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SUBJECT:	LIFE SCIENCE
GRADE:	12
MODULE:	2 Structure, control and processes in basic life systems of plants and humans
UNIT:	3 Sexually transmitted diseases and cancer of parts of the reproductive system

By the end of this unit you should be able to:

- Describe the causes, symptoms, treatment and prevention of various sexually transmitted diseases
- Describe the causes, symptoms, treatment and prevention of various forms of reproductive system cancers

LESSON OVERVIEW: (Knowledge areas)

1. Introduction
2. Table of STD's and types of cancers
3. Review questions
4. Exercises

LESSON:

1. Introduction:

Sexually transmitted diseases (STDs) are diseases that are transferred by **sexual contact**. They are very common and widely spread. Research has found that the incidence of STDs has doubled since 2002. Communities used to blame prostitution for the spread of STDs but the latest finding point to the acceptance of sexual promiscuity and the apparent moral decline of societies.

STDs are caused by **viruses and bacteria**, which are transferred sexually. In some cases, the symptoms are not immediate, which means a person is a carrier without being aware of it. STDs can be prevented by **abstinence**, the use of **condoms** and the improvement of moral standards.

2. Common sexually transmitted diseases:

	HIV/AIDS:
General:	HIV/AIDS is known as the killer of the twenty-first century. It is caused by a retrovirus called the human immunodeficiency virus (HIV) , which in turn causes acquired immune deficiency syndrome (AIDS). AIDS is the final stage of the HIV infection where opportunistic diseases infect the body and the person finally dies. The virus is transmitted in body fluids like sperm, breast milk, vaginal fluid and blood . The HIV is transferred from an infected mother to her unborn child. Touching, kissing, shaking hands, tears do not transfer HIV, sneezing, coughing or mosquito bites.
Cause:	The virus attacks the lymphocytes , which weakens the immune system thereby reducing the body's resistance to illness. The infected person has no resistance to any diseases that may attack the body and will contract an illness like flu, TB, diarrhoea, some cancers or pneumonia. The immune system eventually stops working completely. It is the infection from the contracted diseases that causes

Symptom:	death and not the HIV. HIV shows no symptoms for up to 10 years. This time span from infection to symptoms depends on various factors: ○ genetic make-up ○ level of immune function ○ physical health condition at time of infection For several weeks after initial infection, there are no signs of infection. This is called the 'window period' where all tests will show negative. It can take up to six months for the test to show positive, in spite of the HIV being present. When HIV positive people show symptoms, it means that the disease has progressed to AIDS. The most common symptoms are: ○ severe weight loss ○ diarrhoea and fevers ○ skin cancer may develop beginning with small swollen spots which spread over the whole body ○ organs begin to swell, especially lymph nodes ○ secondary illness infection that results in severe symptoms. For this reason, AIDS is often confused with malnutrition, skin cancer, TB, a bad cold or flu, and blood cancer.
Treatment:	At present, a drug called AZT is used to block the HIV replication in the early stages. AZT works by blocking the action of reverse transcriptase, the enzyme needed by the retrovirus for incorporation into the host cell's DNA. Pregnant mothers are given AZT and babies are treated with AZT after birth. Treatment in later stages is restricted to the secondary illness infection. There is no known cure for HIV/AIDS. People who have contracted HIV/AIDS are afraid of the disease and also the response of others. They need support, understanding and care. However, when caring for people who are infected, the following rules must be applied to ensure your safety: ○ Keep cuts and wounds covered ○ Do not share needles, toothbrushes, razors or blades with an infected person ○ Always use rubber gloves when cleaning sores, wounds, vomit, faeces or blood of an infected person
Prevention:	Education programmes conducted across the world to inform people of HIV/AIDS. Multiple sex partners are discouraged and monogamy (one sexual partner) is promoted. People are advised to practice 'safe' sex and use condoms at all times. Condoms are being made readily available at clinics, hospitals, places of work and most public toilets. Sterile hypodermic needles are distributed free of charge to drug addicts
	GONORRHOEA:
General:	This is the most common of the STDs, as there are many strains of the bacteria that cause this disease. A person may develop immunity to one strain but be infected with another. Infected pregnant women may

