

## **Association between Pediatric Emergency Room Visits for Headache and Fine Particulate Matter (PM<sub>2.5</sub>)**

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**Background:** Headaches have a significant impact on the quality of life of youth. While treatment for pediatric headaches has been well studied, identification of modifiable risk factors has been limited. Adult studies have demonstrated that weather conditions including temperature, humidity, barometric pressure and air pollution as measured by fine particulate matter (PM<sub>2.5</sub>) can trigger headaches. However, none of these studies have explored this association in the pediatric population. Identification of environmental triggers can have a significant impact on public policy regarding air quality as well as counseling for youth who suffer from primary headache disorders, including migraines.

**Objective:** To determine if environmental fine particulate matter (PM<sub>2.5</sub>) is correlated with presentation to a pediatric emergency department (ED) with headache.

**Design/Methods:** We utilized a retrospective chart review with a case-crossover design where participants act as their own control. We included all children  $\leq 18$  years old with chief complaint/primary diagnosis of headache treated in the Lurie Children's Hospital Emergency Department during the study period (June 2007-December 2011) with home zip code in Cook County, IL. We included only the first ED visit in individuals with multiple visits. We excluded those with a secondary cause of headache, including but not limited to VP shunt malfunction, intracranial mass, or current febrile illness. We utilized the CDC's WONDER database to extrapolate fine particulate matter (PM 2.5  $\mu\text{g}/\text{m}^3$ ) in Cook County, IL on the index date and on 3-4 other same calendar dates within that month to serve as control dates. We then compared the PM<sub>2.5</sub> on the index date to the average of the control dates using conditional logistical regression analysis and stratified exposure periods on the index date and 24-hr and 48-hr lagged exposure intervals.

**Results:** The final analysis included 1589 participants, with 760 males (47.8%), 829 females (52.1%) with an average age of 10.9 years. There was no association between index and control dates PM<sub>2.5</sub>, adjusted odds ratio 0.996 (95% CI 0.986, 1.01) on the index date, and at the 24-hr [0.996 (95% CI 0.98, 1.005)], 48-hr [0.997 (95% CI 0.988, 1.006)] lagged exposure intervals.

**Conclusion(s):** There was no association between environmental fine particulate matter (PM<sub>2.5</sub>) and presentation to pediatric ED for primary headache in children.