BIOMONITORING OF NON-PERSISTENT PESTICIDES IN URINE FROM LACTATING MOTHERS: EXPOSURE AND RISK ASSESSMENT

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INTRODUCTION
Organophosphate insecticides (OPs), synthetic pyrethroids and some herbicides are the most widely used pesticides in the world6. The majority of these pesticides have genetic, epigenetic, oxidative stress and endocrine-disrupting effects in humans and we can be exposed to them by three pathways: inhalation of air, dermal contact and ingestion of food and water7.

Human biomonitoring allows one to determine a human’s internal exposure to pesticides from all routes of exposure. OPs, pyrethroids and herbicides are quickly metabolized and excreted via urine within 4 – 72 h after exposure3. Therefore, the analysis of these non-persistent pesticide metabolites in urine is a useful strategy in order to obtain valuable information about recent exposure to pesticides through all possible sources and to interpret biomonitoring data in a risk assessment context4.

The objectives of this study were: i) to determine the urinary levels of currently used pesticide metabolites in Spanish lactating mothers; ii) to identify correlations between urinary levels of pesticide metabolites and sociodemographic characteristics, dietary habits and use of pesticides of the target population; and, iii) to perform a risk assessment for the most frequently detected pesticides.

STUDY DESIGN

June – November 2015

Valencia

First-morning urine sample

Questionnaire

N = 116

CHEMICAL ANALYSIS

SAMPLE PRETREATMENT

- Human urine sample
- Internal standard: enzyme (any specific metabolite), and buffer

Incubation: 24 h

+ QuEChERS extraction salts

Vortex (1 min) + Centrifugation (4000 rpm, 10 min, 10ºC)

Collect organic phase

Transfer to vial

LC-MS/MS ANALYSIS

PRECONCENTRATION

Evaporation until dryness (SPC, 10ºC)

Dissolution (200 µl) + Vortex (1 min)

FILTRATION

RESULTS

Detection frequencies ranged from 0% (2,4,5-T) to 91% (DEP)

In 99% of the samples, at least one pesticide metabolite was detected

predictors of exposure

Risk Assessment

Individual exposure to pesticides (HQ)

Parathion

Dimethoate

Chlorpyrifos

Deltamethrin

Exposure to OPs (HI)

0.06

0.27

GM

P95

CONCLUSIONS

1. Closeness to farming activities, place of residence and presence of garden or plants at home seemed to be important contributors to the exposure to pesticides

2. These mothers were mostly exposed to deltamethrin and chlorpyrifos. However, none of these pesticides exceeded the safety limit, and therefore a relatively low health risk was obtained

REFERENCES