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Title: Increasing oxidative stress and inflammation in patients with exacerbated chronic obstructive pulmonary disease (COPD) and their association with lung function

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Body: Oxidative stress and chronic inflammation are the milestones in pathogenesis of COPD. It is assumed that their increase is associated with a worse lung function and frequent exacerbations. Our aim was to assess changes in antioxidant enzymes superoxide-dismutase (SOD) and glutathione-peroxidase (GPx) activities and inflammatory markers in patients with exacerbated COPD, stable COPD and healthy controls and their association with airway obstruction. We performed a cross-sectional study among 244 participants (mean age 60.5±9.5 years) divided into 3 groups: 76 were with exacerbated COPD (group 1), 65 were with stable COPD (group 2) and 103 were matched healthy subjects (group 3). We performed a questionnaire to define pack years, spirometry and biochemical tests. Oxidative stress was measured by erythrocyte activities of SOD and GPx. Compared to the control group, patients from group 1 had significantly lower SOD and GPx activities ($p<0.0001$), with an increasing trend between groups. ESR and CRP activities were significantly higher in patients with exacerbated COPD ($p<0.0001$). The inflammatory markers correlated positively with pack years ($r=0.15$, $p<0.05$ for ESR and $r=0.242$, $p<0.0001$ for CRP) and negatively with FEV1 % ($r=-0.427$, $p<0.0001$ for ESR and $r=-0.259$, $p<0.0001$ for CRP). Using multiple linear regression we found that SOD and GPx were significantly influenced by FEV1 % ($\beta=0.187$, $p<0.05$ and $\beta=0.219$, $p<0.0001$ resp.). The present study suggests that there is an increased oxidative stress and inflammation in patients with COPD in exacerbation and there is a relationship with the severity of the disease.