

A Cutoff Value Based on Analysis of a Reference Population Decreases Overestimation of the Prevalence of Nocturnal Polyuria

Ernst P. van Haarst* and J. L. H. Ruud Bosch†

From the Departments of Urology, Sint Lucas Andreas Ziekenhuis, Amsterdam and University Medical Centre Utrecht (JLHRB), Utrecht, The Netherlands

Purpose: We sought criteria for nocturnal polyuria in asymptomatic, nonurological adults of all ages by reporting reference values of the ratio of daytime and nighttime urine volumes, and finding nocturia predictors.

Materials and Methods: Data from a database of frequency-volume charts from a reference population of 894 nonurological, asymptomatic volunteers of all age groups were analyzed. The nocturnal polyuria index and the nocturia index were calculated and factors influencing these values were determined by multivariate analysis.

Results: The nocturnal polyuria index had wide variation but a normal distribution with a mean \pm SD of $30\% \pm 12\%$. The 95th percentile of the values was 53%. Above this cutoff a patient had nocturnal polyuria. This value contrasts with the International Continence Society definition of 33% but agrees with several other reports. On multivariate regression analysis with the nocturnal polyuria index as the dependent variable sleeping time, maximum voided volume and age were the covariates. However, the increase in the nocturnal polyuria index by age was small. Excluding polyuria and nocturia from analysis did not alter the results in a relevant way. The nocturnal voiding frequency depended on sleeping time and maximum voided volume but most of all on the nocturia index.

Conclusions: The prevalence of nocturnal polyuria is overestimated. We suggest a new cutoff value for the nocturnal polyuria index, that is nocturnal polyuria exists when the nocturnal polyuria index exceeds 53%. The nocturia index is the best predictor of nocturia.

Abbreviations and Acronyms

FVC = frequency-volume chart
 ICS = International Continence Society
 NI = nocturia index
 NP = nocturnal polyuria
 NPI = NP index
 NUP = nocturnal urine production

Submitted for publication December 29, 2011.

* Correspondence: Department of Urology, Sint Lucas Andreas Ziekenhuis, Jan Tooropstraat 164, 1064 AE Amsterdam, The Netherlands (telephone: +31-20-5108300; e-mail: e.vanhaarst@slaz.nl).

† Financial interest and/or other relationship with Celon-Olympus and Ferring.

Key Words: urinary bladder, urination, nocturia, reference values, urination

NOCTURIA is one of the most bothersome lower urinary tract symptoms. Several causative categories are recognized, including low maximum nocturnal voided volume, general polyuria and NP, including combinations of these causes in some cases, and sleep disorders. It is assumed that this classification is useful for understanding and treating the problem. The need to treat a patient is determined by the potential physical harm when the problem goes untreated and by the degree of bother that a patient experiences. When assessing pa-

tient status, a key step is to determine a cutoff or a reference value above or below which treatment initiation is appropriate. However, the first issue is which group should serve as the reference group, including those without complaints, those without symptoms, those without nocturia or polyuria, those who are elderly or maybe a combination.

Nocturia evaluation implies the use of FVCs. Several NIs were introduced in 1998 and seem to have gained some acceptance.¹ The NPI is the ratio of

NUP to total 24-hour urine production. The NI is calculated as NUP divided by FBC, where FBC is the largest single void in a typical 24-hour period.

A prerequisite when considering NP is normal 24-hour urine output.^{2,3} The ICS defines general polyuria as a urine output of more than 40 ml/kg of body weight during a 24-hour period. Often definitions of volume only are used, varying from more than 1,800 ml for females and more than 2,200 ml for males⁴ to more than 2,500 ml.^{1,5} Studies of asymptomatic subjects showed that the 95% upper limit of the values was more than 3,000 ml.⁶⁻⁸ With an assumed average body mass of 70 kg the ICS definition advises a cutoff of 2,800 ml.

An accurate, generally accepted definition of NP is a prerequisite for any meaningful discussion of clinical significance.³ In older individuals NP is defined by the ICS as NUP exceeding 33% of total 24-hour urine output but a lower cutoff of 20% is suggested for younger individuals.² Subsequently the nocturia think tank at an International Consultation on Incontinence-Research Society meeting in 2010 noted that no group had assessed the validity of these cutoffs in clinical practice.⁹

We sought criteria for NP in adults of all ages without urological complaints by reporting reference values of the ratio of daytime and nighttime urine volumes.

