



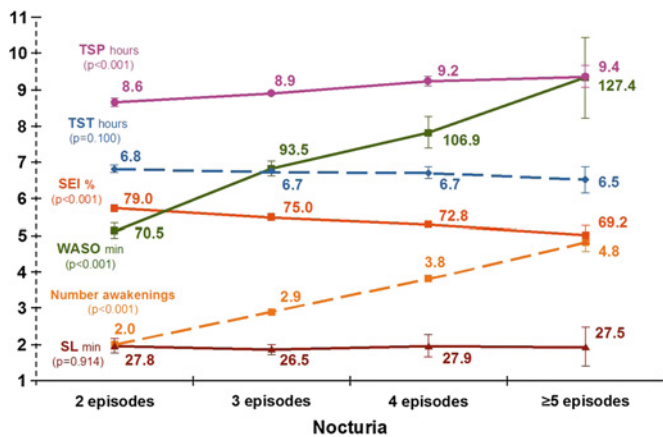








## Prostatic hyperplasia and excessive sleepiness



**Figure 2** Impact of lower urinary tract symptoms/benign prostatic hyperplasia on sleep characteristics and sleepiness. SEI, sleep efficiency index; SL, sleep latency; TST, total sleep time; WASO, wake after sleep onset.

moderately affected sleepiness, but there was no association found between the I-PSS and ESS.

There was no significant association between RLS and sleep apnoea minimum criteria and any BPE symptom.

### DISCUSSION

One major finding of this study is that older men complaining of LUTS related to BPE have poor sleep as reported by many studies<sup>4–8</sup> and a high prevalence of insomnia, as assessed by well-validated tools. In a group of 2179 patients with LUTS and nocturia, visiting GPs and urologists, carefully representative of the clinicians who usually take care of BPE in France, found a high prevalence of insomnia (60.9%): more than three times greater than that observed (with the same tools) in the general population of France (ie, 19% in 12 778 subjects).<sup>21</sup> Although these studies cannot be compared from a statistical point of view, we can suggest that insomnia is a major underestimated complaint in this group of LUTS patients. Ageing has a normal effect on sleep quality and quantity<sup>26–27</sup>: sleep in older people is commonly shorter than in younger adults, with a lower percentage of slow wave sleep.<sup>27</sup> It is also common that, due to a phase advance of the biological clock, older people get to sleep earlier in the evening, with an earlier

awakening in the morning. Insomnia is also more prevalent in older subjects and is estimated to affect 30%–40% of them, mostly women.<sup>11 13–15 18 19 26</sup> Facing this high prevalence of sleep disturbance, GPs and urologists may be tempted to consider poor sleep as an unavoidable consequence of ageing. Our study demonstrated that this is not only a question of ageing but it is also associated with the severity of nocturia. Based on these results, we firmly encourage GPs to investigate more deeply a possible link between the two disorders and to use well admitted sleep and LUTS/BPE instruments to assess the severity of illness.

This is the second issue highlighted by our study, which shows that some tools used to describe HGB may be significantly associated with the severity of insomnia:

- First, the I-PSS, which has been recommended to assess the impact of LUTS/BPE on QoL, was significantly associated with insomnia in our study. The I-PSS in insomniacs was higher than in subjects with no insomnia, and insomnia was more prevalent in subjects with a severe I-PSS than in those with moderate or mild scores. The severity of I-PSS also significantly correlates with SEI and excessive somnolence as measured by the ESS.

- Second, the number of nocturia episodes had a significant impact on the severity of insomnia. It may seem obvious that the more times one needs to void the bladder at night, the more awakenings result. Our study describes which sleep parameters were affected by the frequency of nocturia. As shown, it did not affect total sleep time, which means that patients with severe BPE did not sleep less than others in our survey. However, they had longer WASO and they compensated by staying in bed more with a longer total sleep period. Staying in bed is not recommended for insomniacs since it decreases sleep homeostatic power and may increase insomnia. It is possible that in these elderly subjects, staying in bed too much at night may decrease the quality of their sleep, driving them to be more sensitive to prostatic pressure, which may prompt them to go to the bathroom more often.

Interestingly, our study also allows us to better understand how sleep is disturbed and leads to insomnia in

**Table 4** Characteristics of LUTS/BPE and sleep efficiency

SEI (%)	Number of episodes of nocturia				p Value
	2 (n=619)	3 (n=929)	4 (n=289)	≥5 (n=75)	
Mean ± SD	79.0±12.3	75.4±12.2	72.8±13.8	69.2±14.4	<0.001
95% CI	78.0 to 80.0	74.6 to 76.2	71.3 to 74.4	65.9 to 72.4	
24 h diuresis					
SEI (%)	≤1500 ml (n=619)		>1500 ml (n=619)		p Value
Mean ± SD	74.9±14.0		76.6±11.8		
95% CI	73.8 to 76.1		75.4 to 77.8		
SEI (%)	Severity of LUTS/BPE (I-PSS—classes of global score S)			p Value	
	Mild (n=116)	Moderate (n=1309)	Severe (n=453)		
Mean ± SD	80.7±10.6	76.3±12.7	74.2±12.1	<0.001	
95% CI	78.8 to 82.6	75.6 to 77.0	73.1 to 75.3		

BPE, benign prostatic hyperplasia; I-PSS, International Symptom Score Prostate; LUTS, lower urinary tract symptoms; SEI, sleep efficiency index.

