Course Guide for HED 204

Course Information

Course Code: HED 204
Course Title: Communicable and Non communicable Diseases
Credit Unit: 2
Course Status: Core
Course Blub:
Semester: Second
Course Duration: One Semester
Required Hours for Study: 30

Course Team

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Copy Editor

Ice Breaker

You have an information regarding diseases the one that can be transmitted from one person to another and the one that cannot be transmitted from one person to another. You in your life you have contracted with one disease or the other. Also, you have done some courses that may introduce you to communicable and non-communicable diseases. Mention any four communicable and non-communicable diseases.

Introduction

HED 204- communicable and non-communicable diseases. The course is a core course in second semester. It will take you 15 weeks to complete the course. You are to spend 91 hours of study for a period of 13 weeks while the first week is for orientation and last week is for end semester examination. The credit earned in this course is part of the requirement for graduation.
You will receive the course material which you can read online or download and read off-line. The online course material is integrated in the Learning Management System (LMS). All activities in this course will be held in the LMS. All you need to know in this course is presented in the following sub-headings.

Course Competencies

By the end of this course, you will gain competency:

- in having the knowledge, nature, causes of communicable diseases

- in having the knowledge, nature, causes of non-communicable diseases
- to have better understanding of communicable and non-communicable diseases preventive measures
- to have ability to educate community on preventive strategies of communicable and non-communicable diseases
- to represent and reason with Knowledge

Course Objectives

The course objectives are to:

- Provide background information on communicable and non-communicable diseases
- Create awareness on the preventive measures of communicable and non-communicable diseases
- Gain an overview of the various means of communicable and non-communicable disease transmission

Working through this Course

The course is divided into modules and units. The modules are derived from the course competencies and objectives. The competencies will guide you on the skills you will gain at the end of this course. So, as you work through the course, reflect on the competencies to ensure mastery. The units are components of the modules. Each unit is sub-divided into introduction, intended learning outcome(s), main content, self-assessment exercise(s), conclusion, summary, and further readings. The introduction introduces you to the unit topic. The intended learning outcome(s) is the central point which help to measure your achievement or success in the course. Therefore, study the intended learning outcome(s) before going to the main content and at the end of the unit, revisit the intended learning outcome(s) to check if you have achieved the learning outcomes. Work through the unit again if you have not attained the stated learning outcomes.

The main content is the body of knowledge in the unit. Self-assessment exercises are embedded in the content which helps you to evaluate your mastery of the competencies. The conclusion gives you the takeaway while the summary is a brief of the knowledge presented in the unit. The final part is the further readings. This takes you to where you can read more on the knowledge or topic presented in the unit. The modules and units are presented as follows:

Module 1: Overview of Disease
Unit 1 : Disease Causing Agents
Unit 2 : Importance of Disease Study
Unit 3: Factors Involved in the Transmission of Communicable Diseases
Unit 4: Risk Factors of Non-Communicable Diseases
Unit 5: Problem of Communicable Disease among School Age-group
Module 2: Communicable Diseases
Unit 1: Indirect contact (Water and Food bone)

Hepatitis
Poliomyelitis
Unit 2 : Vector bone
Malaria
Onchocerciasis
Yellow fever
Unit 3: Direct contact
HIV/AIDS
Syphilis
Gonorrhoea
Unit 4
Tuberculosis
Rabies
Unit 5 Transmission process and Preventive Measures of communicable diseases
Module 3: Non-Communicable Diseases
Unit 1 : Cancer and Obesity
Unit 2 : Hypertension
Unit 3 : Diabetes
Unit 4 : Sickle cell Anaemia and Arthritis
Unit 5 : Prevention and Control of Non-Communicable Diseases
There are fifteen units in this course. Each unit represent a week of study.

Presentation Schedule

The weekly activities are presented in Table 1 while the required hours of study and the activities are presented in Table 2. This will guide your study time. You may spend more time in completing each module or unit.

Table I: Weekly Activities

Week	**Activity**
1	Orientation and course guide
2	Module 1 Unit 1
3	Module 1 Unit 2
4	Module 1 Unit 3
5	Module 1 Unit 4 and 5
6	Module 2 Unit 1
7	Module 2 Unit 2
8	Module 2 Unit 3 and 4
9	Module 2 Unit 5
10	Module 3 Unit 1
11	Module 3 Unit 2
12	Module 3 Unit 3
13	Module 3 Units 4 and 5
14	Revision and response to questionnaire
15	Examination

The activities in Table I include facilitation hours (synchronous and asynchronous), assignments, mini projects, and laboratory practical. How do you know the hours to spend on each? A guide is presented in Table 2.

Table 2: Required Minimum Hours of Study

S/N	Activity	Hour per Week	Hour per Semester
1	Synchronous Facilitation (Video Conferencing)	2	26
2	Asynchronous Facilitation (Read and respond to posts including facilitator's comment, self-study)	4	52
3	Assignments, mini-project, laboratory practical and portfolios	1	13
	Total	7	91

Assessment

Table 3 presents the mode you will be assessed.

Table 3: Assessment

S/N	**Method of Assessment**	**Score (%)**
1	Portfolios	10
2	First C.A Test	20
3	Second C.A Test	20
4	Assignments	10
5	Final Examination	40
Total		100

Portfolio

A portfolio has been created for you tagged "**My Portfolio**". With the use of Microsoft Word, state the knowledge you gained in every Module and in not more than three sentences explain how you were able to apply the knowledge to solve problems or challenges in your context or how you intend to apply the knowledge. Use this Table format:

Application of Knowledge Gained

Module	Topic	Knowledge Gained	Application of Knowledge Gained

You may be required to present your portfolio to a constituted panel.

First C.A Test

You will be required to write first C.A test from the beginning to the middle of the semester for the continuous assessment.

Second C.A Test
You will be required to write the second C.A. test at the end of the semester for your continuous assessment.

Assignments
Take the assignment and click on the submission button to submit. The assignment will be scored, and you will receive a feedback.
Examination
Finally, the examination will help to test the cognitive domain. The test items will be mostly application, and evaluation test items that will lead to creation of new knowledge/idea.

How to get the Most from the Course
To get the most in this course, you:

- Need a personal laptop. The use of mobile phone only may not give you the desirable environment to work.
- Need regular and stable internet.
- Need to install the recommended software.
- Must work through the course step by step starting with the programme orientation.
- Must not plagiarise or impersonate. These are serious offences that could terminate your studentship. Plagiarism check will be used to run all your submissions.
- Must do all the assessments following given instructions.
- Must create time daily to attend to your study.

Facilitation
There will be two forms of facilitation – synchronous and asynchronous. The synchronous will be held through video conferencing according to weekly schedule. During the synchronous facilitation:

- There will be two hours of online real time contact per week making a total of 26 hours for thirteen weeks of study time.
- At the end of each video conferencing, the video will be uploaded for view at your pace.
- You are to read the course material and do other assignments as may be given before video conferencing time.
- The facilitator will concentrate on main themes.
- The facilitator will take you through the course guide in the first lecture at the start date of facilitation

For the asynchronous facilitation, your facilitator will:

- Present the theme for the week.

- Direct and summarise forum discussions.
- Coordinate activities in the platform.
- Score and grade activities when need be.
- Support you to learn. In this regard personal mails may be sent.
- Send you videos and audio lectures, and podcasts if need be.

Read all the comments and notes of your facilitator especially on your assignments, participate in forum discussions. This will give you opportunity to socialise with others in the course and build your skill for teamwork. You can raise any challenge encountered during your study. To gain the maximum benefit from course facilitation, prepare a list of questions before the synchronous session. You will learn a lot from participating actively in the discussions.
Finally, respond to the questionnaire. This will help ACETEL to know your areas of challenges and how to improve on them for the review of the course materials and lectures.

Learner Support
You will receive the following support:

- Technical Support: There will be contact number(s), email address and chat resources on the Learning Management System where you can chat or send message to get assistance and guidance any time during the course.

- 24/7 communication: You can send personal mail to your facilitator and the centre at any time of the day. You will receive answer to you mails within 24 hours. There is also opportunity for personal or group chats at any time of the day with those that are online.

- You will receive guidance and feedback on your assessments, academic progress, and receive help to resolve challenges facing your studies.

Course Development

HED 204: COMMUNICABLE AND NON-COMMUNICABLE DISEASES

BY

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Unit 3 Factors Involved in the Transmission of Communicable Diseases
Unit 4 Risk Factors of Non-Communicable Diseases
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Module 2 Communicable Diseases
Unit 1: Indirect contact (Water and Food bone)
Hepatitis
Poliomyelitis
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Malaria
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Yellow fever
Unit 3: Direct contact
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Syphilis
Gonorrhoea
Unit 4:
Tuberculosis
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Module 3 Non-Communicable Diseases
Unit 1 cancer and Obesity
Unit 2 Hypertension
Unit 3 Diabetes
Unit 4 Sickle cell Anaemia and Arthritis
Unit 5 Prevention and Control of Non-Communicable Diseases

Module 1 Overview of Disease

Basic information on disease will be provided in this module to equip you with knowledge of signs, symptoms, causes, and prevention and control measures. Having knowledge of diseases will influence your attitude towards and practice of preventive measures of disease contraction. The knowledge of disease will favourably influence your health seeking behaviour of students and community.

Unit 1 Disease Causing Agents
Unit 2 Importance of Disease Study
Unit 3 Factors Involved in the Transmission of Communicable Diseases
Unit 4 Risk Factors of Non-Communicable Diseases
Unit 5 Problem of Communicable Disease among School Age-group

Unit 1 Communicable Diseases Causing Agents

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1.0 Introduction

Communicable diseases constitute serious public health challenge in both developed and under developed nations. Many died and others sustain different disabilities as a result of communicable diseases. This is due to inadequate manpower and facilities to address the problem or in ability to use appropriate preventive measures that will reduce the menace of communicable diseases contraction more particularly in developing countries. In this unit you will learn the definition of disease, prevention as well as control measures of communicable disease.

2.0 Intended Learning Outcome(ILOs)

By the end of this unit, you will be able to:

- define disease.
- identify different types of disease causing agents.
- describe the prevention and control measures of communicable diseases.

3.0 Main Content

3.1 Disease

Disease refers to any harmful deviation from the normal structural or functional state of an organism, generally associated with certain signs and symptoms and differing in nature from physical injury. A diseased organism commonly exhibits signs or symptoms indicative of its abnormal state. Thus, the normal condition of an organism must be understood in order to recognise the hallmarks of disease. Nevertheless, a sharp demarcation between disease and health is not always apparent, (Scarpelli & Burrows, 2019). A disease may also be seen as a particular abnormal condition that negatively affects the structure or function of part or all of an organism,

and that is not due to any external injury, (Scarpelli & Burrows 2019). Diseases are often construed as medical conditions that are associated with specific symptoms and signs. (Scarpelli&Burrows, 2019) A disease may be caused by external factors such as pathogens or by internal dysfunctions. For example, internal dysfunctions of the immune system can produce a variety of different diseases, including various forms of immunodeficiency, hypersensitivity, allergies and autoimmune disorders.

3.2 Infectious Agents

These refer to organisms that are responsible for causing pathological changes in human, animals or plants body due to its invasion .They are also known as disease causing organisms. The organism uses a person's body to sustain itself, reproduce, and colonise. These infectious organisms are known as pathogens. Examples of pathogens include bacteria, viruses and fungi Pathogens can multiply and adapt quickly.

Some infections are mild and barely noticeable, but others are severe and life-threatening, and some are resistant to treatment. Infection can be transmitted in a variety of ways.

These include skin contact, bodily fluids, contact with feces, airborne particles, and touching an object that an infected person has also touched. How an infection spreads and its effect on the human body depend on the type of agent.

The immune system is an effective barrier against infectious agents, but colonies of pathogens may grow too large for the immune system to fight. At this stage, infections become harmful. Many pathogens give off toxins that trigger negative responses from the body.

Basic facts on infection

- Infection is the effect of a foreign organism in the body.
- Types of infection include bacterial, fungal, viral, protozoan, parasitic, and prion disease.
- They are classified by the type of organism causing the infection.
- Infections can range from mild inflammation in one person to an epidemic.

3.3 Types of Infectious Agents

Bacteria are one type of infectious agent.

Bacteria, viruses, fungi, protozoa, parasites, and prions are different types of pathogen. They vary in their size, shape, function, genetic content, and how they act on the body.

For example, viruses are smaller than bacteria, and they can enter a host and take over cells. However, bacteria can survive without a host.

Treatment will depend on the type of pathogen. This article will focus on the most common and deadly types of infection: Bacterial, viral, fungal, and prion.

Viral infections

The common cold is a viral infection.

Viral infections are caused by virus and there are millions types of virus that are existing, but only 5,000 types have been identified. Viruses contain a small piece of genetic code. They are protected by a coat of protein and fat. Viruses invade a host and attach themselves to a cell. As they enter the cell, they release genetic material. The genetic material forces the cell to replicate, and the virus multiplies. When the cell dies, it releases new viruses, and these go on to infect new cells.

Not all viruses destroy their host cell. Some of them change the function of the cell. In this way, viruses such as human papillomavirus (HPV) or Epstein-Barr virus (EBV) can lead to cancer by forcing cells to replicate in an uncontrolled way. They can also target certain age groups, such as infants or young children. A virus may remain dormant for a period before multiplying again. The person with the virus can appear to have recovered but may get sick again when the virus reactivates.

Here are some examples of viral infections:

- the common cold, mainly caused by the rhinovirus, coronavirus, and adenovirus
- encephalitis and meningitis, caused by enteroviruses and the herpes viruses
- warts and skin infections, caused by the human papillomaviruses (HPV) and herpes simplex virus (HSV).
- gastroenteritis, caused by the nova virus

Other viral conditions include:

- Zika virus
- human immunodeficiency virus (HIV)
- hepatitis C
- polio
- influenza
- Dengue fever
- H1N1 swine flu
- Ebola
- Middle East respiratory syndrome (MERS-CoV)

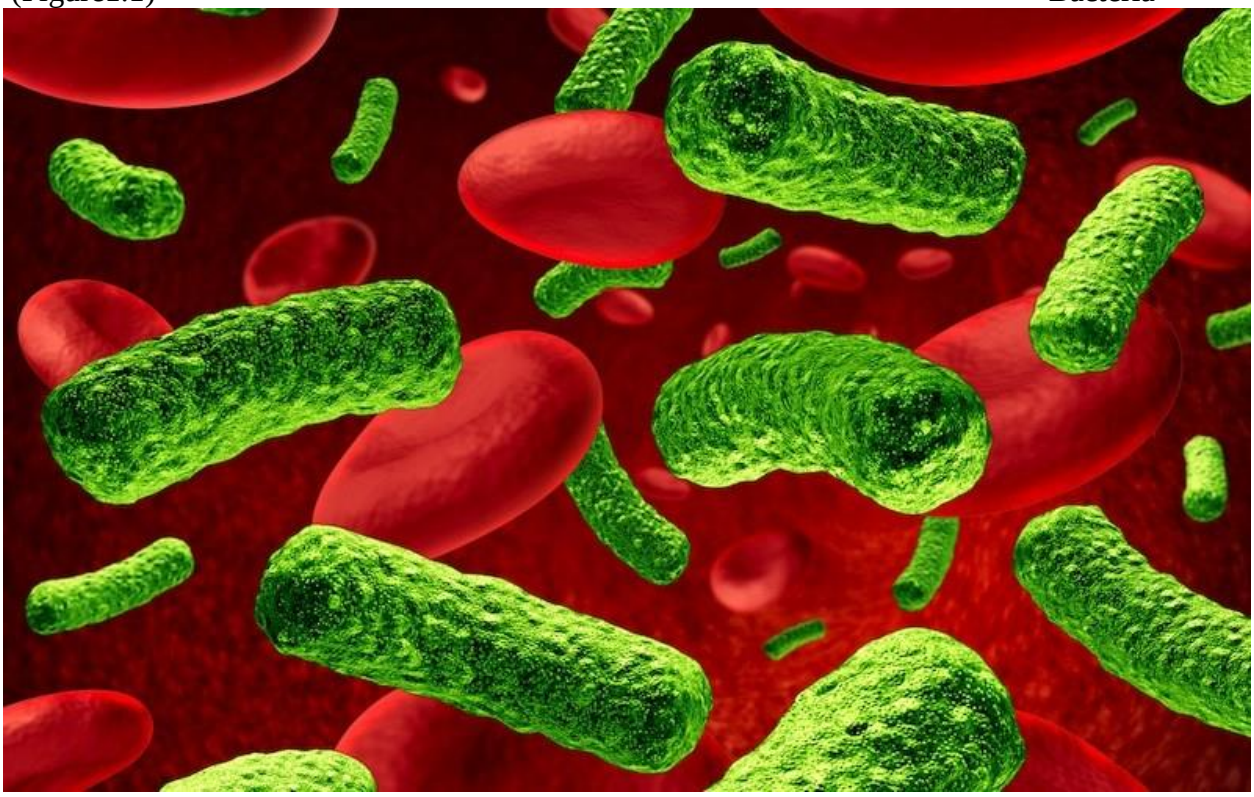
Antiviral medications help in some cases. They can either prevent the virus from reproducing or boost the host's immune system. Antibiotics are not effective against viruses**.** Using antibiotics against a virus will not stop the virus, and it increases the risk of antibiotic resistance. Most treatment aims to relieve symptoms while the immune system combats the virus without assistance from medicine.

3.3.1 Bacterial infections

Bacteria are single-celled microorganisms known as prokaryotes. They are estimated to be at least one million bacteria on the earth. Bacteria do exist in any of three main shapes:

- Spherical: These are usually the simplest to treat and are known as cocci.
- Rod-shaped: These are called bacilli.
- Spiral: Coiled bacteria are known as spirilla. If the coil of a spirillus is particularly tight, they are known as spirochetes.

(Figure1.1) Bacteria



Bacteria can live in almost any kind of environment, from extreme heat to intense cold, and some can even survive in radioactive waste. There are trillions of strains of bacteria, and few of these cause diseases in humans. Some of them live inside the human body without causing harm, for example in the gut or airways. Some "good" bacteria attack "bad" bacteria and prevent them from causing sickness. However, some bacterial diseases are deadly. These include: cholera, diphtheria, dysentery, bubonic plague, pneumonia, tuberculosis ,typhoid and typhus. Some examples of bacterial infections are: bacterial meningitis, otitis media ,pneumonia ,tuberculosis ,upper respiratory tract infection ,gastritis ,food poisoning ,eye infections ,sinusitis ,urinary tract infections ,skin infections and sexually transmitted diseases. Bacterial infections can be treated with antibiotics, but some strains become resistant and can survive the treatment.

3.3.2 Fungal Infection

Fungi reproduce by spreading spores. A fungus is an often multi-cellular parasite that can decompose and then absorb organic matter using an enzyme. They almost always reproduce through the spreading of single-celled spores, and the structure of a fungus is normally long and cylindrical with small filaments branching from the main body. This structure is known as hypha. There are approximately 51 million species of fungus. Many fungal infections will appear in the upper layers of the skin, and some progress to the deeper layers. Inhaled fungal spores can lead to systemic fungal infections, such as thrush, or candidiasis. Systemic diseases affect the whole body. The body usually has a population of "good" bacteria that help to maintain the balance of microorganisms in the intestines, mouth, vagina, and other parts of the body.

Figure 2.2 Fungal infection

s

If enough "good" bacteria are destroyed, for example, by overusing antibiotics, fungi can grow and cause health problems for the host. Those with a higher risk of developing a fungal infection include people who: use strong antibiotics for a long time ,have a weakened immune system, due, for example, to HIV or AIDS, diabetes, chemotherapy treatment, and those who have undergone a transplant, as they take medications to prevent their body from rejecting the new organ. Examples of fungal infections are: valley fever, or coccidioidomycosis, athlete's foot ringworm, some eye infections. A rash can be an indicator of a fungal infection of the skin.

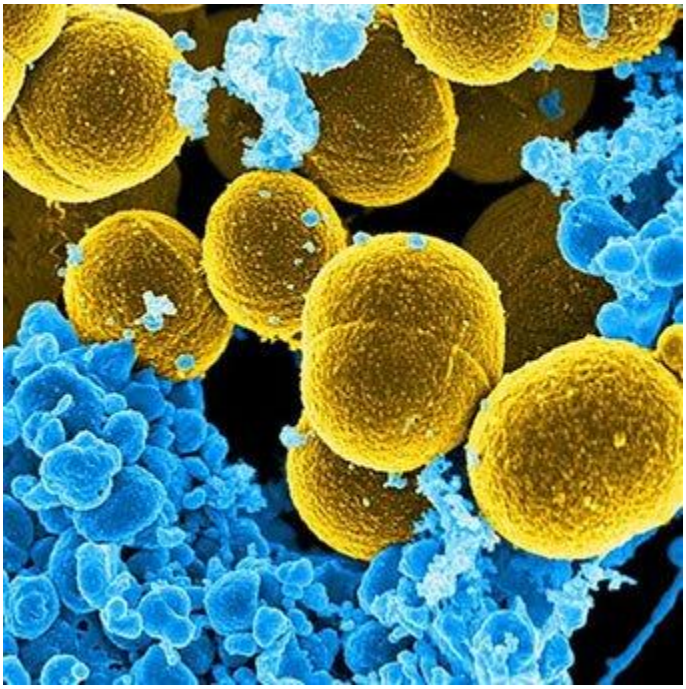
Prion disease: A prion is a protein that contains no genetic material. It is normally harmless, but if it folds into an abnormal shape, it can become a rogue agent and affect the structure of the brain or other parts of the nervous system.

Prions do not replicate or feed on the host but trigger abnormal behaviour in the body cells proteins**.**Prion diseases are rare, but they progress rapidly, and all are currently fatal. Prions cause degenerative brain diseases, such as: bovine spongiform encephalopathy (BSE), also known as mad cow disease, Creutzfeldt-Jakob disease (CJD)Researchers have linked some cases of Alzheimer's disease to prion infection.

3.3.3 Other infections

While the forms of infection mentioned above are the main types, there are others that can have an effect on the body. A single-celled organism with a nucleus can cause a **protozoan infection**.

Figure 3.3 Staph Infection (*Staphylococcus Aureus*)



Protozoa commonly show features similar to animals, such as mobility, and can survive outside of the human body. They are most commonly transferred by contact with feces. When they enter the human body, protozoa can also cause infection. Amebic dysentery is an example of a protozoan infection.

Helminths are larger, multicellular organisms that tend to be visible to the naked eye when full-grown. This type of parasite includes flatworms and roundworms. These are also able to infect the human body. Finally, **ectoparasites** such as mites, ticks, lice, and fleas can cause infection by attaching or burrowing into the skin. The term can also include blood-sucking arthropods, such as mosquitos, that transmit infection by consuming human blood.

3.4 Causes of Infection

The cause of an infection is said to be whichever type of organism has invaded the body. A particular virus, for example, will be the cause of a viral infection. The effects of an infection, such as swelling or a runny nose, occur as a result of the immune system fighting the invading organism. A wound filling with pus, for example, occurs when white blood cells rush to the site of an injury to combat foreign bacteria.

Symptoms of Infection

The symptoms of an infection depend on the organism responsible as well as the site of the infection.

Viruses target specific cells, such as those in the genitals or upper respiratory tract. The rabies virus, for example, targets the nervous system. Some viruses target skin cells, causing warts. Others target a wider range of cells, leading to various symptoms. A flu virus can cause a runny nose, muscle aches, and an upset stomach.

A person with a bacterial infection will often experience redness and heat, swelling, fever, pain at the site of infection, and swollen lymph glands. A bacterial infection is less likely to affect a wide area of the body than a viral one. A rash can be an indicator of a fungal infection of the skin. Common symptoms of prion diseases an indicator of a fungal infection of the skin. Common symptoms of prion diseases include brain damage, memory loss, and cognitive difficulties. They can also trigger the buildup of plaque in the brain, causing it to waste away.

3.6 Prevention against Infection

There is no single way to prevent all infectious diseases, but the following tips can reduce the risk of transmission:

- Wash your hands often, especially before and after preparing food and after using the bathroom.
- Clean surface areas and avoid leaving room-temperature food exposed when cooking.
- Receive any recommended vaccinations, and keep them up to date.
- Only take antibiotics when prescribed, and be sure to complete any recommended course even if symptoms improve earlier than anticipated.
- Disinfect rooms where there may be high concentrations of bacteria, such as the kitchen and bathroom.
- Practice safe sex by receiving regular STIs checks, using condoms, or abstaining altogether.

- Avoid sharing personal items such a toothbrushes, combs, razor blades, drinking glasses, and kitchen utensils.
- Follow a doctor's advice about travel ling or working when you are ill, as you could infect others.

A healthy, active lifestyle can help keep the immune system strong and able to defend the body against different kinds of infection (Nordqvist & Charles, 2017).

3.7 Prevention Control of Disease

Most diseases are preventable to a greater or lesser degree, the chief exceptions being the idiopathic diseases, such as the inherited metabolic defects. In the case of those diseases resulting from environmental exposures, prevention is a matter of eliminating, or sharply reducing, the factors responsible in the environment. Because chemicals and other substances and materials originate largely from human activities, prevention ought to be a simple matter of the application of well-established principles of industrial hygiene. In practice, however, this is often difficult to achieve.

The infectious diseases may be prevented in one of two general ways:
1. By preventing contact, and therefore transmission of infection, between the susceptible host and the source of infection and;
2. By rendering the host unsusceptible, either by selective breeding or by introduction of an effective artificial immunity. The nature of the specific preventive measures and their efficacy, varies from one disease to another.

Quarantine, which is an effective method of preventing transmission of disease in principle, has had only limited success in actual practice. In only a few instances has quarantine achieved prevention of the spread of disease across international borders, and quarantine of individual cases of human disease has long been abandoned as ineffective, (Scarpelli&Burrows, 2019).

4.0 Self-Assessment Exercise

Explain what infectious agent of a disease is,
Outline any four (4) disease causing agents and give two (2) examples of disease caused by the agent outlined.

5.0 Conclusion

Knowledge of disease facilitates better use of preventive measures against the spread of disease among the students and community at large. It will also help clinicians to develop drugs for the management of diseases, as well as public health officers to mount effective strategies of prevention and control of diseases.

6.0 Summary

Disease is the invasion of pathogen into human body which has potential of causing pathological changes. Different diseases are caused by different infectious agent such as; virus causes viral

infection, bacteria causes bacterial infection, parasites causes parasitic infection, fungal causes fungal infection, etc.

7.0 References/ Further Reading

Nordqvist, C. &Charles, M., (2017). Everything you need to Know about Infectious Agent http://www.browardhealthservices.com/communicable-diseases/communicable-diseases-prevention-and-control/

Scarpelli, D.G & Burrows , W.(2019). Science Museum - Brought To Life - Diseases and epidemics. Chicago, IL, United States. Disease at *Dorland's Medical Dictionary*

Answer to Self-Assessment Exercise

This refers to an organism that is responsible for causing pathological changes in human, animals or plants body due to its inversion. The organism use a person's body to sustain itself, reproduce, and colonize. Infectious organisms are known as pathogens. Examples of pathogens include bacteria, viruses, fungi, and prions. Pathogens can multiply and adapt quickly.

1. Two examples of diseases caused by bacteria
i. Cholera
ii. Diphtheria

2 Two examples of diseases caused by Virus are
i. Zika Virus
ii. Human Immunodeficiency Virus (HIV)
3. Two examples of diseases caused by Fungi
i. Valley fever
ii. Athlete's foot

4. Two examples of diseases caused by Prions
i. Bovine spongiform encephalopathy (BSE), also known as mad cow disease

ii. Creutzfeldt-Jakob disease (CJD)

Unit 2: Importance of Disease Study

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1.0 Introduction

In the previous unit you have learnt definition of disease, prevention and control measures of communicable disease. In this unit you will learn the importance of disease study

2.0 Intended Learning Outcome (ILOs)

By the end of this unit, you will be able to:

- enumerate the importance of studying diseases.
- apply the importance of studying disease.

3.0 Main Content

3.1 Importance of Disease Study

Global health research should not only generate knowledge. More importantly, it should lead to action. In particular, research outcomes must guide policy and programme development as well as the delivery of health services. Healthcare interventions should be evidence-based and grounded in solid research.

Pneumonia, diarrheal diseases, tuberculosis and malaria, when combined, have been estimated to account for more than 20% of the disease burden in the world (mostly in developing countries), yet only 10% of the world expenditure on health research and development is spent on health conditions that represent 90% of the global disease burden (Delisle, Roberts, Munro, Jones, & Gyorkos, 2009). Having knowledge of disease causes, signs and symptoms and preventive measures will make people to be aware of the action to be taken at the right time.

According to Health Encyclopaedia of the University of Rochester Medical Centre, New York, clinical pathology covers a wide range of laboratory functions and is concerned with the diagnosis, treatment, and prevention of diseases (Gundu, 2018). For instance, if we look at the studies related to cardio-metabolic diseases, Framingham studies started over half a century ago discovered, major risk factors associated with this cluster of diseases. Western medicine, which is considered disease-centric developed guidelines to reduce or prevent these risks in the general populations. Disease study can play significant role in educating people on cardiovascular and metabolic diseases which could drastically reduce the complications and mortality rate from the diseases.

Cohn (20003), a pioneering cardiologist from the University of Minnesota has advocated that when addressing a complex disease like ischemic heart disease, it is better to treat the disease rather than just the risk factors. Atherosclerosis is a progressive disease of the vessel walls induced by endothelial dysfunction and vascular pathology. This kind of philosophy was developed based on extensive research in this area which traced progression of the vessel-wall disease to the current state of knowledge (Ferrante, 2015). Disease study is important in disseminating of information on prevention and control measures of diseases and health conditions which could reduce the opportunistic infection.

According to Gundu (2018), on-going studies from the Indian researchers as well as the epidemiology group from the University of Southampton, the UK, have demonstrated that children with low birth weight are pre-disposed to develop excess weight, obesity and cardio-metabolic diseases. Large number of children are born with low birth weight in India (>30%) and China. Robert Freishtat and associates at the children's hospital. Basic observational studies by the pediatrists at the Children's hospital at Mysore, led to the discovery of relationship between low birth weight and excess metabolic diseases. Now the studies by the Children's hospital Washington DC are trying to address the basic mechanism underlying obesity and metabolic diseases at the cellular level (Ferrante, 2015). Disease study can be used to educate mothers' of under-five on the causes of low birth weight babies, abortion, birth complications as well as means of reducing the rate maternal mortality.

Robert Freishtat and associates at the children's hospital, Washington on DC, have hypothesized that adipocyte-derived exosomes contain mediators capable of activating end-organ end-organ inflammatory and fibrotic signaling pathways. These studies have become a part of bilateral investigations between India and the US. These studies could soon become a game changer for early detection and prevention of obesity-related cardio-metabolic diseases (Cohn, 20003).
Disease study provides necessary information on the importance of periodic medical check-up. Which help in early detection of health problems for timely addressing.

