ABSTRACT

EVALUATION OF THE ACUTE TOXICITY OF CIGARETTE BUTT LEACHATE IN ZEBRAFISH EMBRYOS (*DANIO RERIO*)

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BACKGROUND: Cigarette butts (CBs) are widely present in the environment and represent a major global environmental concern. In addition to the high resistance of this material to biodegradation, CBs retain toxic compounds derived from cigarette combustion, which can be released into the environment upon contact with water. Their toxic components may influence the quality of aquatic and terrestrial ecosystems, although the mechanisms and extent of these effects are not yet fully elucidated. **OBJECTIVE**: This study aims to evaluate the acute toxicity (FET test, OECD n°236) and acetylcholinesterase (AChE) activity of cigarette butt leachate using zebrafish (*Danio rerio*) as a model organism. **MATERIAL AND METHODS**: Zebrafish embryos at ≤ 3 hours post-fertilization (hpf) were exposed to three distinct groups of cigarette butt leachate: unsmoked butts (BNF), smoked butts (without residual tobacco) (BF), and whole smoked butts (1 cm of residual tobacco) (BFI). The working concentrations were 0.1, 0.2, 0.3, 0.5, 0.9, and 1.5 CB/L for the BF and BFI groups, and 0.1, 0.3, 1, 3, 9, and 30 CB/L for the BNF group. The FET test was employed to evaluate embryos from the early stages of embryogenesis up to 120 hpf. Additionally, AChE activity was evaluated at 120 hpf, the concentrations were reduced to 0.1, 0.3, 0.6, 1.6, 4, and 10 CB/L for the BNF group, and 0.1, 0.2, 0.4, 0.6, 0.8, and 1 CB/L for the BF and BFI groups. **RESULTS AND CONCLUSION**: Significant mortality was observed at the concentration of 10 CB/L in the BNF group and at 1.5 CB/L in the BF and BFI groups. A decline in the inflation rate of the swim bladder was observed. The AChE activity was reduced significantly at 10 BC/L (BNF), 0.8 and 1 BC/L for the BF groups, and 0.6 and 0.8 BC/L for the BFI groups, indicating that the leachate has neurotoxic potential. No significant difference in toxicity was observed between the BF and BFI groups in the FET test; however, AChE inhibition occurred at a lower concentration in the BFI group. The results indicate that significant biochemical toxicity may occur even at very low concentrations of the leachate.

KEYWORDS: Aquatic toxicology; Embryogenesis; Neurotoxicity; Acetylcholinesterase
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