

Cytogenetic Effects of Hospital Waste Water in Bone Marrow Cells of Swiss Albino Mice [†]

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Abstract: Hospitals represent an incontrovertible release source of many harmful and infectious chemical compounds in the environment due to laboratory activity or medicine excretion. The problem that arises is the discharge of hospital effluents into the municipal sewer network without preliminary treatment. Therefore, the present study focused on the cytotoxic potential of hospital wastewater (HWW) in Swiss albino mice bone marrow cells using chromosomal aberration (CA) and micronucleus (MN) bioassays. The hospital wastewater was collected from one of the major hospitals of Jaipur city, India, at different times (March 2019 to January 2020). Treated hospital wastewater collected at different times was given orally to male Swiss albino mice at their low (90% dilution) and high (pure treated i.e., no dilution) concentration for three different durations i.e., 7, 15, and 30 days respectively. Results indicated that a significant ($p < 0.01$) increase in micronucleus (MNs) induction and decreased ratio ($p < 0.01$) of polychromatic to normochromatic erythrocytes (indicators of cytotoxicity) were observed in samples collected in the month of March as compared to the samples collected in September and January. No changes in the polychromatic erythrocytes to erythrocyte ratio were observed when HWW was given at low concentration i.e., at 10% concentration in September and January collected samples. Chromosomal aberrations (CAs) such as breaks, fragments, rings, and pulverization were recorded in bone marrow cells. The mean percent frequency of CAs was increased ($p < 0.05$) in all the treated groups compared with their respective control groups. A significant ($p < 0.01$) decrease in the mitotic index was more observed in 100% concentration treated groups of March as compared to 100% treated groups of September and January month. These results indicated that treated hospital wastewater of the selected hospital showed less genotoxic effect at low concentration and high at pure concentration. The findings of the present study suggested that the treated wastewater collected during January was more suitable than the one utilized in the month of March and September.

Keywords: mutagenicity; Swiss albino mice; hospital wastewater; environmental pollution; wastewater management.

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Conflicts of Interest

The authors and co-authors of this study have no competing interests. The present study was based on original research work. Authors PM and KR planned and executed the experiments and contributed in writing the manuscript.