Chapter 7: Human Health and Disease

Exercises — Chapter-end Exercises

Q1 What are the various public health measures, which you would suggest as safeguard against infectious diseases?

SOLUTION

Public health measures are essential to prevent the spread of infectious diseases. The following measures are recommended:

1. Personal hygiene: Keeping the body clean, consuming clean drinking water, and eating clean food, vegetables and fruits.

2. Proper disposal of waste and excreta: Community sanitation and periodic cleaning and disinfection of water reservoirs, pools, cesspools and tanks.

3. Control of vectors: For vector-borne diseases like malaria and filariasis, eliminating breeding sites of mosquitoes is critical. This includes avoiding stagnation of water, regular cleaning of household coolers, use of mosquito nets, introducing fish like Gambusia in ponds (they feed on mosquito larvae), spraying insecticides in ditches, drainage areas and swamps, and fitting doors and windows with wire mesh.

4. Vaccination and immunisation: Use of vaccines has helped control and even eradicate diseases like smallpox. Vaccines against polio, diphtheria, pneumonia and tetanus have reduced their incidence significantly.

5. Avoiding close contact with infected persons: For air-borne diseases like pneumonia and common cold, avoiding close contact with infected persons and their belongings reduces transmission.

6. Safe food and water: Observing hygienic practices in public catering and ensuring food and water are free from contamination prevent diseases like typhoid, amoebiasis and ascariasis.

7. Use of antibiotics and drugs: Discovery of antibiotics has enabled effective treatment of many infectious diseases.

Answer: Key public health measures include personal and community hygiene, proper waste disposal, vector control, vaccination, avoiding contact with infected persons, and safe food and water practices.

Q2 In which way has the study of biology helped us to control infectious diseases?

SOLUTION

The study of biology has contributed enormously to controlling infectious diseases in the following ways:

1. Discovery of pathogens: Biological research identified the causative agents (bacteria, viruses, fungi, protozoa, helminths) of various diseases, enabling targeted prevention and

treatment.

2. Development of vaccines: Understanding the immune system's memory property led to the development of vaccines. Smallpox has been completely eradicated; polio, diphtheria, pneumonia and tetanus have been greatly controlled through vaccination programmes.

3. Antibiotics and drugs: Biological discoveries led to the development of antibiotics and anti-parasitic drugs that effectively treat bacterial and other infections.

4. Recombinant DNA technology: Advances in molecular biology have enabled production of antigenic polypeptides of pathogens in bacteria or yeast to produce safer vaccines on a large scale — for example, the hepatitis B vaccine is produced using yeast.

5. Diagnostic techniques: Biological research has given us tools like ELISA (Enzyme-Linked Immunosorbent Assay) for diagnosing diseases like AIDS, Widal test for typhoid, biopsy and histopathology for cancer, and blood and bone marrow tests.

6. Understanding transmission routes: Knowledge of how pathogens spread (via food, water, air, vectors, body fluids) has allowed targeted public health interventions.

7. Vector control: Biological understanding of disease vectors like mosquitoes has informed control strategies.

Answer: Biology has helped control infectious diseases through identification of pathogens, development of vaccines and antibiotics, recombinant DNA technology for safer vaccines, improved diagnostics, and understanding of transmission routes and vector biology.

Q3 How does the transmission of each of the following diseases take place?
(a) Amoebiasis
(b) Malaria
(c) Ascariasis
(d) Pneumonia

SOLUTION

(a) Amoebiasis: Caused by Entamoeba histolytica, a protozoan parasite in the large intestine. Transmission occurs through drinking water and food contaminated with faecal matter containing cysts of the parasite. Houseflies act as mechanical carriers, transmitting the parasite from the faeces of infected persons to food and food products.

(b) Malaria: Caused by Plasmodium (a protozoan). Transmission occurs through the bite of an infected female Anopheles mosquito. The mosquito acts as the vector. When an infected mosquito bites a person, sporozoites (the infectious form) are introduced into the bloodstream. When a female Anopheles bites an infected person, gametocytes enter the mosquito and undergo further development into sporozoites stored in the salivary glands, ready to infect the next person bitten.

(c) Ascariasis: Caused by Ascaris (the common roundworm). The eggs of the parasite are excreted along with the faeces of infected persons, contaminating soil, water and plants. A

healthy person acquires the infection through consumption of contaminated water, vegetables and fruits.

