Assessing Genotoxicity and Coliform Contamination of Rivers and Lakes in the Saginaw Watershed Area

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Purpose: Rivers can be contaminated by sewage, industrial runoff, and other pollutants. Most of these water sources can be polluted with different hazardous toxins and pathogenic organisms. Different toxins were identified in water bodies in Michigan such as in the Great Lakes. In this study, rivers in the MBS (Midland, Saginaw, and Bay City) area in Michigan were tested. The genotoxicity level which is a sample's capacity to cause mutations in a person's DNA was studied using the Ames Fluctuation Test and the coliform contamination was indicated by the presence of Escherichia Coli and other Gram-Negative Bacteria. Procedure: Genotoxicity was tested using the Ames Fluctuation test, a standard test to determine if a chemical is mutagenic using a mutated Salmonella species (TA 100). Moreover, the presence of coliforms including fecal contamination indicators and bacterial pathogens was determined using water filtration techniques and subculture on agar media. Bacterial identification was done using a MALDI-TOF-MS. Additionally, different parameters were tested such as pH, the hardness of water, and several different contaminants. Results: According to the Ames Test, 62.5% of the collected samples were genotoxic, meaning that they can induce a mutation and lead to cancer. E. Coli was found in all rivers, which is an indicator of the presence of fecal matter. Other bacteria including Acinetobacter and Pseudomonas were found. However, the absence of pathogens such as Salmonella and Shigella is reassuring. Outcomes: In conclusion, these results suggest that rivers in the Tri-City area are contaminated with coliforms and are possibly genotoxic. Further monitoring to assess their genotoxicity and coliform levels is needed.

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