These observations suggest that understanding the mechanisms of disease will provide the better chance to develop personalised preventive measures. The world now is crowded and interconnected planet, with a projected global human population of at least 9 billion by 2050. Public health advances such as safe water, adequate sanitation, antibiotics, vaccines and balance. Nutrition programs have extended overall life expectancy, even in remote, under-developed settings. The resulting unprecedented population urge has contributed to numerous challenges that will increasingly serve as counter-balances to these public health advances and will synergise with other inter-related factors such globalisation, climate change and urbanization to contribute to the spread of dangerous infectious diseases. However disease study is one of the strategy of addressing this issue.

International travel and immigration increase each year, with more than 1 billion humans crossing international borders in 2013 alone (UNWTO Annual Report 2014, June 2015). Many cross to embrace economic opportunities or to escape war or disaster. Many also travel to visit family or friends, or for business, education or leisure purposes. Exotic, remote and dangerous locations—often lacking public health infrastructure—are increasingly common destinations for travelers as well as sources of immigrants to the developed world. This "smaller world" effect brings with it much good in terms of societal connectedness and economic stimulation, but also individual risk to the traveler and the opportunity for spread of disease upon return.

Disease study is an important mechanism of stopping the spread and breaking the chain of disease transmission which could occur as a result of international travel and tours or at local level. The current globalisation also involves the increasingly rapid and direct transportation of food and other products that can introduce or facilitate disease transmission, whether it be cyclosporiasis associated with Latin America raspberries, *(*Bern , Hernandez , Lopez , Arrowood , DeMerick , Klein,1999 *)* enterohemorrhagic E. coli infection associated with Middle Eastern fenugreek

sprouts, *(*Frank , Werber , Cramer , Askar , Faber , an der Heiden 2011*)*,monkeypox from pet Gambian rats and prairie dogs, *(*Reed, Melski , Graham, Regnery , Sotir , Wegner, 2004l*)* or introduction into the US of Aedesalbopictus (the Asian Tiger mosquito and potential vector of dengue and chikungunya) via imported used-tires from Asia *(*Vega-Rúa , Lourenço-de-Oliveira , Mousson , Vazeille,2015*).* Disease study provides desired information on food bone diseases and possible way of reducing the menace of such diseases.

4.0 Self-Assessment Exercise

1. Outline the factors that could decrease the level of disease spread worldwide.

2. Briefly state the importance of studying disease.

5.0 Conclusion

Numerous factors contribute to the decrease of disease spread. It is quite imperative to have good information about these factors in order to decrease the spread which in turns promote healthy living among human population.

6.0 Summary

Having information about disease is the first giant step towards management and control of the spread. It will also, help public health advances such as safe water, adequate sanitation, antibiotics, vaccines and balance. Nutrition programs have extended overall life expectancy, even in remote, under-developed settings.

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Answer to Self-Assessment Exercise

Q1. Having knowledge of disease causes, signs and symptoms and preventive measures will make people to be aware of the action to be taken at the right time.

Disease study can play significant role in educating people on cardiovascular and metabolic diseases which could drastically reduce the complications and mortality rate from the diseases.

Disease study is important in disseminating of information on prevention and control measures of diseases and health conditions which could reduce the opportunistic infection.

Disease study can be used to educate mothers' of under-five on the causes of low birth weight babies, abortion, birth complications as well as means of reducing the rate of maternal mortality.

These observations suggest that understanding the mechanisms of disease will provide the better chance to develop personalised preventive measures.

Disease study is an important mechanism of stopping the spread and breaking the chain of disease transmission which could occur as a result of international travel and tours or at local level.

Disease study provides desired information on food bone diseases and possible way of reducing the menace of such diseases.

Unit 3: Factors Involved in the Transmission of Communicable Diseases

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1.0 Introduction

Many events happen time upon time for disease to be transmitted from one person to another or from animal to human. The infectious agents causing disease gets into the body of an individual and cause changes in the state of the health of that person. It could be through mouth, nose, eye, skin and anus. Improving personal hygiene will help in breaking the chain of disease transmission.

2.0 Intended Learning Outcome (ILOs)

By the end of this unit, you will be able to:

- identify the factors involve in disease transmission.
- determine susceptible hosts and risk factors of disease infection.

3.0 Main Content

3.1 Communicable Diseases

Communicable diseases is an illnesses caused by viruses or bacteria that people spread to one another through contact with contaminated surfaces, bodily fluids, blood products, insect bites, or through the air (Edemekong& Huang,2019). There are many examples of communicable diseases, some of which require reporting to appropriate health departments or government agencies in the locality of the outbreak. Some examples of the communicable disease include HIV/AIDS, hepatitis A, B and C, measles (Rubeola), salmonella, Cholera, Diphtheria, Plague, Rabies, Syphilis, Tuberculosis and other blood-borne illnesses. Most common forms of spread include fecal-oral, food, sexual intercourse, insect bites, contact with contaminated fomites, droplets, or skin contact (Barrett, 1988).

3.2 Factors involved in the Transmission of Communicable Diseases

Transmission is a process in which several events happen one after the other in the form of a chain. Hence, this process is known as a chain of transmission (figure below). Six major factors can be identified: the infectious agent, the reservoir, the route of exit, the mode of transmission, the route of entry and the susceptible host. Each of these factors will be discussed.

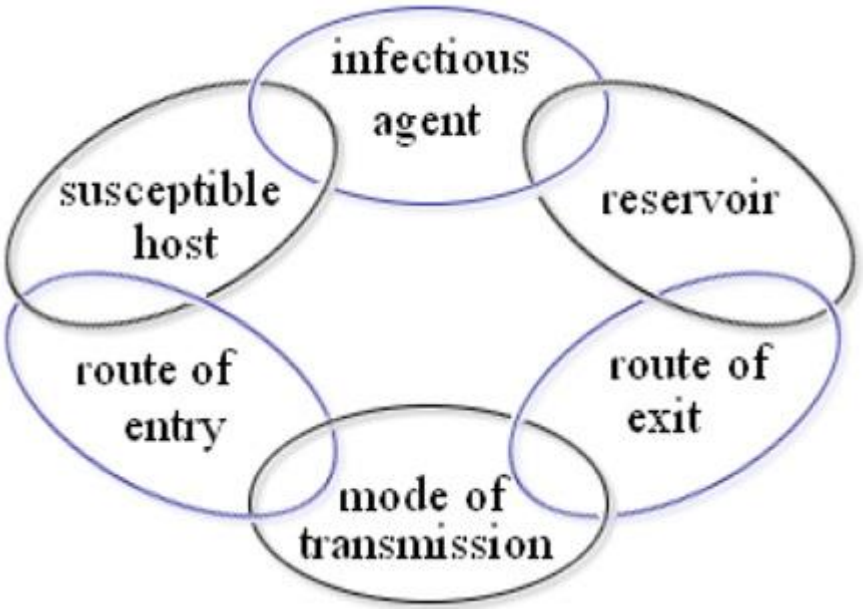


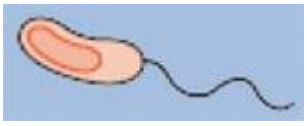
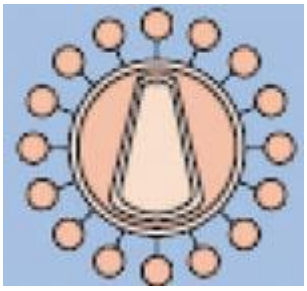
Fig.1.4: Factors involved in the Chain of Communicable Disease Transmission.
(Source: Nordqvist, & Charles, 2017).
For more information follow this Link
https://moodle.digitalcampus.org/mod/page/view.php?id=11608

3.3 Infectious Agents

Infectious agents can have varying sizes. Some, such as Plasmodium falciparum and all bacteria and viruses, are tiny and are called micro-organisms, because they can only be seen with the aid of microscopes. Others, such as the ascaris worm (Ascarislumbricoides), can be easily seen with the naked eye.

Different types of infectious agents: their number of cells, visibility and examples. (Adapted from the Open University, 2007, Water and Health in an Overcrowded World, Chapter 2)

Type of infectious agent	Number of cells	Visibility	Examples

Helminths	Many	Visible with the naked eye	Ascaris worm causes ascariasis Its length reaches 15–30 cm	
Protozoa	1	Visible with a standard microscope	*Plasmodium falciparum* causes malaria	
Bacteria	1	Visible only with a special microscope; much smaller in size than protozoa	*Vibrio cholerae* causes cholera	
Viruses	0	Visible only with a special microscope; much smaller in size than bacteria	HIV causes AIDS	

Helminths are worms made up of many cells; for example, *Ascarislumbricoides*.

Protozoa are micro-organisms made up of one cell; for example, *Plasmodium falciparum*.

Bacteria are also micro-organisms made up of one cell, but they are much smaller than protozoa and have a different structure; for example *Vibrio cholerae*, which causes cholera.

Viruses are infectious agents that do not have the structure of a cell. They are more like tiny boxes or particles and are much smaller than bacteria; for example, HIV (the Human Immunodeficiency Virus), which can lead to AIDS.

Though not as common as causes of communicable disease in humans, other types of infectious agents include *fungi* (e.g. ringworm is caused by a fungus infection), and *mites* (similar to insects), which cause scabies.

3.4 Reservoirs of Infectious Agents

Many infectious agents can survive in different organisms, or on non-living objects, or in the environment. Some can only persist and multiply inside human beings, whereas others can survive in other animals, or for example in soil or water. The place where the infectious agent is normally present *before* infecting a new human is called a reservoir. Without reservoirs, infectious agents could not survive and hence could not be transmitted to other people. Humans and animals which serve as reservoirs for infectious agents are known as infected hosts. Two examples are people infected with HIV and with the bacteria that cause tuberculosis; these infectious agents persist and multiply in the infected hosts and can be directly transmitted to new hosts.

Animals can also be reservoirs for the infectious agents of some communicable diseases. For example, dogs are a reservoir for the virus that causes rabies (Figure 1.3). Diseases such as rabies, where the infectious agents can be transmitted from animal hosts to susceptible humans, are called zoonoses (singular, zoonosis).

3.5 Route of Exit

Before an infectious agent can be transmitted to other people, it must first get out of the infected host. The site on the infected host through which the infectious agent gets out is called the route of exit. Some common examples are described below.

3.6 Respiratory Tract

The routes of exit from the respiratory tract are the nose and the mouth. Some infectious agents get out of the infected host in droplets expelled during coughing, sneezing, spitting or talking, and then get transmitted to others (Figure 1.4). For example, people with tuberculosis in their lungs usually have a persistent cough; *Mycobacterium tuberculosis* uses this as its route of exit.

3.7 Modes of Transmission

Once an infectious agent leaves a reservoir, it must get transmitted to a new host if it is to multiply and cause disease. The route by which an infectious agent is transmitted from a reservoir to another host is called the mode of transmission. It is important for you to identify different modes of transmission, because prevention and control measures differ depending on the type of infection.

3.7.1 Route of Entry

Successful transmission of the infectious agent requires it to enter the host through a specific part of the body before it can cause disease. The site through which an infectious agent enters the host is called the route of entry. It includes mouth, nose, eye, genital parts and skin.

3.7.2 Susceptible Hosts and Risk Factors

After an infectious agent gets inside the body it has to multiply in order to cause the disease. In some hosts, infection leads to the disease developing, but in others it does not. Individuals who are likely to develop a communicable disease after exposure to the infectious agents are called susceptible hosts. Different individuals are not equally susceptible to infection, for a variety of reasons.

Factors that increase the susceptibility of a host to the development of a communicable disease are called risk factors. Some risk factors arise from outside the individual – for example, poor personal hygiene, or poor control of reservoirs of infection in the environment. Factors such as these increase the *exposure* of susceptible hosts to infectious agents, which makes the disease more likely to develop.

4.0 Self-Assessment Exercise

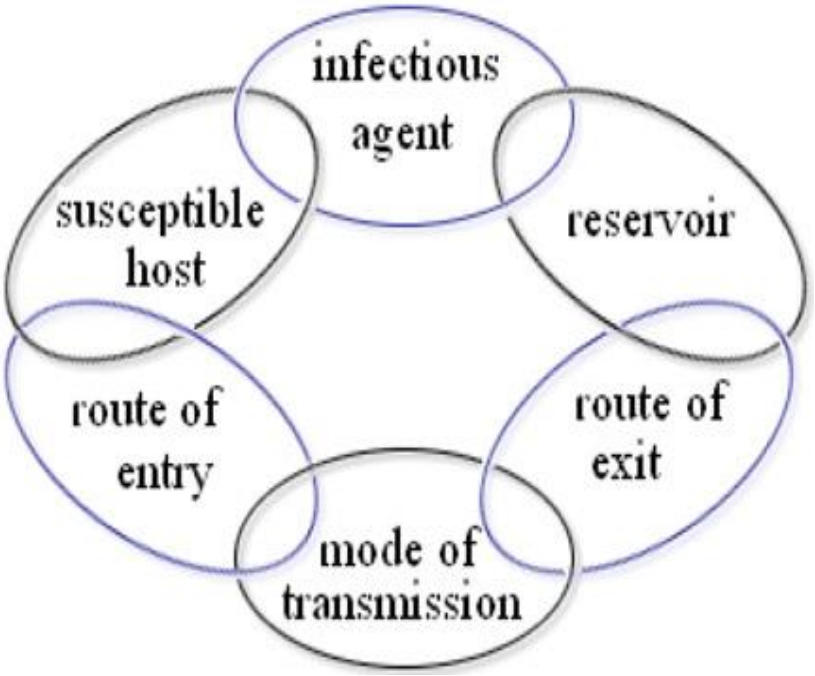
1a. Explain the transmission process

1b. Draw the chain of communicable disease transmission.

Answer to Self-Assessment Exercise

1a. Transmission is a process in which several events happen one after the other in the form of a chain. Hence, this process is known as a **chain of transmission** (figure below). Six major factors can be identified: the infectious agent, the reservoir, the route of exit, the mode of transmission, the route of entry and the susceptible host.

1b.Factors involved in the chain of communicable disease transmission.



5.0 Conclusion

Disease agents get into human body through route of entries which allow the agents to replicate and overcome the immunity of the body resulted to pathological changes. Breaking this chain of transmission will stop disease development and progression.

6.0 Summary

Factors that increase the susceptibility of a host to the development of a communicable disease are called risk factors. Some risk factors arise from outside the individual such as, poor personal hygiene, or poor control of reservoirs of infection in the environment. Factors such as these increase the *exposure* of susceptible hosts to infectious agents, which makes the disease more likely to develop

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Unit 4: Risk Factors of Non-communicable Diseases

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1.0 Introduction

Non-communicable diseases generally are long-lasting and progress slowly, and thus sometimes also referred to as chronic diseases. They can arise from environmental exposures or from genetically determined abnormalities, noticed during or after delivery or which may become apparent later in life. These diseases include; metabolic diseases, cardiovascular diseases, respiratory diseases and cancer. There are many risk factors that contribute to their emergence but adhering to preventive measures will help in preventing their occurrences and their severity.

2.0 Intended Learning Outcomes (ILOs)

By the end of this unit, you will be able to:

- distinguish the modifiable behavioural risk factors and metabolic modifiable risk factors.
- explain the relationship of socioeconomic status and non-communicable diseases.

3.0 Main Content

3.1 Risk Factors of Communicable Diseases

The World Health Organization (WHO) has identified four major types of non-communicable disease: cancer, cardiovascular disease (e.g., heart attack, stroke), chronic respiratory disease (e.g., asthma), and diabetes mellitus. WHO estimated that, combined, these four groups of conditions account for 82 percent of all deaths from non-communicable diseases. (Scarpelli & Burrows, 2019).

Non-communicable diseases (NCDs), also known as chronic diseases, tend to be of long duration and are the result of a combination of genetic, physiological, environmental and behaviours factors.

The main types of NCDs are cardiovascular diseases (like heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma) and diabetes.

NCDs disproportionately affect people in low- and middle-income countries where more than three quarters of global NCD deaths – 32million – occur.

3.2 Who is at Risk of such Diseases?

People of all age groups, regions and countries are affected by NCDs. These conditions are often associated with older age groups, but evidence shows that 15 million of all deaths attributed to NCDs occur between the ages of 30 and 69 years. Of these "premature" deaths, over 85% are estimated to occur in low- and middle-income countries. Children, adults and the elderly are all vulnerable to the risk factors contributing to NCDs, whether from unhealthy diets, physical inactivity and exposure to tobacco smoke or the harmful use of alcohol.

These diseases are driven by forces that include rapid unplanned urbanisation, globalization of unhealthy lifestyles and population ageing. Unhealthy diets and a lack of physical activity may show up in people as raised blood pressure, increased blood glucose, elevated blood lipids and obesity. These are called metabolic risk factors that can lead to cardiovascular disease, the leading NCD in terms of premature deaths.

3.3 Risk Factors of Non- Communicable Diseases

3.3.1 Modifiable Behavioural Risk Factors

Modifiable behaviours, such as tobacco use, physical inactivity, unhealthy diet and the harmful use of alcohol, all increase the risk of NCDs.

- Tobacco accounts for over 7.2 million deaths every year (including from the effects of exposure to second-hand smoke), and is projected to increase markedly over the coming years.
- 4.1 million annual deaths have been attributed to excess salt/sodium intake.
- More than half of the 3.3 million annual deaths attributable to alcohol use are from NCDs, including cancer.
- 1.6 million deaths annually can be attributed to insufficient physical activity.

3.3.2 Metabolic Risk Factors

Metabolic risk factors contribute to four key metabolic changes that increase the risk of NCDs:

- raised blood pressure
- overweight/obesity
- hyperglycemia (high blood glucose levels) and
- hyperlipidemia (high levels of fat in the blood).

In terms of attributable deaths, the leading metabolic risk factor globally is elevated blood pressure (to which 19% of global deaths are attributed), followed by overweight and obesity and raised blood glucose.

3.4 What are the Socioeconomic Impacts of NCDs?

NCDs threaten progress towards the 2030 Agenda for Sustainable Development, which includes a target of reducing premature deaths from NCDs by one-third by 2030.

Poverty is closely linked with NCDs. The rapid rise in NCDs is predicted to impede poverty reduction initiatives in low-income countries, particularly by increasing household costs associated with health care. Vulnerable and socially disadvantaged people get sicker and die sooner than people of higher social positions, especially because they are at greater risk of being exposed to harmful products, such as tobacco, or unhealthy dietary practices, and have limited access to health services.

In low-resource settings, health-care costs for NCDs quickly drain household resources. The exorbitant costs of NCDs, including often lengthy and expensive treatment and loss of breadwinners, force millions of people into poverty annually and stifle development (WHO, 2012-2020). For more information follow this link: https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases.

4.0 Self-Assessment Exercise

1. Mention the types of non-communicable diseases as identified by World Health Organisation.
2. What are the behavioural modifiable risk factors and metabolic modifiable risk factors?

Answers to Self-Assessment Exercise

1. Four major types of non-communicable disease identified by WHO are: cancer, cardiovascular disease (e.g., heart attack, stroke), chronic respiratory disease (e.g., asthma), and diabetes mellitus. WHO estimated that, combined, these four groups of conditions account for 82% of all deaths from non-communicable diseases.

2. Modifiable behavioural risk factors

Modifiable behaviours, such as tobacco use, physical inactivity, unhealthy diet and the harmful use of alcohol, all increase the risk of NCDs.

- Tobacco accounts for over 7.2 million deaths every year (including from the effects of exposure to second-hand smoke), and is projected to increase markedly over the coming years.
- 4.1 million annual deaths have been attributed to excess salt/sodium intake.
- More than half of the 3.3 million annual deaths attributable to alcohol use are from NCDs, including cancer.
- 1.6 million deaths annually can be attributed to insufficient physical activity.

Metabolic risk factors

Metabolic risk factors contribute to four key metabolic changes that increase the risk of NCDs:

- raised blood pressure

- overweight/obesity
- hyperglycemia (high blood glucose levels) and
- hyperlipidemia (high levels of fat in the blood).

5.0 Conclusion

Non-communicable diseases are those diseases that are claiming lives of many people. Also, these diseases are called chronic diseases and are associated with poverty. The rapid rise in NCDs is predicted to impede poverty reduction initiatives in low-income countries, particularly by increasing household costs associated with health care. Vulnerable and socially disadvantaged people get sicker and die sooner than people of higher social positions, especially because they are at greater risk of being exposed to harmful products, such as tobacco, or unhealthy dietary practices, and have limited access to health services.

6.0 Summary

Non- communicable diseases emergence depends on the risk factors an individual exposure.The main types of NCDs are cardiovascular diseases (like heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma) and diabetes. NCDs disproportionately affect people in low- and middle-income countries where more than three quarters of global NCD deaths – 32million – occur.

7.0 References/ Further Readings

Scarpelli, D.G& Burrows, W. (2019). Science Museum - Brought To Life - Diseases and epidemics. Chicago, IL, United States. Disease at *Dorland's Medical Dictionary*

WHO developed a *Global action plan for the prevention and control of NCDs 2013-2020*, which includes nine global targets that have the greatest impact on global NCD mortality. These targets address prevention and management of NCDs.https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases

Unit 5: Communicable Diseases Related Problems
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3.1.5 Blood Born
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5.0 Conclusion
6.0 Summary
7.0 References/Further Reading

1.0 Introduction

Communicable diseases pose a serious challenge among children and adults in our communities. Poor hand hygiene and failure to observe sanitation principles contribute immensely to emergence of communicable diseases in schools. When schools and communities do not have health facilities and the right services to address the cases of communicable diseases at an early stage and fail to report illness to the appropriate authorities, such as public health specialists to assist schools and communities in treating the situation, the case could be serious and out of school control. School and communities authorities as well as students and community members need to have general information on steps to be taken to prevent and control communicable diseases.

2.0 Intended Learning Outcomes (ILOs)

By the end of this unit, you will be able:

- mention common routes of communicable diseases transmission.
- identify the steps to be taken in hand washing.
- mention the problems associated with communicable diseases.

3.0 Main Content

3.1 Communicable Diseases Related Problems

Understanding how diseases are spread can help prevent problems that result to illness. Here are the most common routes of transmission:

3.1.1 Faecal-Oral

Contact with human stool; usually ingestion after contact with contaminated food or objects. Viruses, bacteria, fungi, and parasites spread from person to person, sometimes causing diseases as they move in and out of people's bodies along various routes. When the disease spreads through the faecal-oral route, it means that contaminated faeces from an infected person are somehow ingested by another person. For obvious reasons, this almost never happens deliberately. Usually, the situation occurs when an infected person might forget to properly wash his hands after using

the toilet. Anything he or she touches afterward might be contaminated with microscopic germs that other people may encounter.

Fig. 1.5: (Hand washing is your best defence)

Causes of Faecal Oral Transmission

While poor hand washing is a major cause of faecal-oral contamination, there are other equally important considerations. Below are other ways microbes use the faecal-oral route to cause disease:

- Drinking water contaminated with raw sewage.
- Eating shellfish (such as oysters and clams) that have been harvested from contaminated water.
- Eating raw fruits or vegetables washed in contaminated water.
- Sexual activity that allows direct mouth-to-anus contact or indirect contact (touching the mouth to something that touched the anus).
- Swimming pools that aren't properly disinfected.

Prevention

Good hand washing is a tremendously effective way to break the faecal-oral cycle. Other important tools for preventing the spread of disease through faecal-oral transmission include:

- Using instant hand sanitizers when soap and water are not available.
- Practicing safe and careful food-handling practices.
- Avoiding ingestion of water in pools or from other non-potable sources.
- Using disposable towels.
- Cleaning or disinfecting commonly touched, infected surfaces such as doorknobs, faucet handles, remote controls, etc.

3.1.2 Respiratory

Contact with respiratory particles or droplets from the nose, throat and mouth. Asthma is a chronic inflammatory disorder of the airways characterized by episodes of reversible breathing problems due to airway narrowing and obstruction. These episodes can range in severity from mild to life threatening. Symptoms of asthma include wheezing, coughing, chest tightness, and shortness of breath. Daily preventive treatment can prevent symptoms and attacks and enable individuals who have asthma to lead active lives.

Risk factors for asthma currently being investigated include:

- Having a parent with asthma
- Sensitization to irritants and allergens
- Respiratory infections in childhood
- Overweight

Asthma affects people of every race, sex, and age. However, significant disparities in asthma morbidity and mortality exist, particularly for low-income and minority populations. Populations with higher rates of asthma include:

- Children
- Women (among adults) and boys (among children)
- African Americans
- Puerto Ricans
- People living in the northeastern United States
- People living below the federal poverty level
- Employees with certain exposures in the workplace

COPD is a preventable and treatable disease characterized by airflow limitation that is not fully reversible. The airflow limitation is usually progressive and associated with an abnormal inflammatory response of the lungs to noxious particles or gases (typically from exposure to cigarette smoke).[4] Treatment can lessen symptoms and improve quality of life for those with COPD.

- Contact with infected skin Impetigo – This infection is spread by contact with the sores of an infected person and most often affects infants and children.
- Molluscum contagiosum – This virus spreads to other body parts by scratching or from person to person. In adults, molluscum contagiosum is often acquired through sexual contact.
- Fungal infections – People get fungal infections from breathing in or brushing up against fungal spores in the environment. Most often they affect people with weakened immune systems.
- Athlete's foot – The fungus that causes athlete's foot is often found on damp surfaces such as around a swimming pool or public showers.
- Scabies – This infection is caused by microscopic mites that burrow into the skin to live and feed. The infection spreads from skin-to-skin contact or from infested items such as furniture and bed linens.

- Ringworm – You can get this fungal infection from skin-to-skin contact with an infected person or animal.
- Shingles – Shingles develops from the same virus that causes chicken pox.

Symptoms

Contagious skin diseases present with a wide range of symptoms. Some have similarities such as rashes, but most are very different.

- Impetigo – Red sores around the nose, mouth, hands and feet. Honey-colored crusts develop after the sores rupture. Impetigo may cause mild itching and soreness.
- Molluscum contagiosum – Small, firm bumps that are pink or skin-colored with a dimpled center. They turn red as the immune system fights the infection. Some bumps may itch but are otherwise painless. Molluscum contagiosum often appears on the face, neck, hands, arms and armpits.
- Fungal infections – Rash in moist areas of the body where skin rubs up against skin, such as between the toes, under the breasts and in the genital area.
- Athlete's foot – A cracked or blistered rash that causes stinging, itching and burning and possibly an unpleasant odor. Usually starts between the toes but can also appear on the soles and sides of the feet, and can spread to the toenails, groin and armpits.
- Scabies – Itching that keeps you up at night, rash with small bumps that look like hives, sores from scratching that can become infected, and crusty areas in severe cases. Mites can burrow anywhere on the body but prefer between the wrists, elbows, fingers, around fingernails, the buttocks, belt line, penis and around the nipples.
- Ringworm – A fungal infection that starts as a red scaly area. The area spreads outward and forms a circular ring with a slightly wavy border. The inside of the circle may look clear, scaly or bumpy and red. Sometimes several rings appear and overlap.
- Shingles – Pain, burning, numbness or tingling, red rash, blisters that rupture and crust, and itching. Most often appears as a single strip of blisters that wrap around your torso, but can also develop around an eye, neck or face. Shingles may also cause fever, headache, fatigue and light sensitivity.

3.1.4 Indirect Contact

Contact with contaminated objects or surfaces indirect contact transmission involves inanimate objects called fomites that become contaminated by pathogens from an infected individual or reservoir (Figure 2). For example, an individual with the common cold may sneeze, causing droplets to land on a fomite such as a tablecloth or carpet, or the individual may wipe her nose and then transfer mucus to a fomite such as a doorknob or towel. Transmission occurs indirectly when a new susceptible host later touches the fomite and transfers the contaminated material to a susceptible portal of entry. Fomites can also include objects used in clinical settings that are not properly sterilized, such as syringes, needles, catheters, and surgical equipment. Pathogens transmitted indirectly via such fomites are a major cause of healthcare-associated infections


Fig.1.6a: Contaminated Doorknobs. Fig.1.6b: Contaminated towels. Fig.1.6c: Contaminated syringes

3.1.5 Blood Borne

Contact with blood or body fluids coughing and Sneezing: Teach children (and adults) to cough or sneeze into tissues or their sleeve and not onto surfaces or other people. If children and adults sneeze into their hands, hands should be washed immediately.

Hand washing Procedures: Washing your hands is one of the easiest and best ways to prevent the spread of diseases. Hands should be washed frequently including after toileting, coming into contact with bodily fluids (such as nose wiping), before eating and handling food, and any time hands are soiled. It is also important that children's hands be washed frequently. Water basins and pre-moistened cleansing wipes are not approved substitutes for soap and running water. Alcohol-based hand sanitizers containing at least 60% alcohol may be used when soap and water are not available and hands are not visibly soiled. However, sanitizers do not eliminate all types of germs so they should be used to supplement hand washing with soap and water. The general hand washing procedure includes the following steps:

• Wet hands under warm running water.

• Apply liquid soap. Antibacterial soap is not recommended.

• Vigorously rub hands together for at least 20 seconds to lather all surfaces of the hands. Pay special attention to cleaning under fingernails and thumbs.

• Thoroughly rinse hands under warm running water.

•Dry hands using a single-use disposable towel or an air dryer.

•Turn off the faucet with the disposable towel, your wrists, or the backs of your hands.

Blood borne Exposures Blood borne pathogens, such as Hepatitis B virus (HBV), Hepatitis C virus (HCV) and human immunodeficiency virus (HIV), can be found in human blood and other body fluids. Blood borne pathogens can be transmitted when there is direct contact with blood or other potentially infected material. This can include blood entering open cuts or blood splashing into mucous membranes (eyes, nose or mouth). All human blood should be treated as if it is infectious.

For more information, visit the Michigan Department of Education's Blood borne Pathogens and School Employees website at http://www.michigan.gov/mde/0,4615,7-140-28753_64839_38684_29233_29803-241996--,00.htpps

3.2 Problems of Communicable Diseases among School Age

Problems caused by communicable diseases in schools include:

1. **Absenteeism:** school age children suffering from communicable disease may not have chance of coming to school regularly. And even if they come, there is possibility of infecting others, which could lead to more serious public health problems.
2. **Stunted growth:** communicable disease can cause stunted growth among school age children as their normal body function is affected by the pathogens and that could affect the learning process of the school age.
3. **Attention deficit:** communicable disease can result to attention deficit among the learners. They may not be able to pay attention during the lesson as their body is fighting the infection.
4. **Body deformity:** untreated cases of communicable diseases in the school can lead to having permanent deformity in the body.
5. **Death:** serious cases of communicable diseases that rae not well treated in good time can lead to the loss of life of the infected person.

Some of the common communicable diseases prevalent among school age include; malaria, diaorrhea, dysentery, dental problems, tuberculosis, eye problems, skin diseases, sexual transmitted diseases, sexual transmitted infection. All these diseases are result of poor personal and environmental hygiene. If community and schools can enforce personal and environmental hygiene, it will help in reducing the severity of the case which can be reduced to the barest minimum.

4.0 Self-Assessment Exercise

1. Mention routs of communicable diseases transmission.

2. Describe the steps to be taken in hand washing.

3. Enumerate the problems associated with communicable diseases

Answers to Self-Assessment Exercise

1. the most common routes of transmission are:

- Fecal-oral: Contact with human stool; usually ingestion after contact with contaminated food or objects
- Respiratory: Contact with respiratory particles or droplets from the nose, throat, and mouth
- Direct skin-to-skin contact: Contact with infected skin

• Indirect contact: Contact with contaminated objects or surfaces

• Blood borne: Contact with blood or body fluids Coughing and Sneezing Teach children (and adults) to cough or sneeze into tissues or their sleeve and not onto surfaces or other people. If children and adults sneeze into their hands, hands should be washed immediately.

