HANDOUT 3/3

Class - IX Subject - Science

Chapter 13 – Why do we fall ill?

PRINCIPLES OF TREATMENT

The treatment of infectious diseases consists of two steps. They are to reduce the effects of the disease (symptoms) and to kill the microbes which caused the disease.

i) To reduce the effects of the disease :- This can be done by taking medicines to bring downthe effects of the disease like fever, pain or loose motions etc. and by taking bed rest toconserve our energy.

ii) To kill the microbes :- This can be done by taking suitable antibiotics and drugs which kills the microbes and the disease is cured.

Antibiotics –

They are chemical substances produced by living organism such as bacteria and fungi,etc., which can kill or stop the growth of some pathogenic microrganisms.

Ex- Penicillin, Tetracycline, Streptomycin, etc.

Vaccine –

It is suspension of disease-producing microbes which does not cause disease but on entering, body initiates immune system to produce antibodies against particular disease and killing microbes.

‘Cow’ is ‘vacca’ in Latin, and cowpox is ‘vaccinia’. From these roots, the word ‘vaccination’ has come into our usage

How do we kill microbes? - Antibiotics

Microbes can be classified into different categories- viruses, bacteria, fungi or protozoa. Each of these groups of organisms will have some essential biochemical life process which is peculiar to that group and not shared with the other groups. These processes may be pathways for the synthesis of new substances or respiration.

These pathways will not be used by us either. For example, our cells may make newsubstances by a mechanism different from that used by bacteria. We have to find a drug thatblocks the bacterial synthesis pathway without affecting our own. This is what is achieved bythe antibiotics that we are all familiar with. Similarly, there are drugs that kill protozoasuch as the malarial parasite.

One reason why making anti-viral medicines is harder than making anti-bacterial medicines is that viruses have few biochemical mechanisms of their own. They enter our cells and use our machinery for their life processes

PRINCIPLES OF PREVENTION

There are two ways of prevention of infectious diseases- general ways and specific ways.

i) General ways of prevention :- Public hygiene is most important for prevention of infectious diseases. Proper and sufficient food for everyone will make people healthy to resist infection.

Air borne diseases can be prevented by living in conditions that are not crowded.

Water borne diseases can be prevented by providing safe drinking water.

Vector borne diseases can be prevented by providing clean environment.

ii) Specific ways of prevention :- The specific ways to prevent infectious disease isimmunisation by taking vaccines. Vaccines provide immunity from infectious diseases liketetanus, diphtheria, whooping cough, measles, polio etc. Our body has an immune systemwhich fights microbial infection. When this system first sees an infectious microbe, it kills the microbe and remembers it. So if the microbe enters the body the next time, it responds more vigorously. Vaccines mimic the infectious microbe and strengthens our immune system and protects the body from infectious diseases.

Principle of Immunisation.

- **when the immune system first sees an infectious microbe, it responds against it and then remembers it specifically.**
- **So the next time that particular microbe, or its close relatives enter the body, the immune system responds with even greater vigour.**
- **This eliminates the infection even more quickly than the first time around.**
- **This is the basis of the principle of immunisation.**

IMMUNISATION

Traditional Indian and Chinese medicinal systems sometimes deliberately rubbed theskin crusts from smallpox victims into the skin of healthy people.

They thus hoped toinduce a mild form of smallpox that would create resistance against the disease.

Famously, two centuries ago, an English physician named Edward Jenner, realisedthat milkmaids who had had cowpox did not catch smallpox even during epidemics .

Cowpox is a very mild disease. Jenner tried deliberately giving cowpox to people, and found that they were now resistant to smallpox.

This was because the smallpox virus is closely related to the cowpox virus.

'Cow' is 'vacca' in Latin, and cowpox is 'vaccinia'. From these roots, the word 'vaccination' has come into our usage

Immunisation gives a very good level of protection against many serious diseases.

It uses your body's natural defence mechanism, the immune response, to build resistance tospecific infection.

There are three reasons why we immunise children.

