

# SHAMBHUNATH INSTITUTE OF PHARMACY

3<sup>rd</sup> Sessional Examination 2019-2020

D. Pharm. 1<sup>st</sup> year

Subject- Health Education and community pharmacy

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Time: - 90 minutes.

Max. Marks: 20

Roll no. -

Subject code: 214112

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**Note:** Attempt any **four** questions.

(4x5=20)

1. Discuss in detail purification of water.
2. Write in Details about microbes with their classifications with examples.
3. Write about followings:
  - a) Arthropod borne diseases and their control.
  - b) Staining techniques of organisms of common diseases.
4. Write about followings Causative agents, mode of transmission and prevention:
  - a) Chickenpox
  - b) Tuberculosis
5. Write about followings Causative agents, mode of transmission and prevention:
  - a) Cholera
  - b) Filariases

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## SOLUTIONS

### 1. Purification of water-

**Ans:** Water purification is the process of removing undesirable chemicals, biological contaminants, suspended solids, and gases from water. The goal is to produce water fit for specific purposes. Most water is purified and disinfected for human consumption (drinking water), but water purification may also be carried out for a variety of other purposes, including medical, pharmacological, chemical, and industrial applications. The methods used include physical processes such as filtration, sedimentation, and distillation; biological processes such as slow sand filters or biologically active carbon; chemical processes such as flocculation and chlorination; and the use of electromagnetic radiation such as ultraviolet light.

Water purification may reduce the concentration of particulate matter including suspended particles, parasites, bacteria, algae, viruses, and fungi as well as reduce the concentration of a range of dissolved and particulate matter.

The standards for drinking water quality are typically set by governments or by international standards. These standards usually include minimum and maximum concentrations of contaminants, depending on the intended use of the water.

#### **Treatment-**

1. Pumping and containment – The majority of water must be pumped from its source or directed into pipes or holding tanks. To avoid adding contaminants to the water, this physical infrastructure must be made from appropriate materials and constructed so that accidental contamination does not occur.
2. Screening – The first step in purifying surface water is to remove large debris such as sticks, leaves, rubbish and other large particles which may interfere with subsequent purification steps. Most deep groundwater does not need screening before other purification steps.
3. Storage – Water from rivers may also be stored in bankside reservoirs for periods between a few days and many months to allow natural biological purification to take place. This is especially important if treatment is by slow sand filters. Storage reservoirs also provide a buffer against short periods of drought or to allow water supply to be maintained during transitory pollution incidents in the source river.
4. Pre-chlorination – In many plants the incoming water was chlorinated to minimize the growth of fouling organisms on the pipe-work and tanks. Because of the potential adverse quality effects (see chlorine below), this has largely been discontinued.

2. **Ans:** Microorganisms or microbes are microscopic organisms that exist as unicellular, multicellular, or cell clusters. Microorganisms are widespread in nature and are beneficial to life, but some can cause serious harm. They can be divided into six major types: bacteria, archaea, fungi, protozoa, algae, and viruses.

Microorganisms can be found almost anywhere on Earth. Bacteria and archaea are almost always microscopic, while a number of eukaryotes are also microscopic, including most protists, some fungi, as well as some micro-animals and plants. Viruses are generally regarded as not living and therefore not considered as microorganisms, although a subfield of microbiology is virology, the study of viruses.

### 3. Write about followings:

- a) **Arthropod borne diseases and their control-**

The prevention and control of arthropod borne diseases combines tactics aimed at disease vectors, pathogens and hosts. This chapter emphasizes preventive measures. These are measures, approaches or practices that place a barrier (physical, chemical, immunologic, behavioral or ecological) between disease pathogens and susceptible hosts. In general, preventive measures apply to individual or to small groups of hosts, although some larger scale applications of preventive measures (such as vaccination) also are discussed. Preventive measures include repellents and other forms of individual protection, chemoprophylaxis and chemotherapy, and vaccines. Vector control strategies used for prevention of specific diseases are mentioned briefly.

#### **b) Staining techniques of organisms of common diseases-**

Gram staining is used to determine gram status to classify bacteria broadly. It is based on the composition of their cell wall. Gram staining uses crystal violet to stain cell walls, iodine as a mordant, and a fuchsin or safranin counterstain to mark all bacteria. Gram status is important in medicine; the presence or absence of a cell wall changes the bacterium's susceptibility to some antibiotics.

Gram-positive bacteria stain dark blue or violet. Their cell wall is typically rich with peptidoglycan and lacks the secondary membrane and lipopolysaccharide layer found in Gram-negative bacteria.