	give birth to babies with eye diseases, which can lead to permanent blindness.
Cause:	Gonorrhoea is caused by a bacterium called <i>Neisseria gonorrhoeae</i> . Infection results from direct sexual contact . It is rarely transmitted by indirect contact with toilet seats or towels.
Symptom:	Within 7 to 20 days after exposure the bacteria produce an antigen called exotoxin and causes redness and swelling of the genitalia. Males: infection begins in the urethra with frequent urination, severe burning sensation and a discharge of mucus. Infection then spreads to the prostate gland, seminal vesicles and epididymis. Abscesses develop which may lead to sterility. Females: no immediate symptoms occur. The infection spreads to the uterus and fallopian tubes, leaving dense scar tissue, which can result in sterility. If untreated, the gonorrhoea spreads to other organs affecting the heart valves, the joints and also the meninges of the brain.
Treatment:	Antibiotic: penicillin and tetracycline spectinomycin
	SYPHILIS:
General:	Syphilis causes death in 5 to 10 per cent of infected people if untreated. Pregnant women transmit the syphilis to the unborn baby through the placenta – prenatal syphilis. About 50 per cent of the infected babies die shortly before or after birth.
Cause:	A bacterium called <i>Treponema pallidum</i> is transferred during direct sexual contact . It generally enters the body through a break in the skin or mucus membrane. Within 24 hours, it invades the lymph and circulatory systems, spreading throughout the body.
Symptom:	There are four stages: ○ Primary stage: three weeks after infection with a primary chancre, a small, painless ulcer on the genitals. This chancre is very infectious and any sexual contact leads to infection of the sexual partner. The chancre heals quickly. ○ Secondary stage: two months after infection with flu-like symptoms and a mild rash. In some cases lesions develop in the mucus membrane of the mouth and the genitals. This stage is highly contagious as the lesions contain millions of bacteria. ○ Latent Stage: there are no apparent symptoms now. The bacteria begin to invade the organs of the body. ○ Advanced stage: lesions called gummas develop on the heart, the skin, liver and spleen. The central nervous system may become infected and this leads to insanity and finally death. Severe lesions of the organs will cause death.
Treatment:	Scrapings of the chancre and blood tests will identify the bacteria. Blood tests show the presence of an antibody called reagin , produced when a person is infected. An antibiotic like penicillin is prescribed during the primary stage of infection. Once lesions occur, permanent damage to the organs cannot be repaired.
	GENITAL WARTS:

General:	This disease is uncommon before puberty and after menopause. It is characterized by fibrous tissue outgrowths that look like common warts . The disease is transmitted by direct sexual contact .
Cause:	A virus called human papillomavirus causes the infection and there are 70 known strains of this virus. The virus grows rapidly in the presence of excessive sweat and poor hygiene. It often accompanies other genital diseases.
Symptom:	Two months after infection, warts develop on the moist surfaces of the genitalia, e.g.: the vaginal wall, the cervix in females and the urethra of the male. The warts are small, painless swellings but later, the multiple swellings result in a cauliflower-like wart up to 2,5 cm in size. When infected, these warts release a bad-smelling, puss-like discharge.
Treatment:	Infection is for life. Large warts are removed with carbon dioxide laser treatment. Smaller warts are treated with topical creams.
GENITAL HERPES:	
General:	Genital herpes is a very common disease, caused by a similar virus to the cold sores that many people develop on their lips. This virus can never be destroyed, so the person is infected for life with periodical outbreaks.
Cause:	Genital herpes is caused by the herpes simplex virus type 2, transferred during sexual contact .
Symptom:	Symptoms appear within seven days after infection. The first infection is mild and often is unnoticed. Tiny blisters develop on the genitalia and the blisters develop into ulcers. In severe outbreaks, the person will suffer from fever, enlarged lymph nodes and flu-like symptoms. The ulcers take a few weeks to heal and are very infectious.
Treatment:	No cure is available. Drugs like acyclovir will decrease the duration and severity of the genital infections. Pain medication and creams are used to treat the symptoms.
CANCER:	
General:	You have learned that cancer is caused when cells mutate . When the mutated cells replicate, the malfunction is passed to the next set of cells. The body tries to fix the problem by producing more cells, resulting in a tumour. If the cells stay together, the tumour is classified as benign and is usually removed surgically without much trauma. When cells break off from the tumour and enter the circulation or lymphatic system, the cancer cells spread throughout the body. This is termed a malignant tumour.
Cause:	There are many causes of cancer, besides cells mutating: • Pollutants like exhaust fumes, industrial wastes/pollution and pesticides • Smoking and excessive drinking of alcohol • Exposure to excessive sunlight, nuclear waste radiation and x-rays • Hormonal imbalances in the body

