

# A possible pathological link among swallowing dysfunction, gastro-esophageal reflux, and sleep apnea in acute exacerbation in COPD patients

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## Dear editor

With interest, we read the review article by Lee and Goldstein<sup>1</sup> published in the recent issue of the *International Journal of Chronic Obstructive Pulmonary Disease*. The authors have comprehensively summarized the possible roles of gastroesophageal reflux disease (GERD) in a variety of aspects of pathogenesis of COPD. However, the considerable associations among GERD, swallowing dysfunction, sleep apnea, and acute exacerbation (AE) of COPD have not been fully discussed.

GERD-related chronic cough (CC) may have multifactorial causes. GER is known to induce esophagopharyngeal reflux (EPR), resulting in CC. Importantly, symptoms of CC fully responded to full-dose proton pump inhibitor therapy in CC patients with GERD.<sup>2</sup> There are evidences of increase of weakly acidic gas EPR and swallowing-induced acidic EPR in patients with COPD.<sup>3</sup>

The GERD and its related swallowing impairment may be closely associated with unwitnessed pulmonary aspiration, such as mis-swallowing or silent aspiration in older patients with COPD. Further, sleep apnea, which is relatively common in COPD patients, also causes GER and non-acidic reflux. The sleep apnea-related GER events also cause pulmonary aspiration that is accompanied with bronchial constriction and hypoxic responses in their lungs. Pulmonary aspiration is a risk factor for upper and lower respiratory tract infections in COPD patients.

We have previously reported that more than eight of 48 (16.7%) COPD patients showed an abnormal swallowing function.<sup>4</sup> In our experience, the higher prevalence of GER, abnormal swallowing reflex or sleep apnea has been investigated in COPD patients who experienced AE but not in those without AE. These three disorders are mainly related with the pathogenesis of each disease and contribute to inducing pulmonary infection and/or AE.<sup>5</sup>

From these points of view, GER may have a significant impact on the increased frequency of AE in patients with COPD. Thus GERD, swallowing dysfunction, and sleep apnea may be important risk factors for AE through the pulmonary aspiration-related events in COPD patients.

## Disclosure

The author report no conflicts of interest in this communication.

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## Author reply

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## Dear editor

We thank Dr Teramoto for his interesting comments regarding the relationship between gastroesophageal reflux disease (GERD), swallowing dysfunction, sleep apnea, and acute exacerbation of COPD, in response to our review titled “Gastroesophageal reflux disease in COPD: links and risks”.

We agree that pulmonary aspiration with respect to swallowing dysfunction in COPD is a possibility. With swallowing comprised of four stages, any lack of coordination of these movements introduces the risk of laryngeal penetration and subsequently laryngotracheal aspiration.<sup>1</sup> Individuals with COPD exhibit disrupted coordination of the respiratory cycle with deglutition, with dyspnea and as a result of abnormalities in thoraco-abdominal biomechanics, contributing to dissynchrony and possible dysphagia.<sup>2</sup> Swallowing dysfunction and altered reflexes with laryngeal aspiration<sup>3</sup> may predispose individuals to acute exacerbations, with a relative risk of 2.8 (95% confidence interval 1.5–5.0).<sup>4</sup> The presence of swallowing abnormalities during a stable phase of COPD was linked to a higher risk of developing exacerbations in the following year.<sup>5</sup> A significant proportion of individuals hospitalized with an exacerbation of COPD have a coexisting oropharyngeal swallowing disorder,<sup>6</sup> which may contribute to or exacerbate their disease.

Previous work has also highlighted the link between nocturnal GER symptoms, symptoms of obstructive sleep apnea (OSA), and a reduced forced expiratory volume in 1 second/forced vital capacity in those with COPD<sup>7</sup> and a higher prevalence of OSA in those with COPD and GERD.<sup>8</sup> Proposed causative mechanisms include a lower baseline lower esophageal sphincter (LES) pressure in individuals with OSA, possibly from repetitive strain associated with

upper airway obstruction,<sup>9</sup> a higher frequency of transient LES relaxation during sleep related to preceding arousals and shallow sleep,<sup>10</sup> and LES insufficiency.<sup>11</sup>

With up to a third of severe exacerbations not attributed to respiratory infection or air pollution,<sup>12</sup> impaired coordination between breathing and swallowing may be a key aggravating or causative factor of acute exacerbations in some individuals. Although confirmation is required, this triad of comorbidities (GERD, OSA, and swallowing dysfunction) may heighten the risk of pulmonary aspiration and subsequent acute exacerbation in COPD; the presence of these comorbidities should be considered in those experiencing recurrent acute exacerbations of COPD.

## Disclosure

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