(d) Pneumonia: Caused by bacteria such as Streptococcus pneumoniae and Haemophilus influenzae. A healthy person acquires the infection by inhaling the droplets or aerosols released by an infected person during coughing or sneezing. It can also spread by sharing glasses and utensils with an infected person.

Answer: (a) Amoebiasis — through contaminated food/water and housefly as mechanical carrier; (b) Malaria — through bite of infected female Anopheles mosquito; (c) Ascariasis — through food/water contaminated with parasite eggs in faeces; (d) Pneumonia — through inhalation of infected droplets/aerosols or sharing utensils.

Q4 What measure would you take to prevent water-borne diseases?

SOLUTION

Water-borne diseases such as typhoid, amoebiasis and ascariasis spread through contaminated water. The following measures help prevent them:

1. Drinking only clean, purified water — boiling water before drinking kills most pathogens.
2. Proper disposal of sewage and excreta to prevent contamination of water sources.
3. Periodic cleaning and disinfection of water reservoirs, pools, cesspools and tanks.
4. Treatment of public water supplies (chlorination, filtration) before distribution.
5. Eating clean food, fruits and vegetables — washing produce thoroughly before consumption.
6. Maintaining personal hygiene, especially washing hands before eating and after using the toilet.
7. Observing standard hygienic practices in public catering establishments.

Answer: Prevent water-borne diseases by drinking only purified/boiled water, proper sewage disposal, disinfection of water sources, washing food thoroughly, and maintaining personal hygiene (especially hand-washing).

Q5 Discuss with your teacher what does 'a suitable gene' means, in the context of DNA vaccines.

SOLUTION

In the context of DNA vaccines, 'a suitable gene' refers to a gene that encodes an antigenic protein of the pathogen — a protein that, when expressed in the host's own cells, will stimulate an immune response (both humoral and cell-mediated) without causing the actual disease.

A DNA vaccine works by introducing a plasmid carrying the gene for a specific antigenic protein of the pathogen into the host's body. The host cells take up this plasmid and express (produce) the antigenic protein. The immune system recognises this protein as foreign and mounts a

primary immune response, generating memory B-cells and T-cells.

For the gene to be 'suitable', it must:
— Encode a protein that is strongly immunogenic (triggers a robust immune response).
— Encode a protein that is specific to the pathogen (not present in host cells, to avoid autoimmune reactions).
— Be stable and expressible in human cells.
— Ideally encode a surface or secreted antigen that the immune system can readily recognise.

Recombinant DNA technology has already been used to produce antigenic polypeptides of pathogens in bacteria or yeast for subunit vaccines — for example, the hepatitis B vaccine is produced using yeast expressing the viral surface antigen gene. DNA vaccines extend this concept by letting the host's own cells produce the antigen.

Answer: In DNA vaccines, 'a suitable gene' is one that encodes a strongly immunogenic, pathogen-specific antigenic protein which, when expressed in the host's cells, stimulates a protective immune response without causing disease.

Q6 Name the primary and secondary lymphoid organs.

SOLUTION

Primary lymphoid organs are those where immature lymphocytes differentiate into antigen-sensitive lymphocytes (i.e., where lymphocytes mature):
— Bone marrow (site of origin and maturation of B-lymphocytes; also origin of all blood cells)
— Thymus (site of maturation of T-lymphocytes; a lobed organ located near the heart and beneath the breastbone)

Secondary lymphoid organs are those where mature lymphocytes migrate to and interact with antigens, proliferating to become effector cells:
— Spleen
— Lymph nodes
— Tonsils
— Peyer's patches of the small intestine
— Appendix
— Mucosa-Associated Lymphoid Tissue (MALT) — located within the lining of major tracts (respiratory, digestive and urogenital tracts); constitutes about 50% of the lymphoid tissue in the human body

Answer: Primary lymphoid organs: bone marrow and thymus. Secondary lymphoid organs: spleen, lymph nodes, tonsils, Peyer's patches of small intestine, appendix, and MALT.

Q7 The following are some well-known abbreviations, which have been used in this chapter. Expand each one to its full form:
(a) MALT
(b) CMI
(c) AIDS
(d) NACO
(e) HIV

SOLUTION

(a) MALT — Mucosa-Associated Lymphoid Tissue
(b) CMI — Cell-Mediated Immunity
(c) AIDS — Acquired Immuno Deficiency Syndrome
(d) NACO — National AIDS Control Organisation
(e) HIV — Human Immunodeficiency Virus

Answer: (a) Mucosa-Associated Lymphoid Tissue; (b) Cell-Mediated Immunity; (c) Acquired Immuno Deficiency Syndrome; (d) National AIDS Control Organisation; (e) Human Immunodeficiency Virus.