1) immunisation prevents children from becoming ill with unpleasant and seriousinfectious diseases, which have a risk of complications and long-term side effects.
2) we immunise to try and help protect all children in the population. The morepeople who are immunised, the less of the infectious disease there is around so the lesschance there is of anyone catching it. When levels of immunisation against an infectiousdisease are really, really high - then something happens called 'herd immunity' where therisk of the disease occurring is so low that even those who cannot be immunised areunlikely to be affected.

3) we immunise to try and wipe out as many infectious diseases as we can everywhere in the world.

Difference Between Vaccination And Immunization	
Vaccination	**Immunization**
The process involves Introducing a weakened / deactivated disease causing microbes into a person	The process starts after the person is exposed to the vaccine and the body starts building resistance to that disease
It is usually injected or administered orally	It is not administered in any way, the body develops the resistance from vaccines
Imovax Rabies is the trade name for rabies vaccine	The body builds up immunity through this vaccine for the disease rabies
Vaccination does not guarantee complete resistance to a disease	Complete immunity occurs when the person fully recovers from the disease
Usually, if mutation happens to microbe, it might render the vaccine ineffective (this is the reason why common cold has no vaccine)	Similarly, variations of a disease impact the body's ability to generate an immune response

Rabies virus is spread by the bite of infected dogs and other animals. There are anti-rabies vaccines for both humans and animals.

S.N	Vaccine	Age of administration	Dose	Route of administration	Protect against
1.	BCG (Bacillus Calmette Guerin)	At birth	1	Intradermal	Tuberculosis
2.	Pentavalent Vaccine (Diphtheria, Pertussis, Tetanus, Hepatitis B and Hemophilus influenza B)	6, 10 and 14 weeks	3	Intramuscular	Diphtheria, pertussis,Tetanus, Hepatitis B and Haemophilus Influenza B
3.	OPV (Oral Polio Vaccine)	6, 10 and 14 weeks	3	Oral	Polio
4.	PCV (Pneumococcal Conjugate Vaccine)	6, 10 weeks and 9 months	3	Intramuscular	Pneumococcal diseases (Meninges, ear and chest infections)
5.	Rotavirus vaccine	6, 10 weeks	2	Oral	Rota virus diarrhea
5.	fIPV (Fractional Injectable polio vaccine)	6, 14 weeks	2	Intramuscular	Polio
6.	MR (Measles – Rubella)	9 and 15 months	2	Subcutaneous	Measles and Rubella
7.	JE (Japanese Encephalitis)	12 months	1	Subcutaneous	Japanese Encephalitis

National Immunization Schedule

For Infants	Vaccine & Dose	Route
At Birth	BCG 0.1ml + OPV 2drops(0 dose)	Intradermal
6 weeks	BCG 0.1ml [if not at birth]	Intradermal
	DPT-1 0.5ml + OPV-1 2drops	I/M + Oral
10 weeks	DPT-2 + OPV-2	I/M + Oral
14 weeks	DPT-3 + OPV-3	I/M + Oral
9-12 months	Measles 0.5ml + Vit. A 2ml	Deep S/C + Oral
At 18 months	DPT + OPV[Boosters-1]	I/M + Oral
At 24, 30, 36 months	Vitamin A 2ml	Oral
At 5-6 years	DT[Booster-2]	I/M
At 10 and 16 years	Tetanus Toxoid	I/M
For Pregnant Women	**Vaccine & Dose**	**Route**
Early in Pregnancy	TT-1 or Booster	I/M
One month after TT-1	TT-2	I/M

