



Effects of ultraviolet-A on the activity of two metabolic enzymes, DNA damage and lipid peroxidation during early developmental stages of the African catfish, *Clarias gariepinus* (Burchell, 1822)

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Abstract:

Many ultraviolet-A (UVA)-induced biochemical and physiological changes are valid as biomarkers using aquatic species for detection of the degree of stress. Changes in the concentration and activities of enzymes, such as glucose-6-phosphate dehydrogenase (G6PDH), lactate dehydrogenase (LDH), DNA damage and lipid peroxidation (LPO), can be used as biomarkers to identify possible environmental contamination in fish. This study aimed to investigate the impact of UVA on the activity of the selected enzymes, DNA damage and LPO during early developmental stages of the African catfish *Clarias gariepinus*. Embryo homogenates were used for measurements of G6PDH, LDH, DNA damage and LPO concentrations and activities spectrophotometrically at 37°C. The normal ontogenetic variations in enzyme activities, DNA damage and LPO of the early developmental stages (24–168 h-PFS; hours-post fertilization stage) were studied. There was a significant decrease in the activity of G6PDH till 120 h-PFS. Then after 120 h-PFS, the activity of such enzymes insignificantly increased toward higher stages. The LDH activity was recorded with a pattern of decrease till 96 h-PFS, followed by a significant increase toward 168 h-PFS. The polynomial pattern of variations in DNA damage and LPO was also evident. The patterns of the enzyme activities, corresponding DNA damage and LPO of the early ontogenetic stages under the influence of three different UVA doses (15, 30 and 60 min), were recorded. The pattern of variations in G6PDH activity in UVA-induced groups was similar to that of the control group with variation in the magnitude of such activity. In all treated groups, LDH activity decreased till 96 h-PFS, then increased till 168 h-PFS. Within each of the embryonic stages, the increase in UVA led to a significant increase in DNA damage. A significant increase in lipid peroxidation under UVA doses was recorded. The variability in number and molecular weight of proteins under exposure to UVA was evident, reflecting some of the genetic and transcriptional changes during exposure and development.

Keywords:

UVA □ G6PDH □ LDH □ DNA damage □ LPO □ African catfish

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