < 0.01$). The regression coefficient between the number of episodes of nocturia and mean global PSQI was 0.42 ($p < 0.01$).

Conclusions: Patients with nocturia showed poor sleep quality, and this was related to the number of episodes of nocturia. This suggests that nocturia has a strong impact on sleep quality in patients with LUTS/BPH.

Key Words: Nocturia, Sleep, Prostatic hyperplasia

INTRODUCTION

Nocturia is one of the common lower urinary tract symptoms (LUTS), the third most bothersome symptom in all subject and the most bothersome symptom in men with benign prostatic hyperplasia (BPH).¹⁻⁴ This symptom is of-

ten associated with bladder outlet obstruction and with impairing health related quality of life (QoL).^{4,5} Nocturia is defined as waking at night one or more times to void.⁶ Evaluating the impact of nocturia on sleep quality in patients with LUTS is needed.

Although the International Prostate Symptom Score

Received: May 25, 2012; Revised: Jun 19, 2012; Accepted: Jun 28, 2012

Correspondence to: Yun Seob Song

Department of Urology, Soon Chun Hyang University Seoul Hospital, Soon Chun Hyang University College of Medicine, 59, Daesagwan-ro, Yongsan-gu, Seoul 140-743, Korea.
Tel: +82-2-709-9375, Fax: +82-2-709-9378, E-mail: yssong@schmc.ac.kr

Copyright © 2012 Korean Society for Sexual Medicine and Andrology

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

(IPSS) is commonly used, it does not show how strongly nocturia decreases sleep quality.⁷ The Pittsburgh Sleep Quality Index (PSQI) is a questionnaire related to the sleep quality used worldwide.^{8,9} This study was performed to evaluate that how strongly nocturia impacts sleep quality evaluated by PQSI in patients with LUTS/BPH.

MATERIALS AND METHODS

Men with LUTS/BPH who visited a hospital's Department of Urology between January and December 2010 were selected for the study. Approval for this study was obtained from the Institutional Review Board at the hospital and informed consent was obtained from each patient. Patients were included in the study if they met the criteria of the 5th International Consensus Committee on BPH (Paris, 2000), voided more than 150 ml during uroflowmetry, and were measured postvoid residual urine (PVR) volume and prostate size. Patients who reported more than one episode of nocturia per night using question 7 of the IPSS, had a maximum urinary flow rate (Qmax) under 15 ml/sec, a total IPSS over 7, a digital rectal examination negative for suspected malignancy, and a prostate volume larger than 20 ml were assessed as being in the LUTS/BPH group. LUTS/BPH patients without nocturia were included in the control group. The exclusion criteria included the use of diuretics for treating congestive heart failure, the use of sedatives or tranquilizers

for treating sleep disturbances, or having neurogenic bladder dysfunction. Patients were also excluded from the analysis if they had a documented history or clinical symptoms of prostatitis, prostate cancer, a history of prostate surgery or radiotherapy, or acute urinary retention. The quality of sleep was measured using the PSQI. The overall score can range from 0 (absence of sleep-related problems) to 21 (severe sleep-related problems). A total score of >5 is considered an indicator of severe sleep disorders.⁸ Prostate volume was measured by transrectal ultrasonography. Data are expressed as mean \pm standard error and compared statistically using the Student's t-test, chi-squared test, and Pearson correlation test. A level of $p < 0.05$ was considered statistically significant.

RESULTS

1. Profiles

Seven patients without nocturia (41.2%) had associated diseases, including 1 (5.9%) with hypertension, 4 (23.5%) with diabetes, 1 (5.9%) with herniated intervertebral disk, and 1 (5.9%) with hypothyroidism. Thirty two patients with nocturia (55.2%) had associated diseases, including 14 (24.1%) with hypertension, 11 (19.0%) with diabetes, and 7 (12.1%) with hyperlipidemia. A total of 75 male patients (17 without and 58 patients with nocturia) with LUTS/BPH were enrolled. 58 patients with nocturia had one or more episodes of nocturia: one (11 patients), two

