

8th – Micro Organism - III



Harmful microorganisms: Harmful effects of microorganisms can be divided into the following two categories:

- Causing diseases in human beings, animals, and plants
- Food spoilage

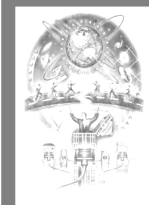
Disease-causing Microorganisms: Microorganisms that cause diseases in human beings, animals, and plants are called pathogens. Let us look at some of the diseases caused by pathogens in human beings, animals, and plants.

In human beings Pathogens enter the body of a healthy person through air, water, and food. They can also spread from an infected person to a healthy one. For example, when a person suffering from common cold sneezes, pathogens are released into the air. These pathogens may enter the body of a healthy person while breathing and he/she may also get common cold.

Pathogens also spread from an infected person to a healthy one through insects like the female Anopheles mosquito and housefly. For example, when a female Anopheles mosquito bites a person suffering from malaria, it sucks in the pathogens along with the blood. When the same mosquito bites a healthy person, the pathogens may enter his/her body and that person may also get infected with malaria. Similarly, when a housefly sits on garbage, pathogens may stick to its body. The same fly may transmit these pathogens to food items, when it sits on them. When a person eats these food items, the pathogens enter his/her body and cause diseases. Insects like the female Anopheles mosquito and housefly, which transmit pathogens from an infected person to a healthy one, are known as carriers of diseases. Diseases that can spread from one person to another are called communicable diseases. Some common communicable diseases in human beings, along with their mode of transmission, causative pathogens, and preventive measures, are listed in Table 1



Disease	Mode of transmission	Causative pathogen	Preventive measures
Malaria	Bite of the female Anopheles mosquito	Protozoan	Not allowing mosquitoes to thrive in the locality; using mosquito nets and repellents
Cholera	Contaminated food and water	Bacterium	Maintaining proper sanitation practices; boiling water before drinking; avoid eating uncovered food
Typhoid	Contaminated food	Bacterium	Maintaining proper sanitation practices;
Tuberculosis	Air	Bacterium	Vaccination
Ring Worm	Direct contact with the infected person	Fungus	Good hygiene; not sharing personal items like towels and combs with infected person
Common cold	Air	Virus	Washing hands regularly; avoiding close contact with people having common cold



8th – Micro Organism - III



Poliomyelitis	Air and water	Virus	Vaccination
Chickenpox	Air; physical contact with the infected person	Virus	Vaccination

In animals: Some animal diseases caused by pathogens are listed in Table 2

Disease	Affected animal	Mode of transmission	Causative pathogen
Foot and mouth disease	Cattle	Contact with diseased animals; air	Virus
Rinderpest	Cattle	Contact with diseased animals; drinking contaminated water; air	Virus
Anthrax	Cattle	Grazing	Bacterium
Fin rot	Fish	Dirty water/injury	Bacterium/Fungus

In plants: Some plant diseases caused by pathogens are discussed below.

Disease:	Mode of transmission	Causative Pathogen
Citrus canker	Air	Bacterium
Rust of wheat	Air seeds	Fungus
Apple scab	Air	Fungus
Septoria leaf blotch	Air	Fungus

(a) Through the air we breathe: Microorganisms that cause common cold, tuberculosis, pneumonia, etc., spread through the air we breathe. For example, when a person suffering from common cold sneezes or coughs, fine droplets of moisture carrying germs are released in the air. When a healthy person breathes such air, the germs enter his/her body and infect the person. For this reason, we should keep our hand or handkerchief on our mouth and nose while coughing and sneezing.

Learning With Innovation.....

(b) Through the water we drink: Some diseases spread through water, e.g., cholera, typhoid, jaundice, etc. The cholera causing microbes enter a healthy person through the water he/she drinks and infect them. After floods or any other natural calamity, we are advised to drink boiled water. Why? This is because many disease-causing microorganisms are present in the water at that time. Boiling of water kills the microorganisms.

(c) Through the food we eat: Protozoa, bacteria and spores of fungi are present in the soil, from where they enter our food. Therefore, we should wash fruits and vegetables after bringing them from the market.

