MedicalXpress

Weaker breaths in kids linked to early pesticide exposure

December 3 2015

Taking a deep breath might be a bit harder for children exposed early in life to a widely used class of pesticides in agriculture, according to a new paper by researchers at the University of California, Berkeley.

A new study has linked the levels of organophosphate pesticide metabolites in the urine of 279 children living in California's Salinas Valley with decreased lung function. Each tenfold increase in concentrations of organophosphate metabolites was associated with a 159-milliliter decrease in lung function, or about 8 percent less air, on average, when blowing out a candle. The magnitude of this decrease is similar to a child's secondhand smoke exposure from his or her mother.

The findings, to be published Thursday, Dec. 3, in the journal *Thorax*, are the first to link chronic, low-level exposures to organophosphate pesticides—chemicals that target the nervous system—to lung health for children.

"Researchers have described breathing problems in agricultural workers who are exposed to these pesticides, but these new findings are about children who live in an agricultural area where the organophosphates are being used," said study senior author Brenda Eskenazi, a professor of epidemiology and of maternal and child health. "This is the first evidence suggesting that children exposed to organophosphates have poorer lung function."

The children were part of the Center for the Health Assessment of

Mothers and Children of Salinas (CHAMACOS), a longitudinal study in which the researchers follow children from the time they are in the womb up to adolescence.

The researchers collected urine samples five times throughout the children's lives, from age 6 months to 5 years, and measured the levels of organophosphate pesticide metabolites each time. When the children were 7 years old, they were given a spirometry test to measure the amount of air they could exhale.

The study accounted for other factors that could affect the results, such as whether the mothers smoked, air pollution, presence of mold or pets in the home and proximity to highways.

"The kids in our study with higher pesticide exposure had lower breathing capacity," said study lead author Rachel Raanan, who conducted the research while she was a postdoctoral scholar in Eskenazi's lab. "If the reduced lung function persists into adulthood, it could leave our participants at greater risk of developing respiratory problems like COPD (chronic obstructive pulmonary disease)."

The study did not examine the pathways for the children's exposure to pesticides, but the researchers did recommend that farmworkers remove their work clothes and shoes before entering their homes. They also suggested that when nearby fields are being sprayed with pesticides, children be kept away and, if indoors, windows should be closed. Pesticide exposure can also be reduced by washing fruits and vegetables thoroughly before eating.

"This study adds exposure to organophosphate pesticides to the growing list of environmental exposures—including air pollution, indoor cook stove smoke and environmental tobacco smoke—that could be harmful to the developing lungs of children," said Raanan. "Given they are still

used worldwide, we believe our findings deserve further attention."

The authors noted that although organophosphate pesticides are still widely used, most residential uses of organophosphate pesticides in the United States were phased out in the mid-2000s. In California, use of organophosphates in agriculture has also declined significantly from 6.4 million pounds in 2000, when the study began, to 3.5 million pounds in 2013, the year with the most recent pesticide use data. Just last month, the U.S. Environmental Protection Agency proposed eliminating all agricultural uses of chlorpyrifos, one of the most heavily used organophosphates, and others are also under evaluation, steps that will continue the trend of declining use.

"Chronic obstructive pulmonary disease is an increasing cause of death around the world," said study co-author and pulmonary specialist Dr. John Balmes, a UC Berkeley professor of environmental health sciences with a joint appointment at the UC San Francisco School of Medicine. "Since we know that reduced lung function increases the risk for COPD, it is important to identify and reduce environmental exposures during childhood that impair breathing capacity."

Provided by University of California - Berkeley