Q8 Differentiate the following and give examples of each:
(a) Innate and acquired immunity
(b) Active and passive immunity

SOLUTION

(a) Innate immunity vs Acquired immunity:

Innate immunity is the non-specific type of defence present from birth. It does not depend on prior exposure to a pathogen and has no memory. It acts through physical barriers (skin, mucus), physiological barriers (stomach acid, saliva, tears), cellular barriers (PMNL-neutrophils, monocytes, natural killer cells, macrophages) and cytokine barriers (interferons secreted by virus-infected cells). Example: Skin preventing microbial entry; macrophages phagocytosing bacteria; interferons protecting uninfected cells from viral infection.

Acquired immunity is pathogen-specific and develops after exposure to a pathogen or antigen. It is characterised by memory — the secondary response to the same pathogen is faster and more intense than the primary response. It operates through B-lymphocytes (producing antibodies — humoral immune response) and T-lymphocytes (cell-mediated immune response, CMI). Example: Recovery from chickenpox conferring lifelong immunity; antibody production against a specific bacterial antigen; graft rejection mediated by T-cells.

(b) Active immunity vs Passive immunity:

Active immunity is produced when a host is exposed to antigens (living or dead microbes, or other proteins) and the host's own immune system produces antibodies. It develops slowly but is long-lasting due to immunological memory. Example: Immunity developed after natural infection (e.g., measles) or after vaccination (e.g., polio vaccine, hepatitis B vaccine).

Passive immunity is conferred when ready-made antibodies are directly given to the host. It provides immediate protection but is short-lived as the host does not produce its own antibodies and no memory is generated. Example: Injection of antitoxin (preformed antibodies) in cases of tetanus or snakebite; IgA antibodies passed to a newborn through mother's colostrum; antibodies transferred from mother to foetus via placenta.

Answer: (a) Innate immunity: non-specific, present from birth, no memory (e.g., skin, macrophages, interferons); Acquired immunity: pathogen-specific, develops after exposure, has memory (e.g., antibody production, CMI). (b) Active immunity: host makes own antibodies, slow but long-lasting (e.g., vaccination); Passive immunity: ready-made antibodies given, immediate but short-lived (e.g., antitoxin injection, colostrum).

Q9 Draw a well-labelled diagram of an antibody molecule.

SOLUTION

An antibody molecule has a Y-shaped structure composed of four polypeptide chains: two identical heavy (H) chains and two identical light (L) chains, held together by disulfide bonds. The molecule is therefore represented as H_2L_2.

Labels to include in the diagram:
— Heavy chains (H): two longer polypeptide chains forming the trunk and upper arms of the Y
— Light chains (L): two shorter polypeptide chains, one attached to each heavy chain in the upper arm region
— Disulfide bonds (S–S): inter-chain bonds linking H to H (in the hinge region) and H to L chains
— Variable region (V): the tips of both arms of the Y — the antigen-binding sites; both heavy and light chains have variable regions here
— Constant region (C): the lower portions of both heavy and light chains; determines antibody class (IgA, IgM, IgE, IgG, etc.)
— Antigen-binding sites: two sites at the tips of the two arms, formed by the variable regions of one H and one L chain together
— Hinge region: the flexible middle section of the heavy chains where the two H chains are joined by disulfide bonds
— Fc region (constant/stem): the lower trunk of the Y formed by the constant regions of the two heavy chains; mediates interaction with immune cells and complement

Note: IgG is the most common type and has the basic Y-shaped monomer structure described above. IgM is a pentamer of five such units.

Answer: An antibody is Y-shaped, composed of 2 heavy (H) chains + 2 light (L) chains (H_2L_2), joined by disulfide bonds. Key labelled parts: heavy chains, light chains, variable regions (antigen-binding sites at the tips), constant regions, hinge region, disulfide bonds, and Fc region.

Q10 What are the various routes by which transmission of human immunodeficiency virus takes place?

SOLUTION

HIV (Human Immunodeficiency Virus) is transmitted only through body fluids. The main routes of transmission are:

1. Sexual contact: Unprotected sexual contact with an HIV-infected person. Individuals with multiple sexual partners are at particularly high risk.

