MICROBIOLOGICAL SAFETY OF DRINKING WATER AND ITS RELATIONSHIP WITH WATER-BORNE DISEASES

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Abstract: *Clean and safe drinking water is fundamental to human health, yet microbial contamination of water supplies continues to pose a serious public health challenge, especially in resource-limited settings. This study evaluated the microbiological safety of drinking water from different sources and examined its association with the occurrence of water-borne diseases in the community. Drinking water samples were analyzed for microbial indicators, while disease prevalence data were collected through household surveys and local health records. The results revealed that many water samples did not meet recommended microbiological standards, and communities consuming contaminated water experienced a higher burden of water-borne illnesses. These findings emphasize the importance of routine water quality monitoring, effective treatment methods, and improved hygiene practices to prevent avoidable diseases.*

INTRODUCTION

The availability of safe drinking water is a key determinant of public health and a major component of disease prevention.

Despite global efforts to improve water supply systems, microbial contamination of drinking water remains widespread in many regions due to inadequate sanitation, insufficient treatment processes, and environmental pollution.

Contaminated water serves as a major route for the transmission of infectious agents responsible for illnesses such as diarrhea, typhoid fever, cholera, dysentery, and viral hepatitis.

From the perspective of hygiene and medical ecology, water quality reflects the interaction between environmental conditions, microbial populations, and human activities. Factors such as population growth, urban expansion, climate variability, and improper waste disposal contribute to the deterioration of water sources. Water-borne diseases continue to disproportionately affect children and vulnerable populations, leading to significant morbidity and mortality. This study was undertaken to assess the microbiological quality of drinking water and to explore its relationship with the prevalence of water-borne diseases within the study area.

Objectives

1. To evaluate the microbiological safety of drinking water obtained from different sources
2. To estimate the prevalence of common water-borne diseases in the population
3. To determine the association between contaminated drinking water and disease occurrence

Materials and Methods

Study Design

A community-based cross-sectional study was conducted over a six-month period.

Study Area and Population

Households using various drinking water sources, including piped water, wells, hand pumps, and stored household water, were included in the study.

Collection of Water Samples

Drinking water samples were collected under sterile conditions from selected sources. The samples were transported to the laboratory within the recommended time frame to ensure accurate analysis.

Microbiological Examination

The collected samples were tested for:

- Total coliform bacteria
- Fecal coliforms, particularly Escherichia coli

Standard laboratory procedures such as membrane filtration and culture techniques were applied. The results were interpreted according to World Health Organization (WHO) drinking water quality guidelines.

Assessment of Water-Borne Diseases

Data on water-borne diseases were obtained through structured household interviews and a review of records from nearby health facilities. Reported cases of acute diarrhea, dysentery, and typhoid fever during the previous three months were considered.

Data Analysis

The data were analyzed using descriptive statistical methods to identify trends and associations between water quality and disease prevalence.

Results

A substantial proportion of the analyzed water samples showed evidence of microbial contamination. The presence of fecal coliforms was more commonly observed in water collected from wells and stored household containers than in treated piped water sources.

Households relying on microbiologically unsafe water reported a higher frequency of water-borne diseases. Diarrheal illnesses were the most prevalent, particularly among young children. A noticeable relationship was observed between poor microbiological water quality and increased incidence of disease.

Discussion

The study findings indicate that microbiological contamination of drinking water remains a major environmental health concern. Detection of coliform bacteria suggests fecal pollution, which significantly elevates the risk of exposure to disease-causing microorganisms. Inadequate water treatment, unsafe storage practices, and poor sanitation likely contributed to contamination at both source and household levels.

The increased occurrence of water-borne diseases among populations consuming unsafe water highlights the close link between environmental hygiene and human health. These observations align with earlier studies demonstrating that improvements in water quality can lead to marked reductions in infectious disease burden. From a medical ecology viewpoint, the interaction between environmental factors, microbial ecosystems, and human behavior plays a critical role in disease transmission.

Conclusion

This study confirms that inadequate microbiological quality of drinking water is closely associated with a higher prevalence of water-borne diseases. Ensuring access to safe drinking water through proper treatment, continuous monitoring, and improved hygiene practices is essential for protecting public health. Effective water safety interventions can substantially reduce preventable illnesses and enhance community well-being.

Recommendations

- Regular surveillance and testing of drinking water sources
- Improvement of water treatment and distribution infrastructure
- Promotion of safe household water storage and handling practices
- Community-based education on hygiene and sanitation
- Inclusion of water safety strategies in public health planning

REFERENCES:

1. World Health Organization. (2017). Guidelines for Drinking-Water Quality (4th ed.). WHO.

2. World Health Organization. (2024). Drinking water — fact sheet. https://www.who.int/news-room/fact-sheets/detail/drinking-water

3. Wen, X., Chen, F., Lin, Y., Zhu, H., Yuan, Z., Kuang, D., & Jia, Z. (2020). Microbial indicators and their use for monitoring drinking water quality — a review. Sustainability, 12(6), 2249.

4. Microbiological standards for water and their relationship to health risk. (2000). Communicable Disease and Public Health.

5. Ng'eno, E. & others (2019). Microbial quality of drinking water and prevalence of water-related diseases in Marigat Urban Centre, Kenya.

6. Bacteriological quality and associated risk factors of drinking water in Eastern zone, Tigrai, Ethiopia, 2019. Tropical Diseases, Travel Medicine and Vaccines.

8. Virological and bacteriological quality of drinking water in Ethiopia.Applied Water Science.