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Association Between Self-Reported Daytime Sleepiness and Declining Glomerular Filtration Rate: A Cross-Sectional Analysis

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Objectives : Sleep duration has been associated with glomerular filtration rate (GFR), and emerging evidence suggests that sleep quality may also influence kidney function. However, assessing sleep quality often requires detailed questionnaires or actigraphy. This study examines the association between self-reported daytime sleepiness and estimated GFR (eGFR).
Methods : We analyzed data from 8,624 adults aged ≥18 years in the NHANES 2017–2020 cycles. Daytime sleepiness was assessed by the question, "In the past month, how often did you feel excessively or overly sleepy during the day?" (0 = never to 4 = almost always). eGFR was calculated using the CKD-EPI equation. Associations between sleepiness and eGFR were examined using univariate and multivariable linear regression, adjusting for demographics (age, sex, race, physical activity), comorbidities (hypertension, diabetes, dyslipidemia, stroke, heart failure, chronic lung diseases, BMI), lab values (urine albumin-creatinine ratio, uric acid, ferritin, hs-CRP, serum albumin), socioeconomic factors (income-to-poverty ratio, marital status, education), and sleep characteristics.
Results : Participants had a mean age of 49.5 ± 18.2 years and mean eGFR of 96.2 ± 22.8 mL/min/1.73 m². In the fully adjusted model (n = 6,001), higher sleepiness scores were associated with lower eGFR. Compared to level 0 (never sleepy), beta coefficients for sleepiness levels 1–4 were -0.52, -1.01, -2.59, and -2.52, respectively, with significant associations at levels 3 and 4 ($p < 0.01$). Ordinal logistic regression showed increased daytime sleepiness was associated with higher CKD stages, with the strongest effect at level 3 (OR: 1.54, 95% CI: 1.25–1.91, $p < 0.001$). Stratified analyses revealed the association was prominent among non-White participants but absent in White individuals.
Conclusions : Daytime sleepiness is independently associated with lower eGFR and higher CKD stage, especially among non-White individuals. A single question on sleepiness may serve as a simple, cost-effective tool to identify individuals at risk for impaired kidney function.

baseline table.jpg

Variable	n	Mean ± SD/ n (%)	In the past month, how often did you feel excessively or overly sleepy during the day?					p-value
			Never (0) 0 time/month	Rarely (1) 1 time/month	Sometimes (2) 2-4 times/month	Often (3) 5-15 times/month	Almost always (4) 16-30 times/month	
Age (years)	8,624	49.49 ± 18.24	52 ± 17	50 ± 18	48 ± 18	48 ± 19	50 ± 19	<0.01
Sex (Male %)	8,624	4257 (49.36%)	799 (53.66%)	1068 (51.72%)	1430 (49.53%)	674 (45.05%)	286 (41.63%)	<0.01
Race (Non-Hispanic White %)	8,624	3056 (35.44%)	354 (23.77%)	678 (32.83%)	1049 (36.34%)	657 (43.92%)	318 (46.29%)	<0.01
eGFR (mL/min/1.73m²)	8,624	96.17 ± 22.84	96.06 ± 21.34	96.11 ± 22.18	96.85 ± 22.86	95.84 ± 24.50	94.48 ± 24.04	0.15
uACR (mg/g)	7797	52.06 ± 363.34	45.10 ± 303.75	47.85 ± 379.23	57.38 ± 437.91	52.74 ± 261.40	55.92 ± 263.59	0.34
Uric acid (mg/dl)	7390	5.42 ± 1.46	5.40 ± 1.40	5.44 ± 1.48	5.45 ± 1.46	5.38 ± 1.49	5.35 ± 1.52	0.47
Family income to poverty ratio	7,373	2.62 ± 1.63	2.58 ± 1.63	2.77 ± 1.67	2.70 ± 1.63	2.50 ± 1.60	2.23 ± 1.53	0.13
Congestive heart failure (Yes %)	8,245	314 (3.81%)	37 (2.57%)	49 (2.46%)	101 (3.68%)	73 (5.16%)	54 (8.17%)	<0.01
Stroke (Yes %)	8,245	419 (5.08%)	57 (3.96%)	77 (3.87%)	121 (4.41%)	102 (7.21%)	62 (9.38%)	<0.01
Sleep duration during weekday (Hours)	8,614	7.62 ± 1.67	7.76 ± 1.62	7.66 ± 1.51	7.65 ± 1.60	7.52 ± 1.82	7.31 ± 2.05	<0.01

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