Disease	Causative Organism	Mode of Transmission	Control	Prevention
Malaria	Plasmodium	Bite of female Anopheles	Quinine	Breaking contact between female Anopheles and man, eliminating Anopheles
Diarrhea	Protozoan, bacteria, viruses	Contaminated food and water	ORS or salt-sugar solution	Proper sanitation, personal hygiene
Cholera	Vibrio cholerae	Contaminated food and water	Antibiotics, ORS or salt-sugar solution	Proper sanitation, vaccination
Typhoid	Salmonella typhi	Contaminated food and water	Use of antibiotics	Proper sewage system, using chlorinated or boiled water
Tuberculosis	Mycobacterium tuberculosis	Cough/sneeze droplets, contaminated milk	Use of antibiotics	Awareness to maintain cleanliness in public places and BCG vaccine for children
Hepatitis	Hepatitis viruses (A-G)	Contaminated food and water for some forms, through body fluids for others	Rest, antiviral injection, food rich in carbohydrates	Good sanitation, safe drinking water, use tested blood, disposables needles and syringes
Rabies	Rabies virus	Bite of infected animal	No cure after the diseases develops	Wash the wound antirabies serum, course of vaccine shots, pets should be vaccinated,
AIDS	Human immunodeficiency virus (HIV)	Infected blood, semen, breast milk, mother to fetus	No cure yet, a combination of drugs slows down progress of the diseases	Screening of blood and donors, use of disposable needles and syringes, not sharing blades and razors, safe sex practices.
Influenza	Myxovirus	Cough/sneeze droplets	No cure, bed rest, aspirin and fluids provide relief	Keeping away from infected person

Additional information about various diseases

1) TUBERCULOSIS

· Tuberculosis (TB), also called Koch's disease is caused by rod-shaped, Gram +ve bacteria,Mycobacterium tuberculosis.

· The bacterium releases a toxin, tuberculin which destroys the organs it infects.

· It can affect almost any tissue or organ in the body like the lungs, lymph nodes, brain, bonesand joints but disease of the lung is by far the most frequent.

Mode of transmission of Tuberculosis

· Incubation period is 3 to 6 weeks or may be years.

· It spreads through sneezing, coughing, contaminated food and water.

Symptoms of Tuberculosis

· Constant cough and in severe cases sputum with blood, pain in chest while coughing, loss ofbody weight, failure of appetite, slight rise of temperature in the evening are the symptoms oflung T. B.

· Sputum, tuberculin, X-ray and gastric analysis are carried out to diagnose tuberculosis.

· Tuberculin test is also called Mantoux test.

Prevention and treatment of Tuberculosis

· BCG (Bacillus Calmette Guerin) vaccine for TB was obtained from bovine bacillus byCalmette and Guerin in 1921.

· Before giving vaccination to any individual it is important to check if they are alreadysuffering from TB or have recovered from it.

· The test is to puncture the skin with a special instrument which has a ring of six short needles(the Heaf test). This introduces tuberculin, purified from dead tubercle bacilli.

· In the absence of past or present TB the skin shows no reaction, but if an individual has thedisease or has recovered, then the skin swells and reddens at the injection site. This indicates asubstantial immunity and no vaccine is offered.

· Some of the anti-tuberculosis drugs are streptomycin, rifampicin, isoniazid, thiatazone, PAS(Para amino salicydic acid) etc.

· Direct observation treatment (DOT) is a programme under WHO for treatment of TB acrossthe world.

2) ANTHRAX (BIOWAR DISEASE)

· Anthrax is an acute infectious disease caused by airborne, spore-forming, rod-like, non-motile bacterium, Bacillus anthracis.

· Bacillus anthracis can be easily grown in the laboratory. Anthrax spores can be produced in adry form which can be stored as particles.

· These particles can be used in biological warfare. Spores are infective in dry form, not in wetform.

· It most commonly occurs in wild and domestic vertebrates (cattle, sheep, goats, camels,antelopes, and other herbivores), but it can also occur in humans when they are exposed toinfected animals or tissues from infected animals.

Mode of transmission of Anthrax (Biowar disease)

· Infected animals shed, a large number of bacilli (bacteria) in the discharges from the mouth,nose and rectum which sporulate in the soil. These spores are source of infection.

· It requires thousands of spores to cause human infection. Anthrax does not spread fromhuman to human.

Symptoms of Anthrax (Biowar disease)

· Initial symptoms resemble those of common cold. Later there is difficulty in breathing,cough, fever, fast pulse and cardiovascular collapse.

· If left untreated, anthrax in all forms can lead to septicemia and death.

· Death is apparently due to oxygen depletion, secondary shock, increased vascularpermeability, respiratory failure and cardiac failure.

Prevention and treatment of Anthrax (Biowar disease)

· The only known effective prevention against anthrax is the anthrax vaccine. The vaccine wasdeveloped from an attenuated strain B. anthracis.

