

Review Study on Water Microbes and Human Diseases

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Abstract- Day by day the temperature of earth increasing due to the human population explosion. All over the world the capacity and resistance power of microbes are also increasing in many numbers due to anthropogenic activities of human, as man playing very bad role to generate various kind of pollution in the air, water, soil, noise, radioactive, thermal, pesticide and latest introduce emotional pollution. Microbes play both type of role in the society good and bad. From the first era the life came in the form of microbes and too strong in the compare of the human being. Microbes which cause dangerous diseases" can not be seen by naked eyes like-bacteria, virus, fungi, protozoa and some helminthes. Microbes cause fatal diseases, and very much harmful and cannot cure due to break immunity and command on DNA of the cell and synthesis of various natural process of human body.

I. INTRODUCTION

Public health and sanitation barely existed during the American Civil War in the mid-nineteenth century. This resulted in outbreaks of infectious diseases such as typhoid fever, cholera and dysentery. These epidemics were especially common in urban areas, where many people shared water sources and created waste. Many scientists proved the connection between microbes and disease, public health officials looked to science for guidance. They designed new practices and laws to protect the public water supply, deal with human waste and handle outbreaks of diseases. In the late 1800's, filtration of municipal water became a standard practice. This reduced the number of disease causing microbes in water supplies by-

- chlorination to protected for water borne diseases.
- In hospitals, the sterilization of medical equipment.
- vaccination of children at certain ages.
- Restaurants and cafeterias are now required to follow Sanitary procedures to prevent contamination of food.

Sanitation

- Sanitation is the hygienic means of promoting health through prevention of human contact with the hazards of wastes as well as the treatment and proper disposal of sewage or wastewater.
- Conditions relating to public health, especially the provision of clean drinking water and adequate sewage disposal.

- "They could afford to erect new dwellings with a reasonable standard of construction and sanitation"
- The process of keeping places free from dirt, infection, disease, etc., by removing waste, trash and garbage, by cleaning streets, etc.

By WHO

- Sanitation generally refers to the provision of facilities and services for the safe disposal of human urine and feces. Inadequate sanitation is a major cause of disease world-wide and improving sanitation is known to have a significant beneficial impact on health both in households and across communities.
- The word 'sanitation' also refers to the maintenance of hygienic conditions, through services such as garbage collection and wastewater disposal.

Microbes-

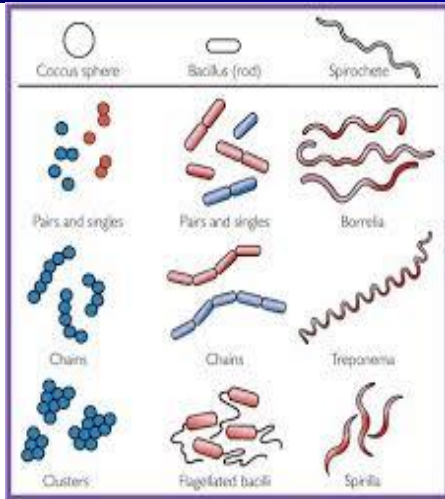
- Are invisible to the naked eye, you need a powerful microscope to see them.



- Are everywhere around us, inside us, on us, in our food, in our homes, in the air we breath and the water we wash in.
- Are mostly useful, but some are harmful.
- Have been around for 3.8 bn year and vital for life on Earth

Number of Microbes

In one single teaspoon of garden soil, there are over 100,000 microbes. In 1ltr of seawater, there are over 1bn microbes. On your hands there are more microbes than there are people in the world. There are so many microbes, that scientists have only named.



0.5% of them. Microbes outnumber all other species and make up most of the living matter on the planet.

Types –Bacteria, Virus , Fungi ,Protozoa, Helminthes.

Water borne Diseases

The term "waterborne disease" is reserved largely for infections that predominantly are transmitted through contact with or consumption of infected water. Water borne disease are caused by pathogenic microorganisms that most commonly are transmitted in contaminated fresh water. Infection commonly results during bathing, washing, drinking, in the preparation of food, or the consumption of food thus infected. According to the World Health Organization, such diseases account for an estimated 4.1% of the total DALY global burden of disease, and cause about 1.8 million human deaths annually The World Health Organization estimates that 88% of that burden is attributable to unsafe water supply, sanitation and hygiene.

Bacterial Diseases

1. Botulism

Clostridium botulinum-Bacteria can enter an open wound from contaminated water sources. Can enter the gastrointestinal tract through consumption of contaminated drinking water or (more commonly) food .

