Climate Change, Air Pollution, and COPD Outcomes
Too Many Factors to Be Considered, Even Barometric Pressure!

To the Editor,

A recent article by Bernstein and Rice\(^1\) published in CHEST (May 2013) reminds us that climate change may be the single greatest health threat of this century. The authors provided an excellent review focusing on the effects of climate variables on common chronic respiratory diseases, namely asthma and COPD. Some of the studies mentioned include the effects of acute increases in temperature, humidity, ambient ozone, or exposure to wildfire smoke on ED visits or hospitalization due to COPD or asthma. Patients with COPD are also at risk for dying as a result of climate change.

Air pollution studies, on the other hand, have consistently shown an association between exposure to ambient particulates—specifically for fine particulate matter (PM) of aerodynamic diameter < 2.5 \(\mu\)m, measured in \(\mu g/m^3\) (PM\(_{2.5}\))—and daily count of total, respiratory, or cardiovascular mortality.\(^2\) Therefore, air pollutants should also be considered in climate change studies. The majority of climate change or air pollution/hospitalization mortality studies relied on administrative data analyzing retrospective cohorts and were inconsistent in controlling by known confounders, including demographics, holidays, cigarette-smoking habits, socioeconomic status, BMI, influenza epidemics, season of the year, ambient temperature, humidity, barometric pressure, or medication use. \(\beta\)-Blockers are associated with increased mortality in oxygen-dependent patients with severe COPD.\(^3\) Furthermore, COPD severity, the specific cause of hospitalization or death, and even comorbidities and conditions were not available, and the question still remains as to which specific COPD comorbidity conditions are associated with air pollution/climate changes. Indicators for hospitalization in patients with COPD include bacterial or viral pneumonia, cardiac arrhythmia, congestive heart failure, renal or liver failure, inadequate response of symptoms to outpatient management, inability to eat or sleep due to symptoms, worsening hypoxemia, worsening hypercapnia, changes in mental status, inability of the patient to care for her/himself, uncertain diagnosis, inadequate home care, and marked increase in dyspnea.\(^4\) Finally, barometric pressure has not been consistently considered.

A previous study found a positive correlation between barometric pressure and blood oxygen saturation in the elderly,\(^5\) suggesting that barometric pressure may produce physiologic changes, and it should be considered a relevant weather variable in daily time series studies of morbidity and mortality in susceptible populations. Currently, there is a lack of air pollution/climate change studies analyzing the effect of barometric pressure on the population of patients who hypothetically represent probably those most susceptible to changes in barometric pressure (ie, oxygen-dependent patients requiring long-term oxygen therapy secondary to COPD or any other illness causing chronic respiratory failure).

Climate change and air pollution studies represent a challenge for epidemiologists because of the complex analysis of many factors potentially associated with morbidity/mortality. There are still many research questions to be answered in this fascinating field of air pollution, climate change, and their adverse health effects.

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