On most Gram-stained preparations, Gram-negative organisms appear red or pink because they are counterstained. Because of presence of higher lipid content, after alcohol-treatment, the porosity of the cell wall increases, hence the CVI complex (crystal violet – iodine) can pass through. Thus, the primary stain is not retained. Also, in contrast to most Gram-positive bacteria, Gram-negative bacteria have only a few layers of peptidoglycan and a secondary cell membrane made primarily of lipopolysaccharide.

#### **Common Biological stain-**

Different stains react or concentrate in different parts of a cell or tissue, and these properties are used to advantage to reveal specific parts or areas. Some of the most common biological stains are listed below. Unless otherwise marked, all of these dyes may be used with fixed cells and tissues; vital dyes (suitable for use with living organisms).

#### **4. Write about followings Causative agents, mode of transmission and prevention-**

Ans-

##### **a) Chickenpox-**

**Chickenpox**, also known as **varicella**, is a highly contagious disease caused by the initial infection with varicella zoster virus (VZV). The disease results in a characteristic skin rash that forms small, itchy blisters, which eventually scab over. It usually starts on the chest, back, and face. It then spreads to the rest of the body. Other symptoms may include fever, tiredness, and headaches. Symptoms usually last five to seven days. Complications may occasionally include pneumonia, inflammation of the brain, and bacterial skin infections. The disease is often more severe in adults than in children. Symptoms begin 10 to 21 days after exposure to the virus.

##### **Sign and symptoms-**

The early (prodromal) symptoms in adolescents and adults are nausea, loss of appetite, aching muscles, and headache. This is followed by the characteristic rash or oral sores, malaise, and a low-grade fever that signal the presence of the disease. Oral manifestations of the disease (enanthem) not uncommonly may precede the external rash (exanthem). In children the illness is

not usually preceded by prodromal symptoms, and the first sign is the rash or the spots in the oral cavity. The rash begins as small red dots on the face, scalp, torso, upper arms and legs; progressing over 10–12 hours to small bumps, blisters and pustules; followed by umbilication and the formation of scabs.

### **Prevention-**

#### **Hygiene measures:**

The spread of chickenpox can be prevented by isolating affected individuals. Contagion is by exposure to respiratory droplets, or direct contact with lesions, within a period lasting from three days before the onset of the rash, to four days after the onset of the rash. The chickenpox virus is susceptible to disinfectants, notably chlorine bleach (i.e., sodium hypochlorite). Like all enveloped viruses, it is sensitive to desiccation, heat and detergents.

#### **Vaccine:**

The varicella vaccine is recommended in many countries. Some countries require the varicella vaccination or an exemption before entering elementary school. A second dose is recommended five years after the initial immunization. A vaccinated person is likely to have a milder case of chickenpox if they become infected. Immunization within three days following household contact reduces infection rates and severity in children.

### **b) Tuberculosis-**

Tuberculosis (TB) is a disease caused by bacteria called *Mycobacterium tuberculosis*. The bacteria usually attack the lungs, but they can also damage other parts of the body.

TB spreads through the air when a person with TB of the lungs or throat coughs, sneezes, or talks. If you have been exposed, you should go to your doctor for tests. You are more likely to get TB if you have a weak immune system.

Symptoms of TB in the lungs may include

- A bad cough that lasts 3 weeks or longer
- Weight loss
- Loss of appetite
- Coughing up blood or mucus
- Weakness or fatigue
- Fever
- Night sweats

Skin tests, blood tests, x-rays, and other tests can tell if you have TB. If not treated properly, TB can be deadly. You can usually cure active TB by taking several medicines for a long period of time.

#### **Prevention-** BCG (Bacille Calmette-Guerin) Vaccine

- **Treatment-** Staying on Track with TB Medicine
- Treatment: Latent TB Infection (LTBI) and TB Disease

## **5. Cholera-**

Cholera is an infectious disease that causes severe watery diarrhea, which can lead to dehydration and even death if untreated. It is caused by eating food or drinking water contaminated with a bacterium called *Vibrio cholerae*.

## Cholera Causes-

*Vibrio cholerae*, the bacterium that causes cholera, is usually found in food or water contaminated by feces from a person with the infection. Common sources include:

- Municipal water supplies
- Ice made from municipal water
- Foods and drinks sold by street vendors
- Vegetables grown with water containing human wastes
- Raw or undercooked fish and seafood caught in waters polluted with sewage

Signs and symptoms of dehydration include:

- Rapid heart rate
- Loss of skin elasticity (the ability to return to original position quickly if pinched)
- Dry mucous membranes, including the inside of the mouth, throat, nose, and eyelids
- Low blood pressure
- Thirst
- Muscle cramps

If not treated, dehydration can lead to shock and death in a matter of hours

## 6. Filariases-

**Filariasis** is a parasitic disease caused by an infection with roundworms of the Filarioidea type. These are spread by blood-feeding insects such as black flies and mosquitoes. They belong to the group of diseases called helminthiases.