Symptom:	
Treatment:	When the cancer is diagnosed in the early stages, the tumour can be surgically removed. If the cancer has progressed, chemotherapy and radiation therapy are prescribed. Both have nasty side effects like nausea, excess hair loss and the destruction of healthy cells. • Chemotherapy is a combination of drugs that are used to destroy the cancer cells at the site where they have developed. The DNA is broken down, so the cancer cell cannot replicate. • Radiation therapy is administered to the patient in three different ways: by injections, by radiation machines or by implanting slow release radiation capsules at the cancer site. Once a patient is diagnosed with cancer and the cancer is removed or treated successfully, the patient is then said to be in remission.
	BREAST CANCER:
General:	Breast cancer is very common and about 5 % of breast cancer cases are genetic. Early diagnosis ensures effective treatment. Women over the age of 40 should have a mammogram once a year to X-ray the breasts. Women should check their breasts regularly for any unusual lumps or swelling.
Treatment:	Once a lump or tumour is found, various options are available: ○ surgical removal of the tumour ○ mastectomy - removal of the entire breast ○ radiotherapy of the breast ○ chemotherapy
	CERVICAL CANCER:
General:	Cervical cancer is very common in women after puberty. Abnormal cells develop in the cervical squamous epithelium and there are no symptoms. Vaginal bleeding, continual vaginal discharge and pain during sexual intercourse as the cancer progresses. In advanced stages, pelvic pain, urine leakage from the bladder, severe weight loss and anaemia will develop. Early diagnosis is essential and sexually active women are advised to visit a clinic or gynaecologist every six months for a pap smear of the cervix where cells from the cervix epithelium are scraped and sent to a pathology laboratory to be analyzed for the presence of cancerous cells.
Treatment:	A procedure called a cone biopsy removes cancerous cells surgically. Laser treatment is also an option. If the cancer cells have spread to the uterus, a hysterectomy will be advised to remove the uterus, followed by chemotherapy to ensure that all the cancer cells are destroyed.
	PROSTATE CANCER:

General:	Prostrate cancer is common in men over the age of 45 with no symptoms until the cancer is advanced.
Cause:	Prostate cancer may result from four factors: ○ genetic predisposition – having a family history of prostate cancer ○ environment – a diet high in saturated fats, smoking, excessive drinking and exposure to carcinogens (cancer-causing substances) ○ endogenous hormonal influence – androgens (male hormones) regulate prostate growth and function; they also speed up the growth of tumours in the prostate ○ sexually transmitted diseases.
Symptom:	Typical symptoms are difficulty to urinate, dribbling, urine retention, cystitis, difficulty to ejaculate, erectile dysfunction and deep abdominal pain, which only appear in advanced stages.
Treatment:	Radiation therapy, surgical removal of the prostate gland, hormone therapy with oestrogen and chemotherapy

REVIEW QUESTIONS:

- Which of the following is not an example of a sexually transmitted disease?
 - Tuberculosis
 - Syphilis
 - AIDS
 - Gonorrhoea
- Which of the following diseases are sexually transmitted?
 - Emphysema
 - Genital herpes
 - Anorexia
 - AIDS
 - Gonorrhoea
 - 1, 2, 3
 - 2, 3, 4
 - 2, 4, 5
 - 1, 4, 5

- 3 The 'window period' is when the body does not show any signs of infection of the HIV/AIDS virus for up to _____ after initial infection even with blood tests:
A 7 weeks
B 6 months
C 12 weeks
D 8 months
- 4 *Neisseria gonorrhoeae* is transmitted through direct sexual contact as well as through contact with toilet seats and towels.
A True
B False
- 5 Penicillin can be used as a treatment for which sexually transmitted diseases?
(i) gonorrhoea
(ii) genital warts
(iii) genital herpes
(iv) syphilis
A ii, iv
B i, ii, iii
C i, iv
D i, iii, iv
- 6 Tiny blisters→ulcers→severe outbreaks→suffering from a fever, enlarged lymph nodes and flu like symptoms are the progressive stages of?
A syphilis
B gonorrhoea
C genital warts
D genital herpes
- 7 The stages of syphilis bacterium are:
primary→secondary→stagnant→advanced
A True
B False
- 8 There is no known cure for the following symptoms:
(i) AIDS
(ii) Syphilis
(iii) Genital warts
(iv) Genital herpes
(v) gonorrhoea
A i, ii, iii
B ii, iii, v
C i, iii, iv
D i, iv, v
- 9 An AIDS infected person will contract illnesses such as:
A flu
B pneumonia
C TB
D all of the above
- 10 Genetic predisposition implies having a hereditary disease running through the family's medical history.
A True
B False

(10)



EXERCISE:

1. Read the passage below and then answer the questions based on it.

Sixty-five million affected by HIV

A new United Nations report revealed that since the first cases of HIV and Aids were detected 25 years ago, sixty-five million people around the world have become infected with HIV and around 25 million have died.

The distribution of the number of people living with HIV in various parts of the world at the end of 2005 is indicated in the table below.

Region	Number living with HIV (millions)
Sub-Saharan Africa	25,00
Asia	8,30
Eastern Europe and Central Asia	1,50
Latin America	1,60
Middle East	0,44
Other countries	1,76
Total	38,60

- 1.1. State TWO reasons why the figures reported in this passage may not be accurate. (2)
- 1.2. Using the information in the passage above calculate the percentage of HIV infected people in each region. (3)
- 1.3. Use the percentages calculated in QUESTION 1.2 to draw a pie chart of HIV infected people in each region. (11)
- 1.4. Although the population of Africa is much lower than that of Asia, the 25 million people living with HIV in Africa is about three times the number of people living with HIV in Asia. Give TWO possible reasons for this. (4)
- 1.5. The following proposal was made to control the spread of HIV:
'An HIV test should be compulsory before people get married.' Explain your view on this. (2)

(Taken from the NSC Exemplar Examination 2008 – Paper 1)

2. Research has shown that there is a major increase in the prevalence of STDs. What in your opinion is the main reason for the increase in the number of people that contract STDs? Suggest ways to prevent further increases in the number of people infected with STDs. (3)

HOMEWORK:

Some sexually transmitted diseases (STDs) are increasing world-wide. The table below indicates the number of people infected with two common bacterial STDs.



Year	Number (per 100 000 people) infected with syphilis	Number (per 100 000 people) infected with gonorrhoea
1986	50	150
1990	150	280
1994	200	150
1998	220	100

1. On the same system of axes, draw TWO line graphs to compare the number of people infected with syphilis and gonorrhoea from 1986 to 1998. (13)
2. Describe the trends shown in both graphs for EACH of the two diseases. (2)

(Taken from the NSC November Examination 2008 – Paper 1)