Pesticides Linked to Increased Risk of Diabetes

Becky McCall | |September 25, 2015

Exposure to pesticides significantly increases the risk of type 2 diabetes by nearly 60%, finds an extensive literature review presented at the the European Association for the Study of Diabetes 2015 Meeting last week.

Fotini Kavvoura, MD, PhD, clinical lecturer in diabetes from the University of Oxford, United Kingdom, presented the poster detailing her research and was representing her coauthors from Imperial College London, United Kingdom, and the University of Ioannina, Greece.

"Our study suggests that pesticides increase the risk for type 2 diabetes, although we can't be certain that this is a causative association," Dr Kavvoura said to *Medscape Medical News*.

"But we have shown in more than 80,000 individuals that exposure to any pesticide increases the risk of diabetes by approximately 60% [odds ratio (OR), 1.58; $P < .001$], a result that is highly statistically significant."

The study was an extension of a similar study carried out in 2013, commissioned by the European Food and Safety Authority (EFSA) that looked at possible links between pesticides and diabetes between the years 2006 and 2013. For this current analysis, the authors further included papers published before 2006 and after 2013.

"Given that we had already shown an increase in type 2 diabetes in this earlier report, we thought it would be interesting to explore other, more extensive sources of evidence too," Dr Kavvoura remarked.

She explained that underlying the study was a need to understand what has been causing the exponential increase in prevalence of type 2 diabetes in recent years.

"We know that it is a multifactorial disease involving genetic causes as well as environmental and lifestyle factors; however, genetics cannot be responsible for all this increase in the past few decades," she observed.

Commenting on the findings, diabetologist Mushtaquar Rahman, MD, of London North West Healthcare NHS Trust, said, "It's an interesting study because it looks at endocrine disruptors."

But some clarification may be needed as to how exposure occurred, he noted, and there could be confounding from carbohydrate consumption, particularly in some regions, such as Southeast Asia, where eating rice has been associated with diabetes.

"Nevertheless, this may well be something that governments need to look into as one factor involved in the increasing incidence of type 2 diabetes. It's important for public health," continued Dr Rahman.

DDT and DDE Most Strongly Associated With Diabetes

A total of 25 peer-reviewed, observational studies were evaluated in the meta-analysis, including 22 studies on type 2 diabetes, one on type 1 diabetes, and two on gestational diabetes, conducted in North America, Europe, and Asia-Pacific.

Pesticides included in the studies were chlordane, oxychlordane, trans-nonachlor, dichlorodiphenyltrichloroethane (DDT), p,p'-DDT, dichlorodiphenyldichloroethylene (DDE), and p,p'-DDE.

Nineteen of the studies used a blood or urine biomarker to assess pesticide exposure, which is the most accurate measure, and these together gave an odds ratio for diabetes of 1.75. Three used a questionnaire (OR, 1.10 for diabetes associated with pesticide exposure).

Fifteen of the studies examined environmental exposure only (OR, 1.81), while five investigated occupational or both types of exposure (OR, 1.10).

The pesticides most strongly associated with diabetes were DDE and DDT, with odds ratios of 1.79 and 1.95, respectively, Dr Kavvoura explained.

Toxic Effects Remain in Body Fat for Many Years

Although all the pesticides evaluated have been banned worldwide, Dr Kavvoura explained that "in general, pesticides are lipophilic and accumulate in body fat either through direct exposure or through the food chain, and over the years, they expose the individual to their effects."

And research suggests that that pesticides promote fat storage in the liver, pancreas. and muscles and, in turn, insulin resistance and a range of health problems, including type 2 diabetes.

Dr Kavvoura said regulatory agencies, including the EFSA, should take these new findings into consideration when developing guidelines on pesticide use in the future.

However, she noted that further studies would need to be done to better understand the pathophysiological mechanisms underlying the pesticide-diabetes association.

Her team is currently performing further analyses to assess whether body mass index (BMI) has a confounding effect on the findings, she explained.

Pregnancy Exposure Quadruples Risk of Gestational Diabetes

Another poster presented at the EASD meeting found that women exposed to organic pollutants in early pregnancy had a fourfold increased risk of gestational diabetes compared with those who were not subject to such exposure.

The research was conducted by Leda Chatzi, MD, assistant professor of nutritional epidemiology from the University of Crete, Heraklion, Greece, and her colleagues.

"These findings suggest that women with high exposure to polychlorinated biphenyls (PCBs) in early pregnancy have a higher risk for developing insulin resistance and gestational diabetes," Dr Chatzi told *Medscape Medical News*.

Exposure to such endocrine-disrupting chemicals is therefore one of the modifiable risk factors contributing to insulin resistance.

"Because pregnant women with gestational diabetes may be more prone to suffer the diabetogenic effect of these pollutants, it is important to develop preventive interventions in pregnancy, including dietary and lifestyle changes to minimize early life exposure to [persistent organic pollutants]," she added.

The chemicals investigated in this study are banned. "But because they persist in the environment, the general population is still exposed to them at low doses, and adverse health outcomes related to background levels of exposure are still a concern."

Dr Kavvoura, Dr Chatzi, and Dr Rahman have declare no relevant financial disclosures.

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