Table 1. Profiles in patients without and with nocturia

Variable	Patients without nocturia	Patients with nocturia	p-value
Number of patients	17	58	
Age	61.2 \pm 2.3	63.7 \pm 0.9	0.31
Prostate volume (ml)	30.3 \pm 1.5	32.7 \pm 2.1	0.50
PSA (ng/ml)	1.19 \pm 0.2	1.5 \pm 0.4	0.62
Uroflowmetry			
Qmax (ml/s)	12.0 \pm 1.0	11.2 \pm 0.8	0.80
PVR (ml)	10.9 \pm 5.8	19.2 \pm 0.8	0.62
IPSS			
Number of nocturia		2.8 \pm 0.2	
Total	12.9 \pm 6.0	15.0 \pm 0.7	0.01
QoL index	2.8 \pm 1.2	3.4 \pm 0.1	0.02

Values are presented as mean \pm standard error.

PSA: prostate specific antigen, Qmax: maximum flow rate, PVR: post-void residual, IPSS: International Prostate Symptom Score, QoL: quality of life.

(15 patients), three (15 patients), four (11 patients), and five (6 patients) episodes. Baseline mean age, prostate volume, and prostate specific antigen (PSA) levels did not differ between patients with or without nocturia (Table 1).

2. Uroflowmetry

The baseline mean Qmax of the patients without and with nocturia were 12.0 ± 1.0 and 11.2 ± 0.8 , respectively. The baseline mean PVR volume of the patients without and with nocturia were 10.9 ± 5.8 and 19.2 ± 0.8 , respectively. There was no significant difference in Qmax or PVR volume between patients without or with nocturia ($p > 0.05$, Table 1).

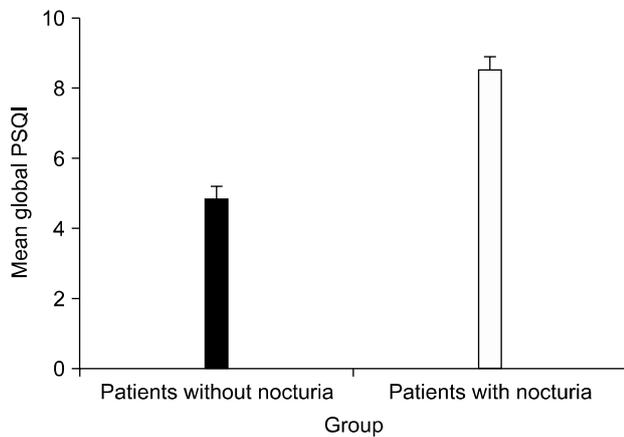


Fig. 1. Mean global PSQI of the patients without and with nocturia. Nocturia has an impact on patient's sleep ($p < 0.01$, ANOVA test). PSQI: Pittsburgh Sleep Quality Index.

3. IPSS

The mean number of episodes of nocturia using question 7 of the IPSS was 2.8 ± 0.2 . The mean total IPSS of the patients without and with nocturia was 12.94 ± 6.04 and 15.0 ± 0.7 , respectively. The mean QoL index of the patients without and with nocturia was 2.82 ± 1.2 and 3.4 ± 0.1 , respectively. The mean total IPSS and QoL index of patients with nocturia were higher than those of patients without nocturia ($p < 0.05$, Table 1).

