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Investigation of Microbial Contamination in Tap Water and Domestic Tanks in Some Areas of Basrah Governorate, Iraq

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Abstract

Water pollution is one of the main dangers that threaten the lives of all living organisms, particularly humans. Microbial investigation is commonly employed to indirectly detect the presence of pathogenic bacteria in water. This study aims to examine the microbial content in tap water and household tank samples from various areas in Basrah governorate by measuring total bacterial content, total coliforms, fecal coliforms, and fungal contamination. Thirty samples were collected from 15 residential areas supplied with tap water, with three replicates for each sample. All collected samples of tap water and household tanks were analyzed for microbial content. The results of the microbial investigation indicated that all samples were contaminated with high levels of total bacteria, total coliforms, fecal coliforms, and fungi. Microbial examination parameters showed severe contamination of 100% according to WHO standards in all tested water samples. While some samples were highly polluted, others exhibited lower levels of pollution but still exceeded permissible limits for various domestic uses according to WHO standards. The fungal examination revealed the isolation and identification of anamorphic fungi from the water samples, with most species belonging to *Aspergillus*, particularly *Aspergillus niger*. Consequently, the study concluded that both tap water and tank water in Basrah governorate are unsuitable and unsafe for human consumption. Therefore, there is an urgent need for stringent monitoring of water treatment plants and strict compliance with health protocols.

Keywords: Total bacteria count; Total coliforms; Fecal coliforms; Tap water; Basrah province

1. Introduction

Water is one of the most vital components of life on Earth and the key factor for its continuity. It is essential for all forms of life and it is directly or indirectly connected to every aspect of human activity. The world, especially developing countries, faces one of the most serious challenges humanities have encountered which is the provision of clean drinking water (Bănăduc *et al.,* 2022; Al-Khafaji *et al.,* 2025). Water has acquired great importance, making it the primary factor determining life as well as agricultural and industrial production. The availability of fresh water in all parts of the Earth was a reason for the emergence and prosperity of civilizations due to their proximity to water sources, while the extinction of many of these civilizations was due to water scarcity and its decline (Mahdi and Al-Abbawy, 2019; Al-Jaberi and Al-Abbawy, 2023; Al Khafaji *et al.,* 2024).

Although water covers about 70% of the Earth's surface, 97% of this water is found in seas and oceans, which contain a high percentage of salts, making it unsuitable for