2. Blood and blood products: Transfusion of HIV-contaminated blood or blood products. People who require repeated blood transfusions (e.g., haemophilia patients) are at high risk.

3. Sharing infected needles and syringes: Intravenous drug abusers who share needles and syringes are at very high risk of HIV transmission.

4. Mother to child (vertical transmission): An HIV-infected mother can transmit the virus to her child through the placenta during pregnancy.

Important note: HIV/AIDS is NOT spread by mere touch or physical contact; it spreads only through body fluids. HIV-infected persons should not be isolated from family and society.

Answer: HIV is transmitted via: (1) sexual contact with infected person, (2) transfusion of contaminated blood/blood products, (3) sharing infected needles/syringes (intravenous drug use), and (4) from infected mother to child through the placenta.

Q11 What is the mechanism by which the AIDS virus causes deficiency of immune system of the infected person?

SOLUTION

After HIV enters the body, the following sequence of events leads to immune deficiency:

1. Entry into macrophages: HIV first enters macrophages. Inside the macrophage, the RNA genome of HIV replicates to form viral DNA with the help of the enzyme reverse transcriptase (HIV is a retrovirus). This viral DNA gets incorporated into the host cell's DNA and directs the infected macrophage to produce virus particles. The macrophages act like an HIV factory, continuously producing virus.

2. Attack on helper T-lymphocytes (TH cells): Simultaneously, HIV enters helper T-lymphocytes ($CD4^+$ T-cells), replicates within them and produces progeny viruses. These progeny viruses are released into the blood and attack more helper T-lymphocytes.

3. Progressive depletion of helper T-lymphocytes: This cycle repeats, leading to a progressive and continuous decrease in the number of helper T-lymphocytes in the body. Helper T-cells are central coordinators of the immune response — they help B-cells to produce antibodies and also activate cytotoxic T-cells.

4. Immunodeficiency and opportunistic infections: As helper T-lymphocyte numbers fall, the immune system becomes severely compromised. The infected person starts suffering from

infections caused by organisms (bacteria such as Mycobacterium, viruses, fungi and even parasites like Toxoplasma) that a healthy immune system would normally control. These are called opportunistic infections. The person is so immunodeficient that he/she cannot protect himself/herself against these infections.

The time between HIV infection and the appearance of AIDS symptoms may vary from a few months to many years (usually 5–10 years).

Answer: HIV enters macrophages (acting as a virus factory) and helper T-lymphocytes, replicates using reverse transcriptase, and progressively destroys helper T-cells. The resulting fall in T-cell numbers cripples both humoral and cell-mediated immunity, leaving the person vulnerable to opportunistic infections.

Q12 How is a cancerous cell different from a normal cell?

SOLUTION

A cancerous (neoplastic) cell differs from a normal cell in the following key ways:

1. Loss of contact inhibition: Normal cells show contact inhibition — when they come into contact with neighbouring cells, their growth is inhibited, preventing uncontrolled proliferation. Cancer cells have lost this property and continue to divide uncontrollably.

2. Uncontrolled growth and division: In normal cells, growth and differentiation are highly controlled and regulated. In cancer cells, these regulatory mechanisms break down, leading to uncontrolled proliferation and formation of tumors (masses of cells).

3. Invasiveness: Normal cells remain within their tissue boundaries. Malignant tumor (cancerous) cells grow rapidly, invading and damaging surrounding normal tissues.

4. Metastasis: Cancerous cells have the ability to detach from the primary tumor, travel through the blood to distant sites in the body, and establish new tumors there. This property — metastasis — is the most feared characteristic of malignant tumors and is absent in normal cells.

5. Competition for nutrients: Cancerous cells actively divide and grow, starving normal cells by competing for vital nutrients.

6. Oncogene activation: Cancerous cells often have activated oncogenes (either viral oncogenes or cellular proto-oncogenes, c-onc, converted to oncogenes) that drive uncontrolled proliferation, which is not a feature of normal cells.

Answer: Cancerous cells differ from normal cells by: loss of contact inhibition, uncontrolled proliferation, invasiveness of surrounding tissues, ability to metastasise (spread to distant sites via blood), and competition for nutrients — all resulting from breakdown of normal growth regulatory mechanisms and oncogene activation.

Q13 Explain what is meant by metastasis.

