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Evaluation of the Neurotoxic Effect of Polycyclic Aromatic Hydrocarbons (PAHs) on Brine Shrimp as an Invertebrate Model

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Abstract

Polycyclic Aromatic Hydrocarbons (PAHs) are a set of organic compounds that are broadly dispersed in the marine habitats. It is released by various sources, such as oil spills or incomplete combustion. In today's world, the quantity of these pollutants is rapidly increasing, which eventually leads to complex toxic effects on aquatic life. This study aims to evaluate the toxicity of Naphthalene (NAP), Phenanthrene (PHE) and Anthracene (ANT) on the brine shrimp (*Artemia salina*), which is used as a model organism for this neurotoxicity assessment. The nauplii (Instar I) of *A. salina* were exposed to increasing concentrations (150, 200 and, 250 ppm) of NAP, PHE and ANT to calculate the mortality percentages and LC₅₀ values. NAP had an LC₅₀ value of 340 ppm after 24 hours and 315 ppm after 48 hours. The LC₅₀ value of PHE was 237 ppm after 24 hours and 241 ppm after 48 hours. Furthermore, ANT had an LC₅₀ of 441.8 ppm after 24 hours, but it reduced to 194.52 ppm after 48 hours. In addition, the morphological abnormalities including body deformations, developmental delays and appendage malformations were observed. The neurotoxic and behavioural effects revealed variations in movement patterns, swimming velocity, and body reflexes. Potassium dichromate was used as a positive control. Real seawater and artificial seawater were maintained as negative controls to give a contrasting result in this experiment. These findings propose that acute PAH exposure causes lethal neurotoxic, morphological and behavioural effects in *A. salina*, emphasizing the suitability of this invertebrate model for aquatic neurotoxicity testing. Further investigation is needed to evaluate the novel effects of PAHs on the environment.

Keywords: *Polycyclic aromatic hydrocarbons, Brine shrimps, Mortality rate, LC₅₀ value, Toxicity*