(d) Through insects and animals: There are some insects and animals which act as carriers of disease-causing microbes. These animal insects are called **vectors**. Vectors carry disease-causing microbes from an infected person to a healthy person and cause disease. Some of the vectors are:

(i) **Housefly:** The housefly is perhaps the most dangerous disease carrier. It collects the disease-causing microbe on its legs and mouth parts from faeces and organic wastes. The same housefly when sits on our exposed food items, leaves the disease-causing microbes on the food. When we consume such food, we get infected. Various diseases like cholera, dysentery, typhoid and tuberculosis are



8th – Micro Organism - III



known to spread by houseflies through contaminated food and water. So, we should avoid eating uncovered food items.

(ii) **Mosquito** : The female Anopheles mosquito sucks the blood of human beings. While doing so, it also transmits Plasmodium (a protozoan) into the human blood. Plasmodium causes malaria, a fatal disease. Aedes mosquito acts as a carrier of dengue virus. All the mosquitoes breed in water. Hence one should not let water collect in coolers, tyres, flower pots, etc. By keeping our surroundings clean and dry, we can prevent mosquitoes from breeding.

In animals: Several microorganisms cause diseases not only in humans but also in other cattle that is cows, buffaloes and poultry birds. The diseases reduce the milk egg production, growth of birds and death.

In plants: Several microorganisms cause diseases in plants like wheat, rice, potato, sugar cane, apples, oranges, cotton and jute. The diseases reduce the yield of crops. The plant diseases are transmitted through seed, air and soil.

Microorganisms and Food Spoilage

Microorganisms like fungi and bacteria are responsible for the spoilage of various foodstuffs, including bread. The main conditions required for the growth of these microorganisms are moderately warm temperature, air, and moisture. These microorganisms often produce poisonous substances, which make food unfit for consumption. Eating such foodstuffs can cause an illness called food poisoning.

Here are a few things that can help us detect food that has become unfit for consumption because of microbial action: foul odour, slimy surface or cotton-like growth on the surface, surface discoloration, sour taste, and gas formation.

Food Preservation: Food items are prone to spoilage by microorganisms, there are methods by which food can be preserved for a longer time. Food preservation is the process of treating and handling food with an aim to stop or slow down its spoilage while maintaining its nutritional value, texture, and flavour. Since microorganisms are one of the major causes of food spoilage, food preservation involves creating conditions unfavorable for their growth. Food preservation methods either kill microbes or prevent their reproduction.

Different methods of food preservation and how it preserves food

Boiling: Boiling liquid food items can kill any existing microbes. Milk and water are often boiled to kill any harmful microbes that may be present in them.

Dehydration: Dehydration involves removal of water, one of the key requirements for microbial growth, from food items. Food items like cereals and pulses are generally dried under the sun to remove the moisture present in them.

Refrigeration and Freezing: Refrigeration at low temperatures and freezing help to preserve food for a longer time because microbes like bacteria and fungi cannot thrive at low temperatures. When fresh fruits and vegetables are frozen, water present in them also freezes. This helps in preventing microbial reproduction. Food items that can be preserved by freezing include meat and vegetable.

Canning: Storing food items in airtight cans is an effective way of preserving them. Food items like jams, vegetables, fish, and even cooked food are canned and sold in the market.

Using Chemical Preservatives: Any substance that helps preserve food or any other item is known as a preservative. Many chemicals help control microbial growth and are used as preservatives. Examples of chemical preservatives are



8th – Micro Organism - III



sodium benzoate and potassium metabisulphite. These preservatives are used in squashes, sherbets, and ketchups.

Using salt sugar, oil, or vinegar: Salt, sugar, oil, and vinegar create an environment that prevents microbial growth, and are, therefore, used for preserving foodstuffs like meat pickles, jams, jellies, and vegetables. In addition to preserving foodstuffs, these substances also impart flavour to them.

Pasteurization: Pasteurization involves heating a foodstuff to a high temperature and then cooling it rapidly. This helps in destroying harmful microbes without changing the composition, flavour, or nutritive value of the foodstuff. This process is named after the French chemist Louis Pasteur, who discovered it in the 19th century. Commercially available milk is first heated to a high temperature for about half a minute and then cooled rapidly. It is then stored at temperatures lower than 10°C.