SOLUTION

Metastasis is the ability of malignant (cancerous) tumor cells to spread from the primary tumor site to distant parts of the body and establish new tumors there.

In metastasis, cells sloughed off from a malignant tumor enter the bloodstream. They travel through the blood circulation to distant sites in the body. Wherever these cells get lodged, they start growing and dividing, forming a new tumor at that secondary location.

Metastasis is considered the most feared property of malignant tumors because:
— It makes the cancer much more difficult to treat (surgery can remove the primary tumor but cannot easily address multiple secondary tumors).
— It means the cancer has spread beyond its original location, making complete eradication very challenging.
— It is responsible for the majority of cancer deaths.

Benign tumors, by contrast, do not metastasise — they remain confined to their original location and cause little damage.

Answer: Metastasis is the spread of cancerous cells from a primary tumor via the blood to distant sites in the body, where they establish new tumors. It is the most feared property of malignant tumors and distinguishes them from benign tumors.

Q14 List the harmful effects caused by alcohol/drug abuse.

SOLUTION

The harmful effects of alcohol and drug abuse include:

Immediate/short-term effects:
— Reckless behaviour, vandalism and violence
— Excessive doses may lead to coma and death due to respiratory failure, heart failure or cerebral haemorrhage
— A combination of drugs or intake along with alcohol generally results in overdosing and even death

Social and behavioural effects:
— Drop in academic performance
— Unexplained absence from school/college
— Lack of interest in personal hygiene
— Withdrawal, isolation, depression and fatigue
— Aggressive and rebellious behaviour
— Deteriorating relationships with family and friends
— Loss of interest in hobbies
— Change in sleeping and eating habits; fluctuations in weight and appetite
— Financial distress to self, family and friends
— May turn to stealing when unable to get money for drugs/alcohol

Long-term/chronic effects:
— Damage to nervous system and liver (cirrhosis) with chronic use
— Heavy alcohol use in adolescence may lead to alcoholism in adulthood
— Adverse effects on the foetus if drugs/alcohol are used during pregnancy

Infectious disease risk:
— Intravenous drug users who share needles are at much higher risk of acquiring AIDS (HIV) and Hepatitis B — both chronic, ultimately fatal infections

Effects of anabolic steroids (misused by some sportspersons):
In females: masculinisation, increased aggressiveness, mood swings, depression, abnormal menstrual cycles, excessive facial/body hair, enlargement of clitoris, deepening of voice.
In males: acne, increased aggressiveness, mood swings, depression, reduction in testicular size, decreased sperm production, kidney and liver dysfunction, breast enlargement, premature baldness, enlargement of prostate gland.
In adolescents of both sexes: severe facial and body acne, premature closure of growth centres of long bones leading to stunted growth.

Answer: Harmful effects of alcohol/drug abuse: immediate — reckless behaviour, coma, death from overdose; social — academic decline, isolation, aggression, financial distress; long-term — nervous system damage, liver cirrhosis; risk of AIDS and Hepatitis B (via shared needles); anabolic steroid misuse causes hormonal and reproductive damage; stunted growth in adolescents.

Q15 Do you think that friends can influence one to take alcohol/drugs? If yes, how may one protect himself/herself from such an influence?

SOLUTION

Yes, friends and peer pressure are among the most significant factors influencing adolescents to experiment with alcohol and drugs. The perception among youth that it is 'cool' or progressive to smoke, use drugs or alcohol can be heavily reinforced within friend groups. Peer pressure — the direct or indirect influence of friends — can drive a person to try alcohol or drugs even when they would not otherwise do so.

How one can protect oneself from peer influence:

1. Avoid undue peer pressure: Have confidence in one's own choices and personality. One should not feel compelled to conform to behaviour that is harmful just to fit in with friends.

2. Education and counselling: Being well-informed about the harmful effects of drugs and alcohol helps one make an informed refusal. Education about addictive potential is a strong deterrent.

3. Channelise energy into healthy activities: Engaging in sports, reading, music, yoga and other extracurricular activities reduces the likelihood of giving in to peer pressure, as healthy pursuits provide positive outlets.

4. Seek help from parents, teachers and trusted friends: If one is facing peer pressure to use drugs or alcohol, immediately seeking guidance from parents or teachers provides both support and appropriate advice.

5. Build strong family and social bonds: Stable, nurturing family structures are associated with lower risk of substance abuse. Strong bonds with family and positive role models help resist negative peer influence.

