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Distribution and Health Risk Assessment of Polycyclic Aromatic Hydrocarbons in Silver Catfish from Escravos Estuary, Nigeria

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Abstract

Polycyclic aromatic hydrocarbons (PAHs) are important components of crude oil that require regular monitoring due to their interaction with the environment, biota and humans. There has been a growing literature on the impact of PAHs on the flora and fauna from both freshwater and coastal ecosystems in the Niger Delta region. However, studies on the potential health risks associated with consuming seafood contaminated with hydrocarbons are limited. In this study, we investigated the tissue distribution and the potential human health risk associated with PAHs in silver catfish, *Chrysichthys nigrodigitatus* collected from the Escravos estuary, a major oil and gas processing zone in Nigeria. Varying concentrations of PAH congeners were reported in the tissues of silver catfish with the highest level reported in the liver compared to the gills and the rest of the fish. Fluorene (36.62%), naphthalene (22.62%) and anthracene (15.19%) were the dominant congeners in fish tissues. The values of PAHs especially carcinogenic congeners were higher than the maximum permissible limits for fishery products which indicate potential concern for public health, but the estimated daily intake for adults and children was below the reference dose values for selected PAH congeners, while the hazard ratio was less than 1. Increasing industrial activities and poor regulation could lead to possible long-term human health risks from the consumption of seafood exposed to PAHs from the estuary. There is a need for the regular monitoring of domestic and industrial effluents entering the estuary to mitigate potential impact on seafood and human health.

Introduction

Crude oil is one of the most important products in global trade due to its critical role in providing a vital energy source for the modern economy. Among the complex classes of compounds present in crude oil, polycyclic aromatic hydrocarbons (PAHs) are of significant interest due to their interaction with the environment, biota and human health (USEPA, 1993; Tongo et al., 2016; Akinnusotu et al., 2023). Although PAHs can enter the environment through various natural sources, anthropogenic activities like