

THE INCIDENCE AND PREVALENCE OF NOCTURIA (INCREASED NOCTURNAL VOIDING FREQUENCY): RESULTS FROM A COMMUNITY BASED COHORT STUDY IN OLDER MEN

Hypothesis / aims of study

Although prevalence data on increased nocturnal voiding frequency (N) have been reported, the incidence of nocturia in the community is unknown. Community based data derived from frequency-volume (FV) charts are needed to accurately determine the incidence of this bothersome symptom. We determined age specific incidence rates of nocturia in older men.

Study design, materials and methods

The data were obtained as part of a community-based cohort study, as previously described [1]. Men aged 50-78 yrs, residing in a commuter town were invited to participate. In the baseline part of the study, data on 1688 participants (50% response) were collected via a questionnaire, during a visit to a health center and a urology outpatient clinic. All men provided written informed consent. If no exclusion criteria were met, men were found eligible for re-invitation for 3 follow-up rounds. These rounds were performed at 2.1, 4.2, and 6.5 years (mean), and included the questionnaire and the urology outpatient visit.

In each round, the participants completed a 3-day FV-chart. The time of arising and bedtime were noted. Since nocturia is defined as getting out of bed to void, nocturnal urinary frequency was determined from bedtime to time of rising. This method is more accurate than using fixed sleeping times because this would lead to significant misclassification of nocturnal voiding frequency. A minimum of 4 sleeping hours was defined as adequately entered. Nocturnal frequency was estimated as the mean of two nights (when available) or the frequency of one night, to allow analyses of as many participants as possible. The percentage of men with a nocturnal voiding frequency of 2 or more (N \geq 2) and 3 or more (N \geq 3), respectively, was determined for 5-year age strata. Prevalences were estimated for each round, separately.

Firstly, all men without N \geq 2 (meaning all men with none or one nocturnal voiding only) at baseline were selected. Second, all men without N \geq 3 (i.e. all men with, none, one or two voids) at baseline were selected. The incidence of N \geq 2, respectively N \geq 3, was estimated as a cumulative incidence. This means that when a man had N \geq 2 or N \geq 3 in the first follow-up round, he was considered to have N \geq 2 or N \geq 3 in the subsequent round. Patients not participating in the subsequent rounds, or when no information was available on the time of rising and bedtime, were censored. With this assumption, the possibility of normalization of nocturnal frequency is ignored. The number of men available for analysis with adequate data in the final round was too small to perform adequate statistical analyses (mainly because time of rising and bedtime were missing). Therefore, for the epidemiology of nocturia, we present data from baseline and first (2.1-yr) and second (4.2-yr) follow-up round.

Results

At baseline 1597 men (95% of responders) completed the 3-day FV-chart. Because of missing data on time of rising and bedtime, nocturnal voiding frequency (N) could be estimated in 1201 men (75% of the completed charts). The prevalences of men with N \geq 3 are presented in Table 1 (prevalence of N \geq 2 not shown). The prevalence of N \geq 2 and N \geq 3 significantly increases over time for all age groups. The association with age was clear in all rounds, showing a higher prevalence of N \geq 2 and N \geq 3 with advancing age. Incidence data were based on 794 men without N \geq 2 and 1023 men without N \geq 3 at baseline, respectively. A clear increase of the incidence over time was shown for N \geq 2 and N \geq 3 (Table 2; incidence of N \geq 2 not shown). Incidence rates appeared to be slightly higher than the prevalence rates, for most age groups.

Interpretation of results

The prevalence of nocturia increases with age in a cross-sectional view at baseline; e.g. 2.8% of the men between 50-54 yrs, but 12.5% of the men between 65-69 yrs have N \geq 3. Furthermore, longitudinally, during the 4.2-year follow-up, the prevalence of nocturia per 5-year age stratum more than doubles for N \geq 3 [2.1-3.5 times] in men between 50 and 70 years at baseline. The prevalence of N \geq 2 increases less dramatically [1.4-2.0 times]. This increase is mainly due to increasing age of the baseline age strata (on average 4.2 yrs).

