632

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A DIFFERENT WAY TO STUDY FREQUENCY VOLUME CHARTS IN PATIENTS WITH NOCTURIA

Hypothesis / aims of study
Nocturia results from a mismatch between bladder capacity and urine production, which is determined with a frequency volume charts (FVC). The aim of this study was to describe variations in nocturia severity and its associated factors.

Study design, materials and methods
This was a post-hoc analysis of patients who all completed a 72h-FVC in previous prospective, observational studies. The nocturnal polyuria index (NPi) was defined as the ratio of nocturnal on 24h urine output. Subgroups were defined according to the variation in nocturia frequency during the three 24h-periods of the FVC (fluctuating/ continuous) and to the number of nocturia episodes during a single night (0/1/≥2).

Results
We analyzed 504 24h-FVC, collected by 168 subjects (58% female) with a median age of 60 (50-68) years.

All significant parameters on univariate analysis were included in a multivariate logistic regression model to predict for the occurrence of nocturia ≥2 during during a given night. Body mass index (OR 1.076; p=0.020), daytime fluid intake (OR 1.002; p<0.001), maximum voided volume (OR 0.992; p<0.001) and NPi (OR 1.119; p<0.001) remained significant predictors for the presence of at least two nocturnal voids during a given night.

Nocturia frequency fluctuated in 69 (41%) subjects. Table 1 shows that for the same number of nocturnal voids, we found no differences in NPi and maximum voided volume (MVV) between continuous and fluctuating nocturia frequency. Increasing numbers of nocturnal voids were associated with an increasing NPi in subjects with fluctuating nocturia, while for continuous nocturia, it was linked to an increase in NPi and a decrease in MVV. For both subjects with fluctuating and continuous nocturia, increasing nocturia severity was associated with increasing daytime fluid intake.

Interpretation of results
These results suggest that subjects with fluctuating nocturia frequency may benefit from treatments that target nocturnal urine output in order to avoid nights with high numbers of nocturnal voids. Previous studies demonstrated that this can be obtained by conservative measures, such as fluid restriction during the evening and leg elevation during daytime, and by pharmaceutical treatments.(1,2) However, our study showed that rather an increased daytime fluid intake than an increase in evening fluid intake was linked to increasing nocturia severity, which suggests that rather a reduction in daytime fluid intake may avoid high nocturia severity. Such a measure will not encourage patients to maintain a normal bladder capacity and may increase urine concentration, leading to bladder irritation and an increased incidence of LUTS and urinary tract infections. Therefore, an adequate fluid intake is recommended and defined as 25 to 30ml fluid per kg bodyweight per day in order to empty the bladder every 3 to 4 hours. (3) If daytime fluid intake would be restricted, this may even lead to the development of continuous nocturia, as this was linked to both an increased NPi and decreasing maximum voided volumes. Consequently, this is an argument to target both nocturnal urine production and bladder capacity in order to obtain a normal urine production during nighttime and acceptable bladder capacity in all patients with nocturia, regardless of whether it is a fluctuating symptom or not. This highlights the need to perform a comprehensive diagnostic assessment using a FVC in all nocturia patients since this allows clinicians to objectify if there is an increased nocturnal urine production, whether or not combined with a decreased bladder capacity, which allows to initiate a treatment adapted to the underlying cause of nocturia.

Concluding message
For the same number of nocturnal voids, bladder capacity and nocturnal urine production were similar between patients with continuous and fluctuating nocturia. An increasing number of nocturnal voids in subjects with fluctuating nocturia was linked to more nocturnal urine production and more daytime fluid intake.

References
1. Park HK, Kim HG (2013) Current evaluation and treatment of nocturia. Korean J Urol 54 (8):492-498.
2. Yazici CM, Kurt O (2015) Combination therapies for the management of nocturia and its comorbidities. Res Rep Urol 7:57-63.
3. Lukacz ES, Sampselle C, Gray M, Macdiarmid S, Rosenberg M, Ellsworth P, Palmer MH (2011) A healthy bladder: a consensus statement. Int J Clin Pract 65 (10):1026-1036.

Disclosures
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Table 1: General characteristics, underlying causes of nocturia and fluid intake according to the number of nocturia episodes during a single night in subjects with continuous or fluctuating nocturia frequency

	Nocturia = 0 n = 80			Nocturia = 1 n = 133			Nocturia ≥2 n = 191			p-value° between continuous n = 99	p-value° between fluctuating n = 69
	continuous	fluctuating	p-value*	continuous	fluctuating	p-value*	continuous	fluctuating	p-value*		
Number of 24h registrations	123	57		45	88		129	62		297	207
Age (years)	49 (31-61)	63 (53-69)	**<0.001**	61 (48-68)	60 (53-69)	0.515	67 (55-69)	52 (52-69)	0.129	**<0.001**	0.942
Gender, M/F (% female)	57/66 (54)	14/43 (75)	**0.006**	12/34 (74)	37/50 (58)	0.088	66/63 (49)	27/35 (57)	0.356	**0.012**	**0.049**
Body mass index (kg/m²)	24 (22-25)	24 (22-26)	0.838	25 (23-27)	24 (22-26)	0.092	25 (23-27)	25 (22-27)	0.519	**0.011**	0.304
Mean voided volume (ml)	286 (198-400)	225 (169-301)	**0.006**	260 (218-311)	209 (159-280)	**0.037**	178 (146-225)	179 (140-271)	0.288	**<0.001**	0.152
Maximum voided volume (ml)	450 (320-640)	400 (300-575)	0.195	428 (340-505)	400 (300-520)	0.604	350 (280-410)	320 (348-500)	0.939	**<0.001**	0.067
Nocturnal polyuria index (%)	25 (18-33)	26 (18-32)	0.857	28 (21-40)	31 (25-38)	0.304	41 (33-50)	38 (28-46)	0.099	**<0.001**	**<0.001**
Nocturnal urine output (ml/h)	46 (33-67)	36 (27-62)	**0.035**	76 (49-98)	65 (44-102)	0.555	103 (72-135)	82 (50-113)	**0.008**	**<0.001**	**<0.001**
Nocturnal polyuria[++], n (%)	22 (18)	10 (18)	1.000	15 (33)	36 (41)	0.354	94 (73)	37 (60)	0.070	**<0.001**	**<0.001**
Reduced functional bladder capacity[+], n (%)	15 (12)	11 (19)	0.255	6 (13)	19 (22)	0.251	26 (20)	20 (32)	0.073	0.209	0.220
Global polyuria, n (%)	20 (16)	6 (11)	0.368	13 (28)	13 (15)	0.106	30 (23)	12 (19)	0.581	0.171	0.422
Daytime fluid intake (ml)	1150 (915-1403)	1200 (760-1465)	0.674	1363 (1063-1713)	1325 (1075-1670)	0.816	1500 (1075-1800)	1300 (950-1650)	0.052	**<0.001**	**0.049**
Evening fluid intake (ml)	500 (350-785)	450 (300-675)	0.292	525 (328-800)	450 (300-640)	0.177	500 (300-760)	400 (250-580)	0.064	0.953	0.553

Data are presented as median (interquartile range) unless indicated otherwise

[+] maximum voided volume <250ml

[++] nocturnal polyuria index >33%, exclusion of global polyuria

* Fisher's exact-test (categorical variables) or Mann-Whitney U (continuous variables)

° Kruskall-Wallis test