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BACKGROUND

End-stage renal disease (ESRD) is the final stage of chronic kidney disease, characterized by severely reduced renal function and the inability to adequately excrete metabolic waste products, including creatinine, and excess fluid.

Healthy patients tend to have normal glomerular filtration rates of 90-120 mL/min/1.73 m², whereas ESRD patients have rates below 15 mL/min/1.73 m². In addition to glomerular filtration rate, ESRD also affects the body's hemostatic balance. Waste product buildup in the blood and endothelial dysfunction can disrupt normal coagulation and fibrinolysis, leading to increased fibrinolytic activity. This increase can result in elevated levels of fibrinolytic deficit markers, such as D-dimer, a biomarker of ongoing fibrin turnover and fibrinolytic activity in ESRD patients.

OBJECTIVES

We compared D-dimer levels between healthy individuals and ESRD patients to examine the association between ESRD and D-dimer levels.

METHODS

- A cohort study was conducted with two groups
- Control group of healthy individuals (n=50)
- ESRD patients (n=72)

MEASUREMENT OF D-DIMER LEVELS

- Collection of blood samples
 - Plasma samples from the control
 - Citrate plasma samples from ESRD patients
 - Conducted at the Hemodialysis Clinic at Loyola University
- Analysis using commercially available sandwich ELISA methods
- Blood CI's extracted from complete blood counts

The comparison between the two groups was performed using a Mann-Whitney test due to the non-normal distribution of the data, with a p-value of < 0.0001.

RESULTS

As shown in Table 1 and Figure 1, patients with ESRD reportedly had higher D-dimer levels than healthy individuals (p < 0.0001). This indicates a direct correlation between elevated D-dimer levels and ESRD patients.

The median values and interquartile ranges (IQR) from both groups also suggest this correlation, with the wider IQR in the ESRD group indicating that D-dimer levels are much more variable, and the higher median value suggesting that levels are much higher in this group.

Table 1: Comparison of median and IQR values between the control group and ESRD patients in D-dimer levels.

	Median (ng/mL)	IQR (ng/mL)
Control Group	0.000	0.000 - 52.55
ESRD Patients	953.8	386.9 - 2465

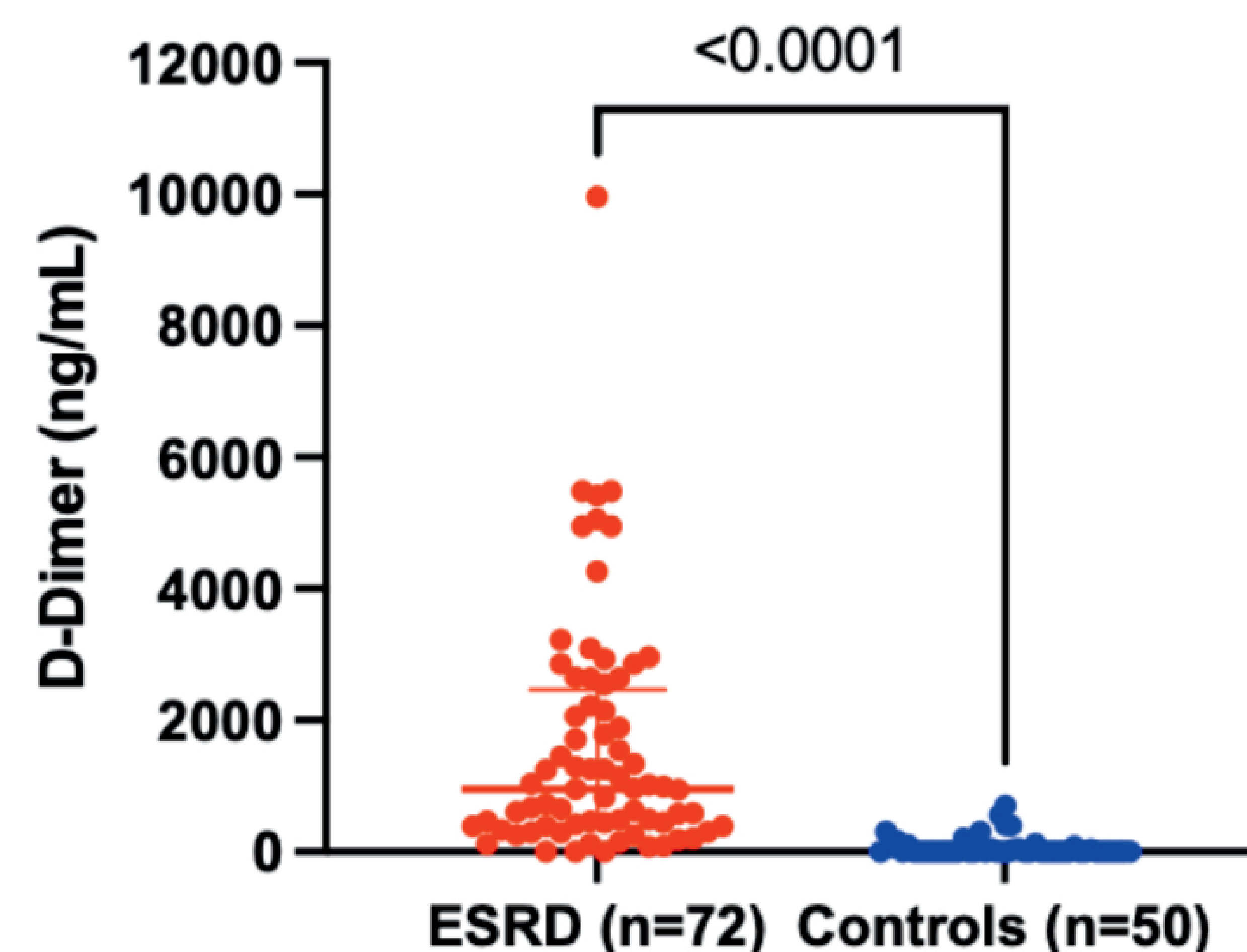


Figure 1: D-dimer levels reportedly marked higher in ESRD patients (red) compared to the control group (blue).

CLINICAL SIGNIFICANCE

Significance of measuring D-Dimer levels in patients with ESRD

- Produced from the breakdown of a blood clot can reflect the degree of blood clotting present in a patient
- Aids in monitoring anticoagulation therapy
- Critical in ruling out cases such as deep vein thrombosis (DVT), pulmonary embolism (PE), and venous thromboembolism (VTE) due to sensitivity.
 - Adjusted cutoffs help prevent unnecessary imaging and tests, which could lead to bleeding complications in patients if ESRD is present

CONCLUSIONS

- The findings of this study suggest that patients with ESRD exhibit significantly higher D-dimer levels compared to healthy individuals, indicating increased fibrinolytic activity and endothelial dysfunction.
- These results also support the use of D-dimer as a potential biomarker of fibrinolytic deficit for assessing coagulation and fibrinolytic activity in patients with advanced kidney disease. With adjusted higher cutoffs helping prevent unnecessary imaging and tests in patients.
- Further research with larger sample sizes and longitudinal data is warranted to explore the prognostic value of D-dimer in predicting disease progression and related complications in ESRD patients.

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