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Detection and quantification of the cyanotoxin cylindrospermopsin from Girandurukotte water reservoirs and water sources using a biochemical method

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Most of the world's population relies on surface freshwater as its primary source of drinking water. The drinking water industry is constantly challenged with surface water contaminants that must be removed to protect human health. Toxic cyanobacterial (blue-green algae) blooms are an emerging issue worldwide due to the production of cyanotoxins. Among them, cylindrospermopsin is known as a potent cytotoxin which affects kidney and liver function.

This study was performed to address the issue of Chronic Kidney Disease of unknown aetiology (CKDu) prevailing in the North Central Province and related areas, targeting identification of the cyanotoxin cylindrospermopsin in water sources. Water samples were collected from eight reservoirs and different water sources used by eight CKDu patients living in Girandurukotte. All the samples were examined for the presence of cylindrospermopsin using an ELISA detection kit, and to quantify the toxin concentration. Twelve samples gave positive results for the toxin with concentrations of 0.0686, 0.0722, 0.0722, 0.1912, 0.0933 and 0.1145 ng/ml for Ulhitiya, Rathkinda, Henanigala, Bathalayaya and Belagana wewa respectively, and 0.0886, 0.0530, 0.3920, 0.2601, 0.0932 and 0.0619 ng/ml for patients' water sources (three from wells and three from streams respectively). The method is simple, rapid and highly sensitive and allows the detection of cylindrospermopsin concentrations between 0.05-2.0 ng/ml which is more than the HPLC method. Further, the test kit does not require any sample processing and therefore can be directly subject to ELISA test kit assay.

In conclusion, results confirmed the presence of cylindrospermopsin in water resources in Girandurukotte and therefore it might be a risk factor for CKDu prevailing in this area. More epidemiological studies are required to confirm cyanotoxins as a risk factor for CKDu.

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