The crude cumulative incidence (CCI) rate of N \geq 2 and N \geq 3, increases with age at the different follow-up points. The CCI also clearly increases with increasing follow-up time. However, the way that the CCI rate is calculated, ignores the possibility of normalisation of nocturnal frequency (i.e. men having N \geq 2 or N \geq 3 in the first follow-up, but not in the second follow-up). Therefore, the CCI rates probably are an overestimation of the true incidence. Normalisation of nocturnal frequency can theoretically occur spontaneously, but also as a result of treatment (e.g. for cardiovascular disease or for LUTS). Subsequent analyses linking the incidence information with info from the charts/files of the general practitioners and pharmacy, will resolve this problem. Theoretically, assuming that the incidence rate per year of follow-up is relatively constant for a certain age stratum, at least when follow-up duration is limited to a few years, one would expect the CCI to approximately double when a follow-up duration of 4.2 years is compared with 2.1 years; for men below 65 at baseline the increase is somewhat higher than this and for men over 65, unexpectedly, this is somewhat lower. Most probably this has to do with the effects of loss to follow-up that are more outspoken in the older age categories; this probably introduces a selection bias.

Concluding message

The true 4.2-yr incidence rate of N \geq 3 for the 50-54 yr baseline age stratum is between 5.4-9.1% and increases for the older age strata; e.g. the 4.2-year incidence (CCI) in men between 60 and 64 is between 13.2-17.2% and men 65-69 yrs of age have a 4.2-yr CCI of about 25%. Our descriptive data constitute the basis for analytic epidemiologic explorations of the data base. Future analyses will identify the most important determinants of incident nocturia. Knowledge of these determinants will help to make well-informed treatment choices for patients with bothersome nocturia.

Table 1. Prevalence of nocturia 3 times or more

Baseline age strata	Baseline		2.1-year follow up		4.2-year follow up	
	Prevalence (n= 1201)	(95% C.I.)	Prevalence (n=929)	(95% C.I.)	Prevalence (n= 409)	(95% C.I.)
50-54 yrs	2,8%	(0,6-5,0)	3,7%	(0,7-6,1)	7,7%	(1,0-14,4)
55-59 yrs	4,2%	(1,9-6,4)	5,1%	(2,3-7,9)	14,8%	(8,2-21,4)
60-64 yrs	7,9%	(4,8-11,1)	9,9%	(6,1-13,7)	17,1%	(10,0-24,2)
65-69 yrs	12,5%	(8,2-16,7)	18,5%	(12,8-24,3)	26,3%	(16,4-36,1)
70-78 yrs	17,0%	(11,0-23,0)	27,7%	(18,5-36,9)	28,9%	(13,8-44,1)

Table 2. Incidence of nocturia 3 times or more

baseline age strata	2.1-year follow up		4.2-year follow up	
	Crude cumulative incidence (n= 598)	(95% C.I.)	Crude cumulative incidence (n = 234)	(95% C.I.)
50-54 yrs	2,7%	(0,4-5,8)	9,1%	(0,0-19,4)
55-59 yrs	4,1%	(1,1-7,2)	16,2%	(7,6-24,8)
60-64 yrs	6,6%	(2,6-10,6)	17,2%	(8,0-26,7)
65-69 yrs	13,4%	(7,0-19,8)	24,4%	(10,7-38,1)
70-78 yrs	20,0%	(9,1-30,9)	36,4%	(14,5-58,2)

C.I. : confidence interval

References

1. Blanker MH, Groeneveld MP, Strong effects of definition and nonresponse bias on prevalence rates of clinical benign prostatic hyperplasia: the Krimpen study of male urogenital tract problems and general health status. BJU Int 85: 665-671, 2000

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Was informed consent obtained from the patients?	Yes