GIT INFECTIONS

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Objectives of Lecture

To,

1. define and classify diarrhea
2. discuss the burden of diarrheal diseases
3. describe epidemiological concepts of acute intestinal infectious diseases
4. discuss W.H.O strategies for control and prevention of these diseases
Acute Diarrheal Diseases

- A Group of diseases in which the paramount symptom is diarrhea
- Diarrhea (≥ 03 loose watery stools per day for 3-7 days)
- Recent change in consistency & character of stool is more important than number of stools
- Chronic diarrhea (diarrhea for >3 weeks)
- Dysentery (Diarrhea with blood & mucous)
- Acute Gastroenteritis (Diarrhea with constitutional symptoms due to infection of bowel)
Diarrhoeal is the second leading cause of death in children under five years old. It is both preventable and treatable.

Each year diarrhoea kills around 760,000 children under five.

A significant proportion of diarrhoeal disease can be prevented through safe drinking-water and adequate sanitation and hygiene.

Globally, there are nearly 1.7 billion cases of diarrhoeal disease every year.

Diarrhoea is a leading cause of malnutrition in children under five years old.

Classification of infective diarrhoea

Viral:
- Rotavirus
- Astroviruses
- Adenoviruses
- Calciviruses
- Coronavirus
- Enteroviruses
- Norwalk group

Bacterial:
- Campylobacter jejuni
- Escherichia coli
- Shigella
- Salmonella
- Vibrio cholerae
- Vibrio parahaemolyticus
- Bacillus cereus

Others:
- E. Histolytica
- Giardia intestinalis
- Trichuriasis
- Cryptosporidium
- Intestinal Worms

Viral: race n, bacterial bsc ve, others get ci
Viral Diarrhoea

• Viruses are probably responsible for about one-half of all diarrhoeal cases in children up to two years.
• Rota viruses have emerged as the single most important cause of diarrhea in infants and children.
• Nearly all children are infected at least once before the age of 02 years.
Bacterial diarrhoea

- **Enterotoxigenic Escherichia coli (ETEC)** is an important cause of acute watery diarrhea.
- ETEC does not invade the bowel mucosa but causes diarrhea mediated by toxins.
- Two ETEC toxins; heat labile and heat stable
- **Salmonella** cause inflammation of bowel epithelium
- Gram negative **campylobacters** are one of the commonest causes of enteritis
- **Shigellosis** caused by S.Dysenteriae Type 1 are the most severe and often occur in epidemic form.
Others

- **Amoebiasis, Giardiasis** and other parasitic infections are the recognized causes of diarrhea.
- **Cryptosporidium** causes diarrhea in infants, immunodeficient patients and a variety of domestic animals.
- **Parenteral** infections particularly in younger children may cause diarrhea.
- Even simple teething may cause diarrhea.
- Certain **malnutritions** like kwashiorkor and coeliac disease are also associated with diarrhea.
- Diarrhea in a newborn may be due to **inborn errors of metabolism** such as Cong. Enzyme deficiencies.
- **AIDS**
| Reservoir of Infection                      | Man as principal reservoir (E.Coli, Shigella, V.Cholera, Giardia lamblia, E.histolica)  
|                                           | Man and animals both as reservoir (Campylobacter jejuni, Salmonella spp, Y.enterocolitica) |
| Host Factors                               | Diarrhea is more common in children especially between 6 months and 2 years  
|                                           | Highest in the age when weaning occurs  
|                                           | Poverty, prematurity, immunodeficiency, lack of personal and domestic hygiene |
| Environmental Factors                      | Bacterial diarrhea is more frequent in warm seasons  
|                                           | Viral diarrhea during winter |
| Mode of Transmission                       | Faeco-oral route |
Key measures to prevent diarrhoea

- access to safe drinking-water
- use of improved sanitation
- hand washing with soap
- exclusive breastfeeding for the first six months of life
- good personal and food hygiene
- health education about how infections spread
- Vaccination against Rota Virus
Key measures to treat diarrhoea

- **Rehydration**: with oral rehydration salts (ORS) solution. ORS is a mixture of clean water, salt and sugar. It costs a few cents per treatment. ORS is absorbed in the small intestine and replaces the water and electrolytes lost in the faeces.

