

## BMI, Sex, and Access to Transplantation

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An astonishing one of every three Americans in the general population is now obese, defined as a body mass index (BMI)  $\geq 30.0$  kg/m<sup>2</sup> (1). Even more strikingly, one of every two American patients with ESRD is obese (2). What is the best treatment modality for such patients? Among patients with ESRD in general, kidney transplantation confers better survival and increased quality of life compared with long-term dialysis (3). This benefit of transplantation compared with long-term dialysis holds among obese recipients as well. Previous studies have shown a 50% risk reduction in death for obese patients who receive a kidney transplant (4,5).

However, the outcomes of transplantation are worse among obese recipients than normal-weight recipients. Several studies found that higher BMI is independently associated with delayed graft function, inferior graft and patient survival, and increased rates of acute rejection and new-onset diabetes (6–9). For example, one study showed at least a 2-fold higher risk of acute rejection and of delayed graft function among obese patients (8).

Obese patients with ESRD have less access to transplantation than do normal-weight patients. A recent national study found that wait-listed patients with a BMI  $\geq 35.0$  kg/m<sup>2</sup> were 24%–42% less likely to receive a transplant compared with patients with lower BMI. Moreover, the most obese wait-listed patients were 13%–23% more likely to be passed over when organ offers are made (10). The reasons for this reduced access are as yet unclear. Obesity is not an absolute contraindication to kidney transplantation, unlike active infection and malignancy. However, it is a relative contraindication at many centers, albeit often with subjective and loosely defined cutoffs.

In this issue of *CJASN*, Gill and colleagues (11) evaluate access to kidney transplantation according to BMI and sex through a retrospective analysis of >700,000 patients with incident ESRD over 12 years using data from the US Renal Data System (USRDS). Outcomes included any transplant, living-donor transplant, deceased-donor transplant, and two steps to obtain a deceased-donor transplant (waiting list placement, transplantation following wait listing). The findings of this study confirm that both obesity and sex are barriers to getting a kidney transplant from any source. More important, the association of obesity with access to transplantation varies greatly by sex. Women with a BMI  $\geq 25.0$  kg/m<sup>2</sup> had a lower likelihood of getting a transplant than normal-weight women. However, men

with a BMI of 25.0–34.9 kg/m<sup>2</sup> had a higher likelihood of getting a transplant than normal-weight men. It wasn't until BMI was  $\geq 35.0$  kg/m<sup>2</sup> that the likelihood of getting a transplant declined among men.

Strengths of the study include the consistent findings for both living- and deceased-donor kidney transplants and the adjustment for many relevant confounders, including rural or urban residence, blood type, and sensitization. Because of the extremely large sample size studied, it is important to focus on the effect size rather than on statistical significance. The authors found that the effects of BMI of 35.0–39.9 kg/m<sup>2</sup> and BMI of  $\geq 40.0$  kg/m<sup>2</sup> were similar to the effect of being black or having cancer or congestive heart failure.

How should these results be interpreted? Possible explanations include study limitations, patient preferences, and physician decision making. A limitation of BMI is that it does not take into account body composition of fat versus muscle. High BMI due to fat has a poorer prognosis among patients with ESRD than does high BMI due to muscle (12). In addition, the BMI values used in this study were based on data collected at ESRD onset and may have changed over time. USRDS data do not include details about patient preferences. In previous work, we found that female patients with ESRD were 10%–20% less interested in receiving a deceased-donor transplant than male patients (13). In addition, only one third of spousal living-donor transplants involve a wife as a recipient; two thirds involve a wife as a donor to her husband (14). Is it possible that these sex differences are magnified in the presence of obesity and associated concerns about body image and suitability for transplantation? We also know very little about physician decision making for the participants in this study. Physicians may perceive obese patients as poor surgical candidates or as nonadherent. Surgeons' perceptions about size mismatching between smaller deceased donors and obese potential recipients may also be a consideration. However, it remains unclear why these factors would differ between men and women.

This study has implications for clinical practice, research, and policy. Surgeons and nephrologists need to inform patients about the risks of obesity associated with receiving a kidney transplant. However, such information should be conveyed in a similar manner to male and female patients. Appropriate weight-loss counseling by providers and referral to nutritionists should be a routine part of the transplant workup. Researchers should determine the reasons for disparities by sex and

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BMI. This may involve prospective observational studies of obese and nonobese patients as they move through specific steps in the transplant process (13). Examining post-transplant outcomes, any weight changes, and body composition (fat versus muscle) is also important. Intervention studies should test the effectiveness of weight-loss programs among obese patients with ESRD who seek transplantation. Policymakers may want to track access to transplantation not just by region, race, and sex, but also by BMI. National policies that have begun to address the obesity epidemic by promoting healthy eating and exercise may need to be modified to address the circumstances of patients with ESRD, such as dietary restrictions and physical activity limitations.

In the end, we must realize that obesity is a medical and public health issue, not a character flaw. Unfortunately, obese individuals in our society, especially women, are often subject not only to the health effects of obesity but also to various forms of social stigma and discrimination. We need to make sure that transplant-related decisions are guided by medical considerations and the best interests of patients, regardless of their BMI or sex.

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#### Disclosures

None.

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See related article, "Differential Association of Body Mass Index with Access to Kidney Transplantation in Men and Women," on pages 951-959.