· A suitable antibiotic like ciprofloxacin is quite effective, particularly if used in the initialstages of disease. But in cattle, ciprofloxacin may be effective only in chronic area.

· Antibiotics should be given to unvaccinated individuals exposed to pulmonary anthrax.Penicillin, tetracycline and fluoroquinolones are effective if administered before the onset oflymphatic spread or septicaemia.

3) PLAGUE (BLACK DEATH)

· Plague is caused by a rod-shaped non-motile bacterium called Pasteurella/Yersinia pestis andis transmitted by the bite of infected rat flea, Xenopsyllacheopis.

· The first authenticated plague epidemics in India in modern times occurred in 1895-96 andfrom 1898 onwards the disease was appreciably manifest, reaching a peak in the year 1907.

· Pasteurella pestis endoparasite of gut of rat flea (which is an ectoparasite of rat and mouse).

· Head louse (Pediculus) and bedbug (Cimex) may also transmit the germs from man to man.

Prevention and treatment of Plague (Black death)

· Plague is confirmed by Wayson stain test.

· Anti-plague vaccine, spray of insecticides, killing of rats, nose caps and high cots (rat flea canjump upto 45 cm) are some preventive measures.

· Streptomycin or oral tetracycline is effective against plague.

4) DIARRHOEAL DISEASES

· Diarrhoeal diseases are group of diseases caused by different bacteria such as Shigelladysenteriae, Escherichia coli, Campylobacter, Salmonella and Clostridium.

Mode of transmission of Diarrhoeal diseases

· Incubation period is variable.

· Epidemics are common in overcrowded insanitary conditions.

· It spreads through food poisoning, contaminated food, water or drinks, clothes, utensils andbed sheets.

Symptoms of Diarrhoeal diseases

· This is characterised by mild diarrhoea i.e., loose stools if infected by E. coli, frequent stoolswith blood and mucus and abdominal cramps if infected by Shigella. Other symptoms aredehydration, diminished appetite, fever, low B.P., increase in pulse rate etc.

Prevention and treatment of Diarrhoeal diseases

· One should avoid contaminated food and water.

· ORS is given repeatedly to check dehydration and loss of minerals.

5) PNEUMONIA

· Pneumonia is a serious disease of lungs characterised by accumulation of mucus/fluid inalveoli and bronchioles to that extent that breathing becomes difficult.

· It is caused by Streptococcus pneumoniae or Diplococcus pneumoniae, and Haemophilusinfluenzae.

Mode of transmission of Pneumonia

· Incubation period is of 1-3 days.

· A healthy person acquires the infection by inhaling the droplets/aerosols released by aninfected person or even by sharing glasses and utensils with an infected person.

Symptoms

· The onset of pneumonia is usually sudden with a single shaking chill, followed by fever, painwith breathing on the side of lung involved, increased pulse and respiratory rates and cough.

· In severe cases the lips and finger nails turn grey to bluish in colour.

