

More Evidence Agricultural Pesticides Up Autism Risk

By Megan Brooks

A new study strengthens the evidence linking prenatal exposure to organophosphates and other commonly applied agricultural pesticides to the development of autism spectrum disorder (ASD) and developmental delay (DD).

“This is actually the third study to show some link with organophosphates and autism risk,” principal investigator Irva Hertz-Picciotto, PhD, MPH, professor of public health sciences at the University of California (UC) Davis MIND Institute, in Sacramento, California, said in a podcast.

“In that early developmental gestational period, the brain is developing synapses...and may well be where these pesticides are operating and affecting neurotransmission,” she added in a statement.

The study was published online June 23 in Environmental Health Perspectives.

California: 200 Million Pounds of Pesticides

California is the top state in the nation for agricultural production, grossing \$38 billion in revenue from farm crops in 2010. Statewide, approximately 200 million pounds of active pesticides are applied each year.

Dr. Hertz-Picciotto and colleagues looked for associations between living near agricultural pesticides during pregnancy and risk for ASD and DD in 970 participants in the Northern California– based Childhood Risk of Autism from Genetics and the Environment (CHARGE) Study.

The analysis included 486 children with ASD, 168 with DD, and 316 typically developing children. The investigators linked commercial pesticide application data from the California Pesticide Use Report to participants’ residential addresses during pregnancy.

“We mapped where our study participants lived during pregnancy and around the time of birth. In California, pesticide applicators must report what they’re applying, where they’re applying it, dates when the applications were made, and how much was applied,” Dr. Hertz-Picciotto explained in a statement.

“What we saw were several classes of pesticides more commonly applied near residences of mothers whose children developed autism or had delayed cognitive or other skills,” she added.

About one third of participants lived in close proximity - within 1.25 to 1.75 kilometers - of commercial pesticide application sites.

For any exposure during pregnancy (vs no exposure), children with ASD were 60% more likely to have organophosphates applied near their home (1.25-km distance; adjusted odds ratio [aOR], 1.60; 95% confidence interval [CI], 1.02 - 2.51), relative to typically developing children.

The risk was higher for exposure to organophosphates in the third trimester (OR, 2.0; 95% CI, 1.1 - 3.6) and exposure to chlorpyrifos in the second trimester (OR, 3.3; 95% CI, 1.5 - 7.4).

In addition, children of mothers living near pyrethroid insecticide applications in the 3 months before becoming pregnant or during the third trimester were at increased risk for both ASD and DD, with ORs ranging from 1.7 to 2.3, the researchers found.

Organophosphates and pyrethroids are 2 of the most commonly applied agricultural pesticides.

Children with DD were nearly 150% more likely to have had carbamate pesticides applied near their home during their mother's pregnancy (1.25-km distance; aOR, 2.48; 95% CI, 1.04 - 5.91), but no specific vulnerable periods were identified.

Dr. Hertz-Picciotto and colleagues note that the positive associations lessened as the buffer size grew larger, "lending support to an exposure-response gradient." A similar study published in 2007 also found associations to be stronger for residences closest to the sites of pesticide application.

"We need to open up a dialogue...at both a societal and individual level" about how to reduce exposures to chemical pesticides. "If it were my family, I wouldn't want to live close to where heavy pesticides are being applied," Dr. Hertz-Picciotto said.

Growing Evidence

Commenting on the study for Medscape Medical News, Armin Alaedini, PhD, from the Department of Medicine and the Institute of Human Nutrition, Columbia University Medical Center, New York City, said that overall the data "add to the accumulating evidence that points to certain widely used agricultural pesticides as potential contributing factors to increased risk of developing autism."

However, he cautioned that the results for DD "are less robust, because the individuals in this group were not matched with unaffected controls and were substantially different on a number of characteristics."

"As the authors concede, this study did not take into account all sources of exposure to the chemicals considered, such as through their use in homes or schools for the purpose of gardening and pest control," he noted. "In fact, it is not clear how significant the contribution of such nonagricultural uses of these specific pesticides would be to one's total exposure. Ingestion of these chemicals, which are used on some fruits and vegetables and can also be detected in drinking water, is another way by which one may be exposed during pregnancy."

"Although not discussed in this study, it would be interesting to see whether and how the history and the extent of the use of these particular pesticides in recent years correlate with the rates of autism in the United States. That could be helpful in gaining a more nuanced understanding of the relevance and contribution of these compounds to the overall rise in the prevalence of autism," Dr. Alaedini said.

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