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Gut-lung-kidney axis: gut microbiota and kidney disfunction in patients with COPD

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Background and Aims: Emerging research highlights the critical role of the gut-lung-kidney axis in the pathophysiology of COPD, with gut microbiota acting as a central modulator. Aim of the study to study gut microbiome in patients with kidney disfunction and COPD.

Method: This study analyzed the gut microbiome, systemic inflammation, and lung function in 180 patients with chronic obstructive pulmonary disease (COPD). Patients were divided into two groups: a control group of 98 patients with kidney dysfunction and a main group of 102 patients without kidney dysfunction. Gut microbiota composition was assessed using mass spectrometry (MALDI-TOF). Laboratory parameters, including C-reactive protein (CRP), tumor necrosis factor-alpha (TNF-α), and serum creatinine, were measured. Lung function was evaluated via spirograph by measuring forced expiratory volume in one second (FEV1), forced vital capacity (FVC), and the FEV1/FVC ratio.

Results: The mean age of the patients was 58.3 $\pm$ 7.35 years (38–73 years). The mean FEV1 value was 54.7 $\pm$ 6.65%. In the cohort of 102 patients without kidney dysfunction gut microbiota analysis showed a relatively lower abundance of Bacteroidetes, and a higher proportion of Firmicutes. At the family level, significant differences were observed in the relative abundances of Fusobacteriaceae, Prevotellaceae, and Bacteroidaceae. Among 98 patients with kidney disfunction (eGFR 41.5 $\pm$ 18.3 ml/min/1.73 m^2) the gut microbiome exhibited higher frequencies of Tannerella, Fusobacterium, Capnocytophaga, and Solobacterium.

Conclusion: This study highlights significant alterations in the gut microbiota composition among patients with (COPD) and kidney dysfunction exhibited a reduced abundance of Bacteroidetes and an increased prevalence of Firmicutes. Conversely, patients with kidney dysfunction demonstrated higher frequencies of Tannerella, Fusobacterium, Capnocytophaga, and Solobacterium. These findings underscore the interplay between the gut microbiota, kidney function, and COPD, offering insights into targeted therapeutic strategies to address systemic complications in this patient population.