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The Effects of Respiratory Viruses on the Acute Pulmonary Exacerbations in Cystic Fibrosis Patients

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Objectives: The impacts of respiratory viruses in pulmonary exacerbations of patients with cystic fibrosis (CF) is not fully understood and there is inadequate information about pulmonary exacerbation (PEX) with concomitant viral agents in CF.

Methods: Prospective longitudinal, 50 CF patients 6-18 years who able to spontaneously produce sputum and had signs and symptoms PEX included (2016 to 2018). Sputum samples collected from all and analyzed for viral respiratory PCR (Allplex respiratory panel), aerobic and fungal culture. Full blood count, sedimentation rates and serum C-reactive protein measured and standard spirometry and radiological severity score performed. Additional nasopharyngeal (NP) swab taken for respiratory virus assessment if clinician considers it necessary.

Results: 23/50 (48.9%) sputum samples were virus-positive. Human rhinovirus was the most common pathogen (23,4%). Influenza A and B detected in 10% percent of PEX by sputum samples and 16% by combination of NP swab and sputum. Virus-positive patients were more likely present with oxygen saturation lower than 93 than virus negative patients. There was no significant difference in term of demographics, comorbidities, FEV1 at PEX, radiograph parameters and score, vit D levels, influenza vaccination rates, previous FEV1 levels and day of antibiotics. In multivariate analysis; patients who present with saturation<93 at time of presentation and dyspnea predict the viral positive infections. ($p=0.045/p=0.026$). In patient with influenza positivity nose flow and sedimentation rate significantly higher ($p=0.007/0.006$). Influenza positive patients more likely to had severe exacerbation and hospitalization. Half of patients with influenza were vaccinated in that year. 20/50 had concomitant NP swab for respiratory viruses. There was discordance in sputum and swab results. By combination of sputum swab, rates of viral detection increase.

Conclusion:

- Respiratory viruses identified near the half of the patients with PEX.
- There is still no consensus on the ideal method for viral detecting in CF patients during PEX and combination of two methods may increase the detection rate.
- Difficult to distinguish exacerbations caused by viral agents by clinical, laboratory and radiological findings probably due to the presence of underlying lung inflammation. In pretense of acute hypoxia and dyspnea viral coexistence should be suspected.
- In PEX at influenza season, if patients have nasal discharge and high sedimentation rate, oseltamivir treatment should consider even if patient vaccinated for influenza.

Although influenza vaccine recommended for all CF patients, the rate of vaccination and protection were low. For this reason, repeated or higher dose of vaccination may be considered in CF.

Keywords: Cystic fibrosis, viral infection, pediatric