- **Zinc supplements**: zinc supplements reduce the duration of a diarrhoea episode by 25% and are associated with a 30% reduction in stool volume.

- Rehydration: with intravenous fluids in case of severe dehydration or shock.
Key measures to treat diarrhoea contd...........

• **Nutrient-rich foods**: the vicious circle of malnutrition and diarrhoea can be broken by continuing to give nutrient-rich foods – including breast milk – during an episode, and by giving a nutritious diet – including exclusive breastfeeding for the first six months of life – to children when they are well.

• Consulting a health professional, in particular for management of persistent diarrhoea or when there is blood in stool or if there are signs of dehydration.
W.H.O. Recommendations

Short Term measures

Appropriate Clinical Management

a) Oral Rehydration

b) I/V Rehydration (W.H.O. recommends Ringer’s Lactate and D.T.S)

c) Chemotherapy (unnecessary use of antibiotics should be avoided)

d) Appropriate Feeding (Normal food should be promoted)
Long Term measures

Betterment of MCH Care Practices

a) Maternal Nutrition

1. Prenatal
2. Postnatal

b) Child Nutrition

1. Promotion of breast feeding
2. Appropriate Weaning practices
3. Supplementary feeding
Long Term measures

Preventive Strategies

a) Sanitation
   1. Protection & purification of water supply
   2. Provision of safe water
   3. Sanitary disposal of human excreta
   4. Food sanitation

b) Health Education
   1. Human biology
   2. Nutrition
   3. Hygiene
   4. Family health
   5. Disease prevention and control
   6. Mental health

c) Immunization (against measles)
d) Fly control
W.H.O. Recommendations

Long Term measures
Control and Prevention of Diarrheal Epidemics

a) Primary health care (Intersectoral approach)
   1. Protection & purification of water supply
   2. Provision of safe water
   3. Sanitary disposal of human excreta
   4. Food sanitation

b) Surveillance through an effective epidemiological surveillance system. Disease Early Warning System.
Cholera

• An acute diarrhoeal disease, caused by V. Cholerae, characterized by sudden onset of profuse, effortless, watery diarrhea followed by vomiting, rapid dehydration, muscular cramps and suppression of urine.

• There are 60 serogroups but only serogroup 01 causes Cholera

• Serogroup 01 is of two Biotypes (Classical and El Tor)

• Each Biotype has got three serotypes (Ogava, Hikojima and Inaba)

• Case fatality may be as high as 30-40 percent
Historical back-ground

• Father of public health (Cholera)
• The most ancient disease and great killer of mankind
• 04 historical phases of cholera
  1. First Period (prior to 1817) Disease confined to east.
  2. Second Period (1817-1923) 06 large pandemics out of which 05 were Indian
  3. Third Period (1923-1960) Retreated from Europe
  4. Fourth Period (1961-todate) Pandemic by El Tor biotype
• A new strain of cholera 0139 emerged in India
## Epidemiological Features

<table>
<thead>
<tr>
<th></th>
<th><strong>Agent factor</strong></th>
<th><strong>V. Cholerae 01 (g-ve) Classical and Eltor with Inaba, Ogava and Hikojima stereotypes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td><strong>Incubation period</strong></td>
<td>Few hours to 05 days</td>
</tr>
<tr>
<td>3.</td>
<td><strong>Reservoir of infection</strong></td>
<td>Human being the only reservoir as case or carrier</td>
</tr>
<tr>
<td>4.</td>
<td><strong>Infective material</strong></td>
<td>Stools and vomits of cases or carriers</td>
</tr>
</tbody>
</table>
| 5. | **Period of infectivity** | - A case is infectious for seven days  
- Convalescent carrier for 2-3 wks  
- Chronic carrier state up to 10 yrs |
| 6. | **Mode of Transmission** | Faeco-oral route                                                                      |
| 7. | **Host/environmental factors** | - Highest in children  
- More in July & September                                                              |
| 8. | **Carriers of cholera** | - Incubatory (1-5 days)  
- Convalescent carrier (2-3 wks)  
- Healthy carriers  
- Chronic carriers |
HOST FACTORS

