

THE ROLE OF ENDOTHELIAL DYSFUNCTION IN THE DEVELOPMENT OF RENAL DYSFUNCTION IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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<https://doi.org/10.5281/zenodo.22108918>

Background. Chronic obstructive pulmonary disease (COPD) is characterized not only by respiratory impairment but also by systemic pathological processes involving multiple organs. As the disease progresses, hypoxemia, oxidative stress, systemic inflammation, and vascular endothelial injury may become more pronounced, potentially impairing renal microcirculation and filtration function. E-selectin, one of the markers of endothelial dysfunction, reflects endothelial activation and inflammatory activity. Assessment of the relationship between E-selectin and renal dysfunction in COPD may therefore have clinical relevance for identifying patients at increased risk.

Objective. To evaluate the association of serum E-selectin levels with renal filtration function and COPD severity.

Materials and Methods. The study included 214 patients with stage II–IV COPD who received inpatient treatment in the Department of Pulmonology of the Multidisciplinary Clinic of Tashkent State Medical University during 2023–2024. According to cystatin C-based estimated glomerular filtration rate (eGFR), the patients were divided into two groups: eGFR <60 mL/min/1.73 m² and eGFR ≥60 mL/min/1.73 m². In stage II COPD, 27 and 24 patients were included in these groups, respectively; in stage III, 52 and 15 patients; and in stage IV, 69 and 27 patients. Serum E-selectin concentrations were measured by enzyme-linked immunosorbent assay using the Human E-Selectin/CD62E Quantikine ELISA kit.

Results. Across all COPD severity stages studied, serum E-selectin levels were higher in patients with eGFR <60 mL/min/1.73 m² than in those with eGFR ≥60 mL/min/1.73 m². In stage II COPD, E-selectin levels were 6215.4±910.8 and 5628.7±875.6 pg/mL, respectively, with a statistically significant difference (p<0.05). In stage III COPD, the corresponding values were 6684.21±1085.4 and 5867.3±930.5 pg/mL, and the between-group difference became more pronounced (p<0.01). In stage IV very severe COPD, E-selectin levels were 7048.6±1168.3 and 6122.9±1015.7 pg/mL, respectively, with a highly statistically significant difference (p<0.001).

The obtained data demonstrated a progressive increase in E-selectin levels with increasing COPD severity. This pattern was more pronounced in patients with reduced eGFR. In particular, the association between increased endothelial dysfunction and reduced renal filtration function was most evident in stages III–IV COPD.

Conclusion. Renal dysfunction in COPD is associated with increased serum E-selectin levels, with the most pronounced changes observed in stages III–IV of the disease. These findings suggest that endothelial dysfunction may represent an important pathogenetic component of COPD-associated renal impairment. Assessment of E-selectin together with eGFR and other clinical and laboratory parameters may provide additional value in identifying patients at increased risk of renal dysfunction.

Keywords: chronic obstructive pulmonary disease, renal dysfunction, eGFR, cystatin C, endothelial dysfunction, E-selectin.