

Evaluation of Endothelial Dysfunction and Aortic Stiffness in End-Stage Renal Disease Patients on Maintenance Hemodialysis and Renal Transplant Recipients

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BACKGROUND

Cardiovascular complications are the leading cause behind the excess morbidity and mortality observed in end-stage renal disease population. The vascular wall in uremia undergoes two major pathological changes being endothelial dysfunction occurring at the intimal level and vascular remodeling occurring in the media. Renal transplant recipients could actually gain benefit from the reduction of circulating uremic toxins affecting the vascular wall with a possible improvement in both endothelial dysfunction and arterial stiffness and thus cardiovascular events.

OBJECTIVE

We aimed to compare endothelial function and arterial stiffness in patients with end-stage renal disease on maintenance hemodialysis (HD) versus those who underwent renal transplantation.

MATERIALS AND METHODS

This cross-sectional controlled study included 30 chronic hemodialysis patients, 30 renal transplant recipients and 25 healthy controls. Thirty two of our patients (53%) were known to be hypertensive. Patients with diabetes mellitus were excluded from our study. Endothelial function was assessed by measuring the serum level of Visfatin, a well-known marker for endothelial damage. Arterial stiffness was evaluated by measuring the aortic pulse wave velocity (PWV) as an index of large artery stiffness and augmentation index (AIx) as an index of peripheral stiffness. Aortic PWV and AIx were determined non-invasively using Mobil-O-graph device, a brachial oscillometric ambulatory blood pressure monitor device.

RESULTS

Plasma Visfatin concentrations were significantly higher in hemodialysis patients than in transplant recipients and healthy controls (29.30 ± 23.57 ng/ml vs 23.32 ± 25.58 ng/ml vs 13.87 ± 3.90 ng/ml; $p < 0.001$). Similarly, the aortic PWV showed the highest values among hemodialysis patients when compared to transplant patients and control (8.28 ± 2.12 m/s vs 6.92 ± 1.54 m/s vs 5.67 ± 1.06 m/s; $p < 0.001$). The augmentation index was significantly higher among hemodialysis patients when compared to transplant recipients and healthy controls (27.20 ± 11.20 % vs 20.27 ± 11.59 % vs 18.88 ± 11.47 %; $p = 0.018$). However, transplant patients had no significant difference in the AIx values as compared to control ($p = 0.790$). By univariate analysis, transplant recipients showed a significant inverse correlation between the post renal transplant duration and both serum Visfatin concentrations and AIx ($r_s = -0.552$, $p = 0.002$; $r_s = -0.435$, $p = 0.016$ respectively).

In a multiple regression model, age, systolic blood pressures and pulse pressures were significantly and positively correlated with the aortic PWV in hemodialysis and transplant patients. However, no association was found between plasma Visfatin concentrations and PWV in both groups.

CONCLUSION

Stable kidney transplant recipients had a better endothelial function and peripheral arterial stiffness when compared to HD patients. The reduction of serum Visfatin concentrations and the better values of the augmentation index especially with longer post-transplant duration support our observation. Central aortic PWV also showed a better value in the transplant recipients group.

Patient's age and their systolic blood pressures were the two main independent factors affecting the central aortic PWV among them.