

**NOCTURIA IS ASSOCIATED WITH CHRONIC KIDNEY DISEASE.**Hypothesis / aims of study

Textbooks mention that nocturia is commonly present in patients with early chronic kidney disease (CKD) as the concentrating ability of the kidney becomes impaired, but we were unable to find published studies to support this. Our objectives were to examine the prevalence of nocturia in adult US non-institutionalized population, and to explore the association between nocturia and severity of CKD stage.

Study design, materials and methods

We used data from the Third National Health and Nutrition Examination Survey (NHANES III), a stratified multistage probability sample of the civilian non-institutionalized US population > 30 years of age. As part of that study, information relating to nocturia, hypertension (HTN), type 2 diabetes mellitus (DM), congestive heart failure (CHF) and diuretic use was collected using standardized questionnaires from 17030 adult men and women, and respondents also gave blood samples for measurement of serum creatinine. Respondents indicated how often they usually urinated at night, in response to the question "How many times do you get up during the night to urinate?". For the purposes of this analysis, nocturia was defined as being present if the usual night-time voiding frequency was recorded as 2 or more times nightly. We calculated estimated-GFR (eGFR) using the abbreviated MDRD formula<sup>1</sup>. We divided participants into three groups as according to their eGFR as follows: eGFR 30-59 ml/min/1.73 m<sup>2</sup> and eGFR < 30 ml/min/1.73 m<sup>2</sup>, with eGFR>60 ml/min/1.73 m<sup>2</sup> body surface area as the reference group. We used logistic regression to examine the association between nocturia and CKD stage after adjustment for age, sex, HTN, diuretic use, CHF, body mass index and smoking status.

Results

Nocturia was common, occurring in 17% of males and 22.3% of females. As has been found in all other population-based studies of nocturia, the prevalence of nocturia increased with age, being 42.9% among those aged 70-79 years, compared to 9.9% in those aged 30-39 years. Results of multivariable logistic regression are detailed in Table 1. The prevalence of nocturia among adults with eGFR 30-59 ml/min/1.73 m<sup>2</sup> was 42%, significantly higher than the 19% prevalence among those with eGFR > 60 ml/min/1.73 m<sup>2</sup> (P < 0.0001, OR 2.58, 95% Confidence interval 2.55-2.60 after adjustment for covariates). Weaker associations between nocturia DM II (OR 1.58 (95% CI 1.58-1.59)), diuretic use (OR 1.61 (95% CI 1.60-1.61)) and HTN (OR 1.16 (95% CI 1.15-1.18)) were noted, in each case after adjusting for covariates.

Interpretation of results

At the population level, we found a novel, strong association between the prevalence of nocturia and declining kidney function after controlling for other factors known to affect nocturia prevalence. As the prevalence of CKD continues to rise, clinicians may need to consider CKD in the differential diagnosis of nocturia.

Concluding message

This analysis confirms the clinical impression that nocturia prevalence is increased during early CKD.

Table 1: Results of multivariable logistic regression: Predictors of the presence of nocturia, adjusting for covariates.

Covariate	Odds Ratios (95% confidence intervals)
Age (continuous)	<b>1.05 (1.04, 1.06)</b>
Race/ethnicity	
Black	<b>2.60 (2.59, 2.60)</b>
Hispanic	<b>1.53 (1.53, 1.54)</b>
White	1 (reference)
Gender	
Men	<b>0.75 (0.74, 0.75)</b>
Women	1 (reference)
Body mass index (kg/m <sup>2</sup> )	
<25	1 (reference)
25-29	<b>1.35 (1.34, 1.35)</b>
30+	<b>1.66 (1.66, 1.67)</b>
eGFR	
>60 mL/min/1.73 m <sup>2</sup>	1 (reference)
30-59 mL/min/1.73 m <sup>2</sup>	<b>2.58 (2.55, 2.60)</b>
<30 mL/min/1.73 m <sup>2</sup>	<b>2.14 (2.12, 2.15)</b>
Diuretic use	<b>1.61 (1.60, 1.61)</b>
Type II diabetes	<b>1.58 (1.58, 1.59)</b>
Hypertension	<b>1.16 (1.15, 1.18)</b>
Current smoker	1.01 (1.00, 1.01)

References

1. Am J Kidney Dis 2002;39[2 Suppl 2]:S1-S246.

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<b><i>Is this a clinical trial?</i></b>	<b>No</b>
<b><i>What were the subjects in the study?</i></b>	<b>None</b>