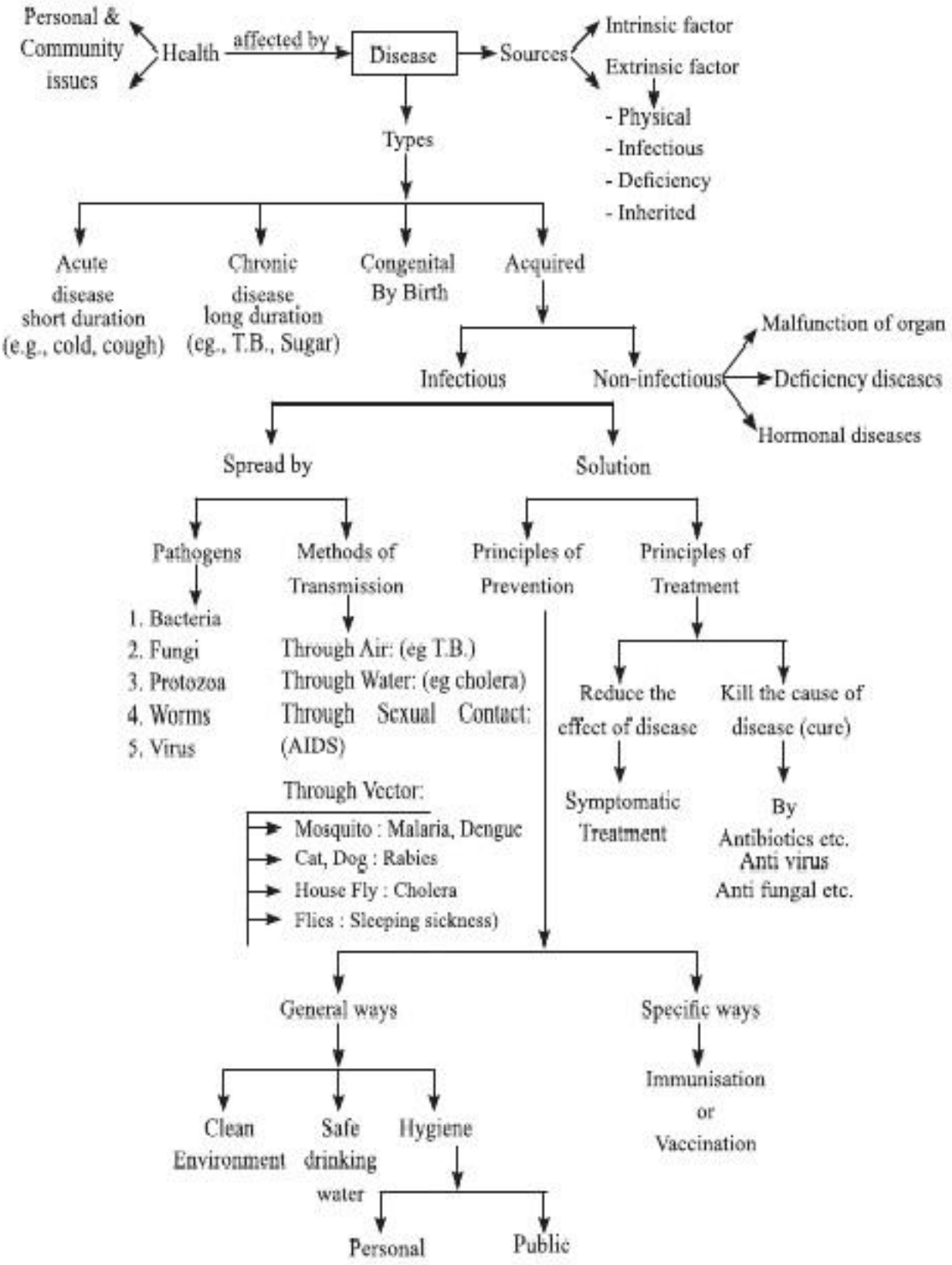
Prevention and treatment of Pneumonia

· The patients should be isolated and healthy persons should not share their belongings.

· Pneumococcal conjugate vaccine (PCV13) is available.

· Drugs against pneumonia are erythromycin, tetracycline and sulphonamide. If untreated,pneumonia leads to death.

CONCEPT MAP


Personal & Community issues
Health
affected by
Disease
Sources
Intrinsic factor
Extrinsic factor
- Physical
- Infectious
- Deficiency
- Inherited
Types
Acute disease short duration (e.g., cold, cough)
Chronic disease long duration (eg., T.B., Sugar)
Congenital By Birth
Acquired
Infectious
Non-infectious
Malfunction of organ
Deficiency diseases
Hormonal diseases
Spread by
Solution
Pathogens
Methods of Transmission
1. Bacteria
2. Fungi
3. Protozoa
4. Worms
5. Virus
Through Air: (eg T.B.)
Through Water: (eg cholera)
Through Sexual Contact: (AIDS)
Through Vector:
Mosquito : Malaria, Dengue
Cat, Dog : Rabies
House Fly : Cholera
Flies : Sleeping sickness)
Principles of Prevention
Principles of Treatment
Reduce the effect of disease
Kill the cause of disease (cure)
Symptomatic Treatment
By Antibiotics etc.
Anti virus
Anti fungal etc.
General ways
Specific ways
Clean Environment
Safe drinking water
Hygiene
Personal
Public
Immunisation or Vaccination