

Being overweight or obese was associated with a greater risk for end-stage renal disease

Hsu CY, McCulloch CE, Iribarren C, Darbinian J, Go AS. **Body mass index and risk for end-stage renal disease.** *Ann Intern Med.* 2006;144:21-8.

Clinical impact ratings: GIM/FP/GP ★★★★★☆☆ Endocrinology ★★★★★☆☆ Nephrology ★★★★★☆☆

QUESTION

Is being obese or overweight associated with an increased risk for end-stage renal disease (ESRD)?

METHODS

Design: Cohort study.

Setting: A health maintenance organization in northern California, United States.

Patients: 320 252 adults who were ≥ 18 years of age (mean age 38 y, 54% women); participated in screening health checkups between 1964 and 1985; and had ≥ 1 concurrent measurement of height, weight, blood pressure, serum creatinine level, and dipstick urinalysis. Exclusion criterion was baseline serum creatinine level $> 884 \mu\text{mol/L}$ ($> 10 \text{ mg/dL}$).

Risk factors: Being overweight (body mass index [BMI] 25 to 29.9 kg/m^2), obese class I (BMI 30 to 34.9 kg/m^2), obese class II (BMI 35 to 39.9 kg/m^2), or obese class III (BMI $\geq 40 \text{ kg/m}^2$). Results were adjusted for age, sex, race, educational level, smoking status, history of myocardial infarction, serum cholesterol level, urinalysis proteinuria, urinalysis

hematuria, serum creatinine level, presence of diabetes, and baseline blood pressure.

Outcomes: ESRD (receipt of renal transplantation, maintenance hemodialysis, or peritoneal dialysis). The ESRD data collection was blinded to risk factors.

MAIN RESULTS

1471 persons had ESRD and 56 336 persons died during 8 347 955 person-years of follow-up. Being overweight or obese was associated with a higher risk for ESRD relative to having normal weight (Table).

Risk factors for end-stage renal disease

Risk factors*	Adjusted relative risk (95% CI)†
Overweight (BMI 25.0 to 29.9 kg/m^2)	1.7 (1.5 to 2.0)
Obesity class I (BMI 30 to 34.9 kg/m^2)	3.0 (2.5 to 3.5)
Obesity class II (BMI 35.0 to 39.9 kg/m^2)	4.7 (3.8 to 5.8)
Obesity class III (BMI $\geq 40 \text{ kg/m}^2$)	5.0 (3.8 to 6.6)

*Reference is being normal weight (BMI 18.5 to 24.9 kg/m^2).

†Adjusted for age, sex, race, educational level, smoking status, history of myocardial infarction, serum cholesterol level, urinalysis proteinuria, urinalysis hematuria, serum creatinine level, presence of diabetes, and baseline blood pressure.

CONCLUSION

Being overweight or obese was associated with an increased risk for end-stage renal disease in community-dwelling men and women.

Source of funding: National Institutes of Health.

For correspondence: Dr. C.Y. Hsu, University of California, San Francisco, San Francisco, CA, USA. E-mail hsuchi@medicine.ucsf.edu. ■

COMMENTARY

Previous cohort studies have established an association between obesity and progressive renal disease in men (1, 2). In their study, which is the largest to date on this subject, Hsu and colleagues report a strong graded association between BMI and onset of treated ESRD among a large community sample with > 8 million person-years of follow-up. Even the approximately one third of participants who were overweight but not obese (BMI 25 to 29 kg/m^2) had greater risk for ESRD than those of normal weight. This elegant study provides further evidence that risk factors for renal disease frequently overlap with those for cardiovascular disease and adds to the growing list of adverse outcomes associated with obesity.

Although showing a robust association between BMI and treated ESRD, a study of this sort has limited ability to answer the question of whether (and how) obesity "causes" renal disease. The association between BMI and ESRD became weaker after adjustment for diabetes and hypertension at baseline, suggesting that the higher incidence of ESRD in patients in higher BMI categories may be partly mediated by diabetes and hypertension. However, a higher BMI was still associated with a higher incidence of ESRD even after accounting for differences in the prevalence of diabetes and hypertension across BMI categories at baseline.

Several possible explanations exist for this observation. Because the authors used single blood pressure and blood sugar measurements and diabetes self-report to capture hypertension and diabetes, respectively, these analyses may not have fully captured differences in the diagnosis or severity of diabetes or hypertension across BMI categories. Nor did the analyses account for differences across BMI categories in the incidence (and severity) of diabetes and hypertension over time.

Nonetheless, these findings raise the possibility that obesity may be linked to ESRD by alternative pathways. For example, obesity has long been recognized as a risk factor for focal segmental glomerulosclerosis, a relation thought to be mediated by renal hyperfusion and glomerular hyperfiltration.

*Ann M. O'Hare, MD
San Francisco and VA Medical Center San Francisco
San Francisco, California, USA*

References

1. Iseki K, Ikemiya Y, Kinjo K, et al. Body mass index and the risk of development of end-stage renal disease in a screened cohort. *Kidney Int.* 2004;65:1870-6.
2. Gelber RP, Kurth T, Kausz AT, et al. Association between body mass index and CKD in apparently healthy men. *Am J Kidney Dis.* 2005;46:871-80.