6. Develop the ability to say 'no': Practising firm refusal and learning to exit situations where drugs or alcohol are present is an important protective skill.

Answer: Yes, peer pressure is a major factor in adolescent drug/alcohol experimentation. Protection: avoid undue peer pressure; get education about harmful effects; channel energy into healthy activities; seek guidance from parents and teachers; build strong family bonds; and develop the confidence to firmly refuse.

Q16 Why is that once a person starts taking alcohol or drugs, it is difficult to get rid of this habit? Discuss it with your teacher.

SOLUTION

Once a person starts taking alcohol or drugs, it becomes very difficult to stop due to the following physiological and psychological reasons:

1. Addiction — psychological dependence: Drugs and alcohol produce perceived benefits such as euphoria, a temporary feeling of well-being and relief from stress. Addiction is a psychological attachment to these effects. The person is driven to take them even when they are not needed or when their use has become self-destructive.

2. Tolerance: With repeated use of drugs or alcohol, the receptors in the body develop tolerance — they become less sensitive and respond only to higher and higher doses. This forces the person to take progressively greater amounts to achieve the same effect, deepening the addiction.

3. Dependence — physical withdrawal syndrome: Dependence is the tendency of the body to manifest a characteristic and unpleasant withdrawal syndrome if the regular dose of drugs or alcohol is abruptly stopped. Withdrawal symptoms include anxiety, shakiness, nausea and sweating. In some cases, withdrawal symptoms can be severe and even life-threatening, requiring medical supervision. The discomfort of withdrawal drives the person back to using the substance.

4. Vicious cycle: The combined effect of addiction and dependence pulls the user into a vicious cycle — the body demands more of the substance, and stopping causes such severe discomfort that resuming the habit becomes the path of least resistance.

5. Social and environmental factors: Without guidance, counselling or professional help, the person is poorly equipped to break free from this cycle.

Treatment requires a combination of medical supervision, psychological counselling, and

de-addiction and rehabilitation programmes. With sufficient willpower and professional support, recovery is possible.

Answer: Once started, alcohol/drug habits are difficult to quit because of addiction (psychological craving for euphoria), tolerance (need for increasing doses), and physical dependence (severe withdrawal symptoms on stopping). These create a vicious cycle that requires professional medical and psychological help to overcome.

Q17 In your view what motivates youngsters to take to alcohol or drugs and how can this be avoided?

SOLUTION

Motivating factors that drive youngsters towards alcohol and drugs:

1. Curiosity, need for adventure and experimentation: The natural curiosity of adolescents motivates them to try new experiences, including substances perceived as exciting or forbidden.

2. Peer pressure and desire to 'fit in': The perception that using alcohol or drugs is 'cool' or modern, reinforced by friends, can strongly motivate experimentation.

3. Escape from stress and problems: Pressures to excel in academics or competitive examinations, family problems, and personal failures can push youngsters to use drugs or alcohol as a means of escape.

4. Media influence: Television, movies, newspapers and internet promote the image of alcohol/drug use as glamorous or desirable, influencing young minds.

5. Unstable or unsupportive family structures: Lack of emotional support at home is associated with increased risk of substance abuse.

6. Perceived benefits: Early use may give a perception of relief from anxiety or improved social confidence, reinforcing the behaviour.

How this can be avoided:

1. Education and awareness: Making youngsters aware of the harmful effects, addictive nature and health consequences of alcohol and drugs from an early age.

2. Avoiding undue peer pressure: Encouraging children to develop their own identity and not feel compelled to conform to harmful group behaviours.

3. Channelising energy positively: Providing opportunities for sports, arts, music, yoga and other constructive activities that give a sense of achievement and fulfilment.

4. Strong parenting: Parenting that combines high nurturance with consistent discipline is associated with lowered risk of substance abuse. Open communication between parents and children is essential.

5. Looking for danger signs: Parents, teachers and friends should watch for warning signs (academic decline, withdrawal, change in behaviour) and act early.

6. Seeking professional help: Qualified psychologists, psychiatrists and rehabilitation programmes are available and should be accessed without hesitation when needed.

Answer: Youngsters are motivated by curiosity, peer pressure, stress/escape, media glamourisation, and unstable family environments. This can be avoided through education about harmful effects, strong parenting and counselling, positive channelling of energy into healthy activities, avoiding peer pressure, and seeking professional help early.