MATERIALS AND METHODS

Data from a database of 1,152 FVCs were used. An analysis of the frequency and volume data of these FVCs was previously published.⁶ Adult volunteers without a urological complaint or a urological history completed questionnaires and 24-hour FVCs. Volunteers were recruited from hospital staff and families, and patient families. The principles of the Helsinki Declaration were followed. All subjects were instructed not to change fluid intake habits.

Recording started with the first micturition after rising and finished with the first morning micturition the next day. During this period time in hours and minutes, the volume of each void, the time of rising on days 1 and 2, and the time of going to bed were recorded on a standard form. All subjects were provided with a water can capable of measuring 25 ml units. Dates and whether the dates indicated working or leisure days were noted. Day of the week and season were derived from the dates.

Volume and frequency were defined as described by the ICS.² Diurnal urine production was the sum of all voided volumes while the subject was awake and out of bed minus the first voided volume, which was regarded as part of the preceding night. The NUP was calculated from all voided volumes during the night and the subsequent first voided volume the next morning. In those without nocturia the NUP was represented by the first morning void only.

The volume of the first morning void on day 2 was missing for 183 subjects, who were excluded from analysis. For some individuals a large interval occurred be-

tween the last daytime void and bedtime or between rising and the first morning void. We excluded another 75 subjects for whom these intervals exceeded 25% of sleeping time since we assumed that this might have a relevant influence on the NPI.

Subject body weight was not recorded. Thus, we defined general polyuria as a 24-hour urine output of more than 2,800 ml, in accordance with the ICS definition.²

The actual recorded period was calculated as the time difference between the first morning void on days 1 and 2. Since recorded periods of 24 hours are often not exact due to differences in the time of rising and, subsequently, for the first morning void 24-hour and daytime volumes were adjusted to exactly 24 hours. Because the night was completely within this period, nocturnal volumes were not adjusted.

To identify NPI determinant factors we performed multivariate linear regression analysis with the NPI as the dependent variable. Univariate analysis was used to select variables. All relations were tested for linearity. Tested variables were gender, age, sleeping time, date (day of the week, month and season), urine production (24-hour and daytime) and maximum voided volume (24-hour and nighttime). Voiding frequency was not tested as a potential determinant of NPI since it is the result rather than the cause of the ratio of NUP to diurnal urine production. Regression analysis was done with backward exclusion of independent variables and an exclusion cutoff of $p < 0.10$. In the constructed model with each 1 unit increase in an independent variable the NPI increased by the value of the unstandardized coefficient β .

IBM® SPSS Statistics 19.0 was used for data analysis. The Pearson correlation coefficient r was used to test the relation of several parameters with statistical significance considered at $p < 0.05$.

RESULTS

Data from the FVCs of 436 men and 458 women 19 years or older were available for analysis. Table 1 lists patient characteristics. Mean age was 47.7 years for men and 45.5 years for women ($p = 0.04$). Table 2 shows the distribution by 10-year age strata.

In 489 subjects (55%) no nocturia occurred. One, 2 and more than 2 nocturia episodes occurred in 286 (32%), 87 (10%) and 32 subjects (3%), respectively. NPI had a normal distribution (fig. 1). By decade the 95th percentile showed small variations, which increased to 57% in the seventh decade (table 2). An NPI of more than 60% occurred in each decade. Of all subjects 66 had general polyuria, 105 had 2 episodes or more of nocturia and 14 had each condition. After excluding these 185 subjects mean \pm SD NPI was $29\% \pm 10.6\%$. The 95th percentile was 48%.

With all 894 subjects included univariate analysis of FVC parameters revealed a moderate correlation of the NPI with nocturnal voiding frequency ($r = 0.51$). This was considered the result of the NPI rather than a causative factor and was not included on multivariate analysis. The NPI did not correlate

Download English Version:

<https://daneshyari.com/en/article/3862255>

Download Persian Version:

<https://daneshyari.com/article/3862255>

[Daneshyari.com](https://daneshyari.com)