

Oral presentation: 81

Detection of cylindrospermopsin and microcystin-LR in well water of CKDu prevalent Medirigiriya, Sri Lanka

H. A. S. N. Abeysiri¹, K. Wanigasuriya² and P. M. Manage^{1*}

¹Centre for Water Quality and Algae Research, Department of Zoology, Faculty of Applied Sciences, University of Sri Jayewardenepura, Sri Lanka

²Department of Medicine, Faculty of Medical Science, University of Sri Jayewardenepura, Sri Lanka

*pathmalal@sjp.ac.lk

Cyanobacterial blooms in aquatic systems have increased over recent decades. Many of the blooms are highly toxic, causing a serious hazard to human and animal health. The commonest cyanotoxins are hepatotoxins such as microcystin-LR (MC-LR) and cylindrospermopsin (CYN). Cyanotoxin has been proposed as one of the causative agents for CKDu in Sri Lanka and recent studies have revealed the contamination of drinking dug wells by toxin-producing cyanobacteria in the North Central, Uva and Eastern provinces. Thus, the present study was carried out to determine the contamination of CYN and MC-LR in randomly selected CKDu patients' household well water. The study was carried out for both dry and wet seasons and water samples were collected from 42 wells in Medirigiriya and 21 wells from Hambanthota as a control area. Water temperature, pH, conductivity, Dissolved Oxygen (DO) were measured at the site itself using standard methods. N-NO₃⁻, N-NO₂⁻, N-NH₃, total phosphorous and total hardness were measured by standard spectrophotometric and titrimetric methods. CYN and MC-LR quantification were done using ELISA detection kits (Beacon) (minimum detection limit 0.1 ppb). Identification and enumeration of cyanobacteria were carried out under a light microscope (×400). The results of the study revealed that all the tested general water quality parameters were within the Sri Lanka standards given for potable water. Mean cell densities of *Microcystis* sp. were varying during dry season from 60 ± 0.03 cells/mL to 307 ± 0.08 cells/mL and from 48 ± 0.07 cells/mL to 127 ± 0.73 cells/mL during wet season where MC-LR ranged from 0.02 to 6.73 µg/L and from 0.01 to 5.34 µg/L during dry and wet seasons respectively. Mean cell densities of *Cylindrospermopsis* sp. during dry and wet season ranged between 20 ± 0.02 cells/mL to 82 ± 0.29 cells/mL and 14 ± 0.19 cells/mL to 76 ± 0.78 cells/mL respectively, whereas the mean concentrations of CYN during dry and wet season was between 0.38 ± 0.01 µg/L to 1.45 ± 0.08 µg/L and 0.27 ± 0.04 µg/L to 1.25 ± 0.08 µg/L. Cyanotoxins and cyanobacteria were not recorded from well water collected from Hambanthota. Principal Component Analysis was done for cyanotoxin concentration, water quality parameters and a number of CKDu patients in the study area and shows a positive relationship between cyanotoxin in wells and CKDu patients who consume water from the wells (p<0.05).

Keywords: CKDu, Cylindrospermopsin (CYN), *Cylindrospermopsis* sp., ELISA, Microcystin-LR (MC-LR), *Microcystis* sp.

Acknowledgment: This work was supported by National Research Council under the research grant 16-078.