4. Sleep quality

The patients with nocturia showed a higher mean glob-

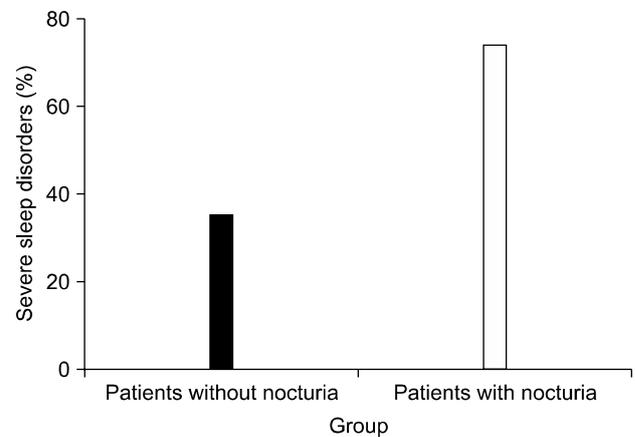


Fig. 2. Severe sleep disorders of the patients without and with nocturia. Nocturia has an impact on patient's sleep ($p < 0.01$, chi-square test). A total Pittsburgh Sleep Quality Index over 5 is considered an indicator of severe sleep disorders.

Table 2. The PQSI in LUTS/BPH patients without or with nocturia

Components	Patients without nocturia	Patients with nocturia	p-value
Number of patients	17	58	
Subjective sleep quality	0.76 ± 0.5	61.61 ± 0.83	< 0.001
Sleep latency	1.23 ± 0.83	1.21 ± 0.96	0.950
Sleep duration	1.53 ± 0.94	1.68 ± 1.10	0.596
Habitual sleep efficiency	0 ± 0	0.70 ± 1.01	0.011
Sleep disturbances	1.06 ± 0.24	1.43 ± 0.55	0.008
Use of sleep medication	0.58 ± 0.24	0.39 ± 0.91	0.150
Daytime dysfunction	0.41 ± 0.71	0.80 ± 0.92	0.089
Global PSQI score	4.82 ± 0.4	8.5 ± 0.4	< 0.01
Ratio of severe sleep disorders	6/17 (35.3)	43/58 (74.1)	< 0.01

Values are presented as mean \pm standard error or number (%).

PSQI: Pittsburgh Sleep Quality Index, LUTS: lower urinary tract symptoms, BPH: benign prostatic hyperplasia.

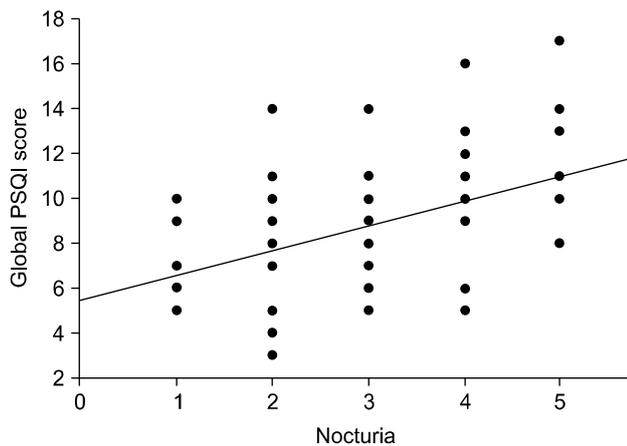


Fig. 3. Regression coefficient of number of nocturia and global PSQI score. $R=0.42$ ($p<0.01$, Pearson correlation test). PSQI: Pittsburgh Sleep Quality Index, R: regression coefficient.

al PSQI (8.5 ± 0.4) than the patients without nocturia (4.82 ± 0.4). ($p<0.01$, Fig. 1). The patients with nocturia showed a higher percentage of severe sleep disorders (74.1%) than the patients without nocturia (35.3%, Fig. 2) ($p<0.01$). The patients with nocturia showed a lower subjective sleep quality, habitual sleep efficiency, sleep disturbances, and daytime dysfunction than patients without nocturia (Table 2). The regression coefficient between number of nocturia and mean global PSQI was 0.42 ($p<0.01$, Fig. 3).

DISCUSSION

The incidence of nocturia has been reported at a frequency of 16% in men aged 40~49 years, to 60% in men aged 70~79 years.^{10,11} In many cases nocturia may be caused by BPH.¹²

Poor sleep quality due to nocturia increased daytime fatigue and lowered levels of general well-being.¹⁰ Moreover, nocturia can be a risk factor for falling.^{13,14} The decrease in a patient's QoL due to nocturia represents a social and economic problem,¹⁵ and a higher prevalence of cardiovascular diseases was reported in men with nocturia.¹⁶

In this study, there was no significant difference in age, prostate volume, PSA, QMax, or PVR between patients without or with nocturia. The mean total IPSS scores and QoL index of patients with nocturia were higher than

those of patients without nocturia.

