Assessment of Anemia and Quality of Life in Patients With Renal Transplantation

S.H. Abacı[a], S. Alagoz[b], A. Salihoglu[c], S.F. Yalin[b], S. Gulcicek[b], M.R. Altiparmak[b], and N. Seyahi[b,*]

[a]Istanbul University, Cerrahpasa Medical Faculty, Department of Internal Medicine, [b]Istanbul University, Cerrahpasa Medical Faculty, Department of Internal Medicine, Division of Nephrology, and [c]Istanbul University, Cerrahpasa Medical Faculty, Department of Internal Medicine, Division of Hematology, Istanbul, Turkey

ABSTRACT

Purpose. Anemia is associated with poor quality of life in dialysis patients. However, data on this association are scarce on transplant patients. We aimed to find the frequency of anemia, and the effect of anemia on the quality-of-life parameters in patients who have undergone kidney transplantation.

Methods. Anemia was defined by a hemoglobin (Hgb) level of <12 g/dL and severe anemia by a Hgb level of <10 g/dL. All patients were evaluated with the Kidney Disease Quality of Life (KDQOL-SF) scale forms.

Results. Two hundred patients (128 male and 72 female; mean age, 39.2 ± 11.5 years) were examined. Anemia was found in 19% and severe anemia was found in 4.5% of all patients. Low glomerular filtration rate, young age, and female gender were demographic parameters associated with anemia. Parathormone levels were higher in the anemic group. The use of angiotensin converting enzyme inhibitors, angiotensin receptor blockers, and mammalian target of rapamycin inhibitors was significantly higher in the anemic group. In addition, patients with anemia had a lower KDQOL-SF mental health component score than that of the patients without anemia.

Conclusions. Anemia was related to the degree of renal function in posttransplant patients. Anemia had an important influence on mental health in renal transplant patients.

RENAL TRANSPLANTATION is the best and most cost-effective treatment for end-stage renal disease. In addition to better survival, those with a well-functioning graft would have a better quality of life compared with hemodialysis and peritoneal dialysis patients [1].

Anemia is a major complication observed in patients with renal failure during the predialysis and dialysis phases, and may also occur in renal transplant patients [2]. It has been suggested that early diagnosis and recovery of anemia leads to improvements in cardiac and cognitive functions, exercise capacity and quality of life, resulting in decreased mortality and morbidity [3,4]. Various studies have been conducted to define the negative effects of anemia on the quality of life of predialysis patients and patients with end-stage renal failure receiving hemodialysis or peritoneal dialysis treatment. However, studies investigating these effects on transplant patients are limited [5–7]. The present study aims to identify the frequency of anemia and associated factors and demonstrate its implications on the quality of life in renal transplant patients.

PATIENTS AND METHODS

Two hundred consecutive renal transplant recipients followed up at the Transplantation Outpatient Clinic of Cerrahpasa Medical Faculty, Istanbul University, were examined; only patients who gave informed consent were enrolled in the study. Amputees, hemiplegic or paraplegic patients, patients with hematologic or solid organ malignancies, dementia, impaired cognitive function, and those who did not give consent were excluded.

Patient age, gender, and primary diseases that led to end-stage renal failure were recorded. Hemoglobin (Hgb) threshold values

*Address correspondence to Nurhan Seyahi, Istanbul University, Halaskargazi c. No: 209-211, Huzur ap. D.2, Sisli, Istanbul, Turkey. E-mail: nseyahi@yahoo.com

360 Park Avenue South, New York, NY 10010-1710

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Table 1. Demographic, Clinical, and Laboratory Parameters

