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Dietary pesticide exposure profiles in the NutriNet-Santé cohort

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Abstract

Pesticides are used in large quantities in current agriculture all over Europe. Some pesticides are suspected of having negative effects on human health. While the risk associated with occupational exposure is getting well-documented, evidence of dietary exposure to these molecules in the general population is lacking. The aim of this study is to describe dietary exposure to pesticides among NutriNet-Santé cohort participants².

NutriNet-Santé is a web-based cohort of French middle-aged adults launched in 2009. BioNutriNet is an ancillary study launched in 2014, aiming to measure organic and conventional food consumption and evaluate different dimensions of diet sustainability. Dietary intake of organic and conventional foods was assessed using a 264 items self-administered semi-quantitative food frequency questionnaire. Exposure to 25 commonly used pesticides was evaluated using contamination data from CVUA Stuttgart accounting for farming system. Dietary pesticide exposure profiles were identified using Non-Negative Matrix factorization (NMF), specially adapted for non-negative data with excess zeros. The NMF scores were then introduced in a hierarchical clustering process. Identified clusters were described in terms of sociodemographics, dietary patterns and exposure to pesticides.

A total of 34,442 participants were selected. Four clusters were identified. All clusters seemed to be exposed to the same molecules, with gradual intensity. The first cluster was characterized by the lowest energy-intake, highest organic food consumption (26.9%) and lowest dietary pesticide exposure; participants had highest consumption levels of organic food groups, including fruits and vegetables. Proportion of male participants and of rural residents was higher than in other groups. Clusters 2 and 3 were characterized by intermediate energy intake, and low organic food consumption. High conventional fruits and vegetables intake and moderate pesticide exposure were observed in cluster 2, composed of a lower smokers' proportion. Cluster 3 individuals were less exposed to pesticides than clusters 2 and 4, except for Spinosad and Pyrethrins. Cluster 4 was characterized by the highest energy intake, lowest organic food consumption (12.2%), and highest pesticide exposure; high consumption levels of conventional fruits, vegetables and a higher proportion of vegetarians were observed. This cluster was composed of 85.6% female participants, mainly retired (47.5%), mostly living in cities of 200 000 inhabitants and more (48.2%), and physically active.

Dietary pesticide exposures seem to vary across the clusters and depending on the proportion of organic food in the diet. High consumers of conventional fruits and vegetables consumers seem to be more exposed to our selection of pesticides.

Conflict of Interest

There is no conflict of interest.