

Presence of arsenic in agrochemicals and their association with the agricultural chronic kidney disease in Sri Lanka

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Abbreviations:

CKDa: Chronic Kidney Disease of Agricultural origin, CKDu: Chronic Kidney Disease of unknown etiology, NCP: North Central Province, TSP: Triple Super Phosphate, SSP: Single Super Phosphate, MOP: Murate of Potash, WHO: World Health Organization

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Abstract

Chronic Kidney Disease of Agricultural origin (CKDa) formerly known as Chronic Kidney Disease of unknown etiology (CKDu) is one of the biggest health problems in Sri Lanka. In recent years, a significant increase in CKDa cases have been

observed in North Central Province (NCP) in Sri Lanka. Since majority of CKDa patients are farmers with chronic arsenic toxicity, the present study was aimed to assess the source of the arsenic in CKDa patients in selected rice farming areas, Padaviya, Mahawilachchiya and Polpithigama and evaluate the amounts of arsenic present in agrochemicals used by these farmers. This study was concentrated on the analysis of agrochemicals; synthetic and natural fertilizers and pesticides which continuously affect the human health. Samples of synthetic fertilizer, organic fertilizer and pesticides (insecticides, weedicides and fungicides) collected from selected CKDa prevalence areas were analyzed using atomic absorption spectrometer using hydride generator and graphite furnace. The highest amount of arsenic contamination was reported from triple super phosphate (TSP) used in cultivation of rice and it was in the range from 25 mg/kg to 37 mg/kg. Since the consumption of TSP for cultivation in Sri Lanka in 2012 was approximately 108,000 MT, the amount of arsenic introduced to Sri Lankan agricultural soils through imported TSP was calculated to be about 2100 kg. On contrary, organic fertilizer prepared with plant organic matter contained very low amounts of arsenic. Investigations carried out to detect presence of arsenic in pesticides showed 0.18 ppm to 2.53 ppm concentration of As. Arsenic has already been identified as one of the major etiological factors for the rapidly spreading CKDa among paddy farmers in the dry zone of Sri Lanka. Since analysis of soil profiles in the endemic areas had previously confirmed that source of arsenic is not from the bed rock, findings of the present study suggest that agrochemicals are the major source of arsenic in CKDa endemic areas.

Citation:

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