Symptoms-Dry mouth, blurred and/or double vision, difficulty swallowing, muscle weakness, difficulty breathing, slurred speech, vomiting and sometimes diarrhea. Death is usually caused by respiratory failure.

2. Campylobacteriosis

Most commonly caused by *Campylobacter jejuni* Drinking water contaminated with feces

Symptoms- dysentery like symptoms along with a high fever. Usually lasts 2–10 days.

3. Cholera

Spread by the bacterium *Vibrio cholerae* Drinking water contaminated with the bacterium In severe forms it is known to be one of the most rapidly fatal illnesses known.

Symptoms- include very watery diarrhea, nausea, cramps, nosebleed, rapid pulse, vomiting, and hypovolemic shock (in severe cases), at which point death can occur in 12–18 hours.

4. E. coli Infection

Certain strains of *Escherichia coli* (commonly *E. coli*) Water contaminated with the bacteria mostly diarrhoea. Can cause death in immuno compromised individuals, the very young, and the elderly due to dehydration from prolonged illness.

5. M. marinum infection

Mycobacterium marinum-Naturally occurs in water, most cases from exposure in swimming pools or more frequently aquariums; rare infection since it mostly infects immunocompromised individuals

Symptoms - include lesions typically located on the elbows, knees, and feet (from swimming pools) or lesions on the hands (aquariums). Lesions may be painless or painful.

6. Dysentery

genera *Shigella* and *Salmonella* with the most common being *Shigella dysenteriae* Water contaminated with the bacterium

Symptoms- Frequent passage of feces with blood and/or mucus and in some cases vomiting of blood.

7. Legionellosis

genus *Legionella* (90% of cases caused by *Legionella pneumophila*) Contaminated water: the organism thrives in warm aquatic environment.

Symptoms-Pontiac fever produces milder symptoms resembling acute influenza without pneumonia. muscle aches, malaise and occasionally diarrhea and vomiting.

8. Leptospirosis Caused Leptospira

Water contaminated by the animal urine carrying the bacteria Begins with flu-like symptoms then resolves. The second

phase then occurs involving meningitis, liver damage (causes jaundice), and renal failure Otitis Externa (swimmer's ear) Caused by a number of bacterial and fungal species.

Swimming in water contaminated by the responsible pathogens Ear canal swells, causing pain and tenderness to the touch.

9. Salmonellosis Caused Salmonella

Drinking water contaminated with the bacteria. More common as a food borne illness.

Symptoms- diarrhea, fever, vomiting, and abdominal cramps

10. Typhoid fever-Salmonella typhi

Ingestion of water contaminated with feces of an infected person Characterized by sustained fever up to 40 °C (104 °F), Symptoms- sweating; diarrhea may occur. Symptoms progress to delirium, and the spleen and liver enlarge if untreated. In this case it can last up to four weeks and cause death. Some people with typhoid fever develop a rash called "rose spots", small red spots on the abdomen and chest.

11. Vibrio Illness Vibrio vulnificus, Vibrio alginolyticus, and Vibrio parahaemolyticus

Can enter wounds from contaminated water. Also got by drinking contaminated water or eating undercooked oysters.

Symptoms- include Abdominal tenderness, Agitation, Bloody stools, Chills, Confusion, Difficulty paying attention Delirium, Fluctuating mood, Hallucination, Nosebleeds, Severe fatigue, slow, sluggish, lethargic feeling, weakness.

Water borne viral Diseases

1. SARS (Severe Acute Respiratory Syndrome)

Coronavirus Manifests itself in improperly treated water.

Symptoms

fever, myalgia, lethargy, gastrointestinal symptoms, cough, and sore throat.

2. Hepatitis A Hepatitis A virus (HAV) Can manifest itself in water (and food).

Symptoms are only acute (no chronic stage to the virus) and include Fatigue, fever, abdominal pain, nausea, diarrhea, weight loss, itching, jaundice and depression.

3. Poliomyelitis (Polio) Poliovirus Enters water through the feces of infected individuals 90-95% of patients show no symptoms 4-8% have minor symptoms (comparatively) with delirium, headache, fever, and occasional seizures, and spastic paralysis, 1% have symptoms of non-paralytic aseptic meningitis. The rest have serious symptoms resulting in paralysis or death

4. Polyomavirus infection can manifest itself in water, ~80% of the population has antibodies to Polyomavirus.

Symptoms- respiratory infection and can infect the kidneys brain (which is fatal).

