URINARY DIALKYL PHOSPHATE LEVELS BEFORE AND AFTER FIRST SEASON CHLORPYRIFOS SPRAY AMONGST FARM WORKERS IN THE WESTERN CAPE, SOUTH AFRICA

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Background and Aims: Chlorpyrifos, an organophosphate (OP) insecticide associated with neurotoxic, reproductive and developmental effects [Perera et.al., 2005] is commonly used worldwide (Barr & Angerer, 2006) including in South Africa. The study investigated urinary levels of dialkyl phosphates (DAP), an OP biomarker, resulting from pesticide exposure amongst 40 farm workers.
Methods: Workers were tested (urinary DAP levels, anthropometry, short exposure questionnaire) before and after the first day of seasonal chlorpyrifos spraying.
Results: The workers (mean age = 42.2, SD: 61.1 years) were mostly male (65%). Median baseline urinary DAP was high amongst both non-applicators (1587.5 µg/g creatinine, n = 8) and applicators (365.6 µg/g creatinine, n = 9). There was not much evidence of an increase in post-spray DAP levels from pre-spray levels amongst both applicators and non-applicators. Hours mixing, spraying, driving a tractor and hours worked by non-applicators were not significantly associated with an increase in post-spray DAP levels adjusting for age, height, weight, gender, use of empty pesticide containers and self-reported kidney problems. Past applicator status was weakly positively associated with pre-spray DAP levels adjusting for age, height, weight, and gender, self-reported kidney problems, smoking and alcohol (• = 1019.5, p = 0.307, R^2 = 0.28.
Conclusions: The relationship between pesticide exposure and OP bio-monitoring require further investigation. The high DAP levels call for an epidemiological investigation into the health effects of OP pesticides.
References:
Perera FP, Rauh V, Whyatt RM, Tang D, Tsai WY, Bernert JT, Tu YH, Andrews H, Barr DB, Camann D E, Diaz D, Dietrich J, Reyes A, Kinney PL (2005). A summary of recent findings on birth outcomes and developmental effects of prenatal ETS, PAH, and pesticide exposures. Neurotox. 26: 573-587.

Barr DB & Angerer J (2006). Potential uses of biomonitoring data: a case study using the organophosphorus pesticides chlorpyrifos and malathion. Environ Health Perspect. 114: 1763–1769.