

Link shown between thunderstorms and asthma attacks in metro Atlanta area

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In the first in-depth study of its kind ever done in the Southeastern United States, researchers at the University of Georgia and Emory University have discovered a link between thunderstorms and asthma attacks in the metro Atlanta area that could have a "significant public health impact."

While a relationship between thunderstorms and increased hospital visits for asthma attacks has been known and studied worldwide for years, this is the first time a team of climatologists and epidemiologists has ever conducted a detailed study of the phenomenon in the American South.

The team, studying a database consisting of more than 10 million emergency room visits in some 41 hospitals in a 20-county area in and around Atlanta for the period between 1993 and 2004, found a three percent higher incidence of visits for asthma attacks on days following thunderstorms.

"While a three percent increase in risk may seem modest, asthma is quite prevalent in Atlanta, and a modest relative increase could have a significant public health impact for a region with more than five million people," said Andrew Grundstein, a climatologist in the department of geography at UGA and lead author on the research. Grundstein went on to say that "three percent is likely conservative because of limitations in this study."

The next step for the UGA and Emory team will be, for the first time, to

apply Doppler radar, modeling and observational data to the "thunderstorm asthma" problem based on what Grundstein calls an intriguing initial finding. He points out that "radar data coupled with the metro Atlanta database will allow us to correlate thunderstorm-asthma interactions that we are probably missing today."

Paige Tolbert, professor and chair of the department of environmental and occupational health in the Rollins School of Public Health at Emory and a co-author of the just-published study, said the expertise of the two universities came together strongly in studying the problem.

"The Emory team has experience with a comprehensive emergency department database, and the UGA team can provide a much more refined characterization of thunderstorms than was performed in the previous studies of this question," she said. "The study will thus provide new insight into the mechanisms under the phenomenon of thunderstorm-induced asthma."

The research was published in the online edition of the medical journal *Thorax*. Other authors of the paper include: Marshall Shepherd and Thomas Mote from the UGA department of geography; Luke Naeher from the UGA department of environmental health science; and Stefanie Ebelt Sarnat and Mitchell Klein, who along with Tolbert are from the department of environmental and occupational health in the Rollins School of Public Health at Emory.

About 20 million Americans have asthma, according to the American Academy of Allergy, Asthma and Immunology. There has also been a dramatic increase in reported cases of the disease, with its prevalence increasing 75 percent between 1980 and 1994. Some 5,000 Americans die annually from asthma attacks.

Approximately 210,000 Georgia children under the age of 17 have

asthma, according to the Division of Public Health of the Georgia Department of Human Resources. Some 65 percent of that number had an attack within the last year.

While associations between thunderstorm activity and asthma deaths and emergency room visits have been reported around the world, virtually no studies have been done in the American South, where hundreds of thousands suffer from asthma and thunderstorms are prevalent.

Some people may find it odd that thunderstorms, which supposedly "clear the air" of pollen and pollutants, are implicated in asthma attacks. The most prominent hypothesis as to why it happens, the authors of the paper say, is that "pollen grains may rupture upon contact with rainwater, releasing respirable allergens, and that gusty winds from thunderstorm downdrafts spread particles . . . which may ultimately increase the risk of asthma attacks."

The team used thunderstorm occurrences from meteorological data gathered at Atlanta's Hartsfield-Jackson International Airport and compared that information with the vast database of emergency room visits to arrive at the figure of a three percent increase in asthma-related emergency room visits following thunderstorms for the study period.

In all, during the 11-year period, there were 564 thunderstorm days, and in order to better understand the physical mechanisms that relate thunderstorms and asthma, the team also mined the information on total daily rainfall and maximum five-second wind gusts, which they used as "a surrogate for thunderstorm downdrafts and to indicate the maximum wind speed of the storm."

In all, there were 215,832 asthma emergency room visits during the period and 28,350 of these occurred on days following thunderstorms. While the new study is the first of its kind in the South and does clearly

indicate a relationship between thunderstorms and asthma in the metro Atlanta area, much more work remains, Grundstein said.

"Obtaining a better understanding of the mechanistic basis of the phenomenon of thunderstorm-induced asthma will allow for better intervention strategies and improved emergencies services planning," said Stefanie Ebel Sarnat of Emory. "This will be particularly important in the era of climate change."

Grundstein added that in the Atlanta area conditions favorable for an estimated doubling of severe thunderstorms are expected within this century.

Source: University of Georgia

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