• Age---- All ages
• Sex----- Both sexes
• Gastric acidity--- pH 5 destroys organism
• Economic status– Increased incidence in lower socio-economic classes
• Population mobility--- may cause outspread
HOST FACTORS

• Immunity---- Infection confers immunity by local intestinal immune system
• Vaccination--- gives temporary immunity for 3-6 months
ENVIRONMENTAL FACTORS

• Poor environmental sanitation
• Contaminated water & food
• Human habits favoring water & soil pollution
• Flies
• Low standards of personal hygiene
• Poor quality of life
Suspect Cholera

• If there happens a death of a patient aged 5 Years or above, due to acute watery diarrhea.
Prevention & Control of Cholera
(Guide lines proposed by WHO)

- **Verification of diagnosis** (as early as possible get the stool examination for V. Cholera 01)
- **Notification** (Immediate notification to local health authority, within 24 hrs to WHO, Daily reporting till 10 days elapsed since last death, recovery or isolation of last case)
- **Early case finding and prompt treatment** (Detection of household and other contacts, establishment of treatment centers, Oral and I/V rehydration, Chemotherapy)
- **Epidemiological Investigations** (To define the extent of outbreak and identify the modes of transmission)
- **Sanitation Measures** (Safe water to the community for all purposes, Boiling and Chlorination with residual chlorine, Sanitary disposal of human excreta, Food sanitation, Health education)
- **Chemoprophylaxis** (Mass chemoprophylaxis not advised, H. Hold contacts are given tetracycline or doxycycline)
- **Vaccination** (Not recommended <01 Yr. age, Primary Vaccination with 02 doses with 4-6 wks apart mass vaccination is useless in controlling an epidemic)
Contd---

• **Health education** early reporting, prompt treatment. Use of ORS. Food hygiene. Proper cooking of food. Hand washing.
Composition for 01 liter of

- **ORS-HCO₃**
  - NaCl---------3.5 g
  - NaHCO₃-----2.5 g
  - KCl---------1.5 g
  - Glucose-----20 g

- **ORS-Citrate**
  - NaCl------------------3.5 g
  - Tri Na.Citrate dehydrate- ------2.9 g
  - KCl-------------------1.5 g
  - Glucose-----------------20 g
New developments

• Recent scientific advances have informed these revised recommendations

1. Development of an improved formula for ORS solution with reduced levels of glucose and salt, which shortens the duration of diarrhoea and the need for unscheduled intravenous fluids

2. Demonstration that zinc supplements given during an episode of acute diarrhoea reduce the duration and severity of the episode and

3. Findings that zinc supplementation given for 10–14 days lowers the incidence of diarrhoea in the following 2–3 months

# Reduced osmolarity ORS

<table>
<thead>
<tr>
<th></th>
<th>G/L</th>
<th>Mmol/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>NaCl</td>
<td>2.6</td>
<td>Sodium</td>
</tr>
<tr>
<td>Glucose, anhydrous</td>
<td>13.5</td>
<td></td>
</tr>
<tr>
<td>KCl</td>
<td>1.5</td>
<td>Potassium</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chloride</td>
</tr>
<tr>
<td>Trisodium citrate dihydrate</td>
<td>2.9</td>
<td>citrate</td>
</tr>
</tbody>
</table>

**Total osmolarity** 245
Solutions recommended for I/V Infusion

• Ringer’s Lactate Solution (Hartmann’s solution)

• If nothing else is available, normal saline can be given

• Diarrhea Treatment Solution (D.T.S)
  NaCl-----------------4 g
  Na-Acetate--------6.5 g
  Glucose----------10 g
MESSAGE

LIFE IS IN YOUR HANDS JUST WASH THEM.............
Thank you
Poliomyelitis

• An acute infection caused by Polio virus affecting primarily GIT but may involve CNS(1%) with varying degree of paralysis and even death

