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Disturbance of circadian rhythm and CKD in Korean Adult population

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Objectives: Disturbances in circadian rhythm are known to cause a number of health problems (psychosis, metabolic syndrome, cancer, etc.), however their contribution to kidney disease is not well understood. Therefore, this study evaluated the association with chronic kidney disease (CKD), sleep disturbance, and shift work in a Korean adult population.

Methods: A total of 32,429 participants who completed the National Health and Nutrition Examination Survey from 2010 to 2018 were assessed for their sleep patterns, shift work, and renal function. CKD was defined by eGFR ≤ 60 mL/min/1.73 m² or urinary albumin-to-creatinine ratio ≥ 30 mg/g.

Results: First, sleep disturbances were assessed according to sleep onset time and total sleep duration. We observed that the early bedtime group (starting sleep before 9pm) had a significantly higher CKD prevalence (OR 2.757, $p < 0.001$) compared to the regular bedtime group (9pm-2am), but inadequate sleep duration (<6hr) had minimal effect on CKD (OR 1.052, $p=0.745$), which suggest that alterations in circadian rhythms due to sleep disturbance are associated with CKD development. In particular, there was a strong association between sleep disturbance and renal dysfunction in patients with comorbidities younger than 65 years of age. Next, work schedules were divided into two types; regular work (day or evening work) and shift work (fixed night shift, 24-hour shift, split-work). The shift-work group also had a higher prevalence of CKD compared to the regular work group (OR 1.32). However, in a multivariate analysis that adjusted for age, sex, BMI, smoking, drinking, diabetes, and hypertension, neither sleep disturbance nor shift work showed an independent association with the occurrence of CKD.

Conclusions: Our results suggest that impaired circadian rhythm may be associated with CKD development and that sleep disturbance can be an important therapeutic target for circadian rhythm.