	All Patients (n = 200)	Hgb < 12 g/dL (n = 38)	Hgb ≥ 12 g/dL (n = 162)	*P*
Age (y)	39.2 ± 11.5	35.1 ± 9.2	40.1 ± 11.7	.006
Male, n (%)	128 (64)	17 (44.7)	111 (78.1)	.008
Posttransplant time (mo)	79.0 ± 57.5	87.3 ± 57.5	77.1 ± 57.5	.323
Living donor, n (%)	164 (82)	32 (84.2)	132 (92.9)	.817
Diabetes mellitus (%)	8 (4)	0	8 (5.6)	.207
Hypertension (%)	91 (45.5)	21 (55.2)	70 (49.2)	.357
Creatinine clearance (mL/min)	71.7 ± 24.9	48.4 ± 19.5	77.3 ± 22.8	.000
eGFR (mL/min/1.73 m^2)	70.0 ± 25.6	45.3 ± 22.1	75.8 ± 22.8	.000
Urea (mg/dL)	44.9 ± 20.7	68.5 ± 28.7	39.4 ± 13.3	.000
Creatinine (mg/dL)	1.3 ± 0.68	2.0 ± 1.1	1.1 ± 0.3	.000
Total protein (g/dL)	7.5 ± 4.6	6.9 ± 0.5	7.6 ± 5.1	.357
Albumin (g/dL)	4.3 ± 3.5	3.8 ± 0.3	4.4 ± 3.9	.357
Fe (μg/dL)	80.2 ± 35.9	71.6 ± 37	82.2 ± 35.5	.104
TIBC (μg/dL)	274.1 ± 62.1	257.1 ± 43	278.1 ± 65.3	.018
Ferritin (ng/mL)	365.6 ± 458.1	391.8 ± 443.3	359.4 ± 462.7	.695
Transferrin saturation, %	3.7 ± 8.7	29.0 ± 16.0	38.8 ± 9.6	.533
B_{12} (pg/mL)	372.1 ± 271.6	390.9 ± 258.2	367.7 ± 275.3	.637
Folate (ng/mL)	6.5 ± 4.8	7.5 ± 5.8	6.7 ± 4.5	.755
PTH (pg/mL)	149.4 ± 153.7	248.2 ± 231.3	126.2 ± 118.5	.003
Leukocyte ($\times 10^3$)	8.2 ± 2.2	7.9 ± 2.2	8.2 ± 2.2	.396
Hgb (g/dL)	13.2 ± 1.7	10.6 ± 1.1	13.9 ± 1.3	.000
Hct (%)	40.3 ± 5.1	33.2 ± 3.8	42.0 ± 3.8	.000
Erythrocyte ($\times 10^6$)	4.67 ± 0.68	3.8 ± 0.5	4.8 ± 0.5	.000
MCV (fL)	86.8 ± 6.6	85.9 ± 8.2	87.0 ± 6.2	.334
MCH (pg)	28.8 ± 5.1	27.6 ± 3.1	29.1 ± 5.5	.114
Platelet ($\times 10^3$)	239.4 ± 58.5	247.6 ± 3.1	237.5 ± 56.6	.339
ESA use (%)	8 (4)	8 (21)	0	.000
Fe use (%)	11 (5.5)	5 (13.1)	6 (4.2)	.037
B_{12} use (%)	8 (4)	4 (10.5)	4 (2.8)	.044
Folate use (%)	18 (9)	7 (18.4)	11 (7.7)	.011

Abbreviations: eGFR, estimated glomerular filtration rate; ESA, erythropoiesis-stimulating agent; Hct, hematocrit; Hgb, hemoglobin; MCH, mean corpuscular hemoglobin; MCV, mean corpuscular volume; PTH, parathyroid hormone; TIBC, total iron binding capacity.

were determined as <12 g/dL for presence of anemia and 10 g/dL for severe anemia.

Peripheral smear examination was conducted on patients with anemia. Peripheral smears were prepared by the same person and May–Grunwald and Giemsa stains were used for staining. Peripheral smears of the patients were examined microscopically under ×100 magnification by the same person and evaluated for leukocyte formula and red cell morphology.

Biochemical data (urea, creatinine, sodium, potassium, creatinine clearance in 24-hour urine specimen, total iron binding capacity [TIBC], ferritin, total protein, albumin, folate, vitamin B_{12}, parathyroid hormone [PTH]) were obtained from outpatient files of the patients. Transferrin saturation value was calculated for each patient using the following formula: transferrin saturation (%) = serum Fe × 100/TIBC. The glomerular filtration rate (GFR) was calculated using the Modification of Diet in Renal Disease (MDRD) formula: MDRD (mL/min/1.73 m^2) = $186 \times (\text{Pcr})^{-1.154} \times (\text{age})^{-0.203} \times (0.742 \text{ if female})$ [8].

All patients were evaluated by using the Kidney Disease and Quality of Life Short Form (KDQOL-SF) [9]. Questionnaire forms were completed with patient interviews. Because only renal transplant patients were included in the study, scale form questions focusing on dialysis were excluded (KDQOL-SF, Question 28). KDQOL-SF results were recorded numerically. Raw data were recorded on a scale of 0 to 100, where 100 represented the highest score (good health) and 0 represented the lowest (poor health). Mean and standard deviations were calculated based on these scores.

The study protocol was approved by the ethics committee of Cerrahpasa Medical Faculty, Istanbul University.

Statistical Method

Data were expressed as mean values ± standard deviation. Parametric variables were compared by the independent samples *t*-test, and nonparametric variables by the chi-square test. The relationship between the parametric variables was analyzed by using the Pearson correlation test. Factors affecting anemia were assessed by the multivariate logistic regression analysis, using forward selection method. Variables that were associated with Hgb < 12 g/dL in univariate analysis with $P < .01$ were included in the multivariate model. SPSS 17.0 (SPSS Inc, Chicago, IL) software was used for calculations. $P < .05$ was considered significant.

RESULTS

Demographic, clinical, and laboratory data of the patients are summarized in Table 1. The patient group was composed of middle-age individuals in general (median age, 38 years; range, 18–74) with a predominance of male patients. Primary etiology was unknown in 92 patients (46%). Among those with a known primary etiology, the most