2. Hand washing Procedures Washing your hands is one of the easiest and best ways to prevent the spread of diseases. Hands should be washed frequently including after toileting, coming into contact with bodily fluids (such as nose wiping), before eating and handling food, and any time hands are soiled. It is also important that children's hands be washed frequently. Water basins and pre-moistened cleansing wipes are not approved substitutes for soap and running water. Alcohol-based hand sanitizers containing at least 60% alcohol may be used when soap and water are not available and hands are not visibly soiled. However, sanitizers do not eliminate all types of germs so they should be used to supplement hand washing with soap and water. The general hand washing procedure includes the following steps:

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• Thoroughly rinse hands under warm running water.

•Dry hands using a single-use disposable towel or an air dryer.

•Turn off the faucet with the disposable towel, your wrists, or the backs of your hands.

3. Problems caused by communicable diseases in schools include:

1. Absenteeism: school age suffering from communicable disease may not have chance of coming to school regularly. And even if he comes there is possibility of infecting others, which could lead to more serious public health problems.

2. Stunted growth: communicable disease can cause stunted growth among school age as their normal body function is affected by the pathogens and that could affect the learning process of the school age.

3. Attention deficit: communicable disease can result to attention deficit among the learners. They may be unable to pay attention during the lesson as their body is fighting the infection.

4. Body deformity: untreated cases of communicable diseases in the school can lead to having permanent deformity in the body.

5. Death: serious cases of communicable diseases that are not well treated in good time can lead to the loss of life of the infected person.

5.0 Conclusion

The common communicable diseases prevalent among school age include; malaria, dysentery, dental problems, tuberculosis, eye problems, skin diseases, sexual transmitted diseases, sexual transmitted infection. All these diseases resulted due to poor personal and environmental hygiene.

6.0 Summary

Communicable diseases are the main problem of stunted growth, absenteeism, attention deficit, body deformity and sometimes death among school age children.

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Module 2: Communicable Diseases

In this module different type of communicable diseases which include diseases that can be transmitted through Indirect contact (Air bone, Water and food Bone, Vector Bone Diseases) and Direct Contact (Sexually Transmitted Infection) will be discussed with their causative agents, signs and symptoms as well as preventive measures.

Unit 1 Indirect Contact (water and Food born)
Unit 2 Vector Bone
Unit 3 Direct Contact
Unit 4 Tuberculosis and Rabies
Unit 5 Transmission Process and Preventive Measures of Communicable Diseases

Unit 1 Indirect Contact (Water and Food Bone Diseases)

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    3.1.1 Epidemiology
    3.1.2 Control measures
  3.2 Poliomyelitis (Polio)
    3.2.1 Types of Polio
    3.2.2 Causative Agent
    3.2.3 Sign and Symptoms
    3.2.4 Reservoir
    3.2.5 Mode of Transmission
    3.2.6 Incubation Period
    3.2.7 Susceptibility and Resistance
    3.2.8 Modes of Prevention and Control
4.0 Self-Assessment Exercises
5.0 Conclusion
6.0 Summary
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1.0 Introduction

Indirect contact infection occurs when there is no direct human-to-human contact. Contact occurs from a reservoir through vector to contaminated surfaces or objects. Vectors could be mosquitos, flies, ticks, and rodents. In this unit you will learn about Hepatitis B and Poliomyelitis.

2.0 Intended Learning Outcomes (ILOs)

By the end of this unit, you will be able to:

- identify the transmission process of Hepatitis B
- describe the prevention and control measures of hepatitis.

- distinguish the different types of poliomyelitis.
- recognise the preventive measures of poliomyelitis

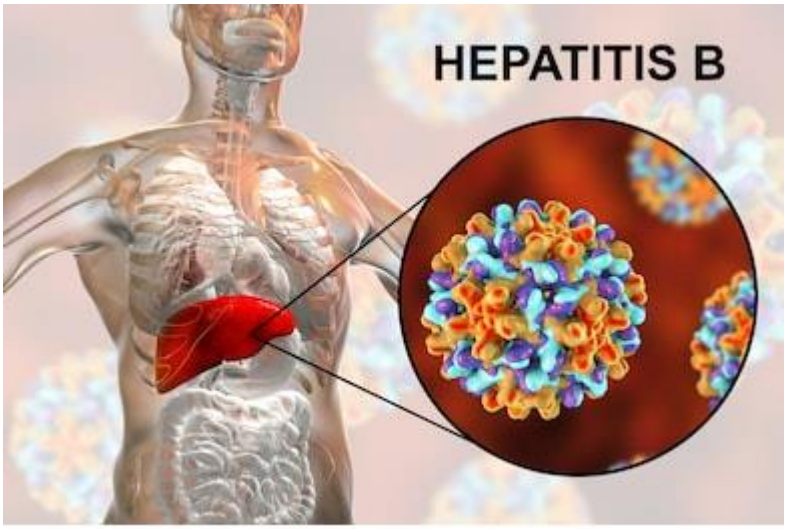
3.0 Main Content

3.1 Hepatitis B (HBV)

Occurrence:	Worldwide
Organism:	Hepatitis B virus (HBV)
Reservoir:	Humans
Transmission:	Blood and blood products
Control:	Counselling
	Hygiene
	Blood Screening
	Vaccination

Hepatitis B is not transmitted by the faeco-oral route but is a blood-borne agent, transmitted by inoculation. Hepatitis B virus causes long-incubation hepatitis. It also gives rise to one of the 10 most common cancers, heptocellular carcinoma. There is evidence that HBV is the aetiological agent in up to 80% of cases.

Fig 2.1 Hepatitis B



3.1.1 Epidemiology

The carrier state (defined as the presence of HbsAg for more than 6 months rises from 0.1% in parts of Europe to 15% in several tropical countries. Globally, early childhood infections are the

most common and most important. In China, Taiwan and Hong Kong, a large number of infections are acquired in the perinatal period, usually from a carrier mother. (Lucas and Gilles, 2003).

Transmission may occur by:

- Transfusion of blood or blood products;
- Accidental inoculation, e.g repeated use of hypodermic needles without adequate sterilization, in particular: drug addicts, tattooing and ritual scarification;
- Insects bites
- Perinatally – from a carrier mother;
- Sexual intercourse – hetero and homosexual;
- Serious exudates of skin ulcers;
- Injury – associated sports or jobs

3.1.2 Control Measures

Control is carried out by a combination of:

(i) counselling

(ii) hygiene practice in high risk areas

(iii) vaccination of at-risk individuals

(iv) selective use of hepatitis B immunoglobin (HbIG).

A recombinant HbsAg vaccine is now widely used. Three doses (at 0,1 and 6 months) are required for complete protection. Vaccination is required for groups at high risk of infection (e.g health-care staff in contact with blood or patients, homosexuals, drug users etc, depending on epidemiological patterns, socio-economic factors, cultural and sexual practices. In areas of the world where perinatal infection is common, immunization of susceptible women of childbearing age and of infants, particularly those born to carrier mothers, is desirable. Administration of HbIG confers extra protection to these infants and those individuals accidentally exposed (e.g, health workers following needle-stick injuries and sexual partners of acute cases).

WHO has recommended that all children should be vaccinated during the first year of life. In countries where perinatal transmission is frequent, vaccination should be done at or soon after birth.

3.2 Poliomyelitis (Polio)

It is one of the dangerous infectious diseases that affect the child. The disease kills a lot of children who are not immunized, and those who escaped death are left paralyzed either on both legs and half of the body involving one leg and one arm. This situation makes both parent and the child unhappy.

Polio is a serious viral disease that is common among children. The polio virus attacks the spinal cord of the child. Since spinal cord is important in human movement, the attack causes motor paralysis and muscles atrophy (failure to develop the body muscle normally) which often result in permanent deformity.

Fig 2.2 poliomylitis

3.2.1 Types of Polio

There are two type of polio namely;

i. Non – paralytic: this type of polio does not result in paralysis and last only a few years.

ii. Paralytic polio: this involves a weakening and paralysis of the muscles, (infantile paralysis). Site of the paralysis depends on the location of nerve cell in the central nervous system destroyed by the virus.

3.2.2 Causative Agent

Polio is caused by a group of viruses called polio virus which attack the central nervous system (spinal cord) and causes paralysis to the legs, arms, and body, and also waste of muscle of right thigh and calf, also flat foot.

3.2.3 Signs and symptoms

Polio is characterized by fever, motor paralysis, muscle atrophy, severe headache and sore throat. There may be stiffness of the neck and back with or without paralysis.

3.2.4 Reservoir

Man is the sole reservoir of polio virus.

3.2.5 Mode of Transmission

Polio is transmitted by direct contact with the carrier or infected person through touching, kissing or by contact with contaminated materials such as faeces and secretions from the pharynx of an infected person. In rare instances the virus may be transmitted through fresh milk.

3.2.6 Incubation Period

The incubation period for the disease on average is 7 – 12 days. But it can start from 3days to 4 or more.

3.2.7 Susceptibility and Resistance

Polio can occur in all ages, but children are mostly susceptible. This means that children are more likely to suffer from the disease than an adult when both are exposed to infection. Some amount of immunity or resistance is usually provided after recovery from an attack. This is usually enough to provide adequate resistance against the disease for life. The best way of resisting polio disease is through formal immunization.

3.2.8 Modes of Prevention and Control

1. Immunization: this is the best way of preventing and controlling of polio disease, here two types of vaccines are available;

i. **Sabin vaccine** (weakened or attenuated virus). Three drops of this vaccine is given orally to infant. For children every 4weeks for 3 dozens. The first doze is given at 2months, second doze at 3month and 3rd doze at 4 months. A booster doze is given to the child when he/she is about to enter school (may be at 6 years) and another one at the age of 15. The Sabin vaccine is the more commonly used form of polio immunization in Nigeria.

Fig 2.3 polio immunization

ii. The second type of vaccine is the sulked (killed virus) which is given by injection to the child at 2months with an interval of 4weeks. Altogether 3 doses as in the case of oral vaccine.

Polio vaccine is give along with vaccines against diphtheria and tetanus as triple toxoid or DPT (diphtheria, pertussis and tetanus) in the EPI programme.

2. Sanitary disposal of faeces and pharyngeal secretions: since faeca contamination is a source of infection, faeces should be properly disposed. Hands should be thoroughly washed after going to the toilet.

Both parents and food handlers must wash their hands with soap after using the toilet or before giving food to children. Polio is a disease associated with low standards of personal and public hygiene, therefore, good personal health and food hygiene is inevitable in preventing this disease.

3. Good nutrition: the nutritional status of a child plays important roles in resisting diseases. This means that a child who is well nourished may have resistance against polio especially against paralytic type of polio that causes paralysis.

4.0 Self-Assessment Exercises

1. Enumerate the Hepatitis B transmission process
2. Describe the control measures of Hepatitis B
3. Outline the different types of poliomyelitis.

Answers to Self-Assessment Exercises

Q.1.Transmission may occur by:

- Transfusion of blood or blood products;
- Accidental inoculation, e.g repeated use of hypodermic needles without adequate sterilization, in particular: drug addicts, tattooing and ritual scarification;
- Insects bites
- Parentally – from a carrier mother;
- Sexual intercourse – hetero and homosexual;
- Serious exudates of skin ulcers;
- Injury – associated sports or Jobs

Q2. Control Measures

Control is carried out by a combination of: (i) counselling; (ii) hygiene practice in high risk areas; (iii) vaccination of at-risk individuals; and (iv) selective use of hepatitis B immunoglobin (HbIG). A recombinant HbsAg vaccine is now widely used. Three doses (at monthly interval) are required for complete protection. Vaccination is required for groups at high risk of infection (e.g health-

care staff in contact with blood or patients, homosexuals, drug users, etc depending on epidemiological patterns, socio-economic factors, cultural and sexual practices. In areas of the world where perinatal infection is common, immunization of susceptible women of childbearing age and of infants, particularly those born to carrier mothers, is desirable. Administration of HbIG confers extra protection to these infants and those individuals accidentally exposed (e.g health workers following needle-stick injuries and sexual partners of acute cases).

WHO has recommended that all children should be vaccinated during the first year of life. In countries where perinatal transmission is frequent, vaccination should be done at or soon after birth.

Q3. There are two type of polio namely;

i. Non – paralytic: this type of polio does not result in paralysis and last only a few years.

ii. Paralytic polio: this involves a weakening and paralysis of the muscles, (infantile paralysis). Site of the paralysis depends on the location of nerve cell in the central nervous system destroyed by the virus.

5.0 Conclusion

Hepatitis is currently more killer disease than HIV/AIDS. It does not show early until at chronic stage. Therefore regular screening is very important in the early detection of the disease. Hepatitis B is not transmitted by the faeco-oral route but is a blood-borne agent, transmitted by inoculation. Poliomylitis is a disease that mostly affects children of under-five. It is one of the major cause child mortality. The disease can be prevented through improving personal hygiene and immunisation services. The disease is having high prevalence in developing countries where low socio economics and low level of education.

6.0 Summary

Hepatitis is a viral infection which kills millions of people worldwide. It is transmitted through blood, blood products, and sexual intercourse. It can be prevented through counselling; hygiene practice in high risk areas; vaccination of at-risk individuals, three doses (at monthly interval) are required for complete protection.

Polio is a viral disease that is common among children. The polio virus attacks the spinal cord of the child. Since spinal cord is important in human movement, the attack causes motor paralysis

and muscles atrophy (failure to develop the body muscle normally) which often result in permanent deformity.

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Unit 2 Vector Bone Diseases (Malaria and Onchocerciasis)

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1.0 Introduction

Vectors are living organisms that can transmit infectious diseases between humans or from animals to human. Many of these vectors are bloodsucking insects, which ingest disease-producing microorganisms during a blood meal from an infected host and later inject into a new host during their subsequent meal. Mosquitos, ticks, flies, bugs and some freshwater aquatic snails. In the previous unit you have learnt about Hepatitis B and Poliomyelitis and in this unit you will learn malaria and onchocerciasis.

2.0 Intended Learning Outcomes (ILOs)

By the end of this unit, you will be able to:

- identify the causative agent of malaria
- describe the transmission process
- explain the prevention and control measures of malaria.
- outline the signs and symptoms of onchocerciasis.
- discuss the prevention and control measures of onchocerciasis.

3.0 Main Content

3.1 Malaria

World Health Organization (WHO, 2011) Reported that a child dies every 45 seconds as a result of the disease. Malaria is a vector-borne disease caused by a single-celled protozoan parasite called Plasmodium, transmitted by female mosquitoes. Malaria is a common and life-threatening disease in many tropical and subtropical areas and it is currently endemic in 99 countries. In 2010, there were an estimated 219 million malaria episodes (uncertainty range 154–289 million), of which approximately 81% were in Africa, and an estimated 660,000 malaria deaths (uncertainty range 490 000 to 836 000), of which 91% were in Africa. Approximately 86% of malaria deaths globally are among children under five years old and an estimated 10 000 pregnant women and 200 000 newborn babies die annually due to malaria during pregnancy. Estimated malaria incidence has been reduced by 17% and malaria-specific mortality rates by 26% globally since 2000. These rates of decline are lower than the 50% target reductions agreed internationally for 2010, but nonetheless represent a major achievement (WHO, 2013).

3.1.1 Causes of Malaria

The four species of Plasmodium which are known to cause disease in man are:

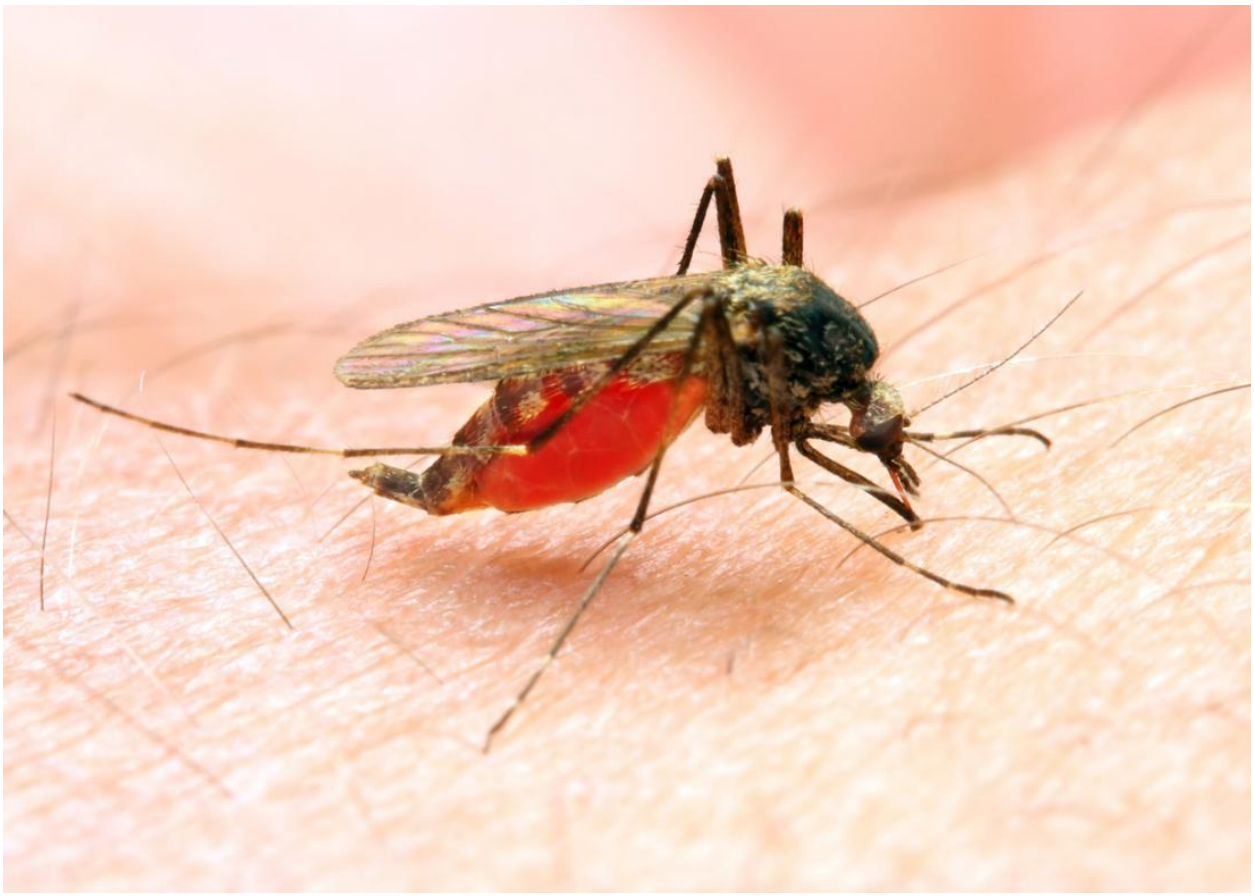
Plasmodium vivax (Tertian): It is the most common species in the World. It is the largest of the malaria parasites found in humans. The length of its asexual cycle is 48 hours. Relapses are common in vivax malaria due to emergence of new blood forms from maturing secondary liver schizonts. In tropical areas, relapses may arise within three to four months of primary attack, while in subtropical areas relapses occur only after nine months or more. However, it has been estimated that more people worldwide live at risk from Plasmodium vivax than Plasmodium falciparum and as a result suffer increased morbidity from Plasmodium vivax.

Plasmodium ovale, (Tertian): It is a relatively a rare species with a frequency of less than 5%. It may sometimes be confused with P. vivax. The length of its asexual cycle is 48 hours. Relapses occur as in P. vivax but the disease tends to be more chronic.

Plasmodium malariae (Quartan): It is a less common species whose length of its asexual cycle is 72 hours. P. malariae is associated with quartan malaria.

Plasmodium falciparum (Sub-Tertian): It is the commonest species in Africa and it accounts for 95 - 98% of all malaria infections. It is responsible for severe illness, cerebral malaria and other complications and may cause death. The length of asexual cycle is about 48 hours. Fever is produced when the schizonts are mature i.e. at 48 hours interval. Sub-tertian means that diurnal periodicity is common. The liver stage of development take about 14 days. In our environment, you may have noticed that many malaria laboratory tests report the presence of P. falciparum. This is because it is the most common cause of malaria in our environment. Indeed in Africa, Plasmodium falciparum is the most common type of malaria parasite transmitted in Africa, south of the Sahara, accounting in large part for the extremely high mortality in this region. Plasmodium falciparum, the dominant species in Africa, is the deadliest and is responsible for approximately 90% of malaria deaths per year, (White, 2011).

Fig 2.4 mosquito (malaria)



White, (2011) explained that each species of the Plasmodium parasite differs in phenotype, immune response, geographical distribution, and relapse pattern and drug response. Female mosquitoes transmit malaria as they feed on blood; they need the high levels of proteins in the blood meal for their eggs to develop. They are attracted to humans by smell and vision. Slender, sharp, saw toothed styles on the end of the female mosquito's proboscis pierce the skin and probe for a suitable small blood vessel. While sucking up the blood, the mosquito pumps saliva into the host. Chemicals in the saliva prevent the blood from clotting and act as an anaesthetic to stop the host feeling the mosquito while it is feeding. The characteristic red, itchy swelling of a mosquito bite is due to an allergic reaction to the left over saliva. Male mosquitoes do not transmit the disease as they feed only on plant juices.

3.1.2 Mode of Transmission

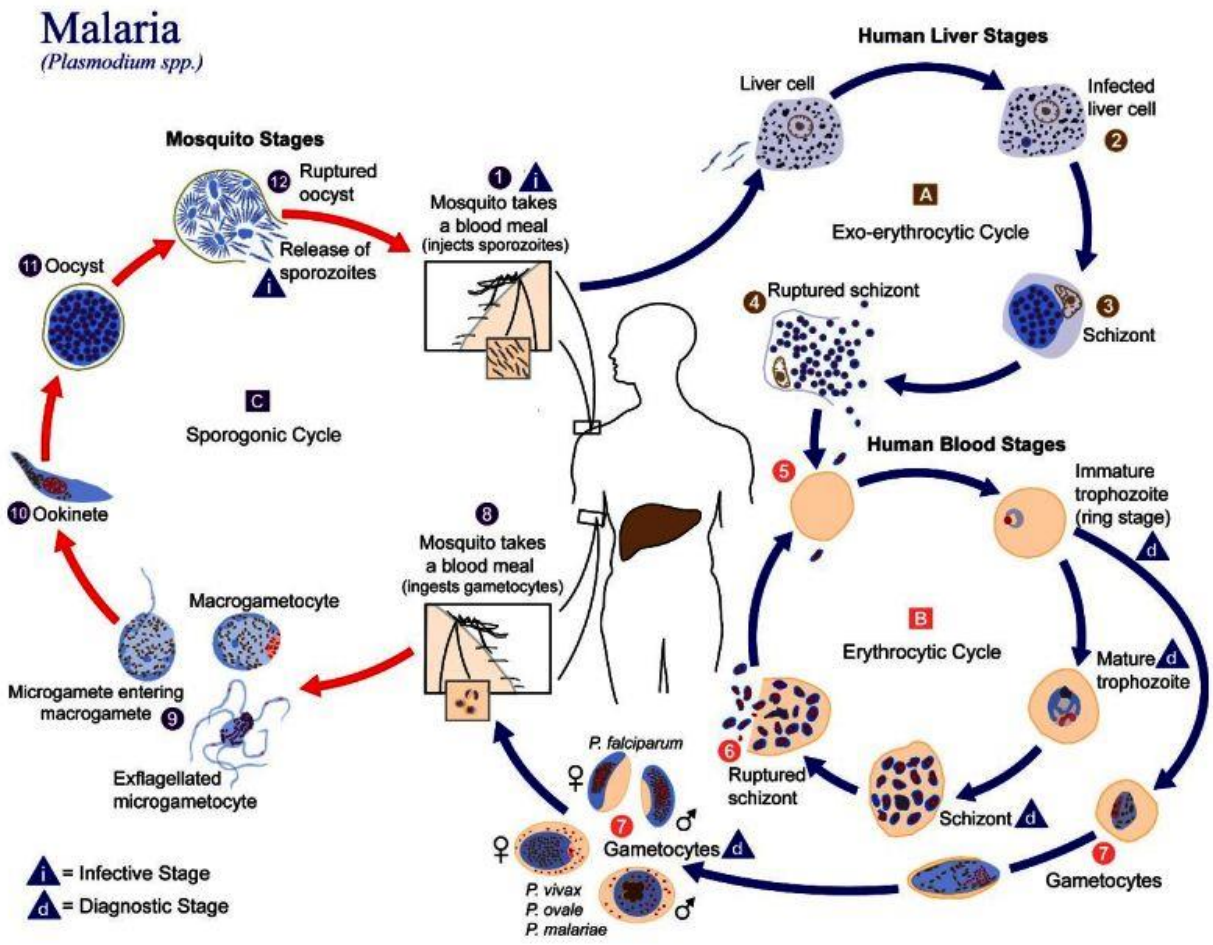
The transmission of malaria depends on interaction of the following factors: Presence of the infective vector, susceptible human host and suitable environment for complete saprogenic cycle. Malaria is transmitted by the female Anopheles mosquito which requires blood for the development of its eggs. These eggs are laid on stagnant water or slow flowing water where they stay for 2-3 days before they hatch to release mosquito larvae. The larvae grow beneath the water surface and become pupa. After a few days the pupa develops into adult mosquitoes and flies away.

The development of mosquitoes from egg to larvae to adults takes 7-14 days at a temperature of 31 or 20 days at 20^{o}C. The sporozoites are the infective stages of malaria parasites in the mosquito. This process called sporogonic cycle takes about 10-14days depending on environmental temperature. When a mosquito carrying sporozoites bites a person, it passes the parasites into the blood of that person, thereby infecting that person with malaria.

3.1.3 The Malaria Life Cycle

The Malaria parasite lifecycle begins when an infected adult female Anopheles mosquito bites a human being to feed on his or her blood. As it feeds on this blood, it releases malaria sporozoites (parasites) into the blood stream of the host (human being). This is the infective bite. Once the parasites enter the human blood stream they move quickly to the liver cells where they develop and multiply (schizogony). The infected liver cells damage and release numerous merozoites into the blood, which invade red blood cells (RBCs). This stage takes 9-14 days. Within the RBCs the parasites develop from "rings" into blood schizonts. The schizonts then rupture the RBCs releasing numerous merozoites which invade new RBCs. When the infected red blood cells damage this process initiates the chills and fever which are characteristic of Malaria. Indeed, the peaks of fever experienced during malaria coincide with the release into blood circulation of malaria parasites (merozoites) from damage RBCs. The period between the infective bite and the onset of symptoms (i.e fever, chills etc,) is called the incubation period of malaria. As mentioned earlier, the incubation period is usually 7-14 days but may be shorter as in Plasmodium falciparum or longer in the case of Plasmodium vivax and Plasmodium malariae, (White, 2011).

Fig 2.5 the malaria life cycle



Only female mosquitoes feed on blood; male mosquitoes feed on plant nectar and do not transmit the disease. Females of the mosquito genus Anopheles prefer to feed at night. They usually start searching for a meal at dusk, and continue through the night until they succeed, (Arrow, Panosian & Gelband, 2004). Malaria parasites can also be transmitted by blood transfusions, although this is rare, (Owusu-Ofori, Parry & Bates, 2010). Check there are many repetition of ideas in malaria section which you need to correct.

3.1.4 Vulnerability

Pregnant women and children under the age of five are most vulnerable to malaria infections because they have a lower natural immunity to the disease compared to others in the community. Adults can also be affected by malaria, however if they have lived in the same area for long perio d of time they are likely to build up some immunity to the parasite. This does not meanthat they a re not infected but have less severe symptoms. People who travel frommalaria free areas to malar ia endemic areas are also at risk of contracting the disease. Holiday makers and immigrant worke

rs can be vulnerable to infections as they have no immunity to the disease. Drugs are available th at can be given by appropriate health workers to people treat when they become infected.

3.1.5 Classification of Malaria

Malaria is classified into either "severe" or "uncomplicated" by the World Health Organisation (WHO). It is deemed severe when any of the following criteria are present, otherwise it is considered uncomplicated, (World Malaria Report, 2017)

- Decreased consciousness
- Significant weakness such that the person is unable to walk
- Inability to feed
- Two or more convulsions
- Low blood pressure (less than 70 mmHg in adults and 50 mmHg in children)
- Breathing problems
- Circulatory shock
- Kidney failure or hemoglobin in the urine
- Bleeding problems, or hemoglobin less than 50 g/L (5 g/dL)
- Pulmonary oedema
- Blood glucose less than 2.2 mmol/L (40 mg/dL)
- Acidosis or lactate levels of greater than 5 mmol/L
- A parasite level in the blood of greater than 100,000 per microlitre (µL) in low-intensity transmission areas, or 250,000 per µL in high-intensity transmission areas

Cerebral malaria is defined as a severe P. falciparum-malaria presenting with neurological symptoms, including coma (with a Glasgow coma scale less than 11, or a Blantyre coma scale less than 3), or with a coma that lasts longer than 30 minutes after a seizure (World Malaria Report, 2017)

3.1.6 Prevention and Control

Methods used to prevent malaria include medications, mosquito elimination and the prevention of bites. The presence of malaria in an area requires a combination of high human population density, high anopheles mosquito population density and high rates of transmission from humans to mosquitoes and from mosquitoes to humans. If any of these is lowered sufficiently, the parasite eventually disappears from that area, as happened in North America, Europe, and parts of the Middle East. However, unless the parasite is eliminated from the whole world, it could re-establish if conditions revert to a combination that favors the parasite's reproduce.

Prevention of malaria may be more cost-effective than treatment of the disease in the long run, but the initial costs required are out of reach of many of the world's poorest people. There is a wide difference in the costs of control (i.e. maintenance of low endemicity) and elimination programs between countries. For example, in China—whose government in 2010 announced a strategy to pursue malaria elimination in the Chinese provinces—the required investment is a small proportion of public expenditure on health. In contrast, a similar program in Tanzania would cost

an estimated one-fifth of the public health budget, (Sabot, Cohen, Hsiang, Kahn, Basu, Tang, Zheng, Gao, Zou, Tatarsky, Aboobakar, Usas, Barrett, Cohen, Jamison &Feachem, 2010).

In areas where malaria is common, children under five years old often have anemia, which is sometimes due to malaria. Giving children with anemia in these areas preventive antimalarial medication improves red blood cell levels slightly but does not affect the risk of death or need for hospitalisation, (Athuman, Kabanywanyi &Rohwer, 2015).

Vector control refers to methods used to decrease malaria by reducing the levels of transmission by mosquitoes. For individual protection, the most effective insect repellents are based on DEET or picaridin, (Kajfasz, 2009). Insecticide-treated mosquito nets (ITNs) and indoor residual spraying (IRS) have been shown highly effective in preventing malaria among children in areas where malaria is common, (Tanser, Lengeler& Sharp, 2010). Prompt treatment of confirmed cases with artemisinin-based combination therapies (ACTs) may also reduce transmission, (Palmer, 2012).

