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Review

The Impact of Bacterial Contamination on Public Health and The Environment

Maryam Jabbar Nasser[1], Doaa AbdulWahid Jasim[1], Ammar Nabil Mujjed[2], Nagham Mahmood Aljamali[3,*]
[1] Medical Laboratory Technique Department, The Islamic University, Diwaniya;
[2] Research and Studies Department, The Islamic University, Najaf, Iraq;
[3] Department of Chemistry, Synthetic Organic Chemistry, Iraq;
* Correspondence: dr.nagham_mj@yahoo.com.
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ABSTRACT

Wastewater contains many bacteria that cause many diseases. For example, one gram of body output (sweat, urine or feces) contains 10 million viruses and a million bacteria. For example, salmonella bacteria that lead to typhoid fever and gastroenteritis. Shigella bacteria cause diarrheal diseases, and Escherichia coli causes vomiting and diarrhea and may lead to dehydration, especially in children. Leptospira bacteria cause inflammatory liver, kidneys, and central nervous system diseases, while Vibrio bacteria cause cholera. These types of bacteria and others cause various diseases due to dealing with water contaminated with sewage, whether by drinking, bathing, or even eating fish caught from this water instead of staying near contaminated water bodies. It can be referred to diseases such as polio, yellow fever, scabies and malaria.

Keywords: Bacteria, Disease, Environment, Microbial, contamination.

INTRODUCTION

Some types of bacterial pollution of water and the environment come from industries, where some industries result in a certain type of pathogenic bacteria, such as mechanical slaughterhouses, and others result in parasites and fungi, such as starch and yeast factories. Biological tests on wastewater determine the presence or absence of pathogenic bacteria by testing a specific type of indicator organism. Biological information is urgently needed to assess the type of wastewater treatment before it is disposed of to the environment. After the passage of the Clean Water Act of 1972 (CWA), pollution levels in United States waterways have generally seen a significant decrease concerning wastewater treatment and many types of industrial wastewater. On the other hand, more than half of US waterways and river miles still violate federal water quality standards in the 21st century[1]. Surveys of lakes, ponds, and reservoirs indicated that about 70 percent of them were damaged (measured in terms of surface area), more than 70 percent of the country's coasts, and 90 percent of the surveyed oceans and nearby coastal areas. Agricultural, industrial, urban runoff and other sources continue to discharge waste into surface waters throughout the country. This poses significant health and environmental risks because these water sources are used as drinking water and for

agricultural use. While the Clean Water Act has positively contributed to the state of surface water in the United States, the act does not fully address all manifestations of this pollution. Many believe that Congress should revise or expand the law to address these problems and gaps in regulation[2]. Although this law effectively controlled pollution from stationary sources, it was not as effective with non-point sources (where the discharge is distributed, prevention and treatment are very difficult or expensive). Despite the negative effects of water pollution on the ecosystem and health, there are solutions capable of treating and reducing pollution levels in water bodies[3].

MATERIALS AND METHODS

Bacterial Contamination

Lack of proper sanitation measures and improperly placed wells can lead to contamination of drinking water with pathogens carried in faces and urine. Such fecal-borne diseases include cholera and diarrhea. Of the four types of pathogens found in faces (bacteria, viruses, protozoa, helminths or helminth eggs) [4], the first three can usually be found in contaminated groundwater. In contrast, the eggs of larger helminths are usually filtered by the soil matrix. Confined deep aquifers are usually the safest source of drinking water for pathogens. Pathogens from treated or untreated wastewater can contaminate certain aquifers, especially shallow water [5].

Pharmaceuticals causing environmental pollution:

Trace amounts of pharmaceuticals from the intrusion of treated wastewater into the aquifer are among the emerging groundwater pollutants being studied across the United States. Common medicines such as antibiotics, anti-inflammatories, antidepressants, decongestants, sedatives, etc., are usually found in treated wastewater[3]. This wastewater is discharged from the treatment facility and often goes to the aquifer or surface water source used for drinking. The presence of trace amounts of pharmaceuticals in groundwater and surface water is far less than what is considered a hazard or a concern in most areas. However, this may be an increasing problem with population growth and the use of reclaimed wastewater in municipal water supplies.[4]

RESULTS

Sources of Bacterial-Health Contamination:

Wastewater is issued by residential, institutional, commercial and industrial establishments, and water contains, according to the source, organic, microbial, radioactive and thermal pollutants. Organic, inorganic and microbial pollutants are generally present in the dead body as sediment, suspended matter, dissolved matter or colloidal matter. Wastewater includes:[6]

Domestic wastewater:

Resulting from toilets, bathrooms, showers, kitchens and drains that flow into sewers. And resulting from the uses of homes, institutions, laboratories or factories whose wastewater is similar to water and can be treated in the same way[2]. Domestic wastewater is turbid, yellow or dark in color and contains food residues, vegetables and paper, human secretions, and huge amounts of germs, fungi, and insects. Some of these organisms cause serious diseases in humans, such as typhus and cholera, for example. The amount of human secretions one person produces daily is about 1.4 kg and about 60% of the organic matter in domestic wastewater.[7]

