



Obesity Risk Factors in Patients After Kidney Transplantation

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ABSTRACT

Background. Kidney transplantation is currently the best approach for renal replacement therapy. Compared with dialysis, it provides a better quality of life and improves patient prognosis. However, some evidence suggests that body composition could play a role in the complications observed in kidney transplant recipients (KTRs), and may influence survival. The purpose of this study was to assess the eating habits and body composition of KTRs.

Methods. Seventy KTRs were included in this study. Anthropometry and body composition were performed using electronic-scale, dynamometer, and bioimpedance analyses. Dietary habits were investigated using the Food Frequency Questionnaire (FFQ6). Biochemical parameters were also determined.

Results. Overweight and obesity were found in 33.8% and 21.1% of KTRs, respectively. High body mass index (BMI, >25) correlated positively with high body fat ($r = 0.8$, $P < .05$) and waist circumference ($r = 0.7$, $P < .05$). The mean percentage of body fat was $30.8 \pm 9.3\%$ (range, 13%-52%), fat tissue index was 12.4 ± 4.9 , and lean tissue index (LTI) was 13.2 ± 2.2 . Sarcopenia was recognized based on decreased LTI and decreased handgrip strength in 33.3% of KTRs with excess body weight. Patients with excess body mass consumed significantly ($P < .05$) more sugar and fruits.

Conclusion. A significant percentage of KTRs present with sarcopenic obesity. Excess body weight is associated with many factors, such as immunosuppressive therapy, low physical activity, and abnormal diet. Results based on the FFQ6 indicate a relationship between carbohydrate intake and excess body weight among those in the study group.

KIDNEY transplantation is currently the optimal approach for renal replacement therapy. Compared with dialysis, it can lead to a better quality of life and improve patient prognosis. More evidence suggests that body composition may influence prognosis after transplantation [1]. Overweight and obesity are associated with an increased risk of metabolic disturbances and, consequently, hyperglycemia, hypertension, dyslipidemia, and high risk of cardiovascular diseases (CVD). The most common cause of allograft loss is the recipient death, secondary to CVD, with functioning graft [2].

Obesity and overweight are complex health issues with a multifactorial etiology, involving genetic, behavioral, and environmental (ie, cultural, economic, and social) factors. The main characteristics of these 2 conditions are abnormal (or excessive) accumulation of body fat resulting from an

energy imbalance between 2 flows: the inflow of calories consumed and the outflow of calories expended.

In addition, in kidney transplant recipients (KTRs), immunosuppressive therapy, mainly with glucocorticosteroids, influences body composition and, in some instances, the patient's weight [3,4].

Dietary habits are not often studied in KTRs. However, a healthy diet can be a factor in preventing overweight,

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maintaining normal glycemia, and avoiding any further consequences of excess body weight [5], and it can also prevent progression of the graft failure. The recommended diet should supply an adequate amount of protein, complex carbohydrates, and poly- and monounsaturated fatty acids. A properly balanced diet can ensure an adequate supply of vitamins and micronutrients. The strong relationship between the Carbohydrates Dietary Pattern index and the health outcome is evident, and intake of carbohydrates is strongly associated with the prevalence of obesity [6].

The purpose of the study was to assess the eating habits and body composition of KTRs.

MATERIALS AND METHODS

The study group consisted of 70 KTRs (37 men; mean age, 49.89 ± 13.4 ; age range, 20-81 years) who were under the care in the Outpatient Transplantation Unit at the Department of Nephrology, Transplantology, and Internal Medicine, Medical University of Gdańsk, Poland. Time from transplantation was 56.2 ± 60.2 (range, 1-284) months. The mean estimated glomerular filtration rate (eGFR), according to the Chronic Kidney Disease–Epidemiology Collaboration (CKD-EPI) equation, was 58.0 ± 19.4 (range, 31.6-111.9) in the study group. All patients were clinically stable. All patients were treated with triple immunosuppressive protocols, including glucocorticosteroids.

This study was approved by the bioethics committee of the Medical University of Gdańsk (NKBBN/417/2015).

