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Study links grape consumption in rural Latvia to sharply higher pesticide traces in urine

Researchers found acetamiprid in 66.7% of grape eaters, suggesting imported produce may be a key exposure source

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A study published Thursday in Scientific Reports found that adults and children in rural Latvia were more likely to show pesticide traces in urine after eating certain fruits and vegetables, with grape consumption standing out as one of the clearest links.

The research used data from the European human biomonitoring project HBM4EU SPECIMEn and analyzed 101 adult-child pairs living in rural parts of Latvia. Researchers collected morning urine samples from all participants and compared the results with food diaries covering the previous 24 hours.

The team reported that eating apples, bananas, eggplants or zucchini, grapes, pears and processed potato products was consistently tied to higher detection rates for pesticide biomarkers. Among people who had eaten grapes, acetamiprid was detected in 66.7% of urine samples, compared with 31.8% among non-consumers. Among those who had eaten French fries or chips, 73.6% had chlorpropham detected, versus 25.9% of non-consumers.

Statistical modeling supported several of those links. Apple consumption was associated with higher odds of detecting acetamiprid, with an odds ratio of 2.49 and a 95% confidence interval of 1.51 to 4.09. Banana consumption was associated with higher odds of detecting boscalid, with an odds ratio of 2.66 and a 95% confidence interval of 1.34 to 5.28.

The authors said this was the first study to systematically examine how dietary habits affect pesticide exposure in Latvia’s rural population. They used suspect screening with full-scan liquid chromatography coupled to high-resolution mass spectrometry to identify pesticide metabolites in urine.

Overall detection frequencies in the Latvian sample included acetamiprid at 32.8%, chlorpropham metabolite 4-HSA at 31.6%, boscalid-related biomarkers at 18.4% and 20%, triclosan conjugates at 16.2%, pyrimethanil-related biomarkers at 14.4%, ametoctradin-related biomarkers at 12.7% and imazalil-related biomarkers at 10.7%, according to the paper’s appendix.

The researchers found no significant differences between organic or homegrown foods and conventional items in this dataset. They also said the presence of pesticides not registered for use in Latvia, including acetamiprid, pyrimethanil and imazalil, suggests imported foods are an important source of exposure.

That point could matter beyond public health policy. Because grapes are a direct raw material for juice and wine, the findings may add to pressure for closer monitoring of pesticide residues in fruit supply chains and for reviews of farming practices and residue limits relevant to beverage producers.

Participants were recruited from rural areas, including heavily farmed regions such as Kurzeme and Zemgale as well as other rural locations because of recruitment challenges. The broader project compared people living near agricultural land with those farther away, but this paper focused on diet-related exposure patterns using food records and urine testing.

People living within 250 meters of agricultural fields were classified as potentially more exposed, while those living at least 500 meters away were treated as controls in the original study design. The study excluded city residents, agricultural workers and people unable to provide urine samples because of urinary tract infections or catheter use.

The paper said all participants gave informed consent and that the work was approved by the ethics committee at Rīga Stradiņš University. Recruitment, sampling, surveys and urine testing were funded through the European Union’s Horizon 2020 program under HBM4EU, while additional analysis and drafting were supported by Latvia’s national research program on human biomonitoring.