

## Association between Organophosphate Pesticides Exposure and Cognitive Behavior in Taipei Children

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**Abstract :** Background: Organophosphate pesticides (OPs) are the most heavily used pesticides in agriculture in Taiwan. Therefore, they are commonly detected in general public including pregnant women and children. These compounds are proven endocrine disrupters that may affect the neural development in humans. The aim of this study is to assess the OPs exposure of children in 2 years of age and to examine the association between the exposure concentrations and neurodevelopmental effects in children. Methods: In a prospective cohort of 280 mother-child pairs, urine samples of prenatal and postnatal were collected from each participant and analyzed for metabolites of OPs by using gas chromatography-mass spectrometry. Six analytes were measured including dimethylphosphate (DMP), dimethylthiophosphate (DMTP), dimethyldithiophosphate (DMDTP), diethylphosphate (DEP), diethylthiophosphate (DETP), and diethyldithiophosphate (DEDTP). This study created a combined concentration measure for dimethyl compounds (DMs) consisting of the three dimethyl metabolites (DMP, DMTP, and DMDTP), for diethyl compounds (DEs) consisting of the three diethyl metabolites (DEP, DETP, and DEDTP) and six dialkyl phosphate (DAPs). The Bayley Scales of Infant and Toddler Development (Bayley-III) was used to assess children's cognitive behavior at 2 years old. The association between OPs exposure and Bayley-III scale score was determined by using the Mann-Whitney U test. Results: The measurements of urine samples are still on-going. This preliminary data are the report of 56 children aged 2 from the cohort. The detection rates for DMP, DMTP, DMDTP, DEP, DETP, and DEDTP are 80.4%, 69.6%, 64.3%, 64.3%, 62.5%, and 75%, respectively. After adjusting the creatinine concentrations of urine, the median (nmol/g creatinine) of urinary DMP, DMTP, DMDTP, DEP, DETP, DEDTP, DMs, DEs, and DAPs are 153.14, 53.32, 52.13, 19.24, 141.65, 192.17, 308.8, 311.6, and 702.11, respectively. The concentrations of urine are considerably higher than that in other countries. Children's cognitive behavior was used three scales for Bayley-III, including cognitive, language and motor. In Mann-Whitney U test, the higher levels of DEs had significantly lower motor score ( $p=0.037$ ), but no significant association was found between the OPs exposure levels and the score of either cognitive or language. Conclusion: The limited sample size suggests that Taipei children are commonly exposed to OPs and OPs exposure might affect the cognitive behavior of young children. This report will present more data to verify the results. The predictors of OPs concentrations, such as dietary pattern will also be included.

**Keywords :** biomonitoring, children, neurodevelopment, organophosphate pesticides exposure

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