• Polio virus is an RNA virus having three serotypes 1,2 and 3

• Most outbreaks are due to serotype-1

• Polio virus can survive longer in cold environment (in Water for 04 Months&in feaces for 06 months)
Problem Statement

• In pre-vaccination era, Polio was found in all countries of the world.
• The extensive use of vaccines since 1954 eliminated polio in the developed countries.
• World Health Assembly passed a resolution for global eradication of polio.
• SEAR of WHO contains the largest remaining reservoir of wild polio.
• During 1996, twenty thousand cases of polio were reported to WHO with 7000 deaths.
• Today, only 3 countries in the world have never stopped transmission of polio (Nigeria, Pakistan, and Afghanistan).
PAKISTAN                   83 cases

## WORLD POLIO COUNT 2013 (TOTAL 368, all Type 1)

<table>
<thead>
<tr>
<th>Country</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAKISTAN</td>
<td>83</td>
</tr>
<tr>
<td>AFGHANISTAN</td>
<td>11</td>
</tr>
<tr>
<td>KENYA</td>
<td>14</td>
</tr>
<tr>
<td>NIGERIA</td>
<td>50</td>
</tr>
<tr>
<td>SOMALIA</td>
<td>183</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>6</td>
</tr>
<tr>
<td>cameroon</td>
<td>4</td>
</tr>
<tr>
<td>Syria</td>
<td>17</td>
</tr>
</tbody>
</table>
### EPIDEMIOLOGY

<table>
<thead>
<tr>
<th>C.Agent</th>
<th>Polio virus with 03 serotypes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reservoir of inf./Infectious material</td>
<td>Man is the only reservoir/Feaces and oro-pharyngeal secretions of an infected person</td>
</tr>
<tr>
<td>Incubation period/Period of communicability</td>
<td>Usually 04-14 days.( range 03-35days)/07-10 days before and after clinical manifestations</td>
</tr>
<tr>
<td>Mode of Transmission</td>
<td>1.Feaco-oral.2.Droplet infection</td>
</tr>
<tr>
<td>Clinical Spectrum</td>
<td>1.Sub-clinical (95% cases) 2.Abortive (4-8%) 3.Non-paralytic polio 4.Paralytic Polio &lt;1%</td>
</tr>
</tbody>
</table>
| Treatment | - No specific treatment  
- Good nursing care and physiotherapy  
- Rehabilitation of residual paralysis |
HOST FACTORS

• AGE........ Infancy & childhood
• SEX........ 3M: 1F
• RISK FACTORS.... Fatigue, Trauma, I/M injection, operative procedures.
• IMMUNITY.... Maternal antibodies gradually disappear during first 6 months of life.
ENVIRONMENTAL FACTORS

• 60% of cases occur in rainy season.
• Environmental sources of infection are contaminated water, food & flies.
• Polio virus survives for a longer time in cold environment.
• Overcrowding & poor sanitation increases risk for infection.
SITUATION IN PAKISTAN

• More than 90 National immunization days have been celebrated since 1994.
• Polio campaign is being run house to house for under 5 children.
• Evaluation is done at the end of campaign.
• Lameness surveys for residual polio cases is done by polio teams during NIDs
Methods of Control

• Notification to local heath authorities
• Isolation of cases and contacts (Contacts are isolated for 03 wks)
• Concurrent Disinfection of oro-pharyngeal secretions, feaces and articles soiled with them.
• Terminal Disinfection is not recommended
• Quarantine regulation permits 03 wks detention of contacts
• Immunization is the only means of preventing poliomyelitis. Celebration of Polio Days in Pakistan has reduced the burden of disease.
Strategies for Polio Eradication

• Conduct Pulse polio Immunization days until polio is eradicated
• Sustain high level of routine immunization coverage
• Monitor OPV coverage at district level and below
• Improve Surveillance system (SMO)
• Arrange follow-up of all cases of AFP at 60 Days
• Conduct outbreak control for cases confirmed or suspected to be poliomyelitis to stop transmission
PREVENTION