Mosquito nets help keep mosquitoes away from people and reduce infection rates and transmission of malaria. Nets are not a perfect barrier and are often treated with an insecticide designed to kill the mosquito before it has time to find a way past the net. Insecticide-treated nets are estimated to be twice as effective as untreated nets, and offer greater than 70% protection compared with no net, (Miller, Korenromp, Nahlen&Steketee, 2007).

Indoor residual spraying is the spraying of insecticides on the walls inside a home. After feeding, many mosquitoes rest on a nearby surface while digesting the blood meal, so if the walls of houses have been coated with insecticides, the resting mosquitoes can be killed before they can bite another person and transfer the malaria parasite, (Enayati& Hemingway, 2010).

3.2 Onchocerciasis

Onchocerciasis, also known as river blindness, is a disease caused by infection with the parasitic worm Onchocerca volvulus. It is the second-most common cause of blindness due to infection, after trachoma. It can cause severe skin and eye disease, including blindness. Worldwide, an estimated 18 million people are infected and 270,000 blinded by the disease. Onchocerciasis is endemic in Africa, where it is a leading cause of blindness, and in specific areas.

The parasite worm is spread by the bites of a black fly of the Simulium type. Usually, many bites are required before infection occurs. These flies live near rivers, hence the common name of the disease. Once inside a person, the worms create larvae that make their way out to the skin, where they can infect the next black fly that bites the person. There are a number of ways to make the diagnosis, including: placing a biopsy of the skin in normal saline and watching for the dsdlarva to come out, looking in the eye for larvae, and looking within the bumps under the skin for adult worms.

About 15.5 million people are infected with river blindness. Approximately 0.8 million have some amount of loss of vision from the infection. Most infections occur in sub-Saharan Africa, although cases have also been reported in Yemen and isolated areas of Central and South America. In 1915,

the physician Rodolfo Robles first linked the worm to eye disease. It is listed by the World Health Organization (WHO) as a neglected tropical disease.

3.2.1 Signs and Symptoms

Symptoms include severe itching, bumps under the skin, and blindness. Adult worms remain in subcutaneous nodules, limiting access to the host's immune system. Microfilariae, in contrast, are able to induce intense inflammatory responses, especially upon their death. Wolbachia species have been found to be endosymbionts of *O. volvulus* adults and microfilariae, and are thought to be the driving force behind most of *O. volvulus* morbidity. Dying microfilariae have been recently discovered to release Wolbachia surface protein that activates TLR2 and TLR4, triggering innate immune responses and producing the inflammation and its associated morbidity. The severity of illness is directly proportional to the number of infected microfilariae and the power of the resultant inflammatory response.

Skin involvement typically consists of intense itching, swelling, and inflammation. A grading system has been developed to categorize the degree of skin involvement:

- Acute papular onchodermatitis – scattered pruritic papules
- Chronic papular onchodermatitis – larger papules, resulting in hyperpigmentation
- Lichenified onchodermatitis – hyperpigmented papules and plaques, with edema, lymphadenopathy, pruritus and common secondary bacterial infections
- Skin atrophy – loss of elasticity, the skin resembles tissue paper, 'lizard skin' appearance
- Depigmentation – 'leopard skin' appearance, usually on anterior lower leg
- Glaucoma effect – eyes malfunction, begin to see shadows or nothing

3.2.2 Life Cycle

The life of the parasite can be traced through the black fly and the human hosts in the following steps:

1. A Simulium female black fly takes a blood meal on an infected human host, and ingests microfilaria.
2. The microfilaria enter the gut and thoracic flight muscles of the black fly, progressing into the first larval stage (J1.).
3. The larvae mature into the second larval stage (J2.), and move to the proboscis and into the saliva in its third larval stage (J3.). Maturation takes about seven days.
4. The black fly takes another blood meal, passing the larvae into the next human host’s blood.
5. The larvae migrate to the subcutaneous tissue and undergo two more molts. They form nodules as they mature into adult worms over six to 12 months.
6. After maturing, adult male worms mate with female worms in the subcutaneous tissue to produce between 700 and 1,500 microfilaria per day.
7. The microfilaria migrate to the skin during the day, and the black flies only feed in the day, so the parasite is in a prime position for the female fly to ingest it. Black flies take blood meals to ingest these microfilaria to restart the cycle.

3.2.3 Prevention and Control Measures

Prevention is by avoiding being bitten by flies. This may include the use of insect repellent and proper clothing. Other efforts include those to decrease the fly population by spraying insecticides. Efforts to eradicate the disease by treating entire groups of people twice a year are ongoing in a number of areas of the world .Various control programs aim to stop onchocerciasis from being a public health problem. The first was the Onchocerciasis Control Programme (OCP), which was launched in 1974, and at its peak, covered 30 million people in 11 countries. Through the use of larvicide spraying of fast-flowing rivers to control black fly populations, and from 1988 onwards, the use of ivermectin to treat infected people, the OCP eliminated onchocerciasis as a public health problem. The OCP, a joint effort of the World Health Organization, the World Bank, the United Nations Development Programme, and the UN Food and Agriculture Organization, was considered to be a success, and came to an end in 2002. Continued monitoring ensures onchocerciasis cannot reinvade the area of the OCP.

In 1995, the African Programme for Onchocerciasis Control (APOC) began covering another 19 countries, mainly relying upon the use of the drug ivermectin. Its goal was to set up community-directed treatment with ivermectin for those at risk of infection. In these ways, transmission has declined. APOC closed in 2015 and aspects of its work taken over by the WHO Expanded Special Programme for the Elimination of Neglected Tropical Diseases (ESPEN). As in the Americas, the objective of ESPEN working with Government Health Ministries and partner NGDOs, is the elimination of transmission of onchocerciasis. This requires consistent annual treatment of 80% of the population in endemic areas for at least 10-12 years - the life span of the adult worm. No African country has so far verified elimination of onchocerciasis, but treatment has stopped in some areas (e.g. Nigeria), following epidemiological and entomological assessments that indicated that no ongoing transmission could be detected. In 2015, WHO facilitated the launch of an elimination program in Yemen which was subsequently put on hold due to conflict.

4.0 Self-Assessment Exercise

1. What are the causes of malaria?
2. Explain the transmission process of malaria
3. Describe the prevention and control measures of malaria.
4. Examine the signs and symptoms of onchocerciasis.

Answer to Self-Assessment Exercise

Q1. **Causes of malaria**

The four species of Plasmodium which are known to cause disease in man are:

Plasmodium vivax (Tertian): It is the most common species in the World. It is the largest of the malaria parasites found in humans. The length of its asexual cycle is 48 hours. Relapses are

common in vivax malaria due to emergence of new blood forms from maturing secondary liver schizonts. In tropical areas, relapses may arise within three to four months of primary attack, while in subtropical areas relapses occur only after nine months or more. However, it has been estimated that more people worldwide live at risk from Plasmodium vivax than Plasmodium falciparum and as a result suffer increased morbidity from Plasmodium vivax.

Plasmodium ovale, (Tertian): It is a relatively a rare species with a frequency of less than 5%. It may sometimes be confused with P. vivax. The length of its asexual cycle is 48 hours. Relapses occur as in P. vivax but the disease tends to be more chronic.

Plasmodium malariae (Quartan): It is a less common species whose length of its asexual cycle is 72 hours. P. malariae is associated with quartan malaria.

Plasmodium falciparum (Sub-Tertian): It is the commonest species in Africa and it accounts for 95 - 98% of all malaria infections. It is responsible for severe illness, cerebral malaria and other complications and may cause death. The length of asexual cycle is about 48 hours. Fever is produced when the schizonts are mature i.e. at 48 hours interval. Sub-tertian means that diurnal periodicity is common. The liver stage of development take about 14 days. In our environment, you may have noticed that many malaria laboratory tests report the presence of P. falciparum. This is because it is the most common cause of malaria in our environment. Indeed in Africa, Plasmodium falciparum is the most common type of malaria parasite transmitted in Africa, south of the Sahara, accounting in large part for the extremely high mortality in this region. Plasmodium falciparum, the dominant species in Africa, is the deadliest and is responsible for approximately 90% of malaria deaths per year.

Species of the Plasmodium parasite differs in phenotype, immune response, geographical distribution, and relapse pattern and drug response. Female mosquitoes transmit malaria as they feed on blood; they need the high levels of proteins in the blood meal to develop their eggs. They are attracted to humans by smell and vision. Slender, sharp, saw toothed styles on the end of the female mosquito's proboscis pierce the skin and probe for a suitable small blood vessel. While sucking up the blood, the mosquito pumps saliva into the host. Chemicals in the saliva prevent the blood from clotting and act as an aesthetic to stop the host feeling the mosquito while it is feeding. The characteristic red, itchy swelling of a mosquito bite is due to an allergic reaction to the left over saliva. Male mosquitoes do not transmit the disease as they feed only on plant juices.

Q2. Mode of transmission

The transmission of Malaria depends on interaction of the following factors: Presence of the infective vector, susceptible human host and suitable environment for complete sporogonic cycle. Malaria is transmitted by the female Anopheles mosquito which requires blood for the development of its eggs. These eggs are laid on stagnant water or slow flowing water where they stay for 2-3 days before they hatch to release mosquito larvae. The larvae grow beneath the water

surface and become pupa. After a few days the pupa develops into adult mosquitoes and flies away. The development of mosquitoes from egg to larvae to adults takes 7-14 days at a temperature of 31 or 20 days at 20^{o}C. The sporozoites are the infective stages of malaria parasites in the mosquito. This process called sporogonic cycle takes about 10-14days depending on environmental temperature. When a mosquito carrying sporozoites bites a person, it passes the parasites into the blood of that person, thereby infecting that person with malaria.

Q3. **Prevention and control**

Methods used to prevent malaria include medications, mosquito elimination and the prevention of bites. The presence of malaria in an area requires a combination of high human population density, high anopheles mosquito population density and high rates of transmission from humans to mosquitoes and from mosquitoes to humans. If any of these is lowered sufficiently, the parasite eventually disappears from that area, as happened in North America, Europe, and parts of the Middle East. However, unless the parasite is eliminated from the whole world, it could re-establish if conditions revert to a combination that favors the parasite's reproduction.

Prevention of malaria may be more cost-effective than treatment of the disease in the long run, but the initial costs required are out of reach of many of the world's poorest people. There is a wide difference in the costs of control (i.e. maintenance of low endemicity) and elimination programs between countries. For example, in China—whose government in 2010 announced a strategy to pursue malaria elimination in the Chinese provinces—the required investment is a small proportion of public expenditure on health. In contrast, a similar program in Tanzania would cost an estimated one-fifth of the public health budget.

In areas where malaria is common, children under five years old often have anemia, which is sometimes due to malaria. Giving children with anemia in these areas preventive antimalarial medication improves red blood cell levels slightly but does not affect the risk of death or need for hospitalization.

Vector control refers to methods used to decrease malaria by reducing the levels of transmission by mosquitoes. For individual protection, the most effective insect repellents are based on DEET or picaridin, *(Kajfasz, 2009).* Insecticide-treated mosquito nets (ITNs) and indoor residual spraying (IRS) have been shown highly effective in preventing malaria among children in areas where malaria is common. Prompt treatment of confirmed cases with artemisinin-based combination therapies (ACTs) may also reduce transmission.

Mosquito nets help keep mosquitoes away from people and reduce infection rates and transmission of malaria. Nets are not a perfect barrier and are often treated with an insecticide designed to kill the mosquito before it has time to find a way past the net. Insecticide-treated nets are estimated to be twice as effective as untreated nets, and offer greater than 70% protection compared with no net.

Indoor residual spraying is the spraying of insecticides on the walls inside a home. After feeding, many mosquitoes rest on a nearby surface while digesting the blood meal, so if the walls of houses

have been coated with insecticides, the resting mosquitoes can be killed before they can bite another person and transfer the malaria parasite.

Q4. Signs and symptoms

Symptoms include severe itching, bumps under the skin, and blindness. Adult worms remain in subcutaneous nodules, limiting access to the host's immune system. Microfilariae, in contrast, are able to induce intense inflammatory responses, especially upon their death. Wolbachia species have been found to be endosymbionts of *O. volvulus* adults and microfilariae, and are thought to be the driving force behind most of *O. volvulus* morbidity. Dying microfilariae have been recently discovered to release Wolbachia surface protein that activates TLR2 and TLR4, triggering innate immune responses and producing the inflammation and its associated morbidity. The severity of illness is directly proportional to the number of infected microfilariae and the power of the resultant inflammatory response.

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- Skin atrophy – loss of elasticity, the skin resembles tissue paper, 'lizard skin' appearance
- Depigmentation – 'leopard skin' appearance, usually on anterior lower leg
- Glaucoma effect – eyes malfunction, begin to see shadows or nothing

5.0 Conclusion

Malaria is a febrile vector-borne disease in which a child dies every 45 seconds. Over 3 million people are at risk of getting infected. It affects up to 250 million and kills nearly 800,000 people per year.

Many people around the world more particularly those living in riverine areas are affected with onchoceciasis. This infection is one of the major cause of blindness. Onchocerciasis is largely preventable.

6.0 Summary

Malaria is a disease caused by a single-celled protozoan parasite called Plasmodium, transmitted by female anopheles mosquitoes. Pregnant women and children under the age of five are most vulnerable to malaria infections. Malaria is classified into either severe or uncomplicated. Malaria can be prevented through medications, mosquito elimination, environmental sanitation, health education and the prevention of bites.

The onchocerciasis parasite worm is spread by the bites of a black fly of the Simulium type. Usually, many bites are required before infection occurs. These flies live near rivers, hence the

common name of the disease. Once inside a person, the worms create larvae that make their way out to the skin, where they can infect the next black fly that bites the person.

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Unit 3: Tuberculosis and Rabies

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1.0. Introduction

In the previous unit have learnt about malaria and onchocerciasis. In this unit you will learn about tuberculosis and rabies. Both of these diseases become a serious public health problem which is claiming many lives. But one good thing about these diseases, there are preventive measures such as; improving personal hygiene, good nutrition proper housing and immunization and illuminate the rabies from dogs.

2.0 Intended Learning Outcomes (ILOs)

By the end of this unit, you will be able to:

- describe the primary complex and early complication of tuberculosis
- identify the transmission process of tuberculosis
- discuss the different types of rabies
- outline the prevention and control measures of rabies.

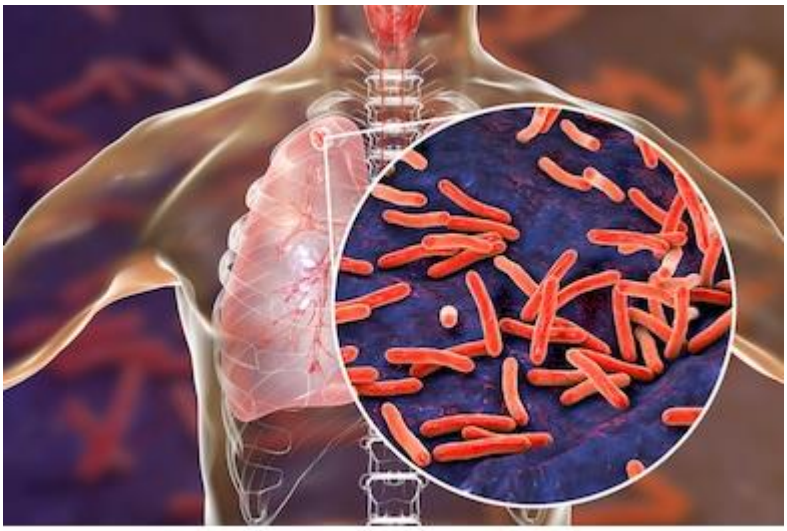
3.0 Main Content

3.1 Tuberculosis

Occurrence:	Worldwide
Organism:	Mycobacterium tuberculosis (human and bovine strains).
Reservoir:	Humans, Cattle
Transmission:	Air borne droplets, droplets nuclei and dust
	Milk and infected meat
Control:	General improvement in housing, nutrition and personal hygiene immunization with BCG
	Chemoprophylaxis
	Case finding and treatment, DOTs.

Tuberculosis remains one of the major health problems in many tropical countries; in some countries the situation is being aggravated by dense overcrowding in urban slums. An estimated 8-10million people develop overt tuberculosis annually as a result of primary infection, endogenous reactivation or exogenous re-infection. The coexistence of HIV infection and tuberculosis has been hailed as one of the most serious threats to human health. Drug resistant tuberculosis is on the increase in many countries of the world. Tuberculosis present a wide variety of clinical forms, but pulmonary involvement is common and is most important epidemiologically as it is primarily responsible for the transmission of the infection (Lucas and Gilles, 2003).

Figure 3.1 **Tuberculosis**



3.1.1 Primary Complex

On first infection, the patient develops the primary complex which consists of a small parenchymal lesion and involvement of the regional lymph node; in the lungs, this constitutes the classical Ghon

focus, with a small lung lesion and invasion of the mediastinal lymph node. In most case the primary complex heals spontaneously, with fibrosis and calcification of the lesions, but the organisms may persist for many years within this focus.

3.1.2 Early Complications

In a small proportion of cases the primary complex progresses to produce more severe manifestations locally (e.g. caseous pneumonia) or there may be haemotogenous dissemination to other parts of the body. Thus within a few years of the primary infection, especially duringthe first 6 months, there is the danger of haemotogenous spread either focal (e.g. bone and joint lesions) or disseminated (in the form of miliary tuberculosis and tuberculosis meningitis).

Secondary Infection

Apart from the primary complex and its early complication, the 'adult' pulmonary form of tuberculosis may occur either as a result of the reactivation of an existing lesion or by exogenous re-infection. Destruction of the lung parenchyma, with fibrosis and cavitation are important features of this adult form. Clinically, it may present with cough, haemoptysis and chest pain, with general constitutional symptoms-fever, loss of weight and malaise; often it remains virtually asymptomatic especially in the early stage.

3.1.3 Bacteriology

The causative agent is mycobacterium tuberculosis the tubercle bacillus. The human type produces most of the pulmonary lesions, also some extra pulmonary lesions; the bovine strain of the organism mainly accounts for extra pulmonary lesions. Other types of M. Tuberculosis (avian and a typical strains) rarely cause disease in humans, but infection may produce immunological changes, with a non-specific tuberculin skin reaction. Tubercle bacilli survive for long period in dried sputum and dust (Lucas and Gilles, 2003).

3.1.4 Epidemiology

Tuberculosis has a worldwide distribution. Until recently, it was absent from a few isolated communities where the local populations are now showing widespread infections with severe manifestations on first contact with tuberculosis.

3.1.5 Reservoir

Human are the reservoir of the human strain and patients with pulmonary infection constitute the main source of infection. The reservoir of the bovine strain is cattle, with infected milk and meat being the main source of infection.

3.1.6 Transmission

Transmission of infection is mainly air-borne by droplets, droplets nuclei and dust; thus it is enhanced by overcrowding in poorly ventilated accommodation. Infection may also occur by ingestion especially of contaminated milk and infected meat.

3.1.7 Host Factors

The host response is an important factor in the epidemiology of tuberculosis. A primary infection may heal, the host acquiring immunity in the process. In some cases the primary lesion progresses to produce extensive disease locally, or infection may disseminate to produce metastic or military lesions. Lesions that are apparently healed may subsequently break down with reactivation of disease. Certain factors such as malnutrition, measles infection and HIV infection, use of corticosteriods and other debilitating conditions predispose to progression and reactivation of the disease.

3.1.8 Control

In planning a programme for the control of tuberculosis, the entire population can be conveniently considered as falling into four groups:

- No previous exposure to tubercle bacilli – they would require protection from infection.
- Healed primary infection – they have some immunity but must be protected from reactivation of disease and re-infection.
- Diagnosed active disease – they must have effective treatment and remain under supervision until they have recovered fully.
- Undiagnosed active disease – without treatment the disease may progress with further irreversible damage. As potential sources of infection, they constitute a danger to the community.

The control of tuberculosis can be considered at the following levels of prevention:

- General health promotion
- Specific protection – active immunisation, chemoprophylaxis, control of animal reservoir;
- Early diagnosis and treatment;
- Limitation of disability;
- Rehabilitation;

- Surveillance

3.2 General Health Promotion

Improvement in housing (good ventilation, avoidance of overcrowding) will reduce the chances of air-borne infections. Health education should be directed at producing better personal habits with regard to spitting and coughing. Good nutrition enhances host immunity.

3.2.1 Specific Protection

Three measures are available: (i) active immunization with BCG (Bacille Calmette Guerin); (ii) chemoprophylaxis; and (iii) control of animal tuberculosis.

3.2.2 BCG Vaccination

This vaccine contains live attenuated tubercle bacilli of the bovine strain. It may be administered intradermal by syringe and needle or by the multiple-puncture technique. It confers significant but not absolute immunity; in particular, it protects against the disseminated military lesions of tuberculosis and tuberculosis meningitis.

3.3 Rabies

3.3.1 What is Rabies?

Rabies is a viral infection that mainly spreads through a bite from an infected animal. It is an RNA virus of the rhabdovirus family. Rabies is an infectious viral disease that is almost always fatal following the onset of clinical symptoms. In up to 99% of cases, domestic dogs are responsible for rabies virus transmission to humans. Yet, rabies can affect both domestic and wild animals. It is spread to people through bites or scratches, usually via saliva.

Rabies is a virus that is usually spread by the bite or scratch of an animal. By the time the symptoms appear, it is generally too late to save the patient. However, a person who may have been exposed to rabies can usually be treated effectively if they seek help at once.

However, globally, it remains a problem, and tens of thousands of deaths result from rabies each year, mostly in rural areas of Southeast Asia and Africa. Over 95 percent of infections are caused by dogs.

Fast facts on rabies

- Rabies is a viral disease that is nearly always transmitted by an infected animal bite.
- Anyone who receives a bite in a geographical area where rabies occurs should seek treatment at once.

- For treatment to be successful, it must be given before symptoms appear.
- Symptoms include neurological problems and a fear of light and water.
- Following the vaccination requirements for pets helps prevent and control rabies.

Without early treatment, it is usually fatal.

The virus can affect the body in one of two ways:

- It enters the peripheral nervous system (PNS) directly and migrates to the brain.
- It replicates within muscle tissue, where it is safe from the host's immune system. From here, it enters the nervous system through the neuromuscular junctions.

Once inside the nervous system, the virus produces acute inflammation of the brain. Coma and death soon follow.

There are two forms of the disease:

- **Furious, or encephalitic rabies**: This occurs in 80 percent of human cases. People with furious rabies exhibit signs of hyperactivity, excitable behaviour, hydrophobia (fear of water) and sometimes aerophobia (fear of drafts or of fresh air). Death occurs after a few days due to cardio-respiratory arrest.

- Paralytic **or "dumb" rabies**: accounts for about 20% of the total number of human cases. This form of rabies runs a less dramatic and usually longer course than the furious form. Muscles gradually become paralyzed, starting at the site of the bite or scratch. A coma slowly develops, and eventually death occurs. The paralytic form of rabies is often misdiagnosed, contributing to the under-reporting of the disease.

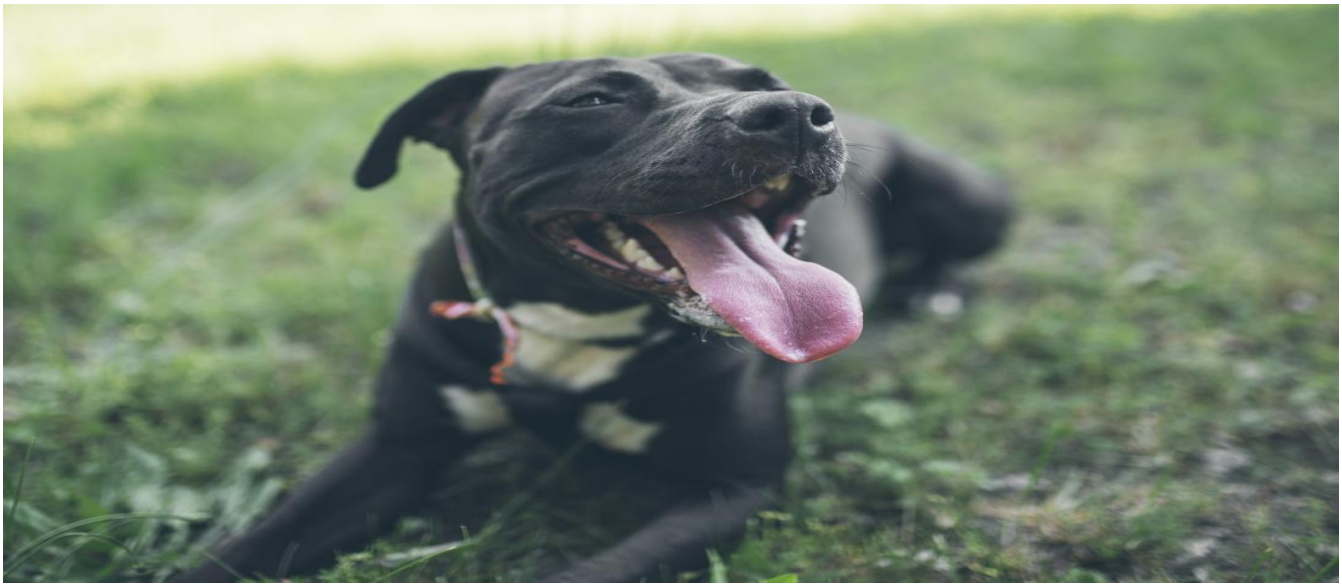


Fig. 2.8: Vaccinate dogs and cats to protect them from rabies.

3.3.2 Transmission

People are usually infected following a deep bite or scratch from an animal with rabies, and transmission to humans by rabid dog's accounts for 99% of cases.

It is passed on through saliva. Rabies can develop if a person receives a bite from an infected animal, or if saliva from an infected animal gets into an open wound or through a mucous membrane, such as the eyes or mouth. It cannot pass through unbroken skin.

Contraction of rabies through inhalation of virus-containing aerosols or through transplantation of infected organs is rare. Contracting rabies through consumption of raw meat or animal-derived tissue has never been confirmed in humans.

Raccoons, coyotes, bats, skunks, and foxes are the animals most likely to spread the virus.

Any mammal can harbor and transmit the virus, but smaller mammals, such as rodents, rarely become infected or transmit rabies. Rabbits are unlikely to spread rabies.

3.3.3 Symptoms

The incubation period for rabies is typically 2–3 months but may vary from 1 week to 1 year, dependent upon factors such as the location of virus entry and viral load. Initial symptoms of rabies include a fever with pain and unusual or unexplained tingling, pricking, or burning sensation (paraesthesia) at the wound site. As the virus spreads to the central nervous system, progressive and fatal inflammation of the brain and spinal cord develops.

Early, flu-like symptoms, include:

- a fever of 100.4 degrees Fahrenheit (38 degrees Celsius) or above
- headache
- anxiety
- feeling generally unwell
- sore throat and a cough
- nausea and vomiting
- discomfort may occur at the site of the bite

These can last from 2 to 10 days, and they worsen over time.

3.3.4 Acute Neurologic Period

Neurologic symptoms develop, including:

- confusion and aggression
- partial paralysis, involuntary muscle twitching, and rigid neck muscles
- convulsions
- hyperventilation and difficulty breathing
- hypersalivation or producing a lot of saliva, and possibly frothing at the mouth
- fear of water, or hydrophobia, due to difficulty swallowing

- hallucinations, nightmares, and insomnia
- priapism, or permanent erection, in males
- photophobia, or a fear of light

Toward the end of this phase, breathing becomes rapid and inconsistent.

3.3.5 Coma and Death

If the person enters a coma, death will occur within a matter of hours, unless they are attached to a ventilator.

Rarely, a person may recover at this late stage.

Why does rabies cause a fear of water?

Rabies used to be known as hydrophobia because it appears to cause a fear of water.

Intense spasms in the throat are triggered when trying to swallow. Even the thought of swallowing water can cause spasms. This is where the fear comes from.

The excess saliva that occurs is probably due to the impact of the virus on the nervous system.

If the individual could swallow saliva easily, this would reduce the risk of spreading the virus to a new host.

Rabies progresses in five distinct stages:

- incubation
- prodrome
- acute neurologic period
- coma
- death

3.3.6 Incubation Period

This is the time before symptoms appear. It usually lasts from 3 to 12 weeks, but it can take as little as 5 days or more than 2 years.

The closer the bite is to the brain, the sooner the effects are likely to appear.

By the time symptoms appear, rabies is usually fatal. Anyone who may have been exposed to the virus should seek medical help at once, without waiting for symptoms.

3.3.7 Prodrome

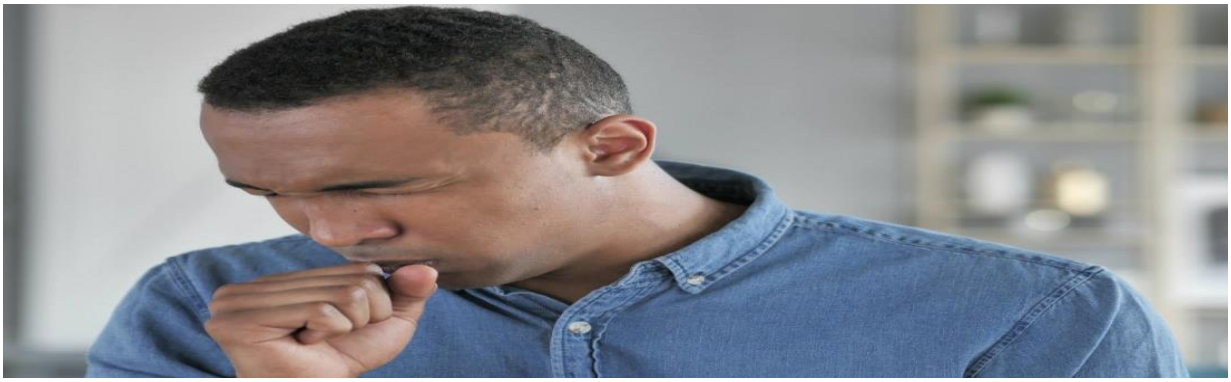


Fig. 2.9: During the prodrome stage of rabies, a person may experience coughing and fever.

3.3.8 Prevention of Rabies

Rabies is a serious disease, but individuals and governments can and do take action to control and prevent, and, in some cases, wipe it out completely.

Fig. 2.10: Vaccination of Humans to Prevent the Spread of Rabies

In some areas the vaccination of humans is necessary to prevent the spread of rabies.
Strategies include:

- regular anti-rabies vaccinations for all pets and domestic animals
- bans or restrictions on the import of animals from some countries
- widespread vaccinations of humans in some areas
- educational information and awareness

Individual precautions

Individuals should follow some safety rules to reduce the chance of contracting rabies.

- Vaccinate pets: Find out how often you need to vaccinate your cat, dog, ferret, and other domestic or farm animals, and keep up the vaccinations.
- Protect small pets: Some pets cannot be vaccinated, so they should be kept in a cage or inside the house to prevent contact with wild predators.
- Keep pets confined: Pets should be safely confined when at home, and supervised when outside.
- Report strays to the local authorities: Contact local animal control officials or police departments if you see animals roaming
- Do not approach wild animals: Animals with rabies are likely to be less cautious than usual, and they may be more likely to approach people.
- Keep bats out of the home: Seal your home to prevent bats from nesting. Call an expert to remove any bats that are already present.

