ISSN: 1391-8796
Proceedings of 8th Ruhuna International Science & Technology Conference
University of Ruhuna, Matara, Sri Lanka
February 17, 2021

Short term variation in liver somatic index, erythrocyte nuclear abnormalities and biliary PAH metabolite levels of *Oreochromis niloticus* upon experimental exposure to water-borne crude oil

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Crude oil, in broad sense, is a mixture of organic pollutants that have detrimental effects on both freshwater and marine ecosystems. However, studies that focus on crude oil impact on freshwater fishes are rare. Present study investigated the effects of sub-lethal crude oil exposure on widely distributed freshwater fish *Oreochromis niloticus* in terms of liver somatic Index (LSI), erythrocyte nuclear abnormalities (ENA), and three main PAH metabolite levels in bile within 16-day period. Two groups of immature sub-adult fish of the same brood cohort were maintained, i.e., the treatment group with crude oil dispersed in water (nominal v/v concentration of 50 ppm to simulate a slight oil slick) in three replicates, and a control group with no crude oil in water (15 fish per tank). Fish were fed with commercial diet, and aeration was maintained in a static renewal system. Water quality was monitored at regular intervals. Sampling was done initially, and subsequently on 4th, 8th, 12th and 16th day post-exposure to collect data on body weight and liver weight, to prepare blood smears for erythrocyte counting, and to collect bile for measuring three main PAH metabolites by fixed wavelength florescence (FF). LSI values and standardized bile florescence values at each sampling point were expressed as percentage difference from the control. LSI increased by water-borne crude oil in the fish over 16-day period. Significantly higher ENA values (Kruskal-Wallis test, $p<0.05$) were found in the exposed group (nuclear buds, notched nuclei, and lobbed nuclei) on 16th day compared to the pre-exposure fish, while micronuclei were absent in all sampling days. FF detected, protein-standardized Naphthalene and Phenanthrene metabolite levels in bile showed more than 30% and 130% increases respectively from day 12 as compared to the control fish, while no discernible trends were seen in pyrene level. The results showed that water-borne crude oil induced short-term changes in LSI, ENA and bile PAH levels in *O. niloticus*.

Keywords: *Bile metabolites, crude oil, ENA, LSI, Polyaromatic Hydrocarbons*

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