Anthropometric Measurements

The following anthropometric measurements were obtained:

- Body mass (kg) and waist circumference (cm).
- BMI, estimated according to the current body mass/height² (kg/m²): BMI range <18.5 was considered underweight, 18.5-24.99 normal weight, 25-30 kg/m² overweight, and BMI ≥ 30 kg/m² obese.
- Handgrip strength (HGS, in kilograms), using a dynamometer (Holtain Caliper, Inc, Crosswell, Crymch, UK).
- Body composition, using the multifrequency bioimpedance analysis (BIA) method with a body composition monitor (Fresenius SA, Bad Homburg, Germany).

Sarcopenia was defined by lean tissue index <14 kg/m², and handgrip strength <26 kg in women and <46 kg in men [7].

Laboratory Assay

Blood samples were taken after 12 hours of overnight fasting, and the following compounds were measured in plasma:

- C-reactive protein (CRP), by enzyme-linked immunoassay (ELISA).
- Albumin (serum albumin), creatinine, blood urea nitrogen (BUN), lipidogram, and morphology, according to routine methods (Hitachi 911; Boehringer Mannheim GmbH, Mannheim, Germany).

Statistical Analysis

Statistical analysis was performed using Statistica 9.0 version for Windows. All data are expressed as mean \pm SD. Comparisons of the groups were examined by Student's *t* test and Mann-Whitney *U* test. Pearson's correlation was used to determine the

relationship between continuous variables and Spearman's correlation was used for nonparametric measure of statistical dependence between 2 variables. $P < .05$ was considered statistically significant for all analyses.

Dietary Habits

Dietary habits were assessed using the Food Frequency Questionnaire (FFQ6). The FFQ is the most common dietary assessment tool used in large epidemiologic studies of diet and health, and has been validated for the Polish population [8].

The self-administered FFQ booklet asks participants to report the frequency of consumption of approximately 62 line items over a defined period of time (last year). Each line item is defined by a series of foods or beverages. The FFQ includes an assessment of 8 food groups: (1) sweets and snacks; (2) dairy products and eggs; (3) grain products; (4) fats; (5) fruits; (6) vegetables and grains; (7) meat products and fish; and (8) drinks.

RESULTS

Overweight and obesity were found in 33.8% and 21.1% of patients, respectively. Mean BMI was 26.1 ± 4.5 (range, 19.3-39.0). High BMI (>25) correlated positively with body fat ($r = 0.8$, $P < .05$) and waist circumference ($r = 0.7$, $P < .05$). The mean content of body fat was $30.8 \pm 9.3\%$ (range, 13%-52%); FTI was 12.4 ± 4.9 and LTI 13.2 ± 2.2 . In KTRs with excess body weight, 40% presented with decreased handgrip strength (HGS) and 33.3% with both decreased HGS and decreased LTI (<14). According to the definition, in 33.3% of KTRs with excess body weight, sarcopenia was recognized (Fig 1). Anthropometric measurements and biochemistry data are presented in Table 1.

Diet Analysis

As shown in Table 2, the total frequency of consumption of product groups was correct. Among the 8 food groups, fats were the most commonly consumed food group (3.14 servings/day). A more detailed analysis shows decreased intake of vegetables, grains, dairy products and eggs, fruits, meat,

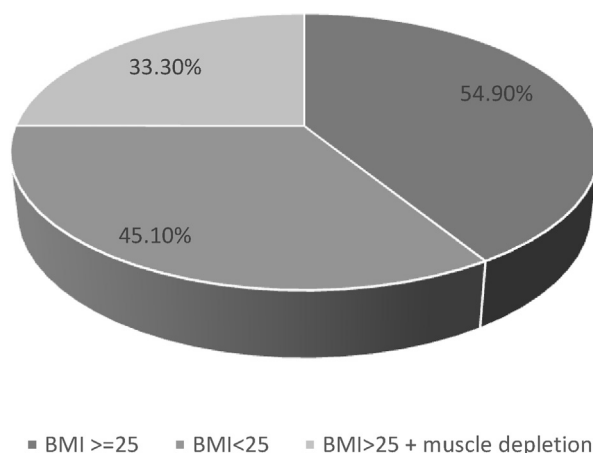


Fig 1. The prevalence of sarcopenia in kidney transplant recipients.

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