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EVALUATION OF SOURCE AND TRANSPORT OF PATHOGENIC MICROBES IN GROUNDWATER USING MICROBIOLOGICAL AND ISOTOPIC TECHNIQUES

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Abstract

Isotopic composition and electrical conductivity (EC) of groundwater were analyzed to trace the source and transport of pathogenic microbes in shallow and deep groundwater wells over a depth range from 9 m to 75 m below land surface (bls). Stable isotopic composition was used for the identification of the source of water while environmental tritium contents were used to estimate the time elapsed since the recharge of the groundwater. The results revealed that drain water contaminates shallow groundwater and as a consequence increases microbial contamination as well as EC. Two potential bacterial pathogens, *Staphylococcus aureus* and *Micrococcus spp.*, were found in old as well as modern groundwater. In contrast, the distribution of *Escherichia coli* (*E. coli*) and *Bacillus spp.* was confined to modern groundwater, predominantly in those locations where there is a mixing of local polluted water. The results of this study suggest that bacteria may persist and travel significant distances into the subsurface, thus posing a potential infectious risk to those who are consuming groundwater for drinking.

Key words: Groundwater, stable isotope, tritium content, recharge source, bacteria, contamination

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