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Association between Specific Gut Microbiota and Chronic Obstructive Pulmonary Disease: A Two-Sample Mendelian Randomization Study

Abstract:

Background: Growing evidence has suggested a critical relationship between gut microbiota (GM) and chronic obstructive pulmonary disease (COPD) based on the connection of the gut-lung axis. However, their causal connection has not been elucidated. This study aimed to investigate the causal relationship between GM and the risk of COPD.

Methods: Using a large-scale genome-wide association study database, a series of quality control steps were taken to select qualified SNPs that were strongly associated with exposure. Two-sample Mendelian randomization (MR) was used to evaluate the causal effect of GM on COPD, including inverse variance weighting (IVW), MR-Egger, weighted median, weighted mode, and simple mode. MR-Egger intercept tests, Cochran's Q test, MR-PRESSO global test, and "leave-one-out" sensitivity analyzes were applied to assess horizontal pleiotropy, heterogeneity, and stability.

Results: Based on extensive genetic data obtained from genome-wide association studies (GWAS) involving 468475 European participants, this work offered evidence that several gut microbial taxa were associated with COPD. IVW results confirmed that class-Clostridia ($P=3.71 \times 10^{-2}$), genus-Haemophilus ($P=2.55 \times 10^{-3}$) and genus-Streptococcus ($P=4.28 \times 10^{-2}$) were associated with the risk of COPD. Analyses of heterogeneity ($P>0.05$) and pleiotropy ($P>0.05$) analysis confirmed the reliability of MR results.

Conclusion: We verified the possibility of a causal link between certain GM taxa and COPD, thereby highlighting the connection of the gut-lung axis. Further investigations into their correlation are necessary and will contribute to the discovery of novel biomarkers for targeted preventive strategies against COPD.

Biography

Qian Zhang received his Ph.D. degree in Pulmonary Medicine from Nanjing Medical University, Nanjing, P.R. China. In 2010, he worked as a visiting scholar in the department of internal medicine at Far Eastern Memorial Hospital, Taiwan. From 2011 to 2016, he worked as a postdoctor in Nanjing General Hospital of Nanjing Military Command, Nanjing, Jiangsu Province, P.R. China. Currently, he is working as chief physician, professor and director in the department of respiratory medicine at Changzhou No.2 People's Hospital affiliated to Nanjing Medical University. He is interested in pulmonary medicine, critical care medicine, molecular biology, allergy and immunology.