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Concentration of heavy metals in water, sediment and some commercial fish species in the coastal area, Bangladesh and health risk assessment

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Introduction

In recent years, the accumulation of heavy metals in aquatic ecosystems has become a great problem throughout the world, especially in developing countries like Bangladesh. The increased unplanned industrialization, urbanization, huge population growth and overall trans-boundary rivers problem with India accelerate the water pollution especially in the coastal environment. The heavy metals contamination in fish has become an important and severe issue to human health risk. In Bangladesh, the accumulation of heavy metals in coastal areas have been paid less attention and no complete study carried out so far. Besides, the concerned authorities and overall general people have not been aware of the severe health risk problem that makes vital public health concern in near future. Hence, it is high time to concentrate our views to this problem with integrated approaches. Therefore, the objectives of my research work is to determine the concentrations of certain heavy metals (Cr, Ni, Cu, Zn, Mn, As, Cd and Pb) and their spatial and temporal distribution in water, sediment and some commercial fishes emphasizing on public health risk assessment in the coastal area of Bangladesh.

Methodology

Four sites (the Cox's Bazaar & adjacent area, the Chittagong port area, the Meghna Estuary and the Sunderbans) with two season samplings will be carried out in the coastal area. Sediment, water and fish samples will be collected and carried out to YNU for chemical analysis. Heavy metals (Cr, Ni, Cu, Zn, Hg, As, Cd and Pb) will be analyzed by inductively coupled plasma-mass spectrometry (ICP-MS, 7700). Besides, health risk assessment will be determined by Health Risk Appraisal (HRA) incorporated with an extended questionnaire measuring by Target Hazard Quotient (THQ) or Estimated Daily Intake (EDI).

Future implications in public health risk for Bangladesh

Bangladesh is a low-lying, riverine country with a largely marshy jungle coastline of 710 km (441 mi) on the northern littoral of the Bay of Bengal. Huge number of peoples is engaged in coastal fishing. Fish is the major protein source and second earning foreign exchange. Heavy metals contamination in fish is not only the threat to fish, but also the health risk associated with fish consumption. For example, lead causes renal failure and liver damage mental retardation and even death. Cadmium injures the kidney and cause symptoms of chronic toxicity, including impaired kidney function, poor reproductive capacity, hypertension, tumors and hepatic dysfunction. Chromium, zinc, copper cause nephritis, anuria and extensive lesions in the kidney. Thus, it may create severe future implications in public health for Bangladesh.

Conclusion/Expected outcome

This study will provide baseline information for public health risk and help the concerned authorities address human health problems attributed to heavy metals toxicity**.**

Key words: Heavy metals, Water, Sediment, Fish, Bangladesh