

Cyanotoxin contamination in rice grains (*Oryza sativa*) in two areas where CKDu is highly prevalent and less prevalent in Anuradhapura district, Sri Lanka

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Toxicogenic cyanobacteria are well known for their ability to produce cyanotoxins such as Cylindrospermopsin (CYN) and Microcystin-LR (MC-LR). Irrigation with cyanobacteria contaminated water containing CYN and MC-LR poses a potential risk of accumulation of cyanotoxins in crops. Cyanotoxin is considered as one of the risk factors for CKDu in Sri Lanka. The aim of the present study was to find the accumulation status of MC-LR and CYN in *Oryza sativa* grains and thus, 184 rice grain samples were collected from CKDu high-prevalent Padaviya (84) and low-prevalent Rajanganaya (Thulana-(33), Yaya 17-(18)), Galnewa (49) to determine CYN and MC-LR. The collected samples were subjected to quantification of CYN and MC-LR using PDA-HPLC. *O. sativa* grains from Padaviya recorded a CYN range of $80 \pm 0.08 \mu\text{g}/\text{kg}$ to $445 \pm 34 \mu\text{g}/\text{kg}$ and MC-LR range of $50 \pm 0.05 \mu\text{g}/\text{kg}$ to $160 \pm 21 \mu\text{g}/\text{kg}$ and from Rajanganaya, Galnewa were $20 \pm 0.01 \mu\text{g}/\text{kg}$ to $190 \pm 34 \mu\text{g}/\text{kg}$ and $30 \pm 0.02 \mu\text{g}/\text{kg}$ to $80 \pm 14 \mu\text{g}/\text{kg}$ respectively. The study showed that the potential exposure for humans consuming ~300g of rice per day from Padaviya (MC-LR, $0.09 \mu\text{g}/\text{kg} \cdot \text{day}^{-1}$ and CYN, $0.06 \mu\text{g}/\text{kg} \cdot \text{day}^{-1}$), Rajanganaya (MC-LR, $0.02 \mu\text{g}/\text{kg} \cdot \text{day}^{-1}$ and CYN, $0.003 \mu\text{g}/\text{kg} \cdot \text{day}^{-1}$) and Galnewa (MC-LR, $0.04 \mu\text{g}/\text{kg} \cdot \text{day}^{-1}$ and CYN, $0.01 \mu\text{g}/\text{kg} \cdot \text{day}^{-1}$). The level of mean concentration of MC-LR and CYN in *O. sativa* grains collected from three areas were significantly different from each other following Padaviya (ANOVA, $p < 0.05$), Rajanganaya (ANOVA, $p < 0.05$) and Galnewa (ANOVA, $p < 0.05$). Thus, the results of the present study revealed that CYN and MC-LR contaminated *Oryza sativa* has a great potential risk on accumulation of CYN and MC-LR in human body.

Keywords: Cylindrospermopsin (CYN), Microcystin-LR (MC-LR), *Oryza sativa*, CKDu and HPLC

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