Protozoan water Infection

1. Amoebiasis (hand-to-mouth) Protozoan (*Entamoeba histolytica*) Sewage, non-treated drinking water, flies in water

supply Abdominal discomfort, fatigue, weight loss, diarrhea, bloating, fever

2. Cryptosporidiosis (oral) Protozoan (*Cryptosporidium parvum*) Collects on water filters and membranes that cannot be disinfected, animal manure, seasonal runoff of water.

Flu-like, watery diarrhea, loss of appetite, substantial loss of weight, bloating, increased gas, nausea.

3. Cyclosporiasis Protozoan parasite (*Cyclospora cayentanensis*) Sewage, non-treated drinking water cramps, nausea, vomiting, muscle aches, fever, and fatigue.

4. Giardiasis (fecal-oral) (hand-to-mouth) Protozoan (*Giardia lamblia*) Most common intestinal parasite Untreated water, poor disinfection, pipe breaks, leaks, groundwater contamination, campgrounds where humans and wildlife use same source of water. Beavers and muskrats create ponds that act as reservoirs for Giardia.

Symptoms- Diarrhea, abdominal discomfort, bloating, and flatulence.

5. Microsporidiosis-Protozoan phylum (*Microsporidia*), has been detected in groundwater, the origin of drinking water Diarrhea.

Water borne helminthes Diseases

1. Schistosomiasis caused by *Schistosoma* Fresh water contaminated with certain types of snails that carry schistosomes Blood in urine.

Symptoms rash or itchy skin. Fever, chills, cough and muscle aches.

2. Dracunculiasis (Guinea Worm Disease) *Dracunculus medinensis* Stagnant water containing larvae, generally in parasitized Copepoda Allergic reaction,

Symptom- urticaria rash, nausea, vomiting, diarrhea, asthmatic attack.

3. Taeniasis- caused by *Taenia* via Drinking water contaminated with eggs

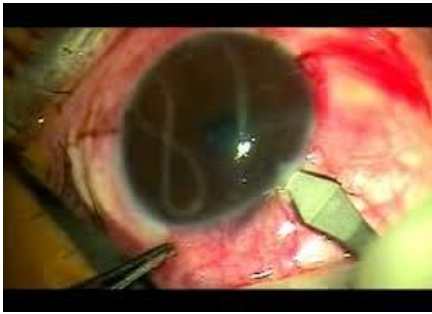
Symptoms- Intestinal disturbances, neurologic manifestations, loss of weight, cysticercosis.

4. Fasciolopsiasis caused by *Fasciolopsis buski* via Drinking water contaminated with encysted metacercaria.

Symptoms- GIT disturbance, diarrhea, liver enlargement, cholangitis, cholecystitis, obstructive jaundice.

5. Hymenolepiasis (Dwarf Tapeworm Infection) caused by *Hymenolepis nana* via Drinking water contaminated with eggs.

Symptoms- Abdominal pain, itching around the anus, nervous manifestation.



6. Echinococcosis (Hydatid disease) caused by *Echinococcus granulosus* through Drinking water contaminated with feces (usually canid) containing eggs.

Symptoms- Liver enlargement, hydatid cysts press on bile duct and blood vessels; if cysts rupture they can cause anaphylactic shock.

7. Coenurosis caused by drinking water with eggs increases.

Symptoms- intracranial tension Ascariasis *Ascaris lumbricoides* via Drinking water contaminated with feces (usually canid) containing eggs.

Symptoms- Mostly disease is asymptomatic or accompanied by inflammation, fever, and diarrhea. Severe cases involve Löffler's syndrome in lungs, nausea, vomiting, malnutrition, and underdevelopment.

8. Enterobiasis caused by *Enterobius vermicularis* through Drinking water contaminated with eggs.

Symptoms- Peri-anal itch, nervous irritability, hyperactivity and insomnia.

Control and prevention

- Global
- Governments
- Communities
- Individuals

Education Issues

- Hygiene education
- Good nutrition
- Improvements in habitation and general sanitation
- Higher education training in water- related issues

Global Surveillances

- Public health infrastructure.

- Standardized surveillance of water-borne disease outbreaks.
- Guidelines must be established for investigating and reporting water-borne diseases.

General Rules-

- Avoid contacting soil that may be contaminated with human feces.
- Do not defecate outdoors.
- Dispose of diapers properly.
- Wash hands with soap and water before handling food.
- When traveling to countries where sanitation and hygiene are poor, avoid water or food that may be contaminated.
- Wash, peel or cook all raw vegetables and fruits before eating.

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