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## Method development for the investigation of pesticide residues in soil and heavy metal contamination in pesticides in selected Chronic Kidney Disease of unknown etiology (CKDu) affected areas in Medawachchiya

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Chronic Kidney Disease of unknown etiology (CKDu) has become one of the major public health problems in the North Central Province in Sri Lanka. There is a major concern that the agrochemicals could contribute to CKDu because North Central Province is an agricultural area where agrochemicals have been used for a prolonged period of time. Pesticides could affect the environment either by remaining in the environment as their residues or as a source of heavy metals in the environment. The purpose of this research is to optimize a method for the qualitative analysis of pesticide residues in soil. Puhudivula grama niladhari division which is an area with a high recorded number of CKDu patients in Medawachchiya was selected as the sampling area. Five representative soil samples each from six paddy fields were collected for the study. This study includes qualitative soil analysis of selected pesticide residues such as *Profenofos*, *Diazinon* and *Imidacloprid*, which are the most commonly used paddy field pesticides in Medawachchiya. The presence of these pesticide residues in agricultural soil were analyzed by a Soxhlet extraction method followed by High-Performance Liquid Chromatography (HPLC) and method optimization was carried out according to the matrix. Pesticide residues were absent or below the detection limits. Further studies are required to minimize the background interference from matrix and LC- MS studies are required for the quantification of the residues. The study also includes quantification of heavy metals such as Pb, Cd, Cr and Cu in pesticides by the flame atomic absorption spectroscopy (FAAS). Both commercially available solid pesticides such as *Nativo*, *Mancozeb* and liquid pesticides such as *Greenup*, *Profenofos* obtained from Medawachchiya area were used for this analysis. When it comes to solid pesticides, *Mancozeb* showed the highest Pb, Cd, Cr and Cu concentrations as  $5.163 \pm 0.283$  mg/kg,  $7.329 \pm 0.038$  mg/kg,  $2.963 \pm 0.207$  mg/kg,  $4.246 \pm 1.706$  mg/kg respectively. The method recovery values of the quantification of heavy metals in solid pesticides were above 70.00%. From liquid pesticides, *Profenofos* showed the highest Pb, Cd, Cr and Cu concentrations as  $1.533 \pm 0.160$  mg/L,  $1.357 \pm 0.040$  mg/L,  $6.909 \pm 0.657$  mg/L,  $4.905 \pm 0.465$  mg/L respectively and the method recovery values for the quantification of heavy metals in liquid pesticides were very low with values below 50.00%. Limit of detection and limit of quantification studies proved that all the values were within the detectable limits.

**Keywords:** Chronic kidney Disease of unknown etiology (CKDu), heavy metals, pesticides