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PATIENTS WITH NOCTURNAL POLYURIA PRESENTED A DIFFERENT NIGHT-TIME AND DAY-TIME BLADDER CAPACITY: IMPLICATION FOR NOCTURIA

Hypothesis / aims of study
Based on a comprehensive diagnostic approach, which involves anamnesis and frequency volume chart (FVC), aim of our study was to subtype patients with nocturia according to daily variations in the urine production and in the bladder capacity.

Study design, materials and methods
From 2015 onwards, a consecutive series of patients with almost one episode of nocturia par day, both gender, aged between 18 and 85 years, were enrolled into a prospective database. For each patient a detailed medical history, body mass index (BMI), sonographic assessment of Post Void Residual urine volume (PVR) and a 3 days-FVC were collected. Patients with a PVR > 50 ml were excluded from the study. Based on 3 days-FVC, frequency (24 hours, day-time, night-time), mean/minimum/maximum bladder capacity (24 hours, day-time, night-time), total voided volume (24 hours, day-time, night-time), Nocturia index (Ni) and Nocturnal Polyuria index (NPi) were assessed. Nocturnal Polyuria (NP) was defined as a Nocturnal Polyuria index (NPi) > 20% in patients ≤ 35 years; > 33% in patients > 65 years; >20% + 2% every 5 years in patients between 35 and 65 years of age. Mean/minimum/maximum bladder capacities were calculated by adding mean PVR to the micturition volume obtained through FVC. Reduced bladder capacity was defined as a mean 24 hours bladder capacity < 200 ml. Severe nocturia was defined as 3 o more episodes per night. Patients were categorised in 4 subgroups according the presence/absence of NP and reduced bladder capacity. Multivariate logistic regression analysis was used to determine covariates associated with NP and reduced bladder capacity.

Results
84 patients were enrolled with a mean age of 62.6±13.5 years. 50/84 patients (59.5%) suffered from NP, and 50/84 patients (59.5%) had decreased bladder capacity. No gender difference in the incidence of NP and reduced bladder capacity were found. Patients with a reduced bladder capacity and NP presented a significant larger mean bladder capacity (p = 0.002) at night-time when compared to day-time and the highest number of nocturia episodes (3.2±1.6); patients with a normal bladder capacity and with NP presented a significant larger mean and maximum bladder capacity at night-time (p = 0.033 and p = 0.016, respectively) when compared to day-time (Table 1). In patients with reduced bladder capacity and without NP no significant variations in bladder capacity was observed between day-time and night-time (Table 1). On multivariate analysis BMI (OR: 1.283 per unit, 95%CI: 1.043-1.579; p = 0.019) and severe nocturia (6.256, 95%CI: 1.707-22.922, p = 0.006) were independent predictive factors for NP, while only severe nocturia (3.773, 95%CI: 1.203-11.833, p = 0.023) was an independent predictive factor for a reduced bladder capacity.

Interpretation of results
The mismatch between bladder capacity and NVV has a key role in the pathophysiology of the nocturia and nocturnal polyuria (NP). Patients with NP presented a different bladder capacity between day-time and night-time. Severe nocturia (3 or more episodes per night) predicts the presence of NP and a reduced bladder capacity. Our data suggest that in patients with severe nocturia both conditions should be considered and managed although further studies should better define the pathophysiology behind our observations.

Concluding message
Table 1: Variations in mean/maximum bladder capacity in different patients' subgroups

	Mean bladder capacity (day-time) (mL)	Mean bladder capacity (night-time) (mL)	p	Maximum bladder capacity (day-time) (mL)	Maximum bladder capacity (night-time) (mL)	p	Mean Nocturia Episodes	Nocturnal voided volume (NVV) (mL)
Patients with reduced bladder capacity and with NP (31/84; 37% pts)	124.2±63.6 (122; 80/142)	149.9±73.5 (135; 96/184)	0.027	227.5±85.9 (204; 170/280)	239.7±97.7 (230; 155.0/300)	0.289	3.2±1.6 (3.0; 2.0/4.0)	503.9±271.3 (430; 340/550)
Patients with reduced bladder capacity and without NP (19/84; 22.5%)	153.8±33.5 (150; 126/190)	178.8±88.2 (160; 105./277)	0.647	257.8±71.1 (240; 200/300)	259.5±121(200; 200/300)	0.669	1.8±1.3 (2.0; 1.0/3.3)	328.2±122.6 (300; 277/405)
Patients with normal bladder capacity and with NP (19/84; 22.5%)	243.1±76.3 (240; 172/275)	294.11±107.3 (311; 260/345)	0.033	346.0±71.1 (240; 200/300)	419.2±194. (400; 295/500)	0.016	2.0±0.9 (2.3; 1.0/3.0)	745.1±234.4 (766; 563/860)
Patients with normal capacity and without NP (15/84; 18%)	239.2±68.7 (210; 201/260)	261.2±160.2 (215; 176/290)	0.733	333.0±106(300; 270/400)	348.7±208(280; 210/400)	0.972	1.4±1.0 (2.0; 1/2.3)	522.4±171.8 (501; 380/640)

Data are expressed as mean ± standard deviation (SD) (median; IQR 25/75);

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