3.3.9 Eliminating Rabies in Dogs

Rabies is a vaccine-preventable disease. Vaccinating dogs is the most cost-effective strategy for preventing rabies in people. Dog vaccination reduces deaths attributable to rabies and the need for PEP as a part of dog bite patient care.

3.3.10 Awareness on Rabies and Preventing Dog Bites

Education on dog behaviour and bite prevention for both children and adults is an essential extension of a rabies vaccination programme and can decrease both the incidence of human rabies and the financial burden of treating dog bites. Increasing awareness of rabies prevention and control in communities includes education and information on responsible pet ownership, how to prevent dog bites, and immediate care measures after a bite. Engagement and ownership of the programme at the community level increases reach and uptake of key messages.

3.3.11 Preventive Immunization in People

Human rabies vaccines exist for pre-exposure immunization. These are recommended for people in certain high-risk occupations such as laboratory workers handling live rabies and rabies-related (lyssavirus) viruses; and people (such as animal disease control staff and wildlife rangers) whose professional or personal activities might bring them into direct contact with bats, carnivores, or other mammals that may be infected.

Pre-exposure immunization is also recommended for travellers to rabies-affected, remote areas who plan to spend a lot of time outdoors involved in activities such as caving or mountain-climbing. Expatriates and long term travellers to areas with a high rabies exposure risk should be immunized if local access to rabies biologics is limited. Finally, immunization should also be considered for children living in, or visiting, remote, highrisk areas. As they play with animals, they may receive more severe bites, or may not report bites.

4.0 Self-Assessment Exercise

1. Explain the primary complex and early complication of tuberculosis.
2. Describe the transmission process of tuberculosis
3. Critically examine any two type of rabies
4. Outline the strategies of an individual can take to rabies.

Answers to Self-Assessment Exercise

Q1. **Primary Complex**

On first infection, the patient develops the primary complex which consists of a small parenchymal lesion and involvement of the regional lymph node in the lungs, this constitutes the classical Ghon focus, with a small lung lesion and invasion of the mediastinal lymph node. In most case the primary complex heals spontaneously, with fibrosis and calcification of the lesions, but the organisms may persist for many years within this focus.

Early Complications

In a small proportion of cases the primary complex progresses to produce more severe manifestations locally (e.g. caseous pneumonia) or there may be haemotogenous dissemination to other parts of the body. Thus within a few years of the primary infection, especially during the first 6 months, there is the danger of haemotogenous spread either focal (e.g. bone and joint lesions) or disseminated (in the form of miliary tuberculosis and tuberculosis meningitis).

Q2. Transmission

Transmission of infection is mainly air-borne by droplets, droplets nuclei and dust; thus it is enhanced by overcrowding in poorly ventilated accommodation. Infection may also occur by ingestion especially of contaminated milk and infected meat.

Host Factors

The host response is an important factor in the epidemiology of tuberculosis. A primary infection may heal, the host acquiring immunity in the process. In some cases the primary lesion progresses to produce extensive disease locally, or infection may disseminate to produce metastic or military lesions. Lesions that are apparently healed may subsequently break down with reactivation of disease. Certain factors such as malnutrition, measles infection and HIV infection, use of corticosteriods and other debilitating conditions predispose to progression and reactivation of the disease.

Q3. Individual precautions

Individuals should follow some safety rules to reduce the chance of contracting rabies.

- Vaccinate pets: Find out how often you need to vaccinate your cat, dog, ferret, and other domestic or farm animals, and keep up the vaccinations.
- Protect small pets: Some pets cannot be vaccinated, so they should be kept in a cage or inside the house to prevent contact with wild predators.

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- Do not approach wild animals: Animals with rabies are likely to be less cautious than usual, and they may be more likely to approach people.
- Keep bats out of the home: Seal your home to prevent bats from nesting. Call an expert to remove any bats that are already present.

5.0 Conclusion

Tuberculosis and rabies remain major health problem in the tropical regions, killing millions of people annually. It requires governmental, non-governmental, community and individual effort to reduce the incidence of infection.

6.0 Summary

Tuberculosis bacterial disease while rabies is a viral disease. Both of these diseases can be contracted directly by having contact with infected host. There are many strategies of prevention and control of these diseases.

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Unit 4: Direct Contact (Sexually Transmitted Infection)

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1.0 Introductions

Direct contact disease transmission occurs when there is physical contact between an infected person and susceptible person. Sexually transmitted diseases are those disease transmitted through sexual contact. They are also known as veneral disease**.** Sexually transmitted diseases are both health and social problem. They are social problems because their existence and spread are depended on behaviours. The eradication and prevention of sexually transmitted diseases depend on moral and ethical standards regarding sexual relationships. Some of these disease include HIV/

AIDs, Syphilis and Gonorrhoea. In the previous unit you have learnt about malaria and onchocerciasis. In this unit you will learn about HIV/AIDs, Syphilis and Gonorrhoea.

I. HIV/AIDS

2.0 Intended Learning Outcomes (ILOs)

By the end of this unit, you will be able to:

- differentiate HIV from AIDS
- outline the preventive measures of HIV/AIDS
- discuss the stages of syphilis manifestation
- recognise the prevent strategies of syphilis
- describe the transmission mode of gonorrhoea
- identify the signs and symptoms of gonorrhoea

3.0 Main Content

3.1 Meaning of Human Immunodeficiency Virus

HIV stands for Human Immunodeficiency Virus. It's a virus that breaks down certain cells in the immune system (body's defence against diseases that helps body stay healthy). When HIV damages the immune system, it's easier to get really sick and even die from infections that body could normally fight off. Once the virus gets into the body, it stays in the body for life. There's no cure for HIV, but, there are certain medicines that can help the infected person to stay healthy. HIV medicine lowers or even stops your chances of spreading the virus to other people. Studies show that using HIV treatment as directed can lower the amount of HIV in the blood so much that it might not even show up on a test when this happens, you can't transmit HIV through sex.

3.1.1 Differences between HIV and AIDS

HIV is the virus that causes AIDS. AIDS stands for Acquired Immune Deficiency Syndrome. HIV and AIDS are not the same thing and people with HIV may not always have AIDS. HIV is the virus that's passed from person to person. Over time, HIV destroys an important kind of the cell in the immune system (called CD4 cells or T cells) that helps protect you from infections. When you don't have enough of these CD4 cells, your body can't fight off infections the way it normally can.

AIDS is the disease caused by the damage that HIV does to the immune system. Person can have AIDS when get dangerous infections or have a super low number of CD4 cells. AIDS is the most serious stage of HIV, and it leads to death over time.

Without treatment, it usually takes about 2 - 10 years for someone with HIV to develop AIDS. Treatment slows down the damage the virus causes and can help people stay healthy for several decades.

3.1.2 Mode of Transmission

HIV is carried in semen (cum), vaginal fluids, anal mucus, blood, and breast milk. The virus gets in the body through cuts or sores in the skin, and through mucous membranes (like the inside of the vagina, rectum, and opening of the penis). HIV can be transmitted through:

- having unprotected vaginal or anal sex
- sharing needles or syringes for shooting drugs, piercings, tattoos, etc.
- getting stuck with a needle that has HIV-infected blood on it
- getting HIV-infected blood, semen (cum), or vaginal fluids into open cuts or sores on the body

HIV is usually spread through having unprotected sex. Therefore the use of condom during having sex /having safer sex, not sharing needles can help protect the transmission of HIV. HIV can also be passed to babies during pregnancy, birth, or breastfeeding. A pregnant woman with HIV can take medicine to greatly reduce the chance that her baby will get HIV.

Non-transmissible ways

HIV isn't spread through saliva (spit), so it is not possible to get HIV from kissing, sharing food or drinks, or using the same fork or spoon. HIV is also not spread through hugging, holding hands, coughing, or sneezing, cannot be contracted through use of toilet seat. A long time ago, some people got HIV from infected blood transfusions. But now, giving or getting blood in medical centers is totally safe as lots of precautions are in place. Doctors, hospitals, and blood donation centers don't use needles more than once, and donated blood is tested for HIV and other infections.

For more information follow this: https://www.plannedparenthood.org/learn/stds-hiv-safer-sex/hiv-aids

3.1.3 Symptoms of HIV/AIDS

The first 2-4 weeks after being infected with HIV, the following symptoms will be noticed feverish, achy, and sick. These flu-like symptoms are your body's first reaction to the HIV infection. During this time, there's a lot of the virus in the system, so it's really easy to spread HIV to other people. The symptoms only last for a few weeks, and then usually don't have symptoms again for years. But HIV can be spread to other people — whether or not there are symptoms or feel sick.

3.1.4 Later HIV/AIDS Symptoms

HIV destroys cells in the immune system called CD4 cells or T cells. Without CD4 cells, the body has a hard time fighting off diseases. This makes the body more likely to get really sick from infections that usually wouldn't hurt the body. Over time, the damage HIV does to the immune system leads to AIDS.

A person is having AIDS when the body get rare infections (called opportunistic infections) or types of cancer, or if the body have lost a certain number of CD4 cells. This usually happens about

10 years after getting HIV if the person is not on treatment. Treatment can delay or even prevent ever developing AIDS.

The signs of AIDS include:

- Thrush (a thick, white coating on your tongue or mouth)
- Sore throat
- Bad yeast infections
- Chronic pelvic inflammatory disease
- Getting bad infections a lot
- Feeling really tired, dizzy, and lightheaded
- Headaches
- Losing lots of weight quickly
- Bruising more easily than normal
- Having diarrhoea, fevers, or night sweats for a long time
- Swollen or firm glands in your throat, armpit, or groin
- Deep, dry coughing spells
- Feeling short of breath
- Purplish growths on your skin or inside your mouth
- Bleeding from the mouth, nose, anus, or vagina
- Skin rashes
- Feeling very numb in your hands or feet, losing control of your muscles and reflexes, not being able to move, and losing strength in your muscles

For more information follow this link:https://www.plannedparenthood.org/learn/stds-hiv-safer-sex/hiv-aids/what-are-symptoms-hivaids

3.1.5 HIV/AIDS Preventive Measures

Anyone can get HIV, but you can take steps to protect yourself from HIV infection.

- **Get tested and know your partner's HIV status.** Talk to your partner about HIV testing and get tested before you have sex. Use this testing locator from the Centers for Disease Control and Prevention (CDC) to find an HIV testing location near you.
- **Choose less risky sexual behaviours.** HIV is mainly spread by having anal or vaginal sex without a condom or without taking medicines to prevent or treat HIV.
- **Use condoms.** Use a condom correctly every time you have sex. Read this fact sheet from CDC on how to use condoms correctly.
- **Limit your number of sexual partners.** The more partners you have, the more likely you are to have a partner with poorly controlled HIV or to have a partner with a sexually transmitted disease (STD). Both of these factors can increase the risk of HIV transmission.
- **Get tested and treated for STIs.** Insist that your partners get tested and treated, too. Having an STD can increase your risk of becoming infected with HIV or spreading it to others.
- **Talk to your health care provider about pre-exposure prophylaxis (PrEP).** PrEP is an HIV prevention option for people who don't have HIV but who are at high risk of becoming

infected with HIV. PrEP involves taking a specific HIV medicine every day. For more information, read the AIDS*info* fact sheet on Pre-Exposure Prophylaxis (PrEP).
- **Don't inject drugs.** But if you do, use only sterile drug injection equipment and water and never share your equipment with others.

HIV is spread through contact with blood or sexual fluids (like semen and vaginal fluids), usually during vaginal and anal sex. So the only 100% certain way to avoid HIV is to not have vaginal or anal sex. But most people do have sex at some point in their lives, so learning about HIV prevention and knowing how to have safer sex is important. Using condoms really lowers the risk of getting HIV. If you are going to have sex, using condoms every single time is the best way to protect yourself from HIV. There is also a daily pill you can take — called PrEP — that can help prevent HIV. Some sexual activities are safer than others when it comes to getting HIV. These activities are "no risk" — they've never caused a reported case of HIV:

- masturbating
- touching your partner's genitals
- rubbing your bodies together (dry humping)
- kissing
- having oral sex with a condom or dental dam
- using clean sex toys

These activities are "lower risk" — they have only caused a few reported cases of HIV (out of millions):

- "French" or deep kissing (if the person with HIV has sores or bleeding in their mouth)
- vaginal sex with a condom and/or PrEP
- anal sex with a condom and/or PrEP
- oral sex without a condom or dental dam

These activities are "high risk" — millions of people get HIV this way:

- vaginal sex without a condom or PrEP
- anal sex without a condom or PrEP

It's easier for HIV to get into the body if there sores, cuts, or openings in the skin that semen (cum), vaginal fluids, or blood may get into. So don not have sex if you have a herpes outbreak or other infections. Having other STIs makes one more likely to get HIV, so it's a good idea to get tested for STIs regularly. There's no vaccine that protects against HIV, but lots of people are working on making one. And there are medicines (called PEP and PrEP) that can help prevent HIV.

For more information follow this link:https://aidsinfo.nih.gov/understanding-hiv-aids/fact-sheets/20/48/the-basics-of-hiv-prevention

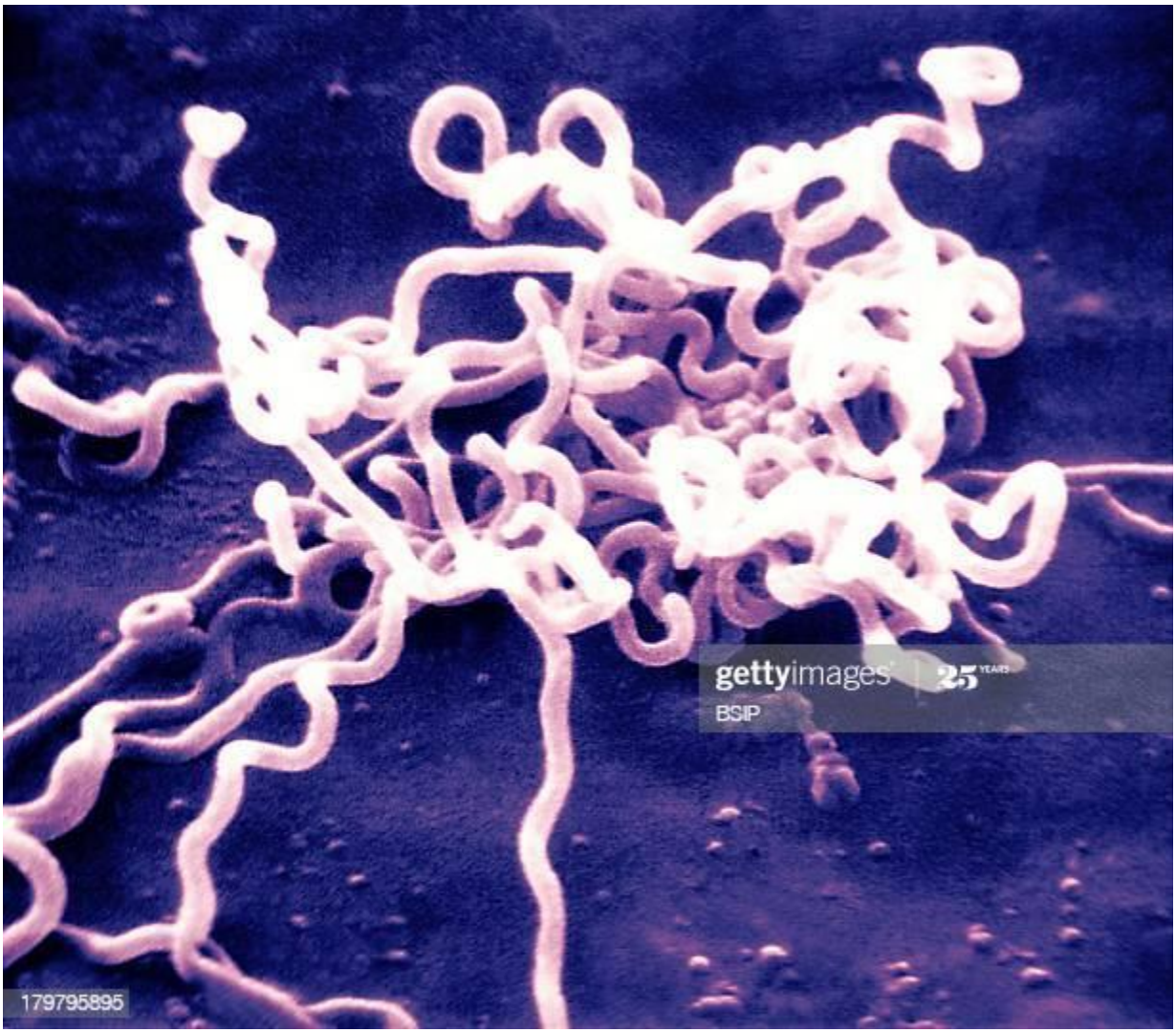
3.2 SYPHILIS

3.2.1 Introduction

Syphilis is a sexually transmitted infection caused by bacteria. The

Syphilis is a sexually transmitted infection (STI) caused by a type of bacteria known as *Treponema pallidum*. **Syphilis** is one of the common sexually transmitted diseases.

Fig 2.11 treponema



3.2.2 Causative Agent

Treponems pallidum (spirochaeta pallida) it is a bacterium which is more serious than gonrrhoea.

3.2.3 Causes

Syphilis is caused when *T. pallidum* transfers from one person to another during sexual activity.

It can also be passed from mother to a fetus during pregnancy, or to an infant during delivery. This is called congenital syphilis.

It cannot spread through shared contact with objects like doorknobs and toilet seats.

3.2.3 Risk factors

Sexually active people are at risk of contracting syphilis.

Those most at risk include:

- those who have unprotected sex
- men who have sex with men
- those with HIV
- people with numerous sexual partners

Syphilitic sores also increase the risk of contracting HIV.

3.2.5 Symptoms

Syphilis is spread through the sores it causes, known as chancres.

Syphilis is categorized by three stages with varied symptoms associated with each stage.

However, in some cases, there can be no symptoms for several years. Contagious stages include primary, secondary, and, occasionally, the early latent phase. Tertiary syphilis is not contagious, but it has the most dangerous symptoms.

3.2.6 Manifestation

The manifestation of syphilis is in stages;

Stage 1 (Primary)

3-6 weeks after infection, a small painless pimple appears on the penis or on the vagina. The pimples changes into sore known as the **primary chancre** (skin lesion) the sore may heal spontaneously (on its own).

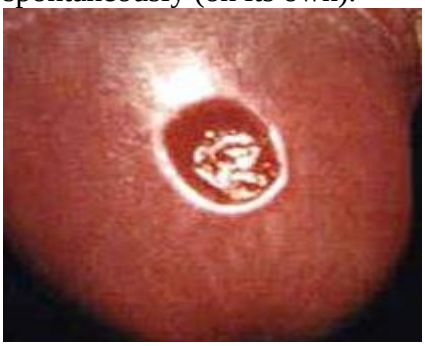


Fig. 2.12: Example of a Primary Syphilis Sore.

Stage 2 (Secondary)
2-3 weeks from stage 1

1. Fever
2. Skin rash
3. Joint pains
4. Swelling of glands in the neck groin and armpit
5. Spread to the heart, brain and other organs.
6. Person is highly infectious during this stage.

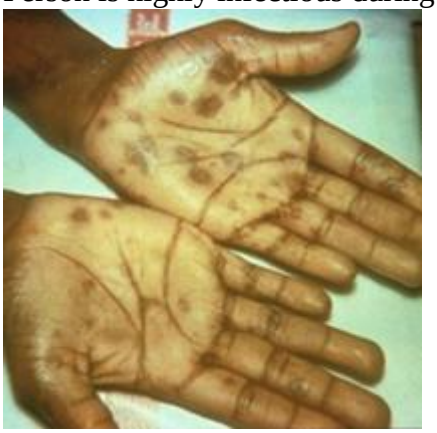


Fig. 2.13: Secondary Rash from Syphilis on Palms of Hands.

Stage 3 (Latent)

The third stage of syphilis is the latent, or hidden, stage. The primary and secondary symptoms disappear, and there won't be any noticeable symptoms at this stage. However, the bacteria remain in the body. This stage could last for years before progressing to tertiary syphilis.

This occurs 5-20 years from time of initial infection.

1. Involment of the eyes, causing blindness
2. Involment of the brain, causing mental problems.
3. Forgetfulness, find it difficult to remember things or promises.
4. Ataxis (walking with unsteady gait).

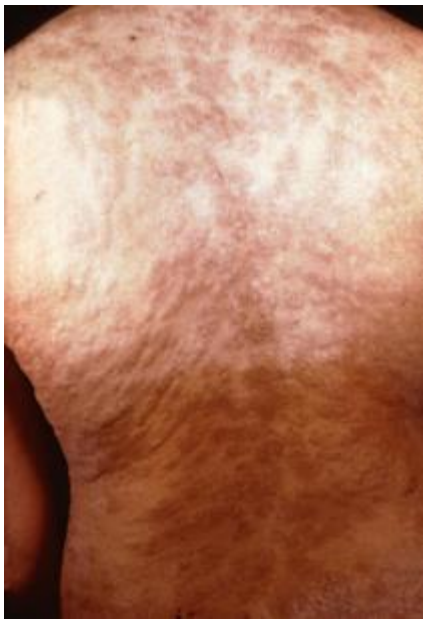


Fig. 2.14 Secondary rash from syphilis on torso.

3.2.7 Prevention

Preventive measures to decrease the risk of syphilis, include:

- abstaining from unprotected sexual activities
- long-term mutual monogamy with an uninfected partner
- condom use, although these protect only against genital sores and not those on the body.
- use of a dental dam, or plastic square, during oral sex.
- not sharing sex toys
- avoiding alcohol and drugs that could potentially lead to unsafe sexual practices
- destruction of causative organism
- breaking or destruction of transmission route
- protecting the susceptible host.
- Avoid sharing sex toys.

Having syphilis once does not mean a person is protected from it. Once it is cured, it is possible to contract it again.

3.3 Gonorrhoea

Gonorrhoea is a sexually transmitted infection (STI) caused by bacteria Neisseria Gonorrhoeae, is the second most common bacterial STI and results in substantial morbidity and economic cost worldwide. In women, the infection may occur in the opening of the uterus, also known as the cervix, and fallopian tubes. In both men and women, the infection may occur in the rectum (the part of your intestine that ends at the anus), throat and the urethra (the tube that carries urine from the bladder).

Uncomplicated gonococcal infection commonly manifests as urethritis in men and may cause mucopurulent cervicitis in women. Rectal and pharyngeal infections in both men and women are

largely asymptomatic. Gonococcal infections are often asymptomatic in women; the lack of discernible symptoms results in unrecognized and untreated infection that may lead to serious complications, including pelvic inflammatory disease, ectopic pregnancy and infertility. Untreated urethral infection in men can lead to epididymitis, urethral stricture and infertility. Infants of mothers with gonococcal infection can contract neonatal conjunctivitis, which may lead to blindness if left untreated. Neisseria gonorrhoeae can be diagnosed by culture or nucleic acid amplification tests (NAATs), and by Gram stain in men with urethritis. In settings without available laboratory diagnostic support, diagnosis is often made clinically, based on the presence of symptoms such as vaginal and urethral discharge. The treatment of gonococcal infections is complicated by the rapidly changing antimicrobial susceptibility patterns of N. gonorrhoeae, raising concerns about the eventual development of untreatable gonococcal infections with serious sexual and reproductive health consequences.

Uncomplicated gonococcal infection commonly manifests as urethritis in men with symptoms of urethral discharge and dysuria. On examination, the urethral discharge may range from scanty and mucoid to copious and purulent. Gonorrhoea is often asymptomatic in women; less than half of infected women complain of non-specific symptoms such as abnormal vaginal discharge, dysuria, lower abdominal discomfort and dyspareunia. The most common clinical signs are vaginal discharge and cervical friability due to mucopurulent cervicitis. Rectal infections in men and women are largely asymptomatic; occasionally patients complain of rectal and anal pain or discharge. Pharyngeal infections are mainly asymptomatic, but mild sore throat and pharyngitis may occur. In the majority of women with gonorrhoea, the lack of discernible symptoms results in unrecognized and untreated infections. Untreated infections usually resolve spontaneously but may lead to serious complications such as pelvic inflammatory disease, including endometritis, salpingitis and tubo-ovarian abscess, which can lead to ectopic pregnancy and infertility. Untreated urethral infection in men can lead to epididymitis, urethral stricture and infertility. The risk of complications increases with repeated infection. Infants of mothers with gonococcal infection can be infected at delivery, resulting in neonatal conjunctivitis manifesting as purulent ocular discharge and swollen eyelids. Untreated conjunctivitis may lead to scarring and blindness.

3.3.1 Causes of Gonorrhoea

Gonorrhoea is caused by bacteria (tiny living cells) called Neisseria gonorrhea. They can live in the cervix (entrance to the uterus), the urethra (tube where urine comes out), the rectum (back passage), the throat and, occasionally, the eyes. Anyone who's sexually active can easily get and pass on gonorrhoea. You don't need to have lots of sexual partners.

3.3.2 Transmission

Gonorrhoea is usually passed from one person to another through sexual contact. You can get the infection if you come into contact with infected semen (cum or pre-cum) or infected discharge from the vagina, throat or rectum (back passage).

Gonorrhoea is most commonly spread through:

- vaginal or anal sex without a condom
- oral sex (going down, giving head) without a condom or dam (a latex or plastic square that covers the anus or vulva)
- Sharing sex toys if you don't wash them or cover them with a new condom each time they're used. If you're pregnant, it's possible to pass gonorrhea to the baby

It's possible for the bacteria to spread from vaginal discharge to the rectum. You don't need to have anal sex for this to happen. If gonorrhea is transferred from the genitals to the eye(s) by the

fingers it can cause conjunctivitis (an eye infection). This isn't common. It's not clear if gonorrhea can be spread by transferring infected semen or vaginal fluid to another person's genitals on the fingers or through rubbing vulvas (female genitals) together. You can't get gonorrhea from kissing, hugging, sharing baths or towels, swimming pools, toilet seats or from sharing cups, plates or cutlery.

3.3.3 Signs and Symptoms

Symptoms may be absent despite an active gonorrheal infection. Symptoms can appear anywhere from 1-14 days following exposure to the infection.

Men and women experience slightly different symptoms; these can include:

Men:

- white, yellow, or green urethral discharge, resembling pus
- inflammation or swelling of the foreskin
- pain in the testicles or scrotum
- painful or frequent urination
- anal discharge, itching, pain, bleeding, or pain when passing stools
- itching, difficulty swallowing, or swollen neck lymph nodes
- eye pain, light sensitivity, or eye discharge resembling pus
- red, swollen, warm, painful joints

Women:

- painful sexual intercourse
- fever
- yellow or green vaginal discharge
- vulvar swelling
- bleeding in-between periods
- heavier periods
- bleeding after intercourse
- vomiting and abdominal or pelvic pain
- painful or frequent urination
- sore throat, itching, difficulty swallowing, or swollen neck lymph nodes
- eye pain, light sensitivity, and eye discharge resembling pus
- red, swollen, warm, painful joints

Anal gonorrhea signs include:

- itching, bleeding, or pain with passing bowel movements
- anal discharge

An itching or burning sensation in the eyes may be a symptom of conjunctivitis. If infected semen or fluid comes into contact with the eyes, a person can develop conjunctivitis.

Prevention

There are many ways to prevent acquiring or passing on gonorrhea; they include:

- abstinence from sex
- using condoms for vaginal or anal intercourse
- using condoms or dental dams for oral intercourse
- having sexual activity with a mutually monogamous, unaffected partner

Individuals should speak with their doctor if they or their sexual partner have been exposed to gonorrhea or if they are experiencing any symptoms of infection.

4.0 Self-Assessment Exercise

1. Describe the preventive measures of HIV/AIDS
2. Identify primary and secondary stages of syphilis manifestation
3. Outline the male and female signs and symptoms of gonorrhoea

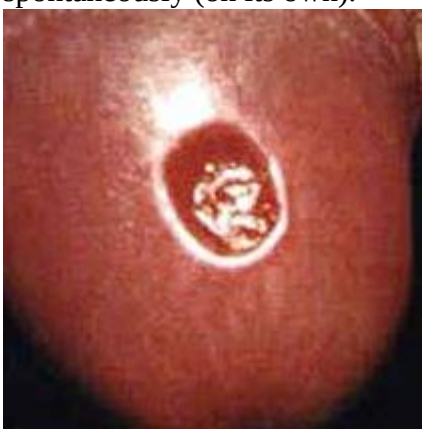
Answers to Self-Assessment Exercise

Q1. **Preventive measures of HIV/AIDS**

- .**Get tested and knows your partner's HIV status.** Talk to your partner about HIV testing and get tested before you have sex. Use this testing locator from the Centers for Disease Control and Prevention (CDC) to find an HIV testing location near you.
- **Choose less risky sexual behaviours.** HIV is mainly spread by having anal or vaginal sex without a condom or without taking medicines to prevent or treat HIV.
- **Use condoms.** Use a condom correctly every time you have sex. Read this fact sheet from CDC on how to use condoms correctly.
- **Limit your number of sexual partners.** The more partners you have, the more likely you are to have a partner with poorly controlled HIV or to have a partner with a sexually transmitted disease (STD). Both of these factors can increase the risk of HIV transmission.
- **Get tested and treated for STDs.** Insist that your partners get tested and treated, too. Having an STD can increase your risk of becoming infected with HIV or spreading it to others.
- **Talk to your health care provider about pre-exposure prophylaxis (PrEP).** PrEP is an HIV prevention option for people who don't have HIV but who are at high risk of becoming infected with HIV. PrEP involves taking a specific HIV medicine every day. For more information, read the AIDS fact sheet on Pre-Exposure Prophylaxis (PrEP).
- **Don't inject drugs.** But if you do, use only sterile drug injection equipment and water and never share your equipment with others.

Q2. Manifestation
The manifestation of syphilis is in stages;
Stage 1 (primary)

3-6 weeks after infection, a small painless pimple appears on the penis or on the vagina. The pimples changes into sore known as the **primary chancre** (skin lesion) the sore may heal spontaneously (on its own).



Example of a primary syphilis sore.

Stage 2 (secondary)
2-3 weeks from stage 1

8 Fever
9 Skin rash
10 Joint pains
11 Swelling of glands in the neck groin and armpit
12 Spread to the heart, brain and other organs.
13 Person is highly infectious during this stage.

Q3. Signs and Symptoms

Symptoms may be absent despite an active gonorrheal infection. Symptoms can appear anywhere from 1-14 days following exposure to the infection.

Men and women experience slightly different symptoms; these can include:

Men:

- white, yellow, or green urethral discharge, resembling pus
- inflammation or swelling of the foreskin

- pain in the testicles or scrotum
- painful or frequent urination
- anal discharge, itching, pain, bleeding, or pain when passing stools
- itching, difficulty swallowing, or swollen neck lymph nodes
- eye pain, light sensitivity, or eye discharge resembling pus
- red, swollen, warm, painful joints

Women:

- painful sexual intercourse
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- yellow or green vaginal discharge
- vulvar swelling
- bleeding in-between periods
- heavier periods
- bleeding after intercourse
- vomiting and abdominal or pelvic pain
- painful or frequent urination
- sore throat, itching, difficulty swallowing, or swollen neck lymph nodes
- eye pain, light sensitivity, and eye discharge resembling pus
- red, swollen, warm, painful joints

5.0 Conclusion

Sexually transmitted infections are diseases that are contracted through unprotected sexual contacts. STIs has become a public health concern worldwide and cause a wide range of health problems which include conjunctivitis, blindness, infertility, still birth, abortion and death. Health education on preventive measures is very essential in prevention of STIs.