The IPSS and QoL index are questionnaires used worldwide in relation to LUTS/BPH. Nocturia also has a severe impact on a patient's sleep quality because it causes a condition of worry about the need to wake to urinate. However, the IPSS and QoL index do not show how strongly nocturia decreases sleep quality.⁷ The PSQI is a simple, self administered questionnaire that contains 19 items assessing a wide variety of factors related to sleep quality.^{8,9} Global PSQI scores over 5 are considered to be an indicator of severe sleep disorders.⁸ In this study, patients with nocturia showed a higher mean global PSQI than patients without nocturia. Patients with nocturia also showed a higher percentage of severe sleep disorders, subjective sleep quality, habitual sleep efficiency, sleep disturbances, and daytime dysfunction than patients without nocturia. The regression coefficient between the number of episodes of nocturia and the mean global PSQI was significant. Therefore, nocturia has strong impact on sleep quality in patients with LUTS/BPH.

CONCLUSIONS

Patients with nocturia showed poor sleep quality and this was related to the number of episodes of nocturia. This suggests that nocturia has a strong impact on sleep quality in patients with LUTS/BPH.

REFERENCES

1. Eckhardt MD, van Venrooij GE, van Melick HH, Boon TA. Prevalence and bothersomeness of lower urinary tract symptoms in benign prostatic hyperplasia and their impact on well-being. *J Urol* 2001;166:563-8
2. Jolleys JV, Donovan JL, Nanchahal K, Peters TJ, Abrams P. Urinary symptoms in the community: how bothersome are they? *Br J Urol* 1994;74:551-5
3. Abrams P. Nocturia: the major problem in patients with lower urinary tract symptoms suggestive of benign prostatic obstruction (LUTS/BPO). *Eur Urol* 2005;3(Suppl):8-16
4. Stanley N. The underestimated impact of nocturia on quality of life. *Eur Urol* 2005;4(Suppl):17-9
5. Kim BS, Lee JW, Kim YT, Park HY, Kwon SW, Lee TY. The prevalence and risk factors of nocturia for males participating in a prostate examination survey. *Korean J Urol* 2008; 49:818-25
6. van Kerrebroeck P, Abrams P, Chaikin D, Donovan J, Fonda

- D, Jackson S, et al. Standardisation Sub-committee of the International Continence Society. The standardisation of terminology in nocturia: report from the Standardisation Sub-committee of the International Continence Society. *Neuro-urology Urodyn* 2002;21:179-83
7. Chapple CR. Night time symptom control with Omnic (Tamsulosin) Oral Controlled Absorption System (OCAS[®]). *Eur Urol* 2005;4(Suppl):14-6
 8. Buysse DJ, Reynolds CF 3rd, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res* 1989;28:193-213
 9. De Gennaro L, Martina M, Curcio G, Ferrara M. The relationship between alexithymia, depression, and sleep complaints. *Psychiatry Res* 2004;128:253-8
 10. Abraham L, Hareendran A, Mills IW, Martin ML, Abrams P, Drake MJ, et al. Development and validation of a quality-of-life measure for men with nocturia. *Urology* 2004;63:481-6
 11. Jackson S. Lower urinary tract symptoms and nocturia in men and women: prevalence, aetiology and diagnosis. *BJU Int* 1999;84(Suppl 1):5-8
 12. Asplund R. The nocturnal polyuria syndrome (NPS). *Gen Pharmacol* 1995;26:1203-9
 13. Coyne KS, Zhou Z, Bhattacharyya SK, Thompson CL, Dhawan R, Versi E. The prevalence of nocturia and its effect on health-related quality of life and sleep in a community sample in the USA. *BJU Int* 2003;92:948-54
 14. Stewart RB, Moore MT, May FE, Marks RG, Hale WE. Nocturia: a risk factor for falls in the elderly. *J Am Geriatr Soc* 1992;40:1217-20
 15. Kobelt G, Borgström F, Mattiasson A. Productivity, vitality and utility in a group of healthy professionally active individuals with nocturia. *BJU Int* 2003;91:190-5
 16. Asplund R. Nocturia: consequences for sleep and daytime activities and associated risks. *Eur Urol* 2005;3(Suppl):24-32

