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Cytotoxic and genotoxic effects of aromatic hydrocarbons on *Allium cepa*

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Environmental pollution caused by aromatic hydrocarbons (AHCs) is of great concern as they are potential health hazardous agents. In this study, genotoxic and cytotoxic effects of five AHCs (benzene, toluene, xylene, naphthalene and phenanthrene) were examined using the *Allium cepa* chromosomal aberration assay.

A. cepa roots were treated with benzene, toluene, xylene and phenanthrene in vapor form and the treatments were done for two separate time durations (3 hours and 6 hours) using distilled water as the control. Naphthalene was provided to *A. cepa* roots as a solution. A root growth inhibition test was performed for naphthalene to identify the EC_{50} value and subsequently, *A. cepa* roots were treated with naphthalene solutions of $2\times EC_{50}$ (30 mg dm^{-3}), EC_{50} (15 mg dm^{-3}) and $1/5\times EC_{50}$ (3 mg dm^{-3}) concentrations for 48 hours. 1% acetone was used as the control in the naphthalene treatment. Mitotic index (a parameter of cytotoxicity) and percentage of aberrant cells (a parameter of genotoxicity) were calculated separately for each treatment and control.

All the tested AHCs (benzene, toluene, xylene, phenanthrene and naphthalene) induced chromosomal aberrations and the most commonly observed aberrations were stickiness, bridges, vagrants, fragments and c-metaphases. A dose-dependent increase of chromosomal aberrations was observed for naphthalene. Toluene, xylene and phenanthrene showed a marked increase in the percentage of aberrant cells with the increase of exposure time from 3 hours to 6 hours. With all tested AHCs, there was a statistically significant decrease in the mitotic index. The results of this study indicated that all the tested AHCs have genotoxic and cytotoxic effects on *A. cepa* root cells.

Keywords: *Allium cepa*, aromatic hydrocarbons, chromosomal aberrations, mitotic index

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