MODULE 23 - INFECTIOUS DISEASES AND WATERBORNE DISEASES

OBJECTIVES

By the end of this session the student will be able to know about: -

- Infectious and Waterborne diseases.
- Causes and prevention of. Infectious and Waterborne.
- Types of Infectious and Waterborne.
- Impact and effect of Infectious and Waterborne.
- Identify common waterborne illnesses, and their symptoms, prevention, and treatment.

SUMMARY

This programs deals with Infections and waterborne diseases..Infectious Diseases caused by bacteria, viruses, fungi and other parasites are major causes of death, disability, and social and economic disruption for millions of people. Infections are prevalent in developing countries, where co-infection is common. The adverse impact of infectious diseases is most severe among the poorest people, who have the fewest resources to draw from and limited or no access to integrated health care, prevention tools and medications. Children are particularly vulnerable to infectious diseases. Pneumonia, diarrhea and malaria are leading causes of death among children under age five.

Waterborne diseases 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. Waterborne disease results typhoid fever, giardia, dysentery, cholera, diarrhea, hepatitis, polio and worms etc. In this program we have tried to explain the waterborne diseases, prevention and precaution to protect them.

TRANSCRIPTION

Infectious Diseases

The most important cause of infectious diseases are bacteria, fungi viruses and other parasites which in turn result in the death, disability, and social and economic disruption for millions of people around the world. Despite safe and effective interventions, there are people who lack access to the basic necessary resources, basic necessary preventions, methods and treatments. Mostly the developing countries are the biggest suffers of Infections diseases, here co-infection is also common phenomenon. The adverse impact of infectious diseases is found mainly in village communities, where they have no or very limited access to basic health care resources.

Infection as every body knows it is the entry of some micro organism into the body

of human being may be any animal or any organism but however we speak here about human being infection is the entry of any micro organism into the body of human beings body & that disease diseases that means whenever dis causes disturbance in the ease of the person, that means the person starts producing symptoms this is disease, so infectious diseases are because of the infection of the micro organisms & micro organisms do not directly come to be in contact with the body.
Air is the best mode of transmission of micro organisms.
The second mode of transmission may be water.
The third mode of transmission may be vectors, it may be mosquitoes, it may be something else some other insects. Similarly we have mechanical transmission & other transmissions.
Approximately 14 -16 million people die every year due to infectious diseases – out of Children are most vulnerable. Pneumonia, diarrhea and malaria are the main causes of death amongst the children below the age of 5years; cerebral malaria can cause permanent mental damage.
Even the adults get affected due to infectious diseases, mental disability reduced quality of life decreased productivity or even death.

Types of Infectious Diseases

1. food or waterborne diseases acquired through eating or drinking:

Hepatitis E - water-borne viral disease that interferes with the functioning of the liver; this disease is most commonly spread through fecal contamination of drinking water; & victims exhibit jaundice, fatigue, abdominal pain, and dark colored urine.
Typhoid fever - bacterial disease spread through contact with food or water contaminated by fecal matter or sewage; victims in this case exhibit sustained high fever.

2. vectorborne diseases acquired through the bite of an infected arthropod:

Malaria – This is caused by single-cell parasitic protozoa Plasmodium; It is transmitted to humans via the bite of the female Anopheles mosquito; the parasites multiply in the liver attacking red blood cells resulting in cycles of fever, chills, and sweats accompanied by anemia; if not treated properly and in time it may lead to death due to damage to vital organs and interruption of blood supply to the brain.

Yellow fever – This is a mosquito-borne viral disease; Its severity ranges from influenza-like symptoms to severe hepatitis and hemorrhagic fever; however it generally occurs only in sub-Saharan Africa and tropical South America, where most cases are reported.

Japanese Encephalitis – this is a mosquito-borne viral disease associated with rural areas in Asia; acute encephalitis can progress to paralysis, coma, and death.

Plague – It is a bacterial disease transmitted by fleas normally associated with rats; person-to-person airborne transmission is also possible; recent plague epidemics which occurred in Asia, Africa, and South America were associated with rural areas or small towns and villages;the disease manifests itself as fever, headache, and painfully swollen lymph nodes; It progresses rapidly and without antibiotic treatment leads to pneumonic form with the death rate exceeding 50%.

Rift Valley fever – this is a viral disease affecting domesticated animals and humans; transmission is by mosquito and other biting insects; infection may also occur through handling of infected meat or contact with blood.
Chikungunya–it is a mosquito-borne (Aedes aegypti) viral disease associated with urban environments; & is similar to Dengue Fever; It is characterized by sudden onset of fever, rash, and severe joint pain usually lasting 3-7 days.