Eight known filarial worms have humans as a definitive host. These are divided into three groups according to the part of the body they affect:

- Lymphatic filariasis is caused by the worms *Wuchereria bancrofti*, *Brugia malayi*, and *Brugia timori*. These worms occupy the lymphatic system, including the lymph nodes; in chronic cases, these worms lead to the syndrome of elephantiasis.
- Subcutaneous filariasis is caused by *Loa loa* (the eye worm), *Mansonella streptocerca*, and *Onchocerca volvulus*. These worms occupy the layer just under the skin. *Loa loa* causes *Loa loa* filariasis, while *O. volvulus* causes river blindness.
- Serous cavity filariasis is caused by the worms *Mansonella perstans* and *Mansonella ozzardi*, which occupy the serous cavity of the abdomen. *Dirofilaria immitis*, the dog heartworm, rarely infects humans.
- The most spectacular symptom of lymphatic filariasis is elephantiasis – edema with thickening of the skin and underlying tissues—which was the first disease discovered to be transmitted by mosquito bites.<sup>[2]</sup> Elephantiasis results when the parasites lodge in the lymphatic system.
- Elephantiasis affects mainly the lower extremities, while the ears, mucous membranes, and amputation stumps are affected less frequently. However, different species of filarial worms tend to affect different parts of the body; *Wuchereria bancrofti* can affect the legs, arms, vulva, breasts, and scrotum (causing hydrocele formation), while *Brugia timori* rarely affects the genitals.<sup>[citation needed]</sup> Those who develop the chronic stages of

elephantiasis are usually free from microfilariae (amicrofilaraemic), and often have adverse immunological reactions to the microfilariae, as well as the adult worms.

- The subcutaneous worms present with rashes, urticarial papules, and arthritis, as well as hyper- and hypopigmentation macules. *Onchocerca volvulus* manifests itself in the eyes, causing "river blindness" (onchocerciasis), one of the leading causes of blindness in the world. Serous cavity filariasis presents with symptoms similar to subcutaneous filariasis, in addition to abdominal pain, because these worms are also deep-tissue dwellers.

Cause:

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- Human filarial nematode worms have complicated life cycles, which primarily consists of five stages. After the male and female worms mate, the female gives birth to live microfilariae by the thousands. The microfilariae are taken up by the vector insect (intermediate host) during a blood meal. In the intermediate host, the microfilariae molt and develop into third-stage (infective) larvae. Upon taking another blood meal, the vector insect, such as *Culex pipiens*, injects the infectious larvae into the dermis layer of the skin. After about one year, the larvae molt through two more stages, maturing into the adult worms.

Diagnosis:

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- Filariasis is usually diagnosed by identifying microfilariae on Giemsa stained, thin and thick blood film smears, using the "gold standard" known as the finger prick test. The finger prick test draws blood from the capillaries of the finger tip; larger veins can be used for blood extraction, but strict windows of the time of day must be observed. Blood must be drawn at appropriate times, which reflect the feeding activities of the vector insects. Examples are *W. bancrofti*, whose vector is a mosquito; night is the preferred time for blood collection. *Loa loa's* vector is the deer fly; daytime collection is preferred. This method of diagnosis is only relevant to microfilariae that use the blood as transport from the lungs to the skin. Some filarial worms, such as *M. streptocerca* and *O. volvulus*, produce microfilariae that do not use the blood; they reside in the skin only. For these worms, diagnosis relies upon skin snips and can be carried out at any time.
- Various concentration methods are applied: membrane filter, Knott's concentration method, and sedimentation technique.
- Polymerase chain reaction (PCR) and antigenic assays, which detect circulating filarial antigens, are also available for making the diagnosis. The latter are particularly useful in amicrofilaraemic cases. Spot tests for antigen are far more sensitive, and allow the test to be done anytime, rather in the late hours.
- Lymph node aspirate and chylous fluid may also yield microfilariae. Medical imaging, such as CT or MRI, may reveal "filarial dance sign" in the chylous fluid; X-ray tests can show calcified adult worms in lymphatics. The DEC provocation test is performed to obtain satisfying numbers of parasites in daytime samples. Xenodiagnosis is now obsolete, and eosinophilia is a nonspecific primary sign.

## Treatment

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- The recommended treatment for people outside the United States is albendazole combined with ivermectin. A combination of diethylcarbamazine and albendazole is also effective. Side effects of the drugs include nausea, vomiting, and headaches. All of these treatments are microfilaricides; they have no effect on the adult worms. While the drugs are critical for treatment of the individual, proper hygiene is also required.
- Different trials were made to use the known drug at its maximum capacity in absence of new drugs. In a study from India, it was shown that a formulation of albendazole had better anti-filarial efficacy than albendazole itself.