Ambient fine particulate matter is associated with risk of hospitalization for acute decompensated heart failure among patients with depressed left ventricular ejection fraction.

Background: Air pollution due to particulate matter (PM) may increase the risk of hospitalization for acute decompensated heart failure (HF). However, the influence of clinical characteristics on the susceptibility to air pollution modulate this association is unknown. Accordingly, we evaluated whether the effects of PM differ in HF patients with impaired left ventricular ejection fraction (LVEF) when compared with HF patients with preserved LVEF.

Methods: We reviewed data for patients hospitalized with acute decompensated HF at 10 clinical centers in Santiago, Chile between 2005 and 2008. Daily data for meteorological and particulate air pollution (PM10, PM2.5) were obtained from the MACAM regulatory monitoring network. We evaluated the association between moving averages (1 to 28 days) of PM10 and PM2.5 and risk of hospitalization using a time-stratified case-crossover design, controlling for temperature and dew point. Analyses stratified by LVEF (<50% vs ≥50%).

Results: 386 patients were included (age: 69.3 ± 16.0 years, mean ± SD; 55% male). Overall, a 10 μg/m3 increase in mean PM2.5 levels over the previous 12 days was associated with a 24.4% (95% CI: 0.4%-54.0%) increased risk of hospitalization. The effect of air pollution was markedly stronger among patients with LVEF <50% (n=261) in whom an increase in 10 μg/m3 of PM2.5 lead to an 25.8% (95% CI: 2.8%, 54.0%) increased risk observed within a 5 day moving average, reaching a peak of 81.3% (95% CI: 13.9%, 188.5%) within a 21-day moving average. No associations were observed between PM2.5 and risk of hospitalization among 125 patients preserved LVEF. The results for PM10 were qualitatively similar to those for PM2.5.

Conclusion: Our results suggest that the effects of air pollution due to particulate matter on heart failure patients differ according to clinical characteristics of the disease, with stronger impact on patients with impaired LVEF.