Appendix

PITTSBURGH SLEEP QUALITY INDEX

INSTRUCTIONS:

The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month.

Please answer all questions.

1. During the past month, what time have you usually gone to bed at night?

BED TIME _____

2. During the past month, how long (in minutes) has it usually taken you to fall asleep each night?

NUMBER OF MINUTES _____

3. During the past month, what time have you usually gotten up in the morning?

GETTING UP TIME _____

4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed.)

HOURS OF SLEEP PER NIGHT _____

For each of the remaining questions, check the one best response. Please answer all questions.

5. During the past month, how often have you had trouble sleeping because you...

- a) Cannot get to sleep within 30 minutes

Not during the Less than Once or twice Three or more
past month _____ once a week _____ a week _____ times a week _____

- b) Wake up in the middle of the night or early morning

Not during the Less than Once or twice Three or more
past month _____ once a week _____ a week _____ times a week _____

- c) Have to get up to use the bathroom

Not during the Less than Once or twice Three or more
past month _____ once a week _____ a week _____ times a week _____

- d) Cannot breathe comfortably

Not during the Less than Once or twice Three or more
past month _____ once a week _____ a week _____ times a week _____

- e) Cough or snore loudly

Not during the Less than Once or twice Three or more
past month _____ once a week _____ a week _____ times a week _____

- f) Feel too cold

Not during the Less than Once or twice Three or more
past month _____ once a week _____ a week _____ times a week _____

- g) Feel too hot

Not during the Less than Once or twice Three or more
past month _____ once a week _____ a week _____ times a week _____

- h) Had bad dreams

Not during the Less than Once or twice Three or more

past month _____ once a week _____ a week _____ times a week _____

i) Have pain

Not during the Less than Once or twice Three or more

past month _____ once a week _____ a week _____ times a week _____

j) Other reason(s), please describe _____

How often during the past month have you had trouble sleeping because of this?

Not during the Less than Once or twice Three or more

past month _____ once a week _____ a week _____ times a week _____

6. During the past month, how would you rate your sleep quality overall?

Very good _____

Fairly good _____

Fairly bad _____

Very bad _____

7. During the past month, how often have you taken medicine to help you sleep (prescribed or "over the counter")?

Not during the Less than Once or twice Three or more

past month _____ once a week _____ a week _____ times a week _____

8. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?

Not during the Less than Once or twice Three or more

past month _____ once a week _____ a week _____ times a week _____

9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?

No problem at all _____

Only a very slight problem _____

Somewhat of a problem _____

A very big problem _____

10. Do you have a bed partner or room mate?

No bed partner or room mate _____

Partner/room mate in other room _____

Partner in same room, but not same bed _____

Partner in same bed _____

If you have a room mate or bed partner, ask him/her how often in the past month you have had...

a) Loud snoring

Not during the Less than Once or twice Three or more

past month _____ once a week _____ a week _____ times a week _____

b) Long pauses between breaths while asleep

Not during the Less than Once or twice Three or more

past month _____ once a week _____ a week _____ times a week _____

c) Legs twitching or jerking while you sleep

Not during the Less than Once or twice Three or more

past month _____ once a week _____ a week _____ times a week _____

d) Episodes of disorientation or confusion during sleep

Not during the Less than Once or twice Three or more

past month _____ once a week _____ a week _____ times a week _____

e) Other restlessness while you sleep; please describe _____

Not during the Less than Once or twice Three or more
past month _____ once a week _____ a week _____ times a week _____