6.0 Summary

Sexually transmitted infections are contracted through many ways which include; unprotected sex, transfusion of unscreened blood, drug abuse, use of infected sharp objects and through mother to child transmission. Some of sexually transmitted infection diseases are carried in semen, vaginal fluids, anal mucus, blood, and breast milk. STIs cannot be spread through hugging, holding hands, coughing, and sneezing or toilet seat. It can be prevented through avoiding multiple sex partners, use of condom, proper blood screening before transfusion among others.

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Unit 5 Prevention and Control of Communicable Diseases

CONTENTS

1.0 Introduction
2.0 Intended Learning Outcomes (ILOs)
3.0 Main Content
3.1 Transmission Process and Preventive Measures of Communicable Diseases
3.1.1 Transmission Process
3.1.2 Types Transmission
3.2 Prevention of Communicable Diseases
4.0 Self-Assessment Exercises
5.0 Conclusion
6.0 Summary
7.0 References/Further Reading

1.0 Introduction

Prevention is better than cure, to prevent communicable disease it needs multi-approach strategy which include physician, nurses, public health officers, environmental health officers, health educators, teachers, students and community members and many other stakeholders. To facilitate better prevention and control measure of communicable diseases transmission process and type of transmission need to be understood clearly.

2.0 Intended Learning Outcomes (ILOs)

By the end of this unit, you will be able to:

- identify the types of communicable diseases transmission
- outline the prevention and control measures of communicable diseases
- describe the ways of communicable disease prevention

3.0 Main Content

3.1 Transmission Process and Preventive Measures of Communicable Diseases

3.1.1 Transmission Process:

Communicable disease transmission is a dynamic process. The process is dependent on the following: Interaction of the agent (microorganism) the host (person), and the environment (conditions present).In order for a communicable disease to occur the following factors must be present:

i. A microorganism of sufficient strength (virulence)
ii. A person who is susceptible (lowered immunity)
iii. An environment supportive to the agent's transmission

3.1.2 Types of Transmission:

Direct Transmission – occurs when an infectious agent enters a receptive portal, i.e., through direct contact as: touching, kissing, biting, or projecting air droplets by sneezing, talking, spitting, coughing.

Indirect Transmission – occurs when an infectious agent is deposited on contaminated objects or materials, i.e., toys, soiled clothes, bedding, cooking or eating utensils, food, water.

a. Enforcing immunization laws and practicing universal precautions/ blood borne pathogen procedures according to School Board policies, and OSHA regulations.

b. Ongoing health education relating to disease prevention, hygiene measures for students, families and school personnel.

c. Implementing good hand washing procedures.

d. Implementing case isolation and effective treatment.

For more information follow this linkhttp://www.browardhealthservices.com/communicable-diseases/communicable-diseases-prevention-and-control/(2019)

3.2 Prevention of Communicable Diseases

According to Division of Communicable Disease Control and Prevention (DCDCP) (2019), the major components of prevention and control of communicable diseases are:

- Surveillance: collect and analyse data on cases of communicable disease (including but not limited to HIV, STDs and Hepatitis) and investigate those that pose highest risk to the public
- Immunization: distribute state-supplied vaccine to health care providers, assess immunization status of children, and sponsor immunization clinics and maintain a small computerized registry of immunization records for children from birth to 18 years old
- Public Health Laboratory: provide testing, isolation and identification of harmful microorganisms that may be present in humans, animals and the environment to aid in the diagnosis and control of communicable diseases
- Education and Prevention: Provide STD, HIV and Hepatitis education and counselling to high risk populations and community agencies; screening of high risk individuals and referral to health care providers for evaluation, treatment and follow-up when appropriate
- Public Health Emergency Preparedness: coordinate with health care and emergency medical service providers on preventing, detecting, quickly responding to, and recovering from any type of emergency that impacts your health, particularly those emergencies whose scale, timing, or unpredictability threatens to overwhelm routine capabilities.

  1. Reduce contact rate (case finding &isolation, contact tracing &quarantine, behaviour change)

2. Reduce infectiousness (treatment, vaccination)
3. Reduce susceptibility (vaccination, immune globulin)
4. Interrupt transmission (infection control)
5. Identify and control reservoir/source (pest/vector control, environmental disinfection)
6. Reduce prevalence of infectious sources (identify and control infectious sources)
7. Reduce duration of infectiousness (treatment, vaccination)
8. Increase herd immunity (vaccination)

(Centre for Infectious Disease Preparedness, 2005).

Mayoclinic.com (2019) opined that, the risk of infecting yourself or others can be decreased through:

- Wash your hands often. This is especially important before and after preparing food, before eating and after using the toilet.
- Get vaccinated. Immunization can drastically reduce your chances of contracting many diseases. Keep your recommended vaccinations up-to-date.
- Use antibiotics sensibly. Take antibiotics only when prescribed. Unless otherwise directed, or unless you are allergic to them, take all prescribed doses of your antibiotic, even if you begin to feel better before you have completed the medication.
- Stay at home if you have signs and symptoms of an infection. Don't go to work or class if you're vomiting, have diarrhoea or are running a fever.
- Be smart about food preparation. Keep counters and other kitchen surfaces clean when preparing meals. In addition, promptly refrigerate leftovers. Don't let cooked foods remain at room temperature for an extended period of time.
- Disinfect the 'hot zones' in your residence. These include the kitchen and bathroom — two rooms that can have a high concentration of bacteria and other infectious agents.
- Practice safer sex. Use condoms. Get tested for sexually transmitted infections (STIs), and have your partner get tested— or, abstain altogether.
- Don't share personal items. Use your own toothbrush, comb or razor blade. Avoid sharing drinking glasses or dining utensils.
- Travel wisely. Don't fly when you're ill. With so many people confined to such a small area, you may infect other passengers in the plane. And your trip won't be comfortable, either. Depending on where your travels take you, talk to your doctor about any special immunizations you may need.

4.0 Self-Assessment Exercise

1. Describe the ways in which communicable diseases can be transmitted
2. Identify the prevention techniques of communicable diseases

Answers to Self-Assessment Exercise

1. Transmission Process:

Communicable disease transmission is a dynamic process. The process is dependent on the following:

Interaction of the agent (microorganism) the host (person), and the environment (conditions present).

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b. Ongoing health education relating to disease prevention, hygiene measures for students, families and school personnel.

c. Implementing good hand washing procedures.

d. Implementing case isolation and effective treatment.

2. Prevention of Communicable Diseases

- **Surveillance:** collect and analyse data on cases of communicable disease (including but not limited to HIV, STIs and Hepatitis) and investigate those that pose highest risk to the public
- **Immunization:** distribute state-supplied vaccine to health care providers, assess immunization status of children, and sponsor immunization clinics and maintain a small computerized registry of immunization records for children from birth to 18 years old
- **Public Health Laboratory:** provide testing, isolation and identification of harmful microorganisms that may be present in humans, animals and the environment to aid in the diagnosis and control of communicable diseases
- **Education and Prevention:** Provide STI, HIV and Hepatitis education and counselling to high risk populations and community agencies; screening of high risk individuals and referral to health care providers for evaluation, treatment and follow-up when appropriate
- **Public Health Emergency Preparedness**: coordinate with health care and emergency medical service providers on preventing, detecting, quickly responding to, and recovering from any type of emergency that impacts your health, particularly those emergencies whose scale, timing, or unpredictability threatens to overwhelm routine capabilities.

1. Reduce contact rate (case finding &isolation, contact tracing &quarantine, behaviour change)
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4. Interrupt transmission (infection control)
5. Identify and control reservoir/source (pest/vector control, environmental disinfection)
6. Reduce prevalence of infectious sources (identify and control infectious sources)
7. Reduce duration of infectiousness (treatment, vaccination)
8. Increase herd immunity (vaccination)

5.0 Conclusion

Communicable diseases are diseases that are easily transmitted from one person to another. Prevention of these diseases requires multi-approach strategy by all health workers.

6.0 Summary

Tuberculosis, HIV/AIDS, malaria, typhoid fever, hepatitis are some of the common communicable diseases. Physician, nurses, public health officers, environmental health officers, health educators, teachers, students and community members and many other stakeholders play very important role in prevention of communicable diseases. It can be prevented and control through health education, immunisation, surveillance, laboratory studies and public health emergency preparedness.

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Module 3 Non-Communicable Diseases

In this module, communicable diseases will be discussed in relation to their nature, risk factors, signs and symptoms, prevention and control measures

Unit 1 Cancer and Obesity
Unit 2 Hypertension
Unit 3 Diabetes
Unit 4 Sickle cell Anaemia and Arthritis
Unit 5 Prevention and Control of Non-Communicable Diseases

Unit 1 Cancer and Obesity

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3.1.2 Cancer Prevention and Control
3.1.3 Cancer Screening
3.2 Obesity
3.2.1 Classification
3.2.2 Causes of Obesity
3.2.3 Health Risks Associated with Obesity
3.2.4 Treatment/Prevention
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5.0 Conclusion
6.0 Summary
7.0 References/Further Reading

1.0 Introduction

Cancer and obesity affects people irrespective of their ages, sexes and races. Cancer and obesity are now public health problem worldwide. In this unit you will learn nature, cause, classification and control and preventive measures of these conditions.

2.0 Intended Learning Outcomes (ILOs)

By the end of this unit, you will be able to:

- identify the causes of cancer.
- describe the prevention and control measures of cancer.
- discuss the causes of obesity.
- outline the health risks associated with obesity.

3.0 Main Content

3.1 Cancer

Cancer may be regarded as a group of diseases characterised by an (i) abnormal growth of cells (ii) ability to invade adjacent tissues and even distance organs, and (iii) the eventual death of the affected patient if the tumour has progressed beyond that stage when it can be successfully

removed. Cancer can occur at any site or tissue of the body and may involve any type of cells (WHO, 1997).

The major categories of cancer are: (a) Carcinoma, which arise from epithelial cells lining the internal surfaces of the various organs (e.g mouth, oesophagus, intestines, uterus) and from the skin epithelium; (b) Sarcomas, which arise from melanoma cells constituting the various connective tissues (e.g fibrous tissue, fat and bone); and (c) Lymphomas myeloma and leukaemia arising from the cells of bone marrow and immune system. .The term "primary tumour" is used to denote cancer in the organ of origin, while "secondary tumour" denotes cancer that has spread to regional lymph nodes and distant organ. When cancer cells multiply and reach a critical size, the cancer is clinically evident as a lump or ulcer localized to the organ of signs of invasion and distant metastases becomes clinically evident (Park, 2015).

Cancer afflicts all communities worldwide, approximately 10 million peoples are diagnosed with cancer and more than 6 million die of the disease every year. About 22.4 million persons were living with cancer in the year 2000. This represents an increase of around 19 percent in incidence and 18 percent in mortality since 1990. The incidence and mortality worldwide. (WHO, 2013).

The total cancer burden is highest in affluent societies mainly due to a high incidence of tumour associated with smoking and western lifestyle, i.e. cancer of the lung, coloretum , breast and prostate. In developing countries, up to 25 percent of tumours are associated with chronic infections, e.g. hepatitis B (Liver Cancer), human papillomaviruses (Cervical cancer), and Helicobacter pylor (stomach cancer). In some western countries, cancer mortality rates have recently started to decline, due to reduction in smoking prevalence, improved early detection and advances in cancer therapy (Park, 2015).

3.1.2 Causes of Cancer

As with other chronic diseases, cancer has a multifactorial aetiology.

1. Environmental Factors

Environmental factors are generally held responsible for 80 to 90 percent of all human cancers. (GLOBOCON, 2013). The major environmental factors identified so far include:

(a) Tobacco: Tobacco in its various forms of its usage (e.g smoking, chewing is the major environmental cause of cancer of the lung, larynx, mouth, pharynx, oesophagus, bladder, and pancreas)

(b) Alcohol: Excessive intake of alcoholic beverages is associated with oesophageal and liver cancer. Some recent studies has suggested that beer consumption may be associated with rectal cancer. It is estimated that alcohol contributed about 3 percent of all cancer deaths (WHO, 2013).

(c) Dietary Factors: Dietary factors are also related to cancer. Smoke fish is related to stomach cancer, dietary fibre to intestine to breast cancer. A variety of other dietary factors such as food additives and contaminants have fallen under suspicious causative agent.

(d) Occupational Exposures: These include exposure to benzen, arsenic, cadmium, chromium, vinyl chloride, asbestos, polycyclic hydrocarbons, etc. Many others remain to be identified. The risk of occupational exposure is considerably increased if the individuals also smoke cigarette. Occupational exposures are usually reported to account for 1 to 5 percent of all human cancers.

(e) Microbes and Parasites: An intensive search for a viral origin of human cancers revealed that hepatitis B and C virus is casually related to hepatocellular carcinoma. Parasites infections may also increase the risk of cancer, for example, schistosomiasis in Middle East producing carcinoma of the bladder.

(f) Customs, Habits and Life – Styles: To the above causes must be added customs, habits and lifestyle of people which may be associated with an increased risk for certain cancers. The familiar examples are the demonstrated association between smoking and lung cancer, tobacco and oral cancer etc.

3.1.3 Cancer Prevention and Control

Cancer control consists of a series of measures based on present medical knowledge in the fields of prevention, detection, diagnosis, treatment, after care and rehabilitation, aimed at reducing significantly the number of new cases, increasing the number of cures and reducing the invalidism due to cancer. The basic approach to the control of cancer is through primary and secondary prevention. It is estimated that at least one-third of all cancers are preventable (WHO, 2014).

1. Primary Prevention

Cancer prevention until recently was mainly concerned with the early diagnosis of the disease (Secondary prevention), preferably at a precancerous stage. Advancing knowledge has increased

understanding of causative factors of some cancers and it is now possible to control these factors in the general population as well as in particular occupational groups. They include the following:
(a)Control of Tobacco and Alcohol Consumption**:** Primary prevention offers the greatest hope for reducing the number of tobacco-induced and alcohol related cancer deaths. It has been estimated that control of tobacco smoking alone would reduce the total burden of cancer by over a million cancers each year.

b) Personal Hygiene: Improvements in personal hygiene may lead to decline in the incidence of certain types of cancer, e.g Cancer cervix.

c) Radiation**:** Special efforts should be made to reduce the amount of radiation (Including medical radiation) received by each individual to a minimum without reducing the benefits.

d) Occupational Exposures: The occupational aspects of cancer are frequently neglected. Measures to protect workers from exposure to industrial carcinogens should be enforced in industries.

e) Immunisation: In the case of primary liver cancer, immunisation against hepatitis B virus presents an exciting prospect.

f) Foods, Drugs and Cosmetic: These should be tested for carcinogens.

g) Air Pollution: Control of air pollution is another preventive measure.

h) Treatment of Precancerous Lesions: Early detection and prompt treatment of pre-cancerous lesions such as cervical tears, intestinal polyposis, warts, chronic gastritis, chronic cervicitis, and denominate is one of the cornerstones of cancer prevention.

i) Legislation: Legislation has also a role in primary prevention. The solution to cancer control problems is not to be found in research laboratories. But in legislatures, for example, legislation to control known environmental carcinogens (e.g. tobacco, alcohol, air pollution) is inadequate or only moderately enforce in a number of countries.

j) Cancer Education**:** An important area of primary prevention is cancer education. It should be directed at "high – risk" groups. The aim of cancer education is to motivate people to seek early diagnosis and early treatment. Cancer organisations in many countries remind the public of the early warning signs ("danger signals") of cancer. These are:

a. A lump or hard area in breast

b. A change in a wart or mole

c. A persistent change in digestive and lowered habits.

d. A persistent cough or hoarseness.

e. Excessive loss of blood at the monthly period or loss of blood outside the usual dates.

f. Blood loss from any natural orifice.

g. A swelling or sore that does not get better

(GLOBACAN, 2013).

2. Secondary Prevention

Secondary prevention comprises the following measures:

i) Cancer Registration

Cancer registration provides a base for assessing the magnitude of the problem and for planning the necessary services. Cancer registries are basically of two types: hospital-based and population based.

a) Hospital Based Registries: The hospital-based registry includes all patients treated by a particular institution, whether in-patient or out patients. Registries should be collect the uniform minimum set of data recommended in the "WHO handbook for Standardized Cancer Registers". If there is a long term follow-up of patients, hospital-based registries can be of considerable value in the evaluation of diagnostic and treatment programmes. Since hospital population will always be a selected population, the use of these registries for epidemiological purpose is thus limited.

b) Population Based Registries: A right step is to set up a "hospital-based cancer registry" and extend the same to a "population-based cancer registry". The aim is to cover the complete cancer situation in a given geographic area. The optimum size of base population for a population based cancer registry is in the range of 2 – 7 million. The data from such registries alone can provide the incidence rate of cancer and serve as a useful tool for initiating epidemiological enquiries into causes of cancer, surveillance of time trends, and planning and evaluation of operational activities in all main areas of cancer control. For more on cancer registries click on https//www.youtube.com/watch?=oasCxJP3sNw

ii) Early Detection of Cases: Cancer screening is the main weapon for early detection of cancer at a pre-invasive (in situ) or pre-malignant stage. Effective screening programme have been developed for cervical cancer, breast cancer and oral cancer. Like primary prevention, early diagnosis has to be conducted on a large scale. However, it may be possible to increase the efficiency of screening programmes by focusing on high-risk groups. Clearly, there is no point in

detecting cancer at an early stage unless facilities for treatment and aftercare are available. Early detection programmes will require mobilisation of all available resources and development of a cancer infrastructure starting at the level of primary health care, ending with complex cancer centres or institutions at the state or national levels. (GLOBACAN, 2013).

iii) Treatment facilities should be available to all cancer patients: Certain forms of cancer are amenable to surgical removal, while some others respond favourably to radiation or chemotherapy or both. Since most of the known methods of treatment have complementary effect on the ultimate outcome of the patient, multi-modality approach to cancer control has become a standard practice in cancer centres all over the world. In the developed countries today, cancer treatment is geared to high technology. For those who are beyond the curable stage, the goal must be to provide pain relief. A largely neglected problem in cancer care is the management of pain. The WHO has developed guidelines on relief of cancer pain. "Freedom from cancer pain" is now considered a right for cancer patients.

3.1.4 Cancer Screening

In the light of present knowledge, early detection and prompt treatment of early cancer and precancerous conditions provide the best possible protection against cancer for the individual and the community. Now a good deal of attention is being paid to screening for early detection of cancer. This approach, that is, cancer screening may be defined as the "search for unrecognized malignancy by means of rapidly applied tests".

Cancer screening is possible because: (a) In many instances, malignant disease is proceeded for a period of months or years by a premalignant lesion, removal of which prevents subsequent development of cancer: (b) Most cancers begin as localised lesions and if found at this stage a high rate of cure is obtainable and (c) as much as 75 percent of all cancers occur in body sites that are accessible (Park, 2013).

3.2 Obesity

Obesity is defined as abnormal or excessive fat accumulation that presents a risk to health. A crude population measure of obesity is the body mass index (BMI), a person's weight (in kilograms) divided by the square of his or her height (in metres). A person with a BMI of 30 or more is generally considered obese. A person with a BMI equal to or more than 25 is considered overweight.

Fig 3.2 obesity

Obesity is a condition in which excess body fat has accumulated to an extent that it may have a negative effect on health and is most commonly caused by a combination of excessive food intake, lack of physical activity, and genetic susceptibility World Health Organization (WHO, 2016). Obesity is major risk factors for a number of chronic diseases, including diabetes, cardiovascular diseases and cancer. Once considered a problem only in high income countries, overweight and obesity are now dramatically on the rise in low- and middle-income countries, particularly in urban settings. Follow this link for more information https://www.who.int/topics/obesity/en/

Fig. 3.3:

In some developed countries obesity has reached epidemic proportions.

3.2.1 Classification

Obesity is classified according to level of Body Mass Index (BMI):

- Any BMI ≥ 35 or 40 kg/m^2 is severe obesity.
- A BMI of ≥ 35 kg/m^2 and experiencing obesity-related health conditions or ≥40–44.9 kg/m^2 is morbid obesity.
- A BMI of ≥ 45 or 50 kg/m^2 is super obesity

3.2.2 Causes of Obesity

The balance between calorie intake and energy expenditure determines a person's weight. If a person eats more calories than he or she burns (metabolizes), the person gains weight (the body will store the excess energy as fat). If a person eats fewer calories than he or she metabolizes, he or she will lose weight. Therefore, the most common causes of obesity are overeating and physical inactivity and ultimately, body weight is the result of genetics, metabolism, environment, behavior, and culture (WHO, 2016).

To Dibaise and Foxx-Orenstein (2013) the following are the common causes of obesity:

- Physical inactivity: Sedentary people burn fewer calories than people who are active. The National Health and Nutrition Examination Survey (NHANES) showed a strong correlations between physical inactivity and weight gain in both sexes.
- Overeating: Overeating leads to weight gain, especially if the diet is high in fat. Foods high in fat or sugar (for example, fast food, fried food, and sweets) have high energy density (foods that have a lot of calories in a small amount of food). Epidemiologic studies have shown that diets high in fat contribute to weight gain.
- Genetics: A person is more likely to develop obesity if one or both parents are obese. Genetics also affect hormones involved in fat regulation. For example, one genetic cause of obesity is leptin deficiency. Leptin is a hormone produced in fat cells and in the placenta. Leptin controls weight by signaling the brain to eat less when body fat stores are too high. If, for some reason, the body cannot produce enough leptin or leptin cannot signal the brain to eat less, this control is lost, and obesity occurs. The role of leptin replacement as a treatment for obesity is under exploration.
- A diet high in simple carbohydrates: The role of carbohydrates in weight gain is not clear. Carbohydrates increase blood glucose levels, which in turn stimulate insulin release by the pancreas, and insulin promotes the growth of fat tissue and can cause weight gain. Some scientists believe that simple carbohydrates (sugars, fructose, desserts, soft drinks, beer, wine, etc.) contribute to weight gain because they are more rapidly absorbed into the bloodstream than complex carbohydrates (pasta, brown rice, grains, vegetables, raw fruits, etc.) and thus cause a more pronounced insulin release after meals than complex carbohydrates. This higher insulin release, some scientists believe, contributes to weight gain.
- Frequency of eating: The relationship between frequency of eating (how often you eat) and weight is somewhat controversial. There are many reports of overweight people eating less often than people with normal weight. Scientists have observed that people who eat small meals four or five times daily, have lower cholesterol levels and lower and/or more stable blood sugar levels than people who eat less frequently (two or three large meals daily). One

possible explanation is that small frequent meals produce stable insulin levels, whereas large meals cause large spikes of insulin after meals.

- Psychological factors: For some people, emotions influence eating habits. Many people eat excessively in response to emotions such as boredom, sadness, stress, or anger. While most overweight people have no more psychological disturbances than normal weight people, about 30% of the people who seek treatment for serious weight problems have difficulties with binge eating.
- Diseases such as hypothyroidism, insulin resistance, polycystic ovary syndrome, and Cushing's syndrome are also contributors to obesity. Some diseases, such as Prader-Willi syndrome, can lead to obesity.
- Social issues: There is a link between social issues and obesity. Lack of money to purchase healthy foods or lack of safe places to walk or exercise can increase the risk of obesity.

Keith (2006) identified ten other possible contributors to the recent increase of obesity: (1) insufficient sleep, (2) endocrine disruptors (environmental pollutants that interfere with lipid metabolism), (3) decreased variability in ambient temperature, (4) decreased rates of smoking, because smoking suppresses appetite, (5) increased use of medications that can cause weight gain (e.g., atypical antipsychotics), (6) proportional increases in ethnic and age groups that tend to be heavier, (7) pregnancy at a later age (which may cause susceptibility to obesity in children), (8) epigenetic risk factors passed on generationally, (9) natural selection for higher BMI, and (10) assortative mating leading to increased concentration of obesity risk factors (this would increase the number of obese people by increasing population variance in weight).

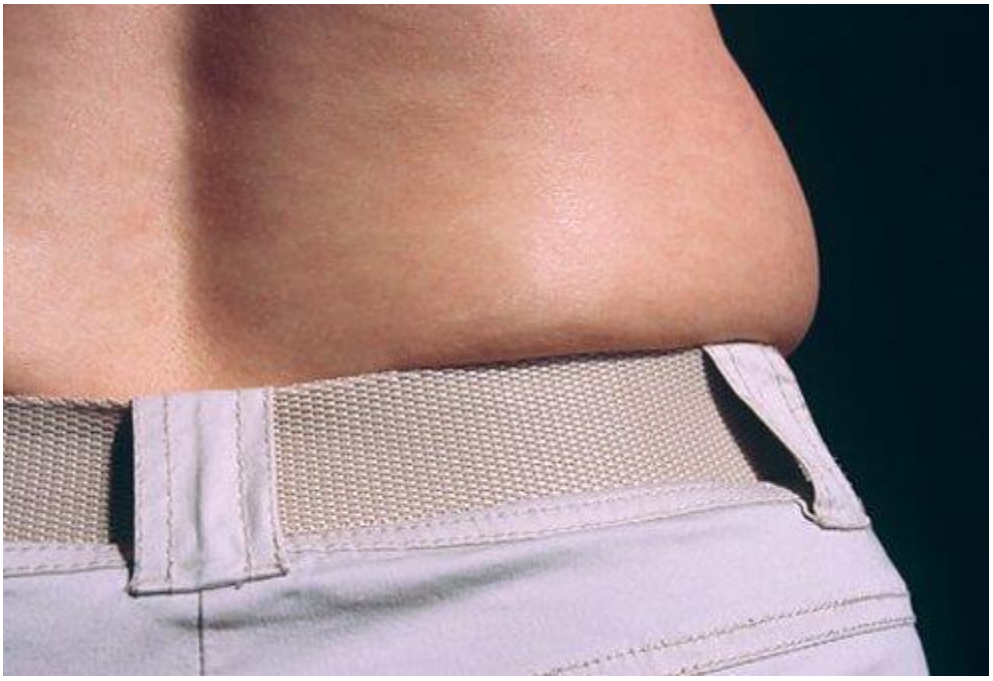

Fig. 3.4: Surprising Reasons for Weight Gain See Slideshow

Other factors associated with obesity

- **Ethnicity**. Ethnicity factors may influence the age of onset and the rapidity of weight gain. African-American women and Hispanic women tend to experience weight gain earlier in life than Caucasians and Asians, and age-adjusted obesity rates are higher in these groups. Non-Hispanic black men and Hispanic men have a higher obesity rate then non-Hispanic white men, but the difference in prevalence is significantly less than in women.
- **Childhood weight**. A person's weight during childhood, the teenage years, and early adulthood may also influence the development of adult obesity. Therefore, decreasing the prevalence of childhood obesity is one of the areas to focus on in the fight against obesity. For example,
    - being mildly overweight in the early 20s was linked to a substantial incidence of obesity by age 35;
    - being overweight during older childhood is highly predictive of adult obesity, especially if a parent is also obese;
    - being overweight during the teenage years is even a greater predictor of adult obesity.
- **Hormones**. Women tend to gain weight especially during certain events such as pregnancy, menopause, and in some cases, with the use of oral contraceptives. However,

with the availability of the lower-dose estrogen pills, weight gain has not been as great a risk.

3.2.3 Health Risks Associated with Obesity

Obesity also increases the risk of developing a number of chronic diseases, including the following:

- Insulin resistance: Insulin is necessary for the transport of blood glucose (sugar) into the cells of muscle and fat (which the body uses for energy). By transporting glucose into cells, insulin keeps the blood glucose levels in the normal range. Insulin resistance (IR) is the condition whereby there is diminished effectiveness of insulin in transporting glucose (sugar) into cells. Fat cells are more insulin resistant than muscle cells; therefore, one important cause of insulin resistance is obesity. The pancreas initially responds to insulin resistance by producing more insulin. As long as the pancreas can produce enough insulin to overcome this resistance, blood glucose levels remain normal. This insulin resistance state (characterized by normal blood glucose levels and high insulin levels) can last for years. Once the pancreas can no longer keep up with producing high levels of insulin, blood glucose levels begin to rise, resulting in type 2 diabetes, thus insulin resistance is a pre-diabetes condition.
- Type 2 (adult-onset) diabetes: The risk of type 2 diabetes increases with the degree and duration of obesity. Type 2 diabetes is associated with central obesity; a person with central obesity has excess fat around his/her waist (apple-shaped figure).
- High blood pressure (hypertension): Hypertension is common among obese adults. A Norwegian study showed that weight gain tended to increase blood pressure in women more significantly than in men.
- High cholesterol (hypercholesterolemia)
- Stroke (cerebrovascular accident or CVA)
- Heart attack: A prospective study found that the risk of developing coronary artery disease increased three to four times in women who had a BMI greater than 29. A Finnish study showed that for every 1 kilogram (2.2 pounds) increase in body weight, the risk of death from coronary artery disease increased by 1%. In patients who have already had a heart attack, obesity is associated with an increased likelihood of a second heart attack.

- Congestive heart failure
- Cancer: Obesity is a risk factor for cancer of the colon in men and women, cancer of the rectum and prostate in men, and cancer of the gallbladder and uterus in women. Gallstones
- Gout and gouty arthritis
- Osteoarthritis (degenerative arthritis) of the knees, hips, and the lower back
- Sleep apnea

3.3.4 Treatment/Prevention

The main treatment for obesity consists of dieting and physical exercise (US Department of Health and Human Services, 2017). Dieting, as part of a lifestyle change, produces sustained weight loss, despite slow weight regain over time (Jensen, 2014). Intensive behavioral interventions combining both dietary changes and exercise are recommended (US Department of Health and Human Services, 2017).

Several diets are effective. In the short-term low carbohydrate diets appear better than low fat diets for weight loss, but in the long term; however, all types of low-carbohydrate and low-fat diets appear equally beneficial (Johnston, Kanters, Bandayrel, Wu, Naji, Siemieniuk, Ball, Busse, Thorlund, Guyatt, Jansen, Mills, 2014).

Decreased intake of sweet drinks is also related to weight-loss and success rates of long-term weight loss maintenance with lifestyle changes are low, ranging from 2–20% (Wing & Phelan, 2005).

The role of physical activity and exercise in obesity?

Physical activity and exercise help burn calories. The amount of calories burned depends on the type, duration, and intensity of the activity. It also depends on the weight of the person.

However regular exercise is an important part of a healthy lifestyle to maintain a healthy weight for the long term. Another advantage of regular exercise as part of a weight-loss program is a greater loss of body fat versus lean muscle compared to those who diet alone. National Health and Examination Survey (NHANES I)

Other benefits of exercise include

- improved blood sugar control and increased insulin sensitivity (decreased insulin resistance),
- reduced triglyceride levels and increased "good" HDL cholesterol levels,
- lowered blood pressure,
- a reduction in abdominal fat,
- reduced risk of heart disease,
- release of endorphins that make people feel good.