3. water contacted diseases acquired through swimming or wading in freshwater lakes, streams, and rivers:

Leptospirosis – this is a bacterial disease that affects animals and humans; infection occurs through contact with water, food, or soil contaminated by animal urine; symptoms include high fever, severe headache, vomiting, jaundice, and diarrhea. This disease can result in kidney damage, liver failure, & respiratory distress; fatality rates are low but left untreated recovery can take months.

Schistosomiasis – this diseases caused by parasitic trematode flatworm Schistosoma; fresh water snails act as intermediate host and release larval form of parasite that penetrates the skin of people exposed to contaminated water; the worms mature and reproduce in the blood vessels, liver, kidneys, and intestines releasing eggs, which become trapped in tissues triggering an immune response; this may manifest as either urinary or intestinal disease resulting in decreased work or learning capacity; mortality, while generally low, may occur in advanced cases usually due to bladder cancer;

4. animal contact disease acquired through direct contact with local animals:

Rabies – this is a viral disease of mammals usually transmitted through the bite of an infected animal, most commonly dogs; the virus affects the central nervous system causing brain alteration and death; symptoms initially are non-specific fever and headache progressing to neurological symptoms; death occurs within days of the onset of symptoms.

Prevention of Infectious Diseases

Prevention is the key in stopping the spread of infectious diseases and it can play a major role between life and death. The basic Hand washing approach can play a major role in stopping the spread of infectious diseases. Unfortunately, improper & infrequent hand washing techniques are the major reasons for the spread of the

disease. The various important ways to prevent the infections are:-
Hand Washing
At home or work, wash your hands at frequent intervals and properly. Use of warm water preferably.
• Wet your hands before applying soap.
• Rub your soapy hands together for at least 10 seconds.
• Rinse your hands thoroughly to remove all soap.
• Turn off water with paper towel.
• Dry your hands with an air-dryer or a clean paper towel.

Immunizations
Immunization is key to preventing disease among the general population. Vaccines benefit both the people who receive them, and the vulnerable, unvaccinated people around them, because the infection can no longer spread. In addition, immunizations reduce the number of deaths and disability from infections, such as whooping cough and chickenpox.

Prevention of Infectious Diseases

Talking of tetanus & diphtheria the kids receive vaccinations at a very early age, whereas the adults should stay up to the date with it. The adults who have never had chickenpox or measles during childhood are more prone to these diseases as they have never been vaccinated against the same disease. Childhood problems like mumps, chickenpox and measles, are the main causes of infection amongst the adults.

Waterborne diseases

Water pollution is the contamination of water bodies like lakes, rivers, oceans and groundwater. Water pollution occurs when pollutants are discharged directly or indirectly into water bodies without adequate treatment to remove harmful compounds.
Water pollution affects plants and organisms living in these bodies of water. In almost all cases the effect is damaging not only to individual species and populations, but also to the natural biological communities.
Waterborne diseases are caused by pathogenicmicroorganisms 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.
They have worse effect of Various forms of waterborne diarrheal disease are found mainly in children of the developing countries; according to a report of the World Health Organization, The waterborne diseases account for 4.1% of the total global amount of the diseases and around 1.8 million people die annually due to it. The term "waterborne disease" is reserved largely for infections that predominantly are transmitted through contact with or consumption of infected water. Trivially,

many infections might be transmitted by microbes or parasites that accidentally, possibly as a result of exceptional circumstances, had got into water.

Types of Waterborne Diseases

We shall now talk about diseases which are caused by Protozoal Infections; The first one is