LUTS/BPE patients. In several previous studies,<sup>28 29</sup> it was assessed that nocturia was strongly associated with insomnia. However, insomnia was just defined by a complaint of poor sleep with or without daytime consequences.

In more recent consensus or review papers, the impact of nocturia on sleep was mainly focused on QoL scales. However, it has been shown that insomnia has a significant impact on QoL,<sup>30–32</sup> it seems difficult to think that the disturbed QoL in LUTS/BPE patients with poor sleep may be only associated with the disturbed sleep and not with other possible factors due to BPE such as pain, anxiety or depression.

In our study, we obtained additional interesting data to better understand insomnia in these patients.

- ▶ First, difficulty initiating sleep affected 21.4% of them versus 48.9% affected by nocturnal awakenings, 42.5% had both. This has not been previously described in other papers as difficulty initiating sleep does not fit with nocturia. We may hypothesise that nocturia may disturb sleep events at the beginning of the night with patients going to the toilet just after going to sleep to avoid future awakenings at night. Difficulty initiating sleep may also be associated with many other causes such as anxiety, environment or pain.
- ▶ Second, the patients in our group were not severely sleep deprived. Some authors have suggested that LUTS/BPE subjects may be severely sleep deprived and have associated risks due to sleepiness or fatigue.<sup>24 28</sup>

Our study shows that the number of nocturia episodes did not affect total sleep time (figure 2); patients with frequent awakenings related to nocturia episodes spent more time in bed (TSP) to reach comparable effective sleep duration TST, with a significant increased WASO and decreased SEI. By being disruptive to sleep, the nocturia episodes affected sleep efficiency and quality, with no reduction of the quantity of sleep, which is within the limits of normal for this age group.<sup>27</sup> Similarly, the urine volume per day has no impact on TST.

We, however, showed that the number of nocturia episodes was associated with an increased sleepiness assessed by the ESS. The ESS score was above 10 for 24.5% of men with two nocturia versus 36.8% of those with more than five episodes (and an ESS score above 16 for 0.5 vs 4.8%  $p<0.001$ ). Considering that total sleep time is not reduced in those patients, we may hypothesise that the quality of sleep is insufficient, which may explain excessive sleepiness during the day. The urge to void the bladder probably acts like other sleep disorders (sleep apnoea or RLS), resulting in sleep fragmentation and increased sleepiness the day after. We are aware that to confirm this hypothesis, polysomnography studies are needed as it is not possible to ascertain that the sleep quality of these patients is disturbed using subjective tools only. Moreover, we have made only one sleep assessment on the night before

clinician's visit. However, questionnaires are well accepted in the field as they have shown their consistency over time and across countries.

We also recognised several other limitations in this study. First, our study is a cross-sectional and observational study made in a group of patients who have sleep complaints and LUTS/BPE. It would have been more convincing to compare them to a similar group of older people with no LUTS/BPE. However, our study focused on the frequency of insomnia and on the correlates between LUTS/BPE and insomnia. The design of our study allowed us to answer more precisely to this second point.

It has been suggested that the frequency of nocturnal voids and the time the episodes occur may affect sleep quality. Deep, slow wave restorative sleep occurs during the first hours of the night, while in the second part, the lighter and less restorative sleep predominates. Such a decrease in deep sleep mainly contributes to daytime fatigue. Based on this, the concept of hours of undisturbed sleep was developed and broadly acknowledged as a potentially important parameter in assessing sleep disturbance due to nocturnal voids.<sup>4 24 33</sup> Hours of undisturbed sleep was defined as the time from falling asleep to first waking to void, the limit considered as normal being 3–4 h. During this survey, the occurrence time of the first nocturnal void was not determined according to the time the patients fell asleep. Nevertheless, as assessed by the I-PSS item-2, 47.9% of the patients with chronic insomnia experienced the need to void <2 h after a miction in at least 1 of 2 cases compared with 28.9% and 26.7% of the patients, respectively, with or without sleep disorders ( $p<0.001$ ). This could signify that patients with more severe sleep disorders were more likely to need to wake up to void during the first part of the night.

The results obtained in this French multicenter observational survey, conducted in routine practice in 2197 men with LUTS/BPE with associated sleep disorders for 1576 patients, showed that the most prevalent sleep disorder was chronic insomnia, mainly characterised by sleep disruption. The number of nocturia episodes appears to be the major driver of insomnia and subsequent decrease in daytime alertness.<sup>1 33 34</sup> Thus, in patients consulting mainly their GP for LUTS, it is recommended to look for possible related sleep disorders and inversely. Tools such as the simplified SQHD—HD-43 that allows to determine the accurate type of sleep disorders and other possibly associated primary sleep disorders, as well as a patient's sleep log, I-PSS, ESS self-administered questionnaires that provide sensitive and reliable quantitative measurements for assessing the sleep disorders and their impact on the QoL—are easy to use in routine practice.

**Contributors** (1) EC-K, DL and DC made substantial contributions to conception and design. EC-K, DL, DC and FH contributed to the acquisition of data. MO and DL contributed to the analysis and interpretation of data; (2) all the authors have participated in the drafting of the article and critical revisions

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for important intellectual content and (3) all the authors have approved the final version of the submitted manuscript.

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## Prostatic hyperplasia is highly associated with nocturia and excessive sleepiness: a cross-sectional study

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