

# A CASE-CROSSOVER STUDY OF AMBIENT AIR POLLUTION AND STROKE: AN EVALUATION OF PATIENT FACTORS THAT MODIFY ASSOCIATIONS

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**Background:** Several studies have demonstrated positive associations between short-term increases in ambient air pollution and the risk of stroke. While these studies have compared risks across different seasons, type of stroke, and age, the influence of individual level patient characteristics has remained unstudied.

**Methods:** This was a time-stratified case-crossover of 5,945 patients who presented to emergency departments (ED) in Edmonton, Canada between 2003 and 2009 with stroke or a transient ischemic attack (TIA). Chart reviews were conducted to extract information on patient's disease history, medication use and smoking status. Daily concentrations of ambient pollution ( $\text{NO}_2$ ,  $\text{PM}_{2.5}$ ,  $\text{O}_3$ ,  $\text{CO}$ , and  $\text{SO}_2$ ) were obtained from fixed-site monitors. Conditional logistic regression was used to estimate odds ratios (OR) and 95% confidence intervals (CI) in relation to an increase in the interquartile range of each pollutant. Stratified analyses were conducted by season, and across variables that captured patient's disease history, medication use and smoking status.

**Results:** Consistent with a previous ED study conducted during 1992-2002, we observed positive associations between  $\text{NO}_2$ , and  $\text{PM}_{2.5}$  between April to September. Specifically, for ischemic stroke the OR for an increase in the interquartile range of the 3-day average of  $\text{NO}_2$  was 1.57 (95% CI: 1.16-2.11). No statistically significant associations were observed with  $\text{NO}_2$  or  $\text{PM}_{2.5}$  for TIAs, or hemorrhagic strokes.  $\text{SO}_2$  levels were not associated with any of the stroke types examined. Stratified analysis by patient characteristics for ED visits between April and September revealed stronger associations between  $\text{NO}_2$  and ischemic stroke for those with a history of stroke (OR=2.43, 95% CI: 1.44-4.08), or heart disease (OR=2.08, 95% CI: 1.25-3.46), and use of insulin or oral hypoglycaemic drugs (OR=2.19, 95% CI: 1.22-3.95).

**Conclusions:** Our results support the hypothesis that individuals with pre-existing comorbid health conditions are at greater risk of experiencing a stroke due to their exposure air pollution.