

Occupational Paraquat exposure among sugarcane and vegetable farmers in Sri Lanka: A case study

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Paraquat (1, 1 – dimethyl -4, 4- bipyridylium dichloride) is a contact herbicide, predominantly used in Sri Lanka. Despite the imposed ban in agriculture sector, Paraquat usage was seen among sugarcane farmers in Pelawatta compared to vegetable farmers in Nuwara Eliya. Therefore the level of Paraquat exposure was studied among sugarcane farmers comparing that with vegetable farmers. Sugarcane farmers [Warunagama GS, (n=44); Rahathangama GS (n=20)] and vegetable farmers (n=16) were selected based on pesticide usage and farming practices. Paraquat concentration in urine samples (U-PQ) were analyzed using competitive enzyme-linked immunosorbent assay (ELISA) method using commercial kits (US Biocontract Inc., San Diego, CA) and (U-PQ) concentrations were determined by 4PL nonlinear regression model. Differences of U-PQ and creatinine adjusted U-PQ among the locations were compared using one-way ANOVA followed by Dunnett's test using IBM statistics 22. Measureable levels of urinary-Paraquat (U-PQ) were detected in all study groups. Highest concentrations of U-PQ were detected in Warunagama sugarcane farmers (mean, $3.25 \pm 0.29 \mu\text{g/g Cr}$) and lowest concentrations of U-PQ were detected in urine samples of Nuwara Eliya vegetable farmers (mean, $0.603 \pm 0.03 \mu\text{g/g Cr}$). Urine samples of Warunagama sugarcane farmers recorded significantly higher levels of U-PQ compared to the control group and Nuwara Eliya vegetable farmers ($P < 0.001$), indicated continuous usage of Paraquat by sugarcane farmers (Warunagama). But U-PQ concentrations in sugarcane farmers in Rahathangama were not significantly different from the control group and Nuwara Eliya vegetable farmers ($P > 0.05$). As measurable levels of U-PQ was detected in urine samples of all study groups non-occupational exposure by Paraquat was evident which warrants further studies and remedial measures.

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