1. Amoebiasis - This disease is transmitted from Hand to Mouth , the Microbial Agent for this disease is Protozoan that is Entamoebahistolytica, which has a Cyst-like appearance. The Sources of Agent of this disease in Water Supply are Sewage, non-treated drinking water, flies in water supply. The General Symptoms of this disease are Abdominal discomfort, fatigue, weight loss, diarrhea, bloating, & fever.
2. The Second disease is Cryptosporidiosis - this is also transmitted Orally. The Microbial Agent for this disease is again are Protozoan that is Cryptosporidium parvum. The Sources of Agent Collects on water filters and membranes that cannot be disinfected, animal manure, seasonal runoff of water. The General Symptoms are Flu-like symptoms, watery diarrhea, loss of appetite, substantial loss of weight, bloating, increased gas, & nausea.
3. The Third disease is known as Cyclosporiasis - The Microbial Agent for this disease is a Protozoan parasite Known as Cyclosporacayetanensis. The agents in this disease are carried through Sewage & non-treated drinking water. The general symptoms are cramps, nausea, vomiting, muscle aches, fever, and fatigue.
4. The fourth disease is known as Giardiasis - It is transmitted hand-to-mouth infection & the Microbial Agent is Protozoan known as Giardia lamblia, this is the most common intestinal parasite. The agents of this disease are 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. The general symptoms of this disease are Diarrhea, abdominal discomfort, bloating, and flatulence.
5. The fifth is called Microsporidiosis - This is caused by a Microbial Agent which is Protozoan phylum, but closely related to fungi. The sources or agents of this disease are Encephalitozoonintestinalis has been detected in groundwater, & it is also in drinking water. The general symptoms are Diarrhea and wasting in immunocompromised individuals.

Waterborne diseases are caused by pathogenic microorganisms...

Parasitic Infections

The first is known as Schistosomiasis, the Microbial Agent for this disease comes from Members of the genus Schistosoma, The sources or Agents of the disease are Fresh water contaminated with certain types of snails that carry schistosomes . The general symptoms of this disease are Rashes or itchy skin. Fever, chills, cough and muscle aches.

The second disease is known as Dracunculiasis or Guinea Worm Disease. The Microbial Agent for this disease is known as Dracunculusmedinensis, the agents or sources of this disease are Stagnant water containing larvae, generally in parasitisedCopepoda. The general symptoms of this disease are Allergic reaction,

urticaria rash, nausea, vomiting, diarrhea, asthmatic attack.
The third disease is known as Taeniasis. The microbial agents of this disease are Tapeworms of the genus Taenia. The sources of this disease are Drinking water contaminated with eggs. The General Symptoms are Intestinal disturbances, neurologic manifestations, loss of weight, cysticercosis.
The fourth disease is known as Fasciolopsiasis. The microbial agent for this disease is called Fasciolopsisbuski. And the Sources or Agent are found in Drinking water contaminated with encysted metacercaria. The general symptoms for this disease are GIT disturbance, diarrhea, liver enlargement, cholangitis, cholecystitis, obstructive jaundice.
The fifth disease is known as Hymenolepiasis or Dwarf Tapeworm Infection. The microbial agent for this disease is known as Hymenolepis nana. And the Sources or Agent are found in Drinking water contaminated with eggs. The general symptoms for this disease are Abdominal pain, severe weight loss, itching around the anus, nervous manifestation.
The third Category of waterborne diseases is caused by Bacterial Infections
Some of the important diseases caused by Bacterial Infections are :
Botulism. This disease is caused by the microbial agent Clostridium botulinum. The Sources or Agents of this disease are Bacteria which can enter an open wound from contaminated water sources. The bacteria can enter the gastrointestinal tract by consumtion of contaminated drinking water or more commonly food. The general symptoms for this disease are Dry mouth, blurred and/or double vision, difficulty in swallowing, muscle weakness, difficulty in breathing, slurred speech, vomiting and sometimes diarrhea. Death is also caused usually by respiratory failure.
Another common disease caused by bacterial infection is Cholera. This disease is spread by the microbial agent known as the bacterium Vibrio cholerae. The Sources or Agent are found in Drinking water contaminated with the bacterium. This disease in severe forms 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 that is in severe cases, at which point death can occur in 12–18 hours.
Another disease under this category is known as E. coli Infection. The microbial agent for this disease is found in certain strains of Escherichia coli, commonly known as E. coli. The Agents are found in Water contaminated with this bacteria. The general symptoms for this disease mostly are diarrhea. This disease can cause death in immunocompromised individuals, the very young, and the elderly due to dehydration from prolonged illness.
One more type of infectious waterborne disease caused by bacteria is the very common Dysentery. This disease is caused by a number of species in the genera Shigella and Salmonella with the most common being Shigelladysenteriae. The sources are found in water contaminated with the bacterium. And the general symptoms are frequent passage of feces with blood and/or mucus or both and in some cases vomiting of blood.
The fourth & the last category of waterborne diseases is caused by Viral Infections
Some of the common diseases of this category are
Now we'll talk about Viral Diseases:

The very first disease is Influenza. Influenza is caused by humane Influenza viruses, though the strain of the viruses it is said that it changes its variety every year & hence no vaccine has been yet very successful against influenza, we know influenza is a very mild disease, it sometimes may turn into hazardous thing or in an epidemic but however it is quite mild to human beings. It decreases the temperature by 99(degree) F till 101(Degree) F. The person has sneezing, cold & cough & this person suffers like having a upper respiratory infection but it is not actually the infection that is a viral & usually viruses are self limiting diseases so most of the care & cure is not required, most of the vaccines are not required but if a person is very cautious about knowing that this is an airborne infection & air can induce any sort of infection into the body the person will be very cautious about the air, whenever there are ups & downs in the temperature, wherever we know that it is endemic in the particular area, endemic means it is spread in the particular area & this particular area is getting many patients of the same disease, if we know that this is endemic in a particular area in that condition people may wear masks, people may care of their own breathing, people may care for the droplet infections so that it is not spread through cough or sneeze or some infected person into a healthy person. So these are the preventive measures that the person should take most of the vaccines are not required.

Adenovirus infection, which is caused by the microbial agent Adenovirus. The agents of this disease Manifests itself in improperly treated water & the general symptoms include common cold symptoms, pneumonia, croup, and bronchitis.

Gastroenteritis, this disease is caused by microbial agent s like Astrovirus, Calicivirus, Enteric Adenovirus, and Parvovirus. The agents manifests themselves in improperly treated water & the Symptoms include diarrhea, nausea, vomiting, fever, malaise, and abdominal pain.

Hepatitis A. This disease is caused by the microbial agent Hepatitis A virus known as HAV. It can manifest itself in water as well as food. The Symptoms are only acute (no chronic stage to the virus) and include Fatigue, fever, abdominal pain, nausea, diarrhea, weight loss, itching, jaundice and depression.

Poliomyelitis commonly known as Polio. This disease is caused by the microbial agent Poliovirus, which 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.

Prevention of Waterborne Diseases

With the slogan of Prevention is better than cure, we do understand that we should prevent rather than having the disease & than going to treated, the waterborne disease are preventable. If we have good safe drinking water, if we use the water which is at least safe for bathing, safe for cooking, safe for washing & a safe water, a clean water this naturally we'll prevent all the diseases, that we think are waterborne.

Let's start with our home, within our home if we have very good, a very clean water

with which we are washing the hands, let's not wash our hands with soap & water even but if the clean water washes the hands it shall clean them & this cleaning is highly required for preventing all the waterborne diseases at the first glance.
Using the water in a hygienic manner in our home having the clean utensils, handling the water cleanly, having all the reservoirs of the water of the drinking water covered, having our bathing water separate, having our toilet water different & having a particular understanding of clean water, the cleanliness, this helps us to prevent the waterborne diseases at our home. Coming to the community level the first thing that we see is well, wells usually are open wells in which fully things are falling down into the water &this water is getting contaminate, we should have covered wells, First thing. Second thing washing bathing & such other activities near the well should be avoided, wherever we have bore wells the underground water is getting used near the boring we should never use the bathing & washing activity, so that it contaminates the ground & the ground water.
When we speak about the lakes & the ponds, it has got stagnant water. This stagnant water may also
get Contaminated & since they are open naturally contamination is more. If we allows the animals to
go into the lakes & the ponds. Naturally the contamination level will be more but if we prevent animals
from getting into the ponds & lakes. If we prevent human beings to go & wash & clean their if we
prevent any sort of effluent, any sort of sewage, sluge any sort of fielding material to go & fall into ponds
& the lakes, the ponds & lakes will be clean, they shall gave fresh water, they shall give clean water
which can be filtered & used naturally, but we know that only the filtered water won't do because we
have a Population explosion scene even today in India, in this condition what we should do is to periodically get Water checked.

GLOSSARY

1.	**Waterborne**	**:**	Floating or moving on water
2.	**Pathogenic**	**:**	Any agent that can cause disease
3.	**Hygiene**	**:**	A condition or practice conducive to the preservation of health, as cleanliness.
4.	**Infection**	**:**	An act or fact of infecting
5.	**Microorganism**	**:**	Any organism too small to be viewed by the unaided eye
6.	**Nematode**	**:**	Any unsegmented worm of the phylum Nematoda, having an elongated, cylindrical body; a roundworm.
7.	**Sewage**	**:**	The waste matter that passes through sewers.
8.	**Intestinal**	**:**	The lower part of the alimentary canal, extending from the pylorus to the anus.

