

Authors: A Rembratt, JP Norgaard, K-E Andersson
Institution: Dept. of Clinical Pharmacology, University of Lund
Title: NOCTURNAL POLYURIA: AN INESCAPABLE CONSEQUENCE OF AGING?

Aims of the study:

During the last years the interest and scientific activity in nocturia and nocturnal polyuria has increased. Several epidemiological trials have found that the prevalence of nocturia increases markedly with age. Nocturnal polyuria can be a component of nocturia. Nocturnal diuresis is known also to increase with age. In recent trials relative [1-2], absolute [3] and functional [4] definitions of nocturnal polyuria have been used to categorise patients and for selection of patients for antidiuretic and diuretic treatment. The aim of this analysis was to investigate the basis for these definitions using frequency-volume charts from community-dwelling elderly.

Methods:

Subjects reporting less than one void per night (non-nocturics) or ≥ 2 voids per night (nocturics) in a questionnaire survey on nocturia were asked to fill out a 3-day frequency-volume chart including time and volume of each void, bedtime and wake-up time. All subjects who had verified ≤ 1 void/night or ≥ 2 voids/night were analysed for the parameters 'proportion of 24-hour urine produced during night', 'rate of nocturnal diuresis in ml/min' and 'ratio between nocturnal urine volume and maximum functional bladder capacity'. Also, the subgroup of non-nocturics reporting zero nocturnal voids was analysed for the same parameters. The proportion of subjects with nocturnal polyuria, as defined by 'proportion of 24-hour urine produced during night' $>33\%$ [1-2], or 'rate of nocturnal diuresis' ≥ 0.9 ml/min [3] or 'nocturnal urine volume exceeding functional bladder capacity' (ratio >1) [4], was calculated. Nocturnal urine volume was defined as urine voided between midnight and 8 a.m. for 'proportion of 24-hour urine produced during night' [1-2] and as urine voided after bedtime and within 30 minutes of wake-up time for the two remaining parameters.

Results:

In the nocturic group 117 subjects (82 men and 35 women) submitted diaries that qualified for analysis (verified ≥ 2 voids per night) with a median of 2.3 and a range of 2.0-6.0 voids per night. Diurnal data was missing in 8 subjects, who were excluded from the calculation of 'proportion of 24-hour urine produced during night'. In the non-nocturic group 109 subjects (58 men and 51 women) submitted diaries that qualified for analysis (verified ≤ 1 void per night). Diurnal data was missing in 5 subjects. During the entire 3-day registration period 29 subjects (27%; 18 men and 11 women) had 0 nocturnal voids, 2 subjects lacked diurnal data. Among the nocturics, mean (\pm SD) 'proportion of 24-h urine produced during night' was $42\pm 11\%$, mean 'nocturnal diuresis' was 1.4 ± 0.5 ml/min and mean 'ratio between nocturnal urine volume and maximum functional bladder capacity' was 2.2 ± 0.6 . In the non-nocturic group, mean 'proportion of 24-h urine produced during night' was $29\pm 9\%$, mean 'nocturnal diuresis' was 0.9 ± 0.3 ml/min and mean 'ratio between nocturnal urine volume and maximum functional bladder capacity' was 1.0 ± 0.2 . In the subgroup of non-nocturics that reported zero nocturnal voids, the mean 'proportion of 24-h urine produced during night' was $26\pm 11\%$, mean 'nocturnal diuresis' was 0.8 ± 0.4 ml/min and mean 'ratio between nocturnal urine volume and maximum functional bladder capacity' was 0.8 ± 0.1 .

Table 1: Percentage of subjects with nocturnal polyuria, showing that a significant number of non-nocturics are classified as polyuric.

	Nocturics	Non-nocturics	Subgroup 0 noct.voids
Proportion of 24-h urine produced at night >33%	85 (78 %)	28 (27 %)	5 (19 %)
Rate of nocturnal diuresis \geq 0.9 ml/min	99 (85 %)	40 (37 %)	7 (24 %)
Noct.urine volume/functional bladder capacity >1	117 (100 %)	42 (39 %)	- [*]

^{*} Per definition

In the nocturic group all subjects had nocturnal urine volume exceeding maximum functional bladder capacity. Also, all subjects had nocturnal polyuria according to at least one additional definition and 91 (83%) qualified as polyuric according to all three definitions. In the non-nocturic group, 70 (67%) had nocturnal polyuria according to at least one definition, 30 (29%) were classified as having nocturnal polyuria in two categories and 7 (7%) qualified as polyuric according to all three definitions.

Discussion:

According to the currently used definitions of nocturnal polyuria the majority of nocturics have nocturnal polyuria regardless of definition. Also a rather large proportion of elderly without nocturia classify as having nocturnal polyuria. Different definitions used for nocturnal polyuria select different subjects as being polyuric. This should be considered when discussing selection for clinical trials, outcome parameters and definitions of normality in the elderly.

References:

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