Moving toward a Mediterranean diet to reach nutritional adequacy does not necessarily increase the exposure to food contaminants: a modeling approach in the French women population

A modeling approach in the French women population

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Context and objective

Existing dietary guidelines do not explicitly or quantitatively take into account food safety considerations. The aim of the present study was to assess whether a nutritionally adequate diet would be compatible with food safety recommendations.

Methodology

MEAN OBSERVED diet (OBS)

Food consumption data:
French Individual and National Food Consumption Study (INCA2) → 205 food items

Toxicological data:
French Total Diet Study 2 (EAT2) → 45 contaminants

Nutrient composition data:
Macronutrients, essential fatty acids, free sugars, fibers, 11 vitamins, 10 minerals

DIET MODELING

Minimization of the departure from the mean observed diet

Realism constraints on food and food-groups quantities

Toxicological constraints:
Contaminant diet contents ≤ Observed contents & ≤ TRV (Toxicological Reference Values)

Nutritional constraints:
Nutrients contents ≥ French RDA (Recommended Dietary Allowances)

MODELED diets

- NUT diet
- NUTOX diet

Results

- **OBS diet**: contaminant contents were below the Toxicological Reference Values. Recommended Dietary Allowances were not all fulfilled (ω3 fatty acids, fibers, vit. D, magnesium…) while some nutrients were in excess (saturated fatty acids, free sugar), typically of the Western dietary pattern
- **NUT diet**: as compared to OBS diet, the main dietary changes were:
  - increases of fruit and vegetable (+100%), unrefined starchy foods (+100%), and fish (+66%) (Fig.1). Mixed dishes, animal fats and meat decreased. Those dietary changes are characteristic of a move toward a Mediterranean diet.
  - increases of contaminant contents, while remaining below the TRV, were noticed for non-dioxin like PCBs and Dioxin-like Compounds, cadmium, and few pesticides (Fig.2).
- **NUTOX diet**: As compared to NUT diet:
  - fruit and vegetable, unrefined starches and fish still increased in the NUTOX model, although in slightly lower amounts for fruit and vegetable (Fig.1). Diet composition changes occurred mainly at the food item level within food groups. For example, there was a switch from apple to pear within the fresh fruits family.

Conclusion

Diet changes needed to reach nutritional adequacy tends to fit with the Mediterranean diet but they might increase the exposure to some contaminants. Making specific choices within food-groups would allow reaching nutritional adequacy without increasing the contaminant content of the diet.