Reduction in urinary organophosphate pesticide metabolites in adults after a week-long organic diet

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Abstract

Background

Conventional food production commonly uses organophosphate (OP) pesticides, which can have negative health effects, while organic food is deemed healthier because it is produced without these pesticides. Studies suggest that organic food consumption may significantly reduce OP pesticide exposure in children who have relatively higher pesticide exposure than adults due to their different diets, body weight, behaviour and less efficient metabolism.

Objectives

A prospective, randomised, crossover study was conducted to determine if an organic food diet reduces organophosphate exposure in adults.

Methods

Thirteen participants were randomly allocated to consume a diet of at least 80% organic or conventional food for 7 days and then crossed over to the alternate diet. Urinary levels of six dialkylphosphate metabolites were analysed in first-morning voids collected on day 8 of each phase using GC–MS/MS with detection limits of 0.11–0.51 µg/L.

Results

The mean total DAP results in the organic phase were 89% lower than in the conventional phase (*M*=0.032 [SD=0.038] and 0.294 [SD=0.435] respectively, *p*=0.013). For total dimethyl DAPs there was a 96% reduction (*M*=0.011 [SD=0.023] and 0.252 [SD=0.403] respectively, *p*=0.005). Mean total diethyl DAP levels in the organic phase were half those of the conventional phase (*M*=0.021 [SD=0.020] and 0.042 [SD=0.038] respectively), yet the wide variability and small sample size meant the difference was not statistically significant.

Conclusions

The consumption of an organic diet for one week significantly reduced OP pesticide exposure in adults. Larger scale studies in different populations are required to confirm these findings and investigate their clinical relevance.

Keywords

Biomonitoring;
Organophosphate pesticides;
Dialkylphosphate metabolites;
Organic diets;
Organic food