Industrial wastewater:

Water is used in industry as a raw material or an auxiliary substance in production or for cooling purposes. Factories take water from the public water network or ground or surface water affiliated with the factory. The water is used as industrial wastewater. Therefore, industrial wastewater can be defined as water resulting from Various industrial uses that contain, according to the source, harmful chemicals and are not allowed to be transferred and treated with domestic wastewater[8]. We find domestic wastewater contains organic and non-organic pollutants in different proportions and is heterogeneous and easy to treat, while industrial wastewater is more homogeneous. The source contains toxic substances that are difficult to disintegrate. Therefore, factories that produce toxic and harmful substances must be carefully monitored and not allowed to dispose of wastewater in water sources or public sewage with domestic public water before these factories treat their wastewater according to the approved specifications in order to maintain public health and safety.[9]

Agricultural wastewater

Agricultural wastewater represents the water generated by various agricultural activities, especially when intensive agriculture and animal husbandry are used. Agricultural wastewater contains organic materials that are easy to disintegrate and do not pose a danger to the environment when choosing the appropriate method for treatment processes, such as returning the resulting materials to nature by using them in agriculture and forestry, thus making use of plant nutrients and soil conditioners found in agricultural wastewater. The agricultural wastewater is collected in special pits, pumped and spread on agricultural and forest lands.[8] Given the spread of various animal breeding farms and the decreasing area of agricultural land that can absorb wastewater, agricultural wastewater has become a burden on the environment, especially in the countryside of industrialized countries. Therefore, it must be treated and not enter the public sewage for treatment with domestic wastewater, given the large number of organic pollutants it contains, and the purification plant can only bear them when qualified to bear this burden.[4] In addition, a new source of agricultural wastewater is the wastewater resulting from the manufacture of animal feed. This is done by fermenting corn and sugar beet leaves. The fermentation of one ton of these plants results in about 450 L of wastewater containing high concentrations of organic matter, organic acids such as acetic acid and lactic acid, and various nitrogen compounds. This wastewater must not be allowed to seep into surface water sources, as it acidifies and consumes the oxygen dissolved in the water. This results in the killing of livestock such as fish.[9]

Scientists, government officials, and the United States public considered water pollution a growing problem in the nineteenth century. Many cities and towns have transferred untreated household wastewater to nearby waterways. The sewage discharged by factories, mines, and other businesses increased as the economy expanded. Later, large cities and small communities began installing drinking water treatment systems in the early 20th century, but wastewater treatment plants were limited and largely ineffective. Effective control of industrial and sewage pollution was not addressed comprehensively until later in the century. Agricultural pollution emerged as a growing problem in the twentieth century with the increased mechanization of agriculture and the increased use of chemicals.[10]

Bacterial contamination of wastewater:

As an extension of the Industrial Revolution, many cities in Europe and North America grew in the 19th century, often resulting in overcrowding and increasing public health concerns. As part of the trend of local sanitation programs in the late 19th and 20th centuries, many cities built extensive sanitation systems to help control outbreaks of diseases such as typhoid and cholera. Initially, these systems

discharged wastewater directly into surface water without treatment.[8] As pollution of water bodies has become a concern, cities have added sewage treatment plants to their systems. Most cities in the United States underwent a sanitation revolution between 1900 and 1935, adding more expensive sewage systems and other technologies to eliminate harmful bacteria through water treatment with chlorine and water and sewage filtration. In areas with surface pollution near the shore, such as Cleveland, extensive water absorption systems have been implemented to reduce pollution in drinking water. During this period, there was a decrease in diseases in cities, such as typhoid fever, which decreased from 35 cases per 10,000 people to less than 5 cases per 10,000 population. These primary sewage systems can be adopted with the increase in population in cities because life expectancy increases and disease decreases.[10]

DISCUSSION

Biological Pollution of the Environment:

Biological or biological pollution is one of the oldest forms of pollution known to man, and this pollution arises as a result of the presence of visible or invisible living organisms, plant or animal, such as bacteria, fungi, and others in the environmental medium, such as water, air or soil. What he drinks or the air he inhales leads to biological pollution, which leads to disease. Biological pollution occurs when sewage and sewage water is disposed of - before chemically treated - by dumping it into freshwater resources or due to the spread of household garbage in the streets without observing health rules in collecting, transporting and disposing of it scientifically, or because dead animals are left in the open or thrown in Water resources, as well as when healthy methods are not followed in preserving and processing foods, which exposes them to pollution .[4], Some types of health pollution resulting from food contamination are because food or water contains what makes it unfit for human or animal consumption, whether harmful microorganisms, toxic chemicals or food contaminated with deadly radioactive substances, which may result from eating food infecting the consumer with diseases. , the most common of which is food poisoning. Food is an easy way to transfer pathogenic microbes, so it is necessary to prevent contamination of food and water with microbes to maintain public health in any human gathering by following several preventive methods to protect food from contamination, such as not making food exposed to insects and dust, and washing vegetables and fruits well, taking into account Wash hands before and after eating any meal[5,6]

