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Opinion
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Microbiome Role in Asthma, Allergic Rhinitis and Covid-19

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Opinion

Microorganisms that live on another organism are called "microbiome" and classified in term beneficial (symbiotic) or dangerous (pathogenic) [1]. These microbiomes in humans' bodies can account for 90% of the cells with a ratio of 10 in to 1, although latest studies showed bacteria number with same order to human cells number [2,3]. Thus, human microbiome composition plays an important role in the context of health. Many research has detected viruses, fungi, and archaea diverse microbial ecosystem in human causing diseases, such as respiratory and food allergies. In the last few decades prevalence of these diseases dramatically increased globally. The central role of gut and environmental microbiomes in allergic rhinitis and asthma are highly influenced. Recent evidence in the research field suggests that these microbiomes can be fertile therapeutically target in management of adaptive immune dysfunction for treating inflammatory diseases like asthma and allergic rhinitis. Changes in nutrition and environment can produce dysbiosis not only in the gut but lung and skin microbiome as per changes in metabolic activity.

Preventive therapy considering the interventions to alter microbiome functionality with probiotics and prebiotics seem result oriented in specific immunotherapy. Bronchial Asthma and allergic rhinitis both disorders are of the two different organs as allergic Rhinitis affects the nose and Bronchial Asthma involves the lungs. Allergic rhinitis is associated with the onset development and severity of asthma. Allergic rhinitis (AR) is a much common health problem affects more than one-third population around the globe worldwide involve all ethnic groups [4].

Clinical phenotype of allergic asthma is easily recognized with the family history of allergic disease such as allergic rhinitis [5]. The condition is frequently under-diagnosed in subjects with asthma as over 80% of asthmatics patients have allergic rhinitis. The dual diseases burden of asthma and allergic rhinitis increases as communities are becoming more urbanized like Pakistan. Allergic rhinitis and bronchial asthma impose a considerable socio-economic burden on patients due to medical costs and lost productivity. On the other hand, human respiratory tract microbiome is diverse and associated with multiple diseases. Changes in the microbiome of the upper respiratory tract affect lower respiratory tract as well due to local microbiome-host interactions. Exposure to SARS-CoV-2 with altered microbiome can enhance symptomatic infection. Different viral infections alter the bacterial microbiome and increased Pseudomonas in the nasopharynx of influenza as compared to non-infected patients as well in virus specific respiratory microbiome after infection [6].

One of the important factors in last few years research suggested essential role in modulating severity in acute lung injury patients with acute respiratory distress syndrome (ARDS). The nasopharyngeal microbiome plays a distinct role as nasal epithelium is the first site SARS CoV-2 infection with the COVID-19 severity, symptoms, or outcome. The disease severity is also linked to nasopharyngeal microbiome composition with antibiotic use and various treatments. The respiratory microbiome in COVID-19 was reported in metagenomic sequence data. Oropharyngeal metagenomes of COVID-19 patients have higher metabolism of valine, leucine, isoleucine, tyrosine, and phenylalanine [7]. Thus, the high-risk population of Covid-19 should be addressed with more systematic microbiome sampling. Additionally, studies relating to respiratory mucosal immune microbiome can aid in determining causality. Identifying gene expression in the airway epithelial cells with cytokine in in mucosal immune cells might be a new therapeutic target for prevention and might be a new therapeutic target for prevention and a useful biomarker of COVID-19 risk. So far, we have no studies on microbiome in immunized populations so further research is needed to understand respiratory microbiome influenced long-term adaptive immunity to SARS CoV-2.

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