• Immunization is the sole effective mean of prevention
• Essential to immunize all infants by 6 months of age
• Two types of vaccines
  1. Inactivated (Salk) polio vaccine **IPV**
  2. Oral (Sabin) polio vaccine **OPV**
Inactivated polio vaccine

- Contains all three types of polio virus inactivated by formalin
- Induces humoral antibodies (IgM, IgG, IgA) but does not induce intestinal or local immunity
- 4 doses are given S/C or I/M
  - First three doses at interval of 1-2 months commencing at 6 weeks of age
  - 4th dose 6-12 months after third dose
IPV

**Advantages**

- Safe to administer to:
  - Immunodeficient persons
  - Persons undergoing corticosteroid and radiation therapy
  - People over 50 years of age
  - Pregnant woman

**Drawbacks**

- Does not confer protection to community from wild virus
- Unsuitable to use in epidemic
  - Immunity is not rapidly achieved
  - Avoidance of injections in epidemics
Oral Polio Vaccine

• Contains live attenuated virus type 1, 2 & 3
• Three doses are given at one month interval
• Important to complete immunization before 6 months of age
OPV

Advantages

• relatively inexpensive.
• Easy to administer
• Suitable to control epidemics
• Safe, effective, and induces long-lasting immunity to all three types of poliovirus.
• Induces both humoral and intestinal immunity
• “passive” immunization of people who have not been directly vaccinated

Disadvantages

• VAPP
• Requires to be stored and transported at sub zero temperature unless stabilised
Typhoid Fever (Enteric Fever)

- An acute systemic infection, characterized by continuous fever for 3-4 weeks, malaise, anorexia, headache, relative bradycardia and involvement of lymphoid tissue.
PROBLEM STATEMENT

• Occurs all over the world where water supplies & sanitation are substandard.

• Uncommon in developed but still prevalent in developing world.

• Affects 6 million people with more than 600,000 deaths annually.
PROBLEM STATEMENT

• Almost 80% of cases & deaths are in Asia, Africa & South America.
• Resistant strains have caused outbreaks in India and Pakistan in recent years.
• The socio-economic impact of disease is huge
EPIDEMIOLOGICAL FACTORS

• **Agent Factors**
  1. *Salmonella typhi*, *Salmonella paratyphi A&B*
  2. Human parasite
  3. Can survive outside the body (48 hrs in water, 70 days in faecal matter, >1 months in Ice)

• **Host factors**
  1. Humans are the only reservoir of infection
  2. Highest incidence in 5-19 yrs
  3. Males are affected > females
  4. Cell mediated immunity & local intestinal immunity
  5. Gastric acidity
CARRIERS

• **Incubatory carriers**; up to period of incubation (10-14 days)

• **Convalescent carriers**; excrete bacilli for 6-8 weeks.

• **Chronic carriers**; excrete bacilli for more than 1 year. 2-5% of cases develop chronic carrier state. Organism persists in Gall bladder & biliary tract.

• **Typhoid Mary**
Environmental Factors:

1. Peak Incidence rainy season
2. Bacilli are found in contaminated water & foods
3. Open air defecation & urination, poor quality food & personal hygiene
4. Typhoid bacilli grow rapidly in milk & food.
5. Vegetables raised in sewage farms or washed in contaminated water are positive health hazards.
INCUBATION PERIOD

10-14 Days
Mode of Transmission

Faeco-oral route or urine-oral route

Faeces and Urine from Cases or Carriers
- Water
- Soil
- Flies
- Fingers

Foods

Mouths of well persons

Social Factors
Cultural Factors
Economic Factors and Quality of Life
CONTROL OF TYPHOID FEVER

• Control of Reservoir of infection
  a. Cases
  1. Early diagnosis (Blood & stool culture)
  2. Notification (To local authorities)
  3. Isolation (Hospitalization till 3 –ve report)
  4. Treatment (10 – 14 days antibiotics)
  5. Disinfection (Urine & stools e 5% cresol)
  6. Follow up for 3-4 mths to prevent carrier state.
CONTROL OF TYPHOID FEVER

b. **Carriers**

1. Identification (by culture and serological tests)
2. Treatment (Ampicilline & probenecid)
3. Surgery (Cholecystectomy + Ampicillin)
4. Surveillance Carriers must be prevented from food handling
5. Health Education (Soap & Water for Hand washing)
CONTROL OF TYPHOID FEVER

