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WATER DISINFECTION IN SYRIA AND BELARUS

Introduction

Water disinfection is a process to clear and clean water from any macrobiotic, or any waste that makes the water unusable, poisonous materials and others. several ways used in this domain, each way is used for a specific water treatment. Water borne diseases can cause significant illness and death, particularly in developing countries. Disinfection is a critical step in water treatment, eliminating harmful microorganisms and preventing waterborne diseases [1, 2, 3].

Goal

To study water disinfection methods, and water disinfection practices in Belarus and Syria. Compare the effectiveness of disinfection methods used in both countries. Identify challenges hindering effective water disinfection.

Material and methods of research

Analysis of scientific publications, and state published materials.

The results of the research and their discussion

Clarification refers to techniques that reduce the cloudiness (turbidity) of water caused by the presence of natural organic and inorganic material. Clarification can markedly improve both the appearance and taste of the water. Decreasing turbidity is an indicator that microbiological contamination will also be reduced, but not enough to ensure water potability; clarification techniques facilitate disinfection by filtration or chemical treatment [1].

Coagulation & Flocculation Large particles like silt and sand will settle by gravity (sedimentation). Cloudiness due to dissolved substances or smaller particles that remain suspended in water can be improved by using chemical products that coagulate and flocculate (i.e., cause clumping). This process removes many, but not all, microorganisms unless the product also contains a disinfectant. Alum, an aluminum salt widely used in food, cosmetic, and medical applications, is the principal agent for coagulation/flocculation. Travelers should add one-fourth teaspoon (1/4 tsp) of alum powder to 1 quart (32 oz; .95 L) of cloudy water; stir frequently for a few minutes and add more powder as necessary until clumps form. Allow the clumped material to settle into the bottom of the container, and then pour the water through a coffee filter or clean, fine cloth to remove the sediment. Since most microbes are removed but not all, travelers must use a second disinfection step. Some commercially available tablets or powder packets combine a flocculant with a chemical disinfectant. Travelers should check their product to determine whether they need additional disinfection.

Filtration Portable hand-pump or gravity-drip filters with various designs and types of filter media are commercially available to international travelers. Filter pore size is the primary determinant of a filter's effectiveness Manufacturers claiming a US Environmental Protection Agency (EPA) designation of water "purifier" for their products must conduct their own testing to demonstrate their filters can remove at least 106 bacteria (99.9999%), 104 viruses (99.99%), and 103 Cryptosporidium oocysts or Giardia cysts (99.9%). The EPA does not independently test the validity of these claims.

Chemical Disinfection Chlorine Compounds & Iodine Chemical disinfectants for drinking water treatment, including chlorine compounds, iodine, and chlorine dioxide, commonly are available as commercial products. Sodium hypochlorite, the active ingredient in common household bleach, has been used for over a century and is the primary disinfectant promoted by CDC and the World Health Organization (WHO). Other chlorine-containing compounds, widely available in granular or tablet formulations (e.g., calcium hypochlorite and sodium dichloroisocyanurate), are equally effective for water treatment.

Ultraviolet Radiation (UVR) kills bacteria, viruses, and Cryptosporidium oocysts in water; efficacy depends on dose and exposure time. Moreover, because suspended particles can shield microorganisms from UVR, UVR units have limited effectiveness in disinfecting water with high levels of suspended solids and turbidity. In the field, portable battery-operated units capable of delivering a metered, timed dose of UVR are an effective way to disinfect 1–2 liters of clear water at a time. Larger units with greater outputs are available for use in places where a power source is available.

Solar Irradiation Using sunlight to irradiate water (solar disinfection or SODIS) can improve the microbiologic quality of water and can be used in austere emergency situations. Because UVR is blocked by particles, travelers should clarify highly turbid water first. The optimal procedure is to use transparent bottles (e.g., clear plastic beverage bottles) laid on their side and exposed to sunlight for a minimum of 6 hours with intermittent agitation. Under cloudy weather conditions, water must be placed in the sun for 2 consecutive days (table 1).

Table 1 – Advantages and disadvantages of some disinfection methods for personal use

Technique	Advantages	Disadvantage
Heat	Does not impart additional taste or color. Single-step process that inactivates all enteric pathogens. Efficacy is not compromised by contaminants or particles in the water.	Does not improve taste, odor, or appearance of water. Fuel sources might be scarce, expensive, or unavailable. No residual protection; does not prevent stored water from recontamination
Filtration	Simple to operate. Many commercial product designs available. Can be combined with chemical disinfection to increase microbe removal.	Many filters do not reliably remove viruses. More expensive than chemical treatment. No residual protection; does not prevent stored water from recontamination
Chemical disinfection:	Inexpensive. Widely available, Simple to use and available in liquid or tablet form.	Iodine is physiologically active and has potential adverse health effects.
Ultraviolet readiation (UVR)	Does not improve taste or appearance of water.	Effective against all wateborne pathogens . Expensive, and dangerous to use

In Belarus, several methods are used in water disinfection. The water quality in Belarus is generally good, but there are some areas where the water is contaminated with bacteria and other harmful microorganisms. The government of Belarus is working to improve the water quality in these areas by investing in water treatment infrastructure [4].

Chlorination: This is the most common method of water disinfection in Belarus. Chlorine is added to water to kill bacteria and other harmful microorganisms.

Ultraviolet (UV) irradiation: UV light is used to kill bacteria and other harmful microorganisms in water. UV irradiation is a safe and effective method of disinfection, but it is more expensive than chlorination.

Ozonation: Ozone is a gas that is used to kill bacteria and other harmful microorganisms in water. Ozonation is a more effective method of disinfection than chlorination, but it is also more expensive.

Electrolysis: Electrolysis is a process that uses electricity to kill bacteria and other harmful microorganisms in water. Electrolysis is a safe and effective method of disinfection, but it is not as common as chlorination or UV irradiation.

The choice of water disinfection method in Belarus depends on a number of factors: the quality of the water source, the cost of the method, and the level of disinfection required [2].

In Syria, chlorination is mostly used due to the limited resources. The choice of water disinfection method in Syria depends on a number of factors, including the quality of the water source, the cost of the method, and the level of disinfection required. In addition to these methods, there are a number of other things that are being done to improve water quality in Syria. These include: repairing damaged water infrastructure, protecting water sources from contamination, raising awareness about the importance of safe water hygiene practices [3].

Despite these efforts, the water crisis in Syria remains a serious problem. Millions of people still lack access to clean water, and waterborne diseases are a major public health threat. More needs to be done to address this crisis and ensure that all Syrians have access to safe water.

A comparison of water-disinfecting methods in Syria and Belarus reveals that Belarus generally has more effective practices in place. This is due to the country's better-developed water infrastructure and its use of more advanced disinfection methods. However, both countries face challenges in ensuring the safety of their drinking water supplies.

Conclusion

Water disinfection is an essential tool for preventing waterborne diseases and improving public health. In Syria and Belarus, there is a need to invest in infrastructure, strengthen governance, and promote community-based programs to improve water disinfection practices. With international assistance and a focus on innovation, these countries can make significant progress in ensuring that their citizens have access to safe drinking water.

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PREVALENCE OF AIR POLLUTION AND ITS IMPACT ON HUMAN HEALTH

Introduction

Air pollution, a complex mixture of particulate matter, gases, and biological molecules, presents a significant threat to public health and the environment. The World Health Organization (WHO) has identified air pollution as a critical risk factor for a range of diseases, including respiratory infections, heart disease, stroke, and lung cancer [1]. Recent studies have further elucidated the profound impact of air pollutants on human health.