General exercise recommendations

- Perform 20-30 minutes of moderate exercise five to seven days a week, preferably daily. Types of exercise include stationary bicycling, walking or jogging on a treadmill, stair climbing machines, jogging, and swimming.
- Exercise can be broken up into smaller 10-minute sessions.
- Start slowly and progress gradually to avoid injury, excessive soreness, or fatigue. Over time, build up to 30-60 minutes of moderate to vigorous exercise every day.
- People are never too old to start exercising. Even frail, elderly individuals (70-90 years of age) can improve their strength and balance.

Exercise precautions

The following people should consult a doctor before vigorous exercise:

- Men over age 40 or women over age 50
- Individuals with heart or lung disease, asthma, arthritis, or osteoporosis
- Individuals who experience chest pressure or pain with exertion, or who develop fatigue or shortness of breath easily
- Individuals with conditions or lifestyle factors that increase their risk of developing coronary heart disease, such as high blood pressure, diabetes, cigarette smoking, high blood cholesterol, or having family members with early onset heart attacks and coronary heart disease
- A patient who is obese.

4.0 Self-Assessment Exercise

1. Describe the causes of cancer
2. Outline the prevention and control measures of cancer
3. State the classification of obesity based on BMI.
4. What are the causes of obesity?

Answers to Self-Assessment Exercise

1. **Causes of Cancer**

As with other chronic diseases, cancer has a multifactorial aetiology.

1. Environmental Factors

Environmental factors are generally held responsible for 80 to 90 percent of all human cancers. The major environmental factors identified so far include:

(a) Tobacco: Tobacco various forms of its usage (e.g smoking, chewing is the major environmental cause of cancer of the lung, larynx, mouth, pharynx, oesophagus, bladder, and pancreas)

(b) Alcohol: Excessive intake of alcoholic beverages is associated with oesophageal and liver cancer. Some recent studies has suggested that beer consumption may be associated with rectal cancer. It is estimated that alcohol contributed about 3 percent of all cancer deaths.

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(f) Customs, Habits and Lifestyles: To the above causes must be added customs, habits and lifestyle of people which may be associated with an increase risk for certain cancers. The familiar examples are the demonstrated association between smoking and lung cancer, tobacco and oral cancer etc.

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1. Primary Prevention

Cancer prevention until recently was mainly concerned with the early diagnosis of the disease (Secondary prevention), preferably at a precancerous stage. Advancing knowledge has increased understanding of causative factors of some cancers and it is now possible to control these factors in the general population as well as in particular occupational groups. They include the following:

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f) Foods, Drugs and Cosmetic: These should be tested for carcinogens.

g) Air Pollution: Control of air pollution is another preventive measure.

h) Treatment of Precancerous Lesions: Early detection and prompt treatment of precancerous lesions such as cervical tears, intestinal polyposis, warts, chronic gastritis, chronic cervicitis , and denominate is one of the cornerstones of cancer prevention.

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a. A lump or hard area in breast
b. A change in a wart or mole
c. A persistent change in digestive and bowel habits.
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3. Classification

Obesity is classified according to level of Body Mass Index (BMI):

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- A BMI of ≥ 45 or 50 kg/m^2 is super obesity

4. Causes of Obesity

- Physical inactivity: Sedentary people burn fewer calories than people who are active. The National Health and Nutrition Examination Survey (NHANES) showed a strong correlations between physical inactivity and weight gain in both sexes.
- Overeating: Overeating leads to weight gain, especially if the diet is high in fat. Foods high in fat or sugar (for example, fast food, fried food, and sweets) have high energy density

(foods that have a lot of calories in a small amount of food). Epidemiologic studies have shown that diets high in fat contribute to weight gain.

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- Diseases such as hypothyroidism, insulin resistance, polycystic ovary syndrome, and Cushing's syndrome are also contributors to obesity. Some diseases, such as Prader- Willi syndrome, can lead to obesity.
- Social issues: There is a link between social issues and obesity. Lack of money to purchase healthy foods or lack of safe places to walk or exercise can increase the risk of obesity.

5.0 Conclusion

The main objective is to identify the causes of cancer realise the prevention and control measures of cancer disease. Cancer is regarded as a group of diseases characterised by an abnormal growth of cells. Cancer can occur at any site or tissue of the body and may involve any type of cells. Cancer affects all individuals worldwide, many people are diagnosed with cancer and many die of the disease every year.
Conclusively, obesity is a condition in which excess accumulation of body fat to an extent that it may have serious health effect. The condition is not only associated with excessive food intake but include lack of physical activity, and genetic susceptibility.

6.0 Summary

In this unit, we have discussed cancer as a disease, causes of cancer disease as tobacco smoking, alcohol taking, dietary factors, occupational exposure, customs, habits and life style. Cancer prevention and control was also examined which included primary prevention and secondary prevention.

Obesity is major risk factors for chronic metabolic, cardiovascular diseases and cancer. It is problem that cut across high income and low income countries, overweight and obesity are now at increase at an alarming rate particularly in urban settings.

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Unit 2 Hypertension

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3.0 Main Content
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  3.2 Classification of Blood Pressure Measurement
  3.3 Risk Factors for Hypertension
  3.4 Prevention of Hypertension
4.0 Self-Assessment Exercises
5.0 Conclusion
6.0 Summary
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1.0 Introduction

In the previous unit you have learnt on the nature, cause, classification and control and preventive measures of these conditions. And in this unit you will learn on definition of hypertension, classification of blood pressure, risk factors of hypertension and prevention and control measures of hypertension.

2.0 Intended Learning Outcomes (s)

By the end of this unit, you will be able to:

- define hypertension
- identify the classification of high blood pressure measurement.
- outline the risk factors of hypertension
- describe the prevention and control measures of hypertension

3.0 Main Content

3.1 Hypertension

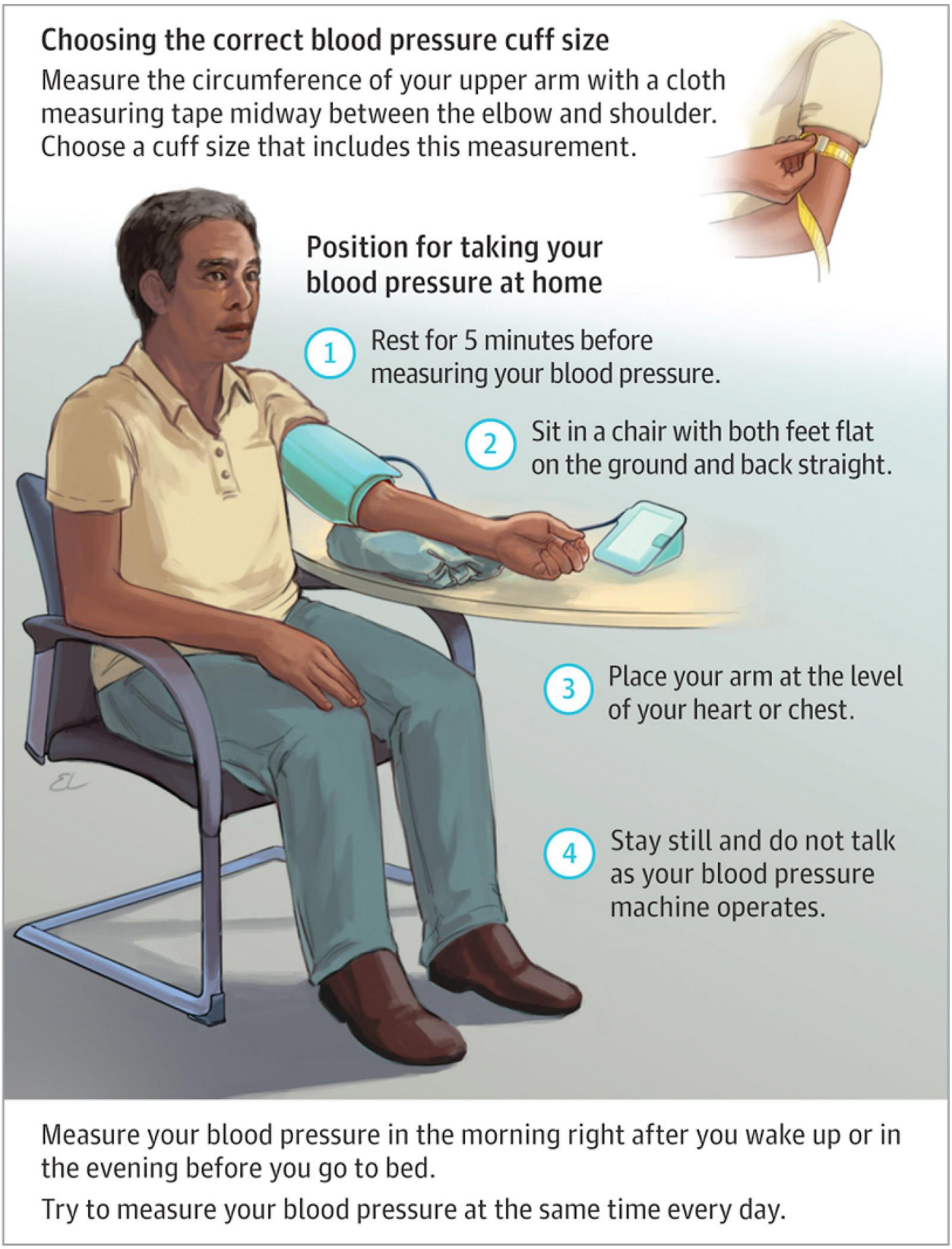
Hypertension is a condition in which the force of the blood against the artery walls is too high otherwise called high blood pressure. Hypertension is a chronic condition of concern due to its role in the causation of coronary heart diseases, stroke and other vascular complication. It is the commonest cardiovascular disorder, posing a major public health challenge to population in socio-economic and epidemiological transition. It is one of the major risk factors for cardiovascular mortality, which accounts for 20-50 percent of all deaths. There is also a direct relation between cardiovascular risk and blood pressure; the higher the blood pressure, the higher the risk of both stroke and coronary events (Park, 2015).

3.1 Classification of Blood Pressure Measurement

Category	Systolic Blood Pressure (mm of Hg)	Diastolic Blood Pressure (mm of Hg)
Normal	<130	<85
High Normal	130 – 139	85 – 90
Hypertension		
Stage 1 (Mild)	140 – 159	90 – 99
Stage 2 (Moderate)	160 – 179	100 – 109
Stage 3 (Severe)	>180	> 110

When systolic and diastolic blood pressure fall into different categories, the higher category should be selected to classify the individual's blood pressure. "Isolated systolic hypertension" is defined as a systolic blood pressure of 140mm of Hg or more and a diastolic blood pressure of less than 90mm of Hg.

Fig 3.5 measurement of blood pressure



3.3 Risk Factors for Hypertension

Hypertension is not only one of the major risk factors for most forms of cardiovascular diseases, but that it is a condition with its own risk factors. A World Health Organization (WHO, 1996) Scientific Group has recently reviewed the risk factors for essential hypertension. These may be classified as:

1. Non-Modifiable Risk Factors

a) Age: Blood pressure rises with age in both sexes and the risk is greater in those with higher initial blood pressure. Age probably represents an accumulation of environmental influence and the effects of genetically programmed senescence in body systems. Some populations have now been identified whose mean blood pressure does not rise with age. These communities are for the most part primitive societies with calorie and often salt intakes at low level.

b) **Sex**: Early in life there is little evidence of a difference in blood pressure between the sexes. However, at adolescence, men display a higher average level. This difference is most evident in young and middle aged adults. Late in life the difference narrows and the pattern may even be reversed. Post-menopausal changes in women may be the contributory factor for this change.

c) Genetic Factors: There is considerable evidence that blood pressure levels are determined in part by genetic factors, and that the inheritance is polygenic. Family studies have shown that the children of two normotensive parents have 3 percent possibility of developing hypertension, whereas this possibility is 45 percent in children of two hypertensive parents. Blood pressure levels among first degree adult relatives have also been noted to be statistically significant.

d) **Ethnicity**: Population studies have consistently revealed higher blood pressure levels in black communities than other ethnic groups.

2. Modifiable Risk Factors

a) Obesity: Epidemiological observations has identified obesity as a risk factor for hypertension. The greater the weight gain, the greater the risk of high blood pressure. Data also indicate that when people with high blood pressure lose weight, their blood pressure generally decrease.

b) Salt Intake: There is an increasingly body of evidence to the effect that a high salt intake (i.e 7 – 8g per day) increase blood pressure proportionately. Low sodium intake has been found to lower the blood pressure. Besides sodium, there are other mineral elements such as potassium which are determinants of blood pressure. Potassium antagonises the biological effects of sodium and thereby reduces blood pressure. Potassium supplements have been found to lower blood pressure of mild

to moderate hypertensive. Calcium, cadmium and magnesium have also been suggested as of importance reducing blood pressure levels.

c) Saturated Fat: The evidence suggest that saturated fat raises blood pressure as well as serum cholesterol.

d) Dietary Fibre: Several studies indicate that the risk of hypertension is inversely related to the consumption of dietary fibre. Most fibres reduce plasma and total cholesterol.

E Alcohol: High alcohol intake is associated with an increased risk of high blood pressure. It appears that alcohol consumption raises systolic pressure more than the diastolic. But the finding that blood pressure returns to normal with abstinence suggests that alcohol-induced elevation may not be fixed, and do not necessarily lead to sustained blood pressure elevation.

g) **Physical Activity**: Physical activity by reducing body weight may have an indirect effect on blood pressure.

h) **Environmental Stress**: The term hypertension itself implies a disorder initiated by tension or stress. It is an accepted fact that psychosocial factors operate through mental processes, consciously or unconsciously, to produce hypertension.

i) **Socio–Economic Status**: In countries that are in post transitional stage of economic and epidemiological change, consistently higher levels of blood pressure have been noted in lower socio-economic groups. This inverse relation has been noted with levels of education, income and occupation, a higher prevalence of hypertension have been noted in upper socio-economic groups.

3.4 Prevention of Hypertension

The low prevalence of hypertension in some communities indicates that hypertension is potentially preventable. The WHO recommended the following approaches in the prevention of hypertension (Park, 2015).

1. **Primary Prevention**

Although control of hypertension can be successfully achieved by medication (Secondary Prevention) the ultimate goal in general is primary prevention. Primary prevention has been defined as “all measures to reduce the incidence of diseases in population by reducing the risk of onset”. The earlier the prevention starts, the more likely it is to be effective. In connection with primary prevention, terms such as “population strategy” and “high-risk strategy” have become established. The WHO has recommended these approaches in the prevention of hypertension. Both the approaches are complementary.

Population Strategy

The population approach is directed at the whole population, irrespective of individual risks levels. The concept of population approach is based on the fact that even a small reduction in the – average blood pressure of a population would produce a large reduction in the incidence of cardiovascular complications such as stroke and CHD. The goal of the population approach is to shift the community distribution of blood pressure towards lower levels or "biological normality". This involves a multifactorial approach, based on the following non-pharmacotherapeutic interventions:

a) Nutrition: Dietary changes are of paramount importance. This comprise: (i) reduction of salt intake to an average of not more than 5gm per day (ii) moderate fat intake (iii) the avoidance of a high alcohol intake, and (iv) restriction of energy intake appropriate to body needs.

b) Weight Reduction: The prevention and correction of overweight/obesity (Body Mass index greater than 25) is a prudent way of reducing the risk of hypertension and indirectly CHD: It goes with dietary changes.

c) Exercise Promotion: The evidence that regular physical activity leads to a fall in body weight, blood lipids and blood pressure goes to suggest that regular physical activity should be encouraged as part of the strategy for risk-factor control.

d) Behavioural Changes: Reduction of stress and smoking. Modification of personal life-style, yoga and transcendental meditation could be profitable.

e) Health Education: The general public require preventive advice on all risk factors and related health behaviour. The whole community must be mobilised and made aware of the possibility of primary prevention.

f) Self-Care: An important element in community-based health programmes is patient participation. The patient is taught self-care, i.e to take his own blood pressure and keep a log-book of his reading. By doing so, the burden on the official health service would be considerably reduced. Log-books can also be useful for statistical purposes.

High-Risk Strategy

This is also part of primary prevention. The aim of this approach is "to prevent the attainment of levels of blood pressure at which the institution of treatment would be considered". This approach is appropriate if the risk factors occur with very low prevalence in the community. Detection of high-risk subject should be encouraged by the optimum use of clinical methods. Since

hypertension tends to cluster in families, the family history of hypertension and "tracking" of blood pressure from childhood may be used to identify individuals at risk.

2. Secondary Prevention

The goal of secondary prevention is to detect and control high blood pressure in affected individuals. Modern anti-hypertensive drug therapy can effectively reduce high blood pressure and consequently, the excess risk of morbidity and mortality from coronary, cerebrovascular and kidney diseases. The control measures comprise:

(i) Early Case Detection**:** Early detection is a major problem. This is because high blood pressure rarely causes symptoms until organic damage has already occurred, and the aim should be to control it before this happens. The only effective method of diagnosis of hypertension is to screen the population. But screening, that is not linked to follow-up and sustained care, is a fruitless exercise. It is emphasised that screening should not be initiated if health resources for treatment and follow-up are not adequate.

In the developed countries, mass screening is not considered essential for the adequate control of blood pressure in the population. In Europe, the large majority of people have at least one contact in every 2 years with the health service. If blood pressure is measured at each such contact, the bulk of the problem of detecting those in need of intervention is solved (Hart, 1980).

(ii) Treatment: The aim of treatment should be to obtain a blood pressure below 140/90, and ideally a blood pressure of 120/80. Control of hypertension has been shown to reduce the incidence of stroke and other complications. This is a major reason for identifying and treating asymptomatic hypertension. Care of hypertensive should also involve attention to other risk factors such as smoking and elevated blood cholesterol levels.

(iii) Patient Compliance**:** The treatment of high blood pressure must normally be life-long and this presents problems of patient compliance, which is defined as "the extent to which patient behaviour (in terms of taking medicines, following diets or executing other life-style changes) coincides with clinical prescription". The compliance rates can be improved through, education directed to patients, families and the community.

4.0 Self-Assessment Exercise

1. Document the classification of high blood pressure measurement.
2. Explain the risk factors of hypertension as classified by World Health Organization Scientific

Group.

Answers to Self-Assessment Exercise

1. **Classification of Blood Pressure Measurement**

Category	Systolic Blood Pressure (mm of Hg)	Diastolic Blood Pressure (mm of Hg)
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b) **Sex**: Early in life there is little evidence of a difference in blood pressure between the sexes. However, at adolescence, men display a higher average level. This difference is most evident in young and middle aged adults. Late in life the difference narrows and the pattern may even be reversed. Post-menopausal changes in women may be the contributory factor for this change.

c) Genetic Factors: There is considerable evidence that blood pressure levels are determined in part by genetic factors, and that the inheritance is polygenic. Family studies have shown that the children of two normotensive parents have 3 percent possibility of developing hypertension, whereas this possibility is 45 percent in children of two hypertensive parents. Blood pressure levels among first degree adult relatives have also been noted to be statistically significant.

d) **Ethnicity**: Population studies have consistently revealed higher blood pressure levels in black communities than other ethnic groups.

2. Modifiable Risk Factors

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b) Salt Intake: There is an increasingly body of evidence to the effect that a high salt intake (i.e 7 – 8gm per day) increase blood pressure proportionately. Low sodium intake has been found to lower the blood pressure. Besides sodium, there are other mineral elements such as potassium which are determinants of blood pressure. Potassium antagonises the biological effects of sodium and thereby reduces blood pressure. Potassium supplements have been found to lower blood pressure of mild to moderate hypertensive. Calcium, cadmium and magnesium have also been suggested as of importance reducing blood pressure levels.

c) Saturated Fat: The evidence suggest that saturated fat raises blood pressure as well as serum cholesterol.

d) Dietary Fibre: Several studies indicate that the risk of hypertension is inversely related to the consumption of dietary fibre. Most fibres reduce plasma and total cholesterol.

e) Alcohol: High alcohol intake is associated with an increased risk of high blood pressure. It appears that alcohol consumption raises systolic pressure more than the diastolic. But the finding that blood pressure returns to normal with abstinence suggests that alcohol-induced elevation may not be fixed, and do not necessarily lead to sustained blood pressure elevation.

g) **Physical Activity**: Physical activity by reducing body weight may have an indirect effect on blood pressure.

h) **Environmental Stress**: The term hypertension itself implies a disorder initiated by tension or stress. It is an accepted fact that psychosocial factors operate through mental processes, consciously or unconsciously leads to hypertension.

i) **Socio –Economic Status**: In countries that are in post transitional stage of economic and epidemiological change, consistently higher levels of blood pressure have been noted in lower socio-economic groups. This inverse relation has been noted with levels of education, income and occupation, a higher prevalence of hypertension have been noted in upper socio-economic groups.

5.0 Conclusion

High blood pressure is a public health problem which affects people irrespective of their age, sex and status. It is called silent killer, it does not usually present any signs or symptoms. It is claiming lives of many people without knowing that they have the condition. The best way to know your status is through regular medical check-ups. Untreated High blood pressure cases resulted to stoke, cardiovascular problems and sometimes death.

6.0 Summary

In this unit we have discussed hypertension as a condition in which the force of the blood against the artery walls is too high otherwise called high blood pressure. Risk factors for hypertension were grouped into Non-Modifiable Risk Factors and Modifiable Risk Factors. World Health Organisation recommended primary prevention and secondary prevention as approaches in the prevention of hypertension

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Unit 3 Diabetes

CONTENTS

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    3.1.1 Classification
    3.1.2 Epidemiological Determinants
    3.1.3 Prevention and Control of Diabetes Mellitus
4.0 Self-Assessment Exercises
5.0 Conclusion
6.0 Summary
7.0 References/Further Reading

1.0 Introduction

Remember, in the last unit you have learnt definition of hypertension, classification of blood pressure, risk factors of hypertension and prevention and control measures of hypertension. In this

unit you will learn on classification of diabetes, epidemiological determinants of diabetes, prevention and control of diabetes.

2.0 Intended Learning Outcomes (ILOs)

By the end of this unit, you will be able to:

- identify the classification of diabetes.
- outline the epidemiological determinants of diabetes
- describe the prevention and control measures of diabetes

3.0 Main Content

3.1 Diabetes Mellitus

Once regarded as a single disease entity, diabetes is now seen as a heterogeneous group of diseases, characterised by a state of chronic hyperglycaemia, resulting from a diversity of aetiologies, environmental and genetic, acting jointly. The underlying cause of diabetes is the defective production or action of insulin, a hormone that controls glucose, fat and amino acid metabolism. Characteristically, diabetes is a long-term disease with variable clinical manifestations and progression. Chronic hyperglycaemia, from whatever cause, leads to a number of complications – cardiovascular, renal, neurological, ocular, and others such as undercurrent infections (WHO, 1985)

Diabetes is an "iceberg" disease. Although increase in both the prevalence and incidence of Type 2 diabetes have occurred globally They have been especially dramatic in societies in economic transition, in newly industrialised countries and developing countries. As at 2012 , the number of cases of diabetes world-wide is estimated to be around 347 million, of these more than 90 percent are type 2 diabetes. In 2008 an estimated 1.2 million people died from consequences of high blood sugar. More than 80 percent diabetes deaths occur in low and middle income countries. Unfavourable lifestyle and dietary habits that are associated with urbanisation are believed to be the most important factors for the development of diabetes. The prevalence of diabetes is approximately twice in urban areas than in rural population (WHO, 2012)

3.1.1 Classification

Park (2015), classified diabetes mellitus as follows;

1. Diabetes mellitus (DM)

i. Type 1 or insulin-dependent diabetes mellitus

ii. Type 2 or Non-insulin dependent diabetes mellitus

iii. Malnutrition-related diabetes mellitus (MRDM)

iv. Other types (secondary to pancreatic, hormonal, drug induced, genetic and other abnormalities).

2. Impaired Glucose Tolerance (IGT)

3. Gestational diabetes mellitus (GDM)

Type 1 Diabetes (Insulin-dependent diabetes mellitus) is the most severe form of the disease. Its onset is typically abrupt and is usually seen in individuals less than 30 years of age. It is lethal unless promptly diagnosed and treated. This form of diabetes is immune-mediated in over 90 percent of cases and idiopathic in less than 10 percent cases. The rate of destruction of pancreatic β cell is quite variable. Rapid in some individuals and slow in others. Type 1 diabetes is usually associated with ketosis in its untreated state. It occurs mostly in children, the incidence is highest among 10-14 year old group, but occasionally occurred in adults. It is catabolic disorder in which circulating insulin is virtually absent, plasma glucagon is elevated and the pancreatic β cells fail to respond to all insulin genetic stimuli. Exogenous insulin is therefore required to reverse the catabolic state, prevent ketosis, reduce the hyperglucagonaemia, and reduce blood glucose.

Type 2 diabetes is much more common than type 1 diabetes. It is often discovered by chance. It is typically gradual in onset and occurs mainly in the middle-aged and elderly, frequently mild, slow to ketosis and is compatible with long survival if given adequate treatment. Its clinical picture is usually complicated by the presence of other disease processes.

Impaired glucose tolerance (IGT) describes a state intermediate – "at risk" group – between diabetes mellitus and normally. It can only be defined by the oral glucose tolerance test.

3.1.2 Epidemiological Determinants

1. **Agent**

The underlying cause of diabetes is insulin deficiency which is absolute in type 1 diabetes and partial in type 2 diabetes. This may be due to a wide variety of mechanisms (Lawrence et-al., 2002).

(a) **Pancreatic disorders** – Inflammatory, neoplastic and other disorders such as cystic fibrosis.

(b) **Defects in the formation of insulin -**e.g. synthesis of an abnormal biologically less active insulin molecule.

(c) **Destruction of beta cells -**e.g. viral infections and chemical agents.

(d) **Decrease insulin sensitivity -**due to increased numbers of adipocyte and monocyte insulin receptors.

(e) **Genetic defects -**e.g. mutation of insulin gene; and

(f) **Auto-immunity.**

Evidence is accumulating that the insulin response to glucose is genetically controlled. The overall effects of these mechanisms is reduced utilization of glucose which leads to hyperglycaemia accompanied by glycosuria.

2**. Host Factors**

a. **Age**: Although diabetes may occur at any age, surveys indicate that prevalence rises steeply with age. Type 2 diabetes usually come to light in the middle years of life and thereafter begins to rise in frequency. Malnutrition related diabetes affects large number of young people. The prognosis is worse in younger diabetics who tend to develop complications earlier than older diabetics.

b. **Sex**: In some countries e.g. UK, the overall male-female ratio is about equal. In South-East Asia, an excess of male diabetics has been observed, but this is often to question.

c. **Genetic Factors**: The genetic factors of diabetes is undisputed. Twin studies shows that in identical twins who developed type 2 diabetes, concordance was approximately 90 percent, thus demonstrating a strong genetic component. In type 1 diabetes, the concordance was only about 50 percent indicating that type 1 diabetes is not totally a genetic entity.

d. **Immune Mechanisms**: There is an evidence of cell mediated and of humoral activity against islet cell. Some people appear to have defective immunological mechanism, and under the influence of some environmental "trigger", attack their own insulin producing cells.

f. **Obesity**: Obesity particularly central adiposity has long been accepted as a risk factor for type 2 diabetes and the risk is related to both the duration and degree of obesity. Thus obesity by itself is inadequate to account for all or even most cases of type 2 diabetes; physical inactivity and/or deficiencies of specific nutrients may also be involved. Obesity appears to play no role in type 1 diabetes pathogenesis.

d. **Maternal Diabetes**: Offspring of women who are diabetic during pregnancies experience gestational diabetes, are often large and heavy at birth, tend to develop obesity in childhood and are at high risk of developing type 2 diabetes at an early age. Those born to mothers after they have developed diabetes have a three-fold higher risk of developing diabetes than those born before.

3. **Environmental Risk Factors**

Susceptibility to diabetes appeared to be unmasked by a number of environmental factors acting on genetically susceptible individuals (Park, 2015). They include:

a. **Sedentary Lifestyle**: Sedentary lifestyle appears to be an important risk factor for the development of type 2 diabetes. Lack of exercise may alter the interaction between insulin and its receptors and subsequently lead to type 2diabetes.

b. **Diet:** A high saturated fat intake has been associated with a higher risk of impaired glucose tolerance, and higher fasting glucose and insulin levels. Higher proportions of saturated fatty acids in serum lipid or muscle phospholipids has been associated with higher fasting insulin, lower insulin sensitivity and a higher risk of type 2 diabetes. Higher unsaturated fatty acids from vegetable sources and polyunsaturated fatty acids has been associated with reduced risk of type 2 diabetes and lower fasting and 2-hour glucose concentrations. Higher proportions of long-chain polyunsaturated fatty acids in skeletal muscle phospholipids have been associated with increased insulin sensitivity. In human intervention studies, replacement of saturated by unsaturated fatty acids leads to improved glucose tolerance and enhanced insulin sensitivity. However, long-chain polyunsaturated fatty acids do not appear to confer additional benefit over monounsaturated fatty acids. When total of fats intake is high (greater than 37 percent of total energy), altering the quality of dietary fat appears to have little effect.

c. **Dietary Fibre**: In many controlled experimental studies, high intakes of dietary fibre have been shown to result in reduced blood glucose and insulin levels in people with type 2 diabetes and impaired glucose tolerance. Moreover, an increased intake of whole grain cereals, vegetables and fruits (all rich in NSP) was a feature of diets in randomized controlled trials. Thus the evidence for a potential protective effect of dietary fibre appears strong. A minimum daily intake of 20 grams of dietary fibre is recommended.

d. **Malnutrition**: Malnutrition (PEM) in early infancy and childhood may result in partial failure of β-cell function. Damage to beta cells may well explain the associated impaired carbohydrate tolerance in kwashiorkor.

e**. Alcohol**: Excessive intake of alcohol can increase the risk of diabetes by damaging the pancreas and liver and by promoting obesity.

f. **Viral Infections**: Among the viruses that have been implicated are rubella, mumps, and human coxsackie virus B4. Viral infections may trigger in immunogenetically susceptible people a sequence of events resulting in β-cell destruction.

g. **Chemical Agents**: A number of chemical agents are known to be toxic to beta cells, e.galloxan, streptozotocin, the rodenticide VALCOR, etc. A high intake of cyanide producing foods (e.g cassava and certain beans) may also have toxic effects on β-cells.

3.1.3 Prevention and Control of Diabetes Mellitus

1. **Primary Prevention**

Two strategies for primary prevention have been suggested:

a. Population strategy and;

b. High-risk strategy

a. **Population Strategy**: The scope of primary prevention of type 1 diabetes is limited on the basis of current knowledge and is probably not appropriate. However, the development of prevention programmes for type 2 diabetes based on elimination of environmental risk factors is possible. There is pressing need for *primordial prevention* – that is, prevention of the emergence of risk factors in countries in which they have not yet appeared. The preventive measures comprises maintenance of normal body weight through adoption of healthy nutritional habits and physical exercise. The nutritional habits include an adequate protein intake, a high intake of dietary fibre and avoidance of sweet foods. Elimination of other less well defined factors such as protein deficiency and food toxins may be considered in some populations. These measures should be fully integrated into other community-based programmes for the prevention of non-communicable diseases e.g coronary heart disease.

b. **High-Risk Strategy**: There is a special high-risk strategy for type 1 diabetes. At present, there is no practical justification for genetic counselling as a method of prevention. Since NIDDM appears to be linked with sedentary lifestyle, over nutrition and obesity, correction of these may reduce the risk of diabetes and its complications. Since alcohol can indirectly increase the risk of diabetes, it should be avoided. Subjects at risk should avoid diabetogenic drugs like oral contraceptives. It is a wise to reduce factors that promote atherosclerosis, e.g smoking, high blood pressure, elevated cholesterol and high triglyceride levels. These programmes may most effectively be directed at target population groups (WHO, 2012).

