

VOIDING FREQUENCY IN AMERICAN MEN: WHAT IS NORMAL?

Aims of Study

The symptom of urinary frequency is usually defined as voiding eight or more times in a 24-hour period. Increased urinary frequency has been shown to interfere with the activities of daily living and to disturb sleep. "Normal" voiding frequency in adult males has usually been determined by questionnaires, which are prone to recall bias. There is little published normative data concerning the urinary habits of asymptomatic American men. With this background, we conducted a study of the voiding frequency of asymptomatic American men. For a racially diverse sample of American men without lower urinary tract symptoms, we aimed to determine normal ranges for the following micturition parameters: (1) total voids per 24-hour period, (2) number of daytime and night time voids, (3) 24-hour fluid intake, (4) largest voided volume, (5) mean voided volume, (6) voids per liter fluid intake and (7) daytime and night time diuresis rates (mL/min).

Methods

We asked American men without lower urinary tract symptoms to complete a 24-hour log of fluid intake and volumes voided. Men were excluded from participation if they had urinary incontinence, were bothered by frequent urination, had voiding difficulty, prior surgery for urinary incontinence, urinary retention or prostate problems, a history of urolithiasis, neurological disorder or pelvic pain, had current or recent penile discharge, urinary tract infection or sexually transmitted disease, were taking medications to control their bladder, or were working the nightshift. Diary variables included total urinary frequency, total fluid intake, voids per liter intake, total voided urine volume, maximum and mean voided volumes, and daytime and night time diuresis rates. We used multivariate linear regression and logistic regression to analyze voiding diary data according to patient characteristics including race, age and body mass index (BMI), with results considered significant at the 5% level.

Results

Two hundred eighty-one asymptomatic males returned interpretable 24-hour diaries. Mean age was 34 years (range 18-66). Mean BMI was 26 (range 19-43). Subjects were 160 (57%) Caucasian, 93 (33%) African American, 15 (5%) Asian and 13 (5%) Hispanic. Forty-four (28%) patients recorded at least one nocturic episode.

Diary variable	Mean +/- st. dev (range) (n=281 except where noted)
Total voids / 24 hours	7 +/- 2.5 (2-21)
Mean voided volume (mL)	262 +/- 118 (58-980)
Maximum voided volume (mL)	429 +/- 219 (90-1550)
Total fluid intake (mL)	2742 +/- 1283 (500-10,520)
Voids per liter intake	3 +/- 1.4 (0.6-10.0)
Daytime voids	7 +/- 2.3 (2-19)
Daytime diuresis rate (mL/min) N=249	1.3 +/- 0.8 (0.2-6.5)
Nighttime voids	0.3 +/- 0.6 (0-3)
Nighttime diuresis rate (mL/min) N=174	1 +/- 0.6 (0.1-4.0)

24-hour urinary frequency was related to total urine volume (beta = 1, p<0.001), total fluid intake (beta =0.3, p<0.001) and inversely related to mean voided volume (beta =-0.8, p<0.001) but was independent of subject age, race and BMI. Logistic regression demonstrated that nocturnal diuresis rate was directly related to reports of nocturia (B=2.6, p=0.001) while Caucasian race and higher mean voided volume (B = -0.01, p=0.001) meant subjects were less likely to report any nocturic episode. Age was not found to predict

independently predict a report of nocturia. Mean voided volume fell with aging (beta = -0.07, p=0.03).

Conclusions

This preliminary study documents the urinary habits of 281 asymptomatic American adult males. The results suggest that the use of a cutoff of 8 to define abnormal urinary frequency may not be correct for all American men. Further, since urinary diary variables depend on patient characteristics including age and race, it is probably incorrect to apply a single set of normative values to all men in North America because of the significant variability in regional climates and populations. Our results may be useful in counseling of men with lower urinary tract symptoms, and in the design of research trials concerning therapy for lower urinary tract symptoms. We were unable to fully explore the effects of aging on normal urinary habits because we recruited relatively few older men to this study.