

ABSTRACT

Cyanobacteria are single-celled algae that thrive in warm and nutrient rich water bodies including lakes. They can produce different kinds of toxins called cyanotoxins. Microcystin is the most common and most studied cyanotoxin. Microcystin mostly affects the liver. Epidemiological studies in China and Serbia have shown an association between cyanotoxins and occurrence of Primary Liver Cancer. Cyanobacteria have been reported in Lake Victoria, which is an important source of drinking water for the riparian communities, thus posing a danger to human health. This is as a result of eutrophication in Lake Victoria increasing the levels of cyanobacteria and cyanotoxins in the Nyanza Gulf. However, the health risk from exposure to toxic cyanobacteria in the Nyanza Gulf water, remains unknown. The purpose of this study was to assess the health risk of toxic cyanobacteria to the riparian communities in the Nyanza Gulf. The specific objectives were to determine the concentration of microcystins, identify and quantify microcystins and evaluate the health risk of microcystins in household and Lake Victoria water for Nyanza Gulf residents. In a longitudinal study adopting survey and experimental design, six beaches were studied and 127 samples were collected monthly from both households and beaches over six months. Cyanobacterial levels were determined using an enzyme assay method (PP2A) and microcystin strains identified using High Performance Liquid Chromatography (HPLC). Two-way ANOVA was done to determine statistical significance of Microcystins in levels. The results showed that all beaches were eutrophic resulting in flourishing of cyanobacteria. 84% of water samples contained Microcystins. Concentration of Microcystins was 3.44 μ g/L which is over the WHO limit of 1 μ g/L. Microcystin RR (MC-RR) is the most abundant cyanotoxins followed by Microcystin YR (MC-YR) and Microcystin LR (MC-LR) is the least abundant in the Nyanza Gulf. There was significant variation between different beaches and different months (ANOVA: $F=12.09$, $p<0.0005$) and no variation between beaches and water treatment (ANOVA: $F=0.97$, $p=0.47$). The health risk factor of cyanotoxins in drinking water is 3.86. There is a health risk posed by cyanotoxins to the residents of the Nyanza gulf who use the lake water for drinking since is over the WHO limit. This information provides an insight into the quality of Lake Victoria water for drinking. The study recommends regular monitoring of cyanobacterial cells, development of cyanobacteria removal methods as well as sensitizing the riparian communities on the health risk of cyanotoxins in drinking water.