Environmental Pollution and Health:

Air pollution can be fatal to many organisms, including humans. Ozone pollution can cause respiratory disease, cardiovascular disease, sore throat, chest pain and nasal congestion. Water pollution causes about 14,000 deaths daily, mostly due to untreated sewage contaminating drinking water in developing countries. It is estimated that 500 million Indians did not have access to a proper toilet, more than 10 million people in India contracted waterborne diseases in 2013, and 1,535 people died, most of them children. There are nearly 500 million Chinese who lack safe drinking water.[10] An analytical study in 2010 estimated that nearly 1.2 million premature deaths each year in China are due to air pollution, and the high levels of smog that China has long experienced can damage civilian bodies and cause various diseases. The World Health Organization estimated in 2007 that air pollution causes half a million deaths annually in India. According to a study in 2019, the number of deaths in the United States that year due to pollution was approximately 60,200 people. Oil spills can cause irritation and rashes. High levels of noise pollution cause hearing loss, high blood pressure, stress and disturbed sleep. Sci-

entists have found a link between developmental disorders in children, neurological symptoms, and mercury pollution. Older people are most affected by air pollution, and those with heart or lung disorders are at additional risk. Children and infants are also at high risk. Lead and other heavy metals have also been shown to cause neurological problems. Chemicals and radioactive substances can cause cancer and birth defects.[1] A study by the Lancet Commission on Pollution and Health in October 2017 found that global pollution, especially air, water, soil, and hazardous workplaces, kills nine million people annually, which is three times the number of deaths from AIDS, tuberculosis and malaria combined, and 15 times higher than deaths from war and other causes. Forms of human violence. The study concluded: "Pollution is one of the major existential challenges in the Anthropocene era, as pollution threatens the stability of the Earth's supporting systems and the continued survival of human societies.[6]"

The danger of environmental pollution:

London also recorded one of the first serious cases of water quality problems when a foul stench emanated from the Thames in 1858, which led to the construction of a sewage system in London. Reformers demand the establishment of sewage and clean water systems. In 1870, sanitary conditions in Berlin were among the worst in Europe. Regarding the conditions that preceded the establishment of a modern sewage system in the late 1870s, Auguste Bebel said: "Wastewater from the homes accumulated in the gutters along the bulkheads, and it smelled really bad. There were no public toilets in the streets and squares. Visitors, often women, were desperate when they had to look for a latrine. The sanitary facilities in public buildings were shockingly primitive. Berlin did not emerge as a city from barbarism to civilization until after 1870.[8]" By the late eighteenth and early nineteenth centuries, coal had become widespread use during the Industrial Revolution. Using coal created smog and soot, which had serious health effects on the population of the growing urban center. In the Great Smog of 1952, pollutants from factories and home heaters killed at least 4,000 people in London over several days. A few years ago 1948, severe air pollution caused a deadly smog that suffocated 20 people in Donora, Pennsylvania and sickened 7,000. Acid rain, first discovered in the 1850s, was another problem caused by coal-fired plants. The release of man-made sulfur and nitrogen compounds into the atmosphere adversely affects plants, fish, soil, forests and some building materials. In the twentieth and twenty-first centuries, pollution became a popular issue after World War (II), and the use of nuclear weapons in it, which led to the emergence of many laws and treaties calling for combating pollution, but most of the countries that signed treaties did not abide by the laws and continued polluting environmental activity and many individuals were not properly educated Enough on the topic of environmental pollution in the world.[11]

Medical waste affecting the environment:

Pharmaceuticals, or over-the-counter human, veterinary, or commercial drugs, are common in the environment. Nine classes of drugs are included in pharmaceuticals and personal care products: hormones, antibiotics, lipid regulators, nonsteroidal anti-inflammatory drugs, beta-blockers, antidepressants, anticonvulsants, chemotherapy and diagnostic anticonvulsants.[13] Personal care products have four categories: fragrances, preservatives, disinfectants and sunscreens. These products can be found in cosmetics, perfumes, menstruation, shampoos, soaps, toothpaste and sunscreen. These products typically enter the environment when they pass or wash the human body, come into contact with the ground or sewer lines, or are disposed of in the trash, septic tank, or sewer system. Traces of illegal drugs can be found in waterways, and even money [14-16-17]

Figure 1. Bacterial Pollution via Wastes

CONCLUSION

Separation and disposal of household waste into gray and black water is becoming more common in the developed world, as treated gray water can be used in irrigation plants or recycled to flush latrines. Point-source pollution occurs when water pollution results from a single source. Pointed sources can include septic tank leaks, oil leaks, and waste or sewage treatment plants dumping. In order to prevent pollution from a point source, the Clean Water Act regulates what can be discharged into the water body by requiring each facility to obtain a permit from the National Pollutant Discharge System.

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