2. **Secondary Prevention**

When diabetes is detected, it must be adequately treated. The aims of treatment are:

a. To maintain blood glucose levels as close within the normal limits as practicable and;

b. To maintain ideal body weight.

Treatment is based on:

a. Diet alone – small balanced meals more frequently.

b. Diet and oral anti-diabetic drugs or;

c. Diet and insulin.

Good control of blood glucose protects against the development of complications.

Proper management of the diabetics is most important to prevent complications. Routine checking of blood sugar, of urine for protein and ketones, of blood pressure, visual acuity and weight should be done periodically. The feet should be examined for any defective blood circulation (Doppler ultrasound probes are advised), loss of sensation and the health of the skin. Primary health care is of great importance to diabetic patients since most care is obtained at this level.

Self-Care: A crucial element in secondary prevention is self-care. That is, the diabetic should take a major responsibility for his own care with medical guidance – e.g adherence to diet and drugs regiments, examination of his own urine and where possible blood glucose monitoring; self-administration of insulin, abstinence from alcohol, maintenance of optimum weight, attending periodic check-ups, recognition of symptoms associated with glycosuria and hyperglycemia etc.

The patient should carry an identification card showing his name, address, telephone number (if any), and the details of treatment he is receiving. In short, he must have a working knowledge of diabetes. All these mean education of patients and their families to optimize the effectiveness of primary health care services.

3. **Tertiary Prevention**

Diabetes is major cause of disability through its complications e.g blindness, kidney failure, coronary thrombosis, gangrene of the lower extremities, etc. The main objective at the tertiary level is to organise specialised clinics (Diabetic clinics) and units capable of providing diagnostic and management skills of a high disorder. There is great need to establish such clinics in large towns and cities. The tertiary level should also be involved in basic, clinical and epidemiological research. It has also been recommended the local and national registries for diabetics should be established.

4.0 Self-Assessment Exercise

1. Identify the classifications of diabetes.
2. Give detail information on primary and secondary prevention and control measures of diabetes.

Answers to Self-Assessment Exercise

1. **Classification**

Park (2015), classified diabetes mellitus as follows;

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Q2.

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a. Population strategy and;

b. High-risk strategy

a. **Population Strategy**: The scope of primary prevention of type 1 diabetes is limited on the basis of current knowledge and is probably not appropriate. However, the development of prevention programmes for type 2 diabetes based on elimination of environmental risk factors is possible. There is pressing need for *primordial prevention* – that is, prevention of the emergence of risk factors in countries in which they have not yet appeared. The preventive measures comprises maintenance of normal body weight through adoption of healthy nutritional habits and physical exercise. The nutritional habits include an adequate protein intake, a high intake of dietary fibre and avoidance of sweet foods. Elimination of other less well defined factors such as protein deficiency and food toxins may be considered in some populations. These measures should be fully integrated into other community-based programmes for the prevention of non-communicable diseases e.g coronary heart disease.

b. **High-Risk Strategy**: There is a special high-risk strategy for type 1 diabetes. At present, there is no practical justification for genetic counselling as a method of prevention. Since NIDDM appears to be linked with sedentary lifestyle, over nutrition and obesity, correction of these may reduce the risk of diabetes and its complications. Since alcohol can indirectly increase the risk of diabetes, it should be avoided. Subjects at risk should avoid diabetogenic drugs like oral contraceptives. It is a wise to reduce factors that promote atherosclerosis, e.g smoking, high blood pressure, elevated cholesterol and high triglyceride levels. These programmes may most effectively be directed at target population groups.

2. **Secondary Prevention**

When diabetes is detected, it must be adequately treated. The aims of treatment are:

a. To maintain blood glucose levels as close within the normal limits as practicable and;

b. To maintain ideal body weight.

Treatment is based on:

a. Diet alone – small balanced meals more frequently.

b. Diet and oral antidiabetic drugs or;

c. Diet and insulin.

Good control of blood glucose protects against the development of complications.

Proper management of the diabetics is most important to prevent complications. Routine checking of blood sugar, of urine for protein and ketones, of blood pressure, visual acuity and weight should be done periodically. The feet should be examined for any defective blood circulation (Doppler

ultrasound probes are advised), loss of sensation and the health of the skin. Primary health care is of great importance to diabetic patients since most care is obtained at this level.

Self-Care: A crucial element in secondary prevention is self-care. That is, the diabetic should take a major responsibility for his own care with medical guidance – e.g adherence to diet and drugs regiments, examination of his own urine and where possible blood glucose monitoring; self-administration of insulin, abstinence from alcohol, maintenance of optimum weight, attending periodic check-ups, recognition of symptoms associated with glycosuria and hyperglycaemia etc. The patient should carry an identification card showing his name, address, telephone number (if any), and the details of treatment he is receiving. In short, he must have a working knowledge of diabetes. All these mean education of patients and their families to optimize the effectiveness of primary health care services.

5.0 Conclusion

Diabetes is health condition that affects many people worldwide. It may cause permanent disability and death among the victims. This condition is as a result of inheritance of the infected genes in some cases, poor nutrition and lack of physical activities.

6.0 Summary

Diabetes is a metabolic health condition which occur as a result of the body inability to produce enough (type 2 diabetes) or total in ability to produce insulin (type 1) to convert blood sugar to release energy for body use. This condition can be prevented and control through life style changes.

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Unit 4 Sickle Cell Anaemia and Arthritis

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1.0Introduction

In the previous unit you have learnt classification of diabetes, epidemiological determinants of diabetes, prevention and control of diabetes. In this unit you will learn the definition of sickle cell anaemia, sickle cell crisis stages, signs, symptoms and complications of sickle cell anaemia. Also youwill learn meaning of arthritis, classification of arthritis, signs and symptoms and prevention and control measures.

Sickle cell disease (SCD) is an inherited blood disorder, which affects children early in life often with repeated episodes of catastrophic illness and bone pains with varying periods of relative good health in between. Children with SCD are susceptible to severe infections; they have negative nutrition balance and are less able to cope with respiratory infections and diarrhoeal diseases as it worsens their clinical state. Less than 50% of babies with SCD will live beyond their fifth birthday if unattended.

2.0 Intended Learning Outcomes (ILOs)

By the end of this unit, you will be able to:

- define the term sickle cell.
- identify the crisis of sickle cell
- mention signs and symptoms arthritis
- outline the classification of arthritis.

3.0 Main Content

3.1 Sickle Cell Disease (SCD)

Sickle cell disease (SCD) is an inherited blood disorder characterised by chronic anaemia characterised by periodic episodes of pain. This disorder affects over 72,000 Americans and millions throughout the world, most of African descent. Approximately 1 in 12 African-Americans carry the trait for SCD and 1 of every 350 African-American infants born have the disorder and the incidence of the disorder in Africa is ten times higher (Wethers, 2000; Ohnishi, Ohnishi & Ogunmola, 2000). Persons with sickle cell disorder in inherit defective hemoglobin genes from both parents. Early research was funded by the National Heart, Lung and Blood Institute (NHLBI). The United States Congress passed the National Sickle Cell Disease Control Act in 1972 which called for the establishment of the National Sickle Cell Disease Programme. Over the years, this programme and others like the Cooperative Study of Sickle Cell Disease (CSSCD), established in 1979, has funded research that has elucidated much of what we know about the disease today, (Bonds, 2005).

Recently, it has been demonstrated that sickled red bloods cells are more susceptible to oxidative damage than normal red blood cells and current treatments for SCD focus on applying free radical

chemistry to sickled cells, (Aslan, Thornley-Brown & Freeman, 2000). This information leads to the hypothesis that the symptoms of SCD are caused by extensive free radical damage and oxidative stress. This paper will discuss new methods for elucidating the role of free radicals in sickle cell disease.

Three-quarters of sickle cell cases occur in Africa. World Health Organization report estimated that around 2% of new-borns in Nigeria were affected by sickle cell anaemia, giving a total of 150,000 affected children born every year in Nigeria alone. The carrier frequency ranges between 10% and 40% across equatorial Africa, decreasing to 1–2% on the North African coast and <1% in South Africa, (WHO, 2011). There have been studies in Africa that show a significant decrease in infant mortality rate, ages 2–16 months, because of the sickle cell trait. This happened in predominant areas of malarial cases, (Aidoo, Terlouw, Kolczak, McElroy, Kuile, Kariuki, Nahlen, Lal &Udhayakumar, 2002).

3.1.1 Signs and Symptoms of Sickle Cell Disease (SCD)

Signs of sickle cell disease usually begin in early childhood. The severity of symptoms can vary from person to person, (National Library of Medicine, 2011). Sickle cell disease may lead to various acute and chronic complications, several of which have a high mortality rate.

3.3.2 Sickle Cell Crisis

The terms "sickle cell crisis" or "sickling crisis" may be used to describe several independent acute conditions occurring in patients with SCD. SCD results in anaemia and crises that could be of many types including the vaso-occlusive crisis, aplastic crisis, sequestration crisis, haemolytic crisis, and others. Most episodes of sickle cell crises last between five and seven days. "Although infection, dehydration, and acidosis (all of which favor sickling) can act as triggers, in most instances, no predisposing cause is identified."

3.1.3 Vaso-Occlusive Crisis

Vaso-occlusive crisis is caused by sickle-shaped red blood cells that obstruct capillaries and restrict blood flow to an organ resulting in ischemia, pain, necrosis, and often organ damage. Painful crises are treated with hydration, analgesics, and blood transfusion and massage. For milder crises, a subgroup of patients manage on nonsteroidal anti-inflammatory drugs (NSAIDs) such as diclofenac or naproxen. For more severe crises, most patients require inpatient management. (Olujohungbe& Burnett, 2013). Incentive spirometer, a technique to encourage deep breathing to minimize the development of atelectasis, is recommended, (Glassberg, 2011).

3.2.4 Splenic Sequestration Crisis

Because of its narrow vessels and function in clearing defective red blood cells, the spleen is frequently affected, (Anie & Green, 2015). It is usually infarcted before the end of childhood in individuals suffering from sickle cell anaemia. This spleen damage increases the risk of infection from encapsulated organisms, (Pearson, 1977).

3.1.5 Acute Chest Syndrome

Acute chest syndrome (ACS) is related with two of the following signs or symptoms: chest pain, fever, pulmonary infiltrate or focal abnormality, respiratory symptoms, or hypoxemia.It is the

second-most common complication and it accounts for about 25% of deaths in patients with SCD, majority of cases present with vaso-occlusive crises then they develop ACS, (Paul, Castro, Aggarwal &Oneal, 2011).

3.1.6 Aplastic Crisis

Aplastic crises are condition in which the patient may develop pale appearance, fast heart rate and fatigue. This crisis is normally triggered by parvovirus B19, which directly affects production of red blood cells by invading the red cell precursors and multiplying in and destroying them. Parvovirus infection almost completely prevents red blood cell production for two to three days.

3.1.7 Haemolytic Crisis

Haemolytic crises refer to rapid decrease in haemoglobin level. The red blood cells break down at a faster rate. (Balgir, 2012).

3.1.8 Prevention of Sickle Cell Crisis

There's no sure way, but you can lower your odds:

- Avoid swimming in cold water.
- Dress in warm clothes when it's cold out or when you're in air-conditioned buildings.
- Drink plenty of water.
- Fly only on commercial airlines. Planes that don't control air pressure could cause you problems.
- Limit how much alcohol you drink.
- Manage your stress.

It also helps to keep yourself as healthy as possible:

- Avoid being around people who are sick.
- Don't smoke.
- Exercise, but drink plenty of liquids and don't push too hard. Activities like intense weight training may put too much stress on your body.
- Get prenatal care right away if you're pregnant or you're planning on it.
- Manage any other health conditions you may have, like diabetes, with your doctor's help.
- Stay up to date on your shots and vaccines.
- Tell your doctor if you have any sleep problems, like snoring.
- Wash your hands often (Ratini, M. & Ms. D.,2019)

3.1.9 Complications

The complications of sickle cell anemia are: Increased risk of severe bacterial infections, Stroke, Cholelithiasis (gallstones) and cholecystitis, Avascular necrosis (aseptic bone necrosis), Decreased immune reactions, Priapism and infarction of the penis, Osteomyelitis (bacterial bone infection), Acute papillary necrosis in the kidneys, Leg ulcers, In eyes, background retinopathy, proliferative retinopathy, vitreous haemorrhages, and retinal detachments, During pregnancy, intrauterine growth retardation, abortion, and pre-eclampsia, Chronic pain, Pulmonary hypertension and

Chronic kidney failure, (Caughey, Poole, Ataga&Hinderliter, 2015;. Caughey et al, 2015; Kavanagh, Sprinz, Vinci, Bauchner& Wang, 2011; Adams, Ohene-Frempong& Wang, 2001;Almeida & Roberts, 2005).

3.1.10 Recommendation for Prevention of Sickle Cell

If you carry the sickle cell trait, seeing a genetic counselor before trying to conceive can help you understand your risk of having a child with sickle cell anemia .Before marriage it is good to do genotype test to confirm the status of the couples. Seek for genetic counseling for marriage to avoid bearing children with sickle cells, if the intended parents have the potentialities of the sickle cell condition.

3.2 Arthritis

The word arthritis is used to describe pain, swelling and stiffness in a joint or joints. Arthritis is not a single condition and there are several different types. In another word arthritis is a term often used to mean any disorder that affects joints (March, Smith, Hoy, Cross, Sanchez-Riera, Blyth, Buchbinder, Vos & Woolf, 2014). Symptoms generally include joint pain and stiffness and in some types of arthritis, other organs are also affected and onset can be gradual or sudden (Richette & Bardin, 2010). There are over 100 types of arthritis and the most common forms are osteoarthritis (degenerative joint disease) and rheumatoid arthritis (March et'al, 2014).

3.2.1 Signs and Symptoms

The sign and symptoms of arthritis include; pain which can vary in severity is a common symptom in virtually all types of arthritis. Other symptoms include swelling, joint stiffness and aching around the joint(s). Arthritic disorders like lupus and rheumatoid arthritis can affect other organs in the body, leading to a variety of symptoms (Athanasiou, Darling, Hu, DuRaine, Reddi & Hari, 2013; Wollenhaupt & Zeidler,1998)).

Pirotta (2010) identify the following symptoms of arthritis:

- Inability to use the hand or walk
- Stiffness, which may be worse in the morning, or after use
- Malaise and fatigue

- Weight loss
- Poor sleep
- Muscle aches and pains
- Tenderness
- Difficulty moving the joint

3.2.2 Classification

There are several diseases where joint pain is primary, and is considered the main feature. Generally when a person has "arthritis" it means that they have one of these diseases, which include:

Osteoarthritis

Osteoarthritis is the most common form of arthritis and it can affect both the larger and the smaller joints of the body, including the hands, wrists, feet, back, hip, and knee (VanItallie, 2010). The disease is essentially one acquired from daily wear and tear of the joint; however, osteoarthritis can also occur as a result of injury and some joint or limb deformities, such as knock-knee or acetabular over coverage or dysplasia, have also been considered as a predisposing factor for knee or hip osteoarthritis (Kock, Jung, & Syn, 2016). Osteoarthritis typically affects the weight-bearing joints, such as the back, knee and hip. Unlike rheumatoid arthritis, osteoarthritis is most commonly a disease of the elderly. More than 30 percent of women have some degree of osteoarthritis by age 65. Other risk factors for osteoarthritis include prior joint trauma, obesity, and a sedentary lifestyle (Jonathan, 2004).

Rheumatoid arthritis

Rheumatoid arthritis (RA) is a disorder in which the body's own immune system starts to attack body tissues. The attack is not only directed at the joint but many other parts of the body. In rheumatoid arthritis, most damage occurs to the joint lining and cartilage which eventually results in erosion of two opposing bones. RA often affects joints in the fingers, wrists, knees and elbows, is symmetrical (appears on both sides of the body), and can lead to severe deformity in a few years if not treated. RA occurs mostly in people aged 20 and above. In children, the disorder can present with a skin rash, fever, pain, disability, and limitations in daily activities.

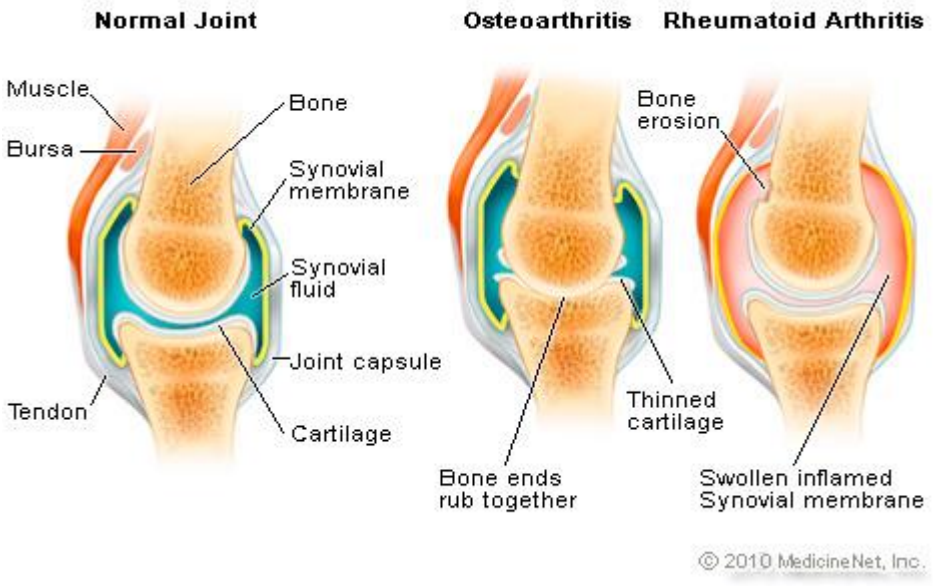

Fig. 3.6: Picture of Rheumatoid Arthritis vs. Osteoarthritis

Lupus

Lupus is a common collagen vascular disorder that can be present with severe arthritis. Other features of lupus include a skin rash, extreme photosensitivity, hair loss, kidney problems, lung fibrosis and constant joint pain (WHO, 2007).

Gout

Gout is caused by deposition of uric acid crystals in the joint, causing inflammation. There is also an uncommon form of gouty arthritis caused by the formation of rhomboid crystals of calcium pyrophosphate known as pseudogout. In the early stages, the gouty arthritis usually occurs in one joint, but with time, it can occur in many joints and be quite crippling. The joints in gout can often become swollen and lose function. Gouty arthritis can become particularly painful and potentially debilitating when gout cannot successfully be treated (Finkelstein, 2008).

Septic arthritis

Septic arthritis, also known as joint infection or infectious arthritis, is the invasion of a joint by an infectious agent resulting in joint inflammation and symptoms typically include redness, heat and pain in a single joint associated with a decreased ability to move the joint. Onset is usually rapid

and other symptoms may include fever, weakness and headache. And occasionally, more than one joint may be involved (Chapman, 2011).

3.2.3 General Treatment/Prevention

There is no known cure for either rheumatoid or osteoarthritis. Treatment and prevention options vary depending as earlier discussed on the type of arthritis and include physical therapy, lifestyle changes (including exercise and weight control)..

3.2.4 Physical Therapy

Physical exercise of the affected joint can noticeably improve long-term pain relief. Furthermore, exercise of the arthritic joint is encouraged to maintain the health of the particular joint and the overall body of the person (Ettinger, Burns, Messier, Applegate, Rejeski, Morgan et'al, 1997; Reid, Shengelia & Parker, 2012)**.**

4.0 Self-Assessment Exercise

1. What are the complication of sickle cell?
2. Describe the crisis of sickle cell anaemia

Answer to Self-Assessment Exercise
Complications

The complications of sickle cell anemia are: Increased risk of severe bacterial infections, Stroke, Cholelithiasis (gallstones) and cholecystitis, Avascular necrosis (aseptic bone necrosis), Decreased immune reactions, Priapism and infarction of the penis, Osteomyelitis (bacterial bone infection), Acute papillary necrosis in the kidneys, Leg ulcers, In eyes, background retinopathy, proliferative retinopathy, vitreous haemorrhages, and retinal detachments, During pregnancy, intrauterine growth retardation, abortion, and pre-eclampsia, Chronic pain, Pulmonary hypertension and Chronic kidney failure, (Caughey, Poole, Ataga&Hinderliter, 2015;. Caughey et al, 2015; Kavanagh, Sprinz, Vinci, Bauchner& Wang, 2011; Adams, Ohene-Frempong& Wang, 2001;Almeida & Roberts, 2005).

Sickle Cell Crisis

Vaso-occlusive crisis

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Haemolytic crisis

Haemolytic crises refer to rapid decrease in haemoglobin level. The red blood cells break down at a faster rate (Balgir, 2012).

5.0 Conclusion

Sickle cell disease (SCD) is an inherited blood disorder, which affects children early in life often with repeated episodes of catastrophic illness and bone pains with varying periods of relative good health in between. Sickle cell disease is public health problem that affect many individuals worldwide.

Arthritis is characterised by joint pain and stiffness and in some types of arthritis, other organs are also affected and onset can be gradual or sudden. It has many classifications with different forms of manifestation.

6.0 Summary

Sickle cell is an inherited health condition in which parents who are positive handed down to their offspring. The condition is characterised with crisis and pain. It is childhood disease; the means of preventing the condition is genetic counselling before marriage.

Arthritis occurs as result of wears and tears of life. Therefore, it cannot totally be prevented but

the manifestation could be early or delayed. However it is not every person that will experience the condition. Exercise plays a significant role in managing the condition.

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Unit 5 Prevention and Control of Non-Communicable Diseases

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1.0 Introduction

In the last unit you have learnt definition of sickle cell anaemia, sickle cell crisis stages, signs, symptoms and complications of sickle cell anaemia. Also you learnt meaning of arthritis, classification of arthritis, signs and symptoms and prevention and control measures. In this unit

you will learn meaning of non-communicable diseases and WHO action plan on non-communicable diseases

2.0 Intended Learning Outcomes (ILOs)

By the end of this unit, you will be able to:

- define the term non-communicable diseases
- describe the prevention and control of non-communicable diseases

3.0 Main Content

3.1 Prevention and Control of Non-Communicable Diseases

Non-communicable diseases (NCDs) are responsible the world's largest killers, with an estimated 38 million deaths annually. Of these deaths, 16 million are premature (under 70 years of age). This problem resulted due to attitudinal problems of people as most of these diseases are life style related which include Cardiovascular diseases, cancer, respiratory diseases, and diabetes are the four leading causes of NCD deaths (Pan American Health Organization, 2016).

According to World Health Organisation (2014), the four leading NCDs (cardiovascular diseases, cancer, respiratory diseases, and diabetes) share four risk factors: tobacco use, harmful use of alcohol, unhealthy diet, and physical inactivity. These in turn lead to other key metabolic/physiological changes such as raised blood pressure, overweight/obesity, raised blood glucose, and higher cholesterol levels.

3.2 The World Health Organisation's Global Action Plan

The UN meeting in 2011 identified a target of 25 per cent reduction in mortality due to NCDs, between the ages of 30 and 70 years, to be achieved globally by 2030. The World Health Assembly, in May 2013, approved a global action plan for prevention and control of NCDs, along with a set of voluntary targets and indicators linked to actions which will enable this goal to be achieved (WHO 2013).

This plan lists nine voluntary targets which are connected to 25 indicators (Table 11.2.1). To achieve these targets, WHO recommends the following actions.

Table 3.1 shows the Voluntary Global Targets from the Action Plan for the Prevention and Control of Non-communicable Diseases 2013–2020

Table 3.1 Mortality and Morbidity

1. Premature mortality from non-communicable disease	A 25% relative reduction in risk of premature mortality from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases
2.Behavioural risk factors	
Harmful use of alcohol	At least 10% relative reduction in the harmful use of alcohol, as appropriate, within the national context
3. Physical inactivity	A 10% relative reduction in prevalence of insufficient physical inactivity
4. Salt/sodium intake	A 30% relative reduction in mean population intake of salt/sodium
5. Tobacco use	A 30% relative reduction in prevalence of current tobacco use in people aged 15+ years
Biological risk factors	
6. Raised blood pressure	A 25% relative reduction in the prevalence of raised blood pressure or contain the prevalence of raised blood pressure, according to national circumstances
7. Diabetes and obesity	Halt the rise in diabetes and obesity
National system response	
8. Drug therapy to prevent heart attacks and strokes	At least 50% of eligible people receive drug therapy and counselling (including glycaemic control) to prevent heart attacks and strokes
9. Essential non-communicable disease medicines and basic technologies to treat major non-communicable diseases	An 80% availability of the affordable basic technologies and essential medicines, including generics, required to treat major non-communicable diseases in both public and private facilities

(World Health Organization, 2013)

3.2.1 Tobacco Use

- Implement the Framework Convention on Tobacco Control (FCTC).
- Reduce affordability of tobacco products by increasing tobacco excise taxes.
- Create, by law, completely smoke-free environments in all indoor workplaces, public places, and public transport.
- Warn people of the dangers of tobacco and tobacco smoke through effective health warnings and mass media campaigns.
- Ban all forms of tobacco advertising, promotion, and sponsorship.

3.2.2 Harmful Alcohol Use

- Excise tax increases on alcoholic beverages.
- Comprehensive restrictions and bans on alcohol advertising and promotion.
- Restrictions on the availability of retailed alcohol.
- Implement the WHO global strategy to reduce harmful use of alcohol.

3.2.3 Unhealthy Diet and Physical Inactivity

- Salt reduction through mass media campaigns/reduced salt content in processed foods.
- Replacement of trans-fats with polyunsaturated fats.
- Public awareness programme about diet and physical activity.

3.2.4 Health System

- Integrate highly cost-effective NCD interventions into the basic primary healthcare package to advance the universal health coverage (UHC) agenda.
- Explore viable health financing mechanisms and innovative financing approaches, like tobacco and alcohol taxation, to generate resources to expand health coverage.
- Improve availability of affordable basic technologies and essential medicines, including generics, required to treat major NCDs in both public and private facilities.
- Scale-up early detection and coverage starting with very cost-effective, high-impact interventions.
- Strengthen and reorient health systems to address NCDs and risk factors through people-centred primary healthcare and UHC.

3.2.5 Cardiovascular Disease and Diabetes

- Educating community on the food choice with low glycaemic index for diabetic patients and avoidance salt, fatty foods for individuals who have had heart attack or stroke and to people with high risk of metabolic and cardiovascular diseases.
- Engaging in regular physical activities to prevent and control of diabetes and coronary heart diseases.

- Cardiac rehabilitation post myocardial infarction.
- Secondary prevention of rheumatic fever and rheumatic heart disease.
- Education on Care of acute stroke and rehabilitation..
- Interventions for foot care; educational programmes, access to appropriate footwear;.

3.2.6 Diabetes

- Lifestyle changes for preventing type 2 diabetes.
- Education on Influenza vaccination.
- Preconception care among women of reproductive age through patient education.
- The early detection of diabetes through careful observation of signs and symptoms to avoid complications.

3.2.7 Cancer

- Prevention of liver cancer through hepatitis B immunization.
- Prevention of cervical cancer through periodic medical check-ups.
- Vaccination against human papillomavirus, as appropriate if cost-effective and affordable, according to national programmes and policies.
- Population-based cervical cancer screening on regular basis.
- Population-based breast cancer mammography screening.
- Population-based colorectal cancer screening at ages over 50 years.
- Oral cancer screening in high-risk groups (e.g. tobacco users).
- Palliative care; using cost-effective treatment modalities.

Chronic respiratory disease

- Access to improved stoves and cleaner fuels to reduce indoor air pollution.
- Cost-effective interventions to prevent occupational lung diseases, that is, exposure to silica, asbestos.
- Treatment of asthma based on WHO guidelines.
- Influenza vaccination for patients with chronic obstructive pulmonary disease.

3.2.8 Research and surveillance

- Develop and implement a prioritized national research agenda for NCDs.
- Strengthen research capacity through cooperation with research institutes.
- Implement other policy options to promote and support national capacity for high-quality research and development.
- Develop national targets and indicators based on global monitoring framework.
- Establish/strengthen a comprehensive NCD surveillance system, including reliable registration of deaths by cause, cancer registration, periodic data collection on risk factors, and monitoring national response.
- Integrate NCD surveillance/monitoring into national health information systems.
- Monitor trends and determinants of NCDs and evaluate progress in their prevention and control.

These recommendations for national and global actions are based on evidence of high impact on population-attributable risk and cost-effectiveness of the interventions (Beaglehole, 2011; WHO 2011d; Bonita et al. 2013). They combine policy and community level interventions which impact on behaviours across the population and health service interventions which enable risk reduction in individuals at high risk of NCD-related death or disability. While many of these are steered by the health system, they will require multi-sectoral actions to influence the determinants of NCDs. Together, they provide a comprehensive framework for prevention and control of NCDs.

For more information follow this link https://www.who.int/ncds/prevention/introduction/en/2019

4.0 Self-Assessment Exercise

1. Identify the preventive measures of cardiovascular diseases
2. Outline the preventive measures of cancer.

Answers to Self-Assessment Exercise

Q1. Cardiovascular disease and diabetes

- Educating community on the food choice with low glycaemic index for diabetic patients and avoidance salt, fatty foods for individuals who have had heart attack or stroke and to people with high risk of metabolic and cardiovascular diseases.
- Engaging in regular physical activities to prevent and control of diabetes and coronary heart diseases.

- Cardiac rehabilitation post myocardial infarction.
- Secondary prevention of rheumatic fever and rheumatic heart disease.
- Education on Care of acute stroke and rehabilitation..
- Interventions for foot care; educational programmes, access to appropriate footwear;.

Q2. Cancer

- Prevention of liver cancer through hepatitis B immunization.
- Prevention of cervical cancer through periodic medical check-ups.
- Vaccination against human papillomavirus, as appropriate if cost-effective and affordable, according to national programmes and policies.
- Population-based cervical cancer screening on regular basis.
- Population-based breast cancer mammography screening.
- Population-based colorectal cancer screening at ages over 50 years.
- Oral cancer screening in high-risk groups (e.g. tobacco users).
- Palliative care; using cost-effective treatment modalities.

5.0 Conclusion

Non-communicable diseases (NCDs) are world's largest killers that affect all categories of people with an estimated 38 million deaths annually. Some non-communicable diseases (NCDs) are cardiovascular diseases, cancer, respiratory diseases and diabetes.

6.0 Summary

Non-communicable diseases are those diseases that cannot be transmitted from one person to another. It can be inherited or acquired later in life. They progress slowly if there is delay in taking prevention and control measures. The one good thing about non-communicable diseases is that they are largely preventable.

7.0 References/Further Reading

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