9.	**Manifestation**	**:**	A public demonstration, as for political effect.
10.	**Bacteria**	**:**	Various species of which are involved in fermentation, putrefaction, infectious diseases, or nitrogen fixation.
11.	**Diarrhea**	**:**	An intestinal disorder characterized by abnormal frequency and fluidity of fecal evacuations.
12.	**Filariasis**	**:**	Infection by filarial worms in the blood and lymph channels, lymph glands, and other tissues, the various species causing skin swellings, blindness, or elephantiasis if untreated.
13.	**Petrochemicals**	**:**	A chemical substance obtained from petroleum.
14.	**Predominantly**	**:**	having ascendancy, power, authority, or influence over others; preeminent.
15.	**Protozoa**	**:**	a major grouping or superphylum of the kingdom Protista, comprising the protozoans.

FAQs

1. What is Hepatitis B?

Ans: Hepatitis B is a type of the Hepatitis that is swelling of the liver. This is caused by the Hepatitis B virus. The virus can be found in the blood and body fluids of an infected person. The virus attacks the liver, and over many years can eventually cause severe illness or death.

2. Are there other types of hepatitis?

Ans: Yes, in addition to Hepatitis B, there is Hepatitis A, Hepatitis C and Hepatitis E.

3. How is malaria transmitted?

Ans: Usually, people get malaria by being bitten by an infective female *Anopheles* mosquito. Only Anopheles mosquitoes can transmit malaria and they must have been infected through a previous blood meal taken from an infected person.

4. What are the signs and symptoms of malaria?

Ans: Symptoms of malaria include fever and flu-like illness, including shaking chills, headache, muscle aches, and tiredness. Nausea, vomiting, and diarrhea may also occur. Malaria may cause anemia and jaundice because of the loss of red blood cells. If not promptly treated, the infection can become severe and may cause kidney failure, seizures, mental confusion, coma, and death.

5. **What is plague?**

Ans: Plague is a disease caused by the bacterium Yersinia pestis.
There are three major forms of plague: bubonic, septicemic and pneumonic.

- Bubonic plague affects the lymph nodes.
- Septicemic plague affects the blood.
- Pneumonic plague affects the lungs.

6. **What is rabies?**

Ans: Rabies is a viral disease that can infect mammals. It causes inflammation of the brain. Once symptoms begin, there is no treatment for rabies, and it is always fatal.

7. **Is there any treatment for rabies?**

Ans: There is no treatment for rabies once a person or animal shows signs of the disease, and death is inevitable.

8. **What Symptoms and Signs of Chikungunya?**

Ans:

- Chills
- High grade and typical joint pain is the characteristics of chikungunya.
- Nausea
- Vomiting
- Headache
- Inflammation of joints causing pain and restriction of movements. There can be tenderness and swelling of the joints also.

9. **What causes of waterborne disease?**

Ans: Drinking of water contaminated by human or animal feces, which contains pathogenic microorganisms, causes water borne diseases.

10. **What are the symptoms of influenza?**

Ans: Seasonal influenza infection most commonly causes a sudden onset of high fever, cough, headache, muscle and joint aches and pain, severe malaise sore throat, and runny nose. Other symptoms may include fatigue and decreased appetite. Uncommon symptoms may include nausea, vomiting and diarrhea.

11. **Can cholera be spread person-to-person?**

Ans: The disease is not likely to spread directly from one person to another; therefore, casual contact with an infected person is not a risk for becoming ill.

12. What Symptoms of dysentery ?

Ans: Patients with bacterial often have fever, abdominal cramps, rectal pain, and bloody stools. Occasionally, large portions of the intestinal membrane pass with particularly foul-smelling stool containing yellowish white mucus and/or blood. In nearly half the cases, Shigella does not cause bloody diarrhea.

13. What is typhoid fever?

Ans: Typhoid fever is a bacterial infection of the intestinal tract and occasionally the bloodstream. Most of the cases are acquired during foreign travel to underdeveloped countries. The germ that causes typhoid is a unique human strain of salmonella called Salmonella typhi.

14: Define waterborne diseases.

Ans: A disease, caused by bacterium or organism able to live in water, which can be transmitted by water.

15: Explain the main factor waterborne diseases.

Ans: Microorganisms causing diseases that characteristically are waterborne, prominently include protozoa and bacteria, many of which are intestinal parasites, or invade the tissues or circulatory system through walls of the digestive tract. Various other waterborne diseases are caused by viruses.

16: How does Filariasis affect human.

Ans: Filariasis is a concern for the rural population in India whose major occupation is agriculture. Although Filariasis can be treated and prevented with oral medicines, lack of medicines in rural India leads to severe disfiguration in many cases.