• Control of Sanitation (Control of Transmission)
  1. Protection & purification of drinking water supplies
  2. Improvement of food hygiene
  3. Health education for using sanitary measures
  4. Improvement of basic sanitation & personal hygiene.
CONTROL OF TYPHOID FEVER

• Immunization

1. Does not give 100% protection

2. Recommended for Endemic Areas, House hold contacts, risk groups.

3. Primary immunization 02 doses of 0.5ml Booster doses after 3 years.
AMOEBIASIS

The condition of harboring the protozoan parasite Entamoeba Histolytica with or without clinical manifestation.
PROBLEM STATEMENT

• It has a world wide distribution. A major health problem in China, South East & West Asia & Latin America.
• Globally about 45 million people carry E. histolytica & there are 70,000 deaths.
• Prevalent rates vary from 2 to 60%.
• Epidemic water borne infection can occur if there is heavy contamination of drinking water supply.
AGENT FACTORS

• E. histolytica exists in vegetative & cystic form.
• Vegetative form is short lived outside human body.
• Cystic form survives for many days in faeces, water, sewage & soil in presence of moisture & low temperature.
• Cysts are readily killed if dried, heated to 55° C or freeze.
AGENT FACTORS

• Reservoir of infection---Man. Healthy carriers discharge cysts. Great risk associated with carriers engaged in preparation & handling of food.

• Period of communicability---as long as cysts are excreted.
HOST FACTORS

• Age--- can occur at any age.
• House hold infection--- any individual in the family if infected may infect others.
• Immunity--- cell mediated immunity plays important role in controlling recurrence of amoebiasis.
ENVIRONMENTAL FACTORS

• Poor sanitation & low socioeconomic status promotes amoebiasis.
• Use of night soil for agriculture purpose promotes the disease.
• Infection rates are higher during rain as cysts survive longer.
• Outbreaks are associated with sewage seepage into the water supply.
MODE OF TRANSMISSION

• Faeco-oral route – most common.
• Sexual transmission- homosexuals
• Vectors- flies, cockroaches & rodents carry cysts.
INCUBATION PERIOD

• 10- 14 days.
CLINICAL SPECTRUM

• Asymptomatic Group
• Symptomatic Group—only 10% of infected
  Further sub divided into;
  1. Intestinal amoebiasis
  2. Extra intestinal amoebiasis— involving liver, lungs, brain, spleen etc.
PREVENTION & CONTROL

1. PRIMARY PREVENTION

- Water supply— sewage seepage protection. Boiling water more effective
- Food hygiene— uncooked vegetables & fruits disinfected with 5% acetic acid soln. or vinegar.
- Health education.
2. SECONDARY PREVENTION.

• Early diagnosis—demonstration of trophozoites in stools. Indirect haemagglutination test.

• Treatment—both symptomatic & asymptomatic infection should be treated by antibiotics.
Thank you
Viral Hepatitis

• It is an acute inflammation of liver caused by Enteroviruses.

• Causative Agents:
  - HAV
  - HBV
  - HCV
  - HDV
  - HEV
HEPATITIS A
PROBLEM STATEMENT

• Endemic in developing countries.
• 10-50 persons per 100,000 are affected annually.
• HAV is responsible for 10-25% of the total cases of hepatitis in children & 1-5% in adults.
• Epidemics of HAV evolve slowly but involve large geographic area & last many months. Common source explosive epidemic may also occur.
Hepatitis A (Infectious Hepatitis or Epidemic Jaundice)

<table>
<thead>
<tr>
<th>C.Agent</th>
<th>HAV, Enterovirus of picornavirus family</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reservoir of inf./Infectious material</td>
<td>Man is the only reservoir (cases)/Feaces of an infected person</td>
</tr>
<tr>
<td>Incubation period/Period of communicability</td>
<td>Usually 25-30 days. (range 15-45 days)/02 wks before to 01 wk after onset of jaundice</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>1. Hav particles in feaces 2. Raised anti-HAV titres 3. IGM antibody to HAV in serum</td>
</tr>
<tr>
<td>Mode of Transmission</td>
<td>1. Feaco-oral 2. Parenteral Route (Infected blood and blood products) 3. Sexual transmission (mainly among homosexuals)</td>
</tr>
<tr>
<td>Resistance</td>
<td>Boiling for 5 minutes kills virus. Formalin &amp; Ultraviolet rays inactivate the virus.</td>
</tr>
<tr>
<td>Treatment</td>
<td>• No specific treatment</td>
</tr>
</tbody>
</table>
HOST FACTORS

• Age— all ages susceptible but more frequent among children.
• Sex— both equally susceptible.

• Immunity– immunity after attack lasts for life.
ENVIRONMENTAL FACTORS

• Cases may occur throughout the year.
• Poor sanitation & overcrowding favours the spread of infection.
Methods of Control

• **Control of Reservoir**
  Notification
  Complete bed rest
  Disinfection- by 0.5% sodium hypochlorite.

• **Control of Transmission**
  Improvement of personal and community hygiene (Hand washing, sanitary disposal of human excreta, Filtration and chlorination of water).

• **Control of Susceptible Population**
  (Induction of Passive immunity with Human Gamma Globulin 0.02-0.05 ml/kg body weight I/M)
  Vaccine– 2 doses 6-18 months apart parentally.
Hepatitis E

- Wide spread problem in developing world.
- Cases reported in hot climates.
- Mortality in fulminant disease, 0.5-4%.
- Mainly adults, aged 15-40 yrs affected.
- In pregnancy may cause abortions, IUD.
- No case of chronic disease reported.
### Hepatitis E

<table>
<thead>
<tr>
<th>C.Agent</th>
<th>HEV, RNA virus - 1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reservoir of inf./Infectious material</td>
<td>Man is the only reservoir / Feaces of an infected person</td>
</tr>
<tr>
<td>Incubation period</td>
<td>02-09 wks</td>
</tr>
<tr>
<td>Mode of Transmission</td>
<td>1. Feaco-oral. Water, Milk, food, fingers, flies and fomites</td>
</tr>
</tbody>
</table>
| Treatment | - No specific treatment  
- No vaccination or Ig available |
Hepatitis B
(Formerly called Serum Hepatitis)

• An acute infection of liver caused by HBV.
• Usually it is an acute self-limiting disease
• Approximately 5-15% cases become chronic carriers
• Persistent HBV infections may cause progressive liver disease including chronic active Hepatitis and Hepatocellular carcinoma
• Endemic throughout the world
• 02 billion people are infected
• 350 million are chronic carriers
• Accounts for 01-02 million deaths per year
HEPATITIS B

• HBV causes 60- 80% of all primary liver cancers.
• In SEAR about 14-16 million people are infected each year.
• In SEAR 80 million HBV carriers (about 6% of population).
• 5-10% adults & 80% Infants become carriers.
Agent Factors

• Double shed DNA virus, Dane particle
• Three morphological forms
• Three distinct antigens
  – HBsAg
  – HBcAg
  – HBeAg
HBsAg

- First to be detected
- Appears during incubation period
- Persists for 4-6 months
HbeAg

• Marker of virus replication and infectivity
• Detected within 3-5 days of surface antigen and persists for 2-6 weeks
• May persist for years without sero conversion in carriers
• Seroconversion of e antigen into e antibody is considered a good prognostic feature
HOST FACTORS

• Age- countries with low incidence 20-40 yrs age group. Countries with high prevalence infection occurs perinatally or in early childhood.

• High risk groups- surgeons, health care & lab personnel, recipient of blood transfusion, homosexuals, prostitutes, drug abusers.

• Immunity- antibodies form in a week or two after onset of jaundice.
  – Core antibody
  – E antibody
  – Surface antibody
### Hepatitis B

<table>
<thead>
<tr>
<th>C.Agent</th>
<th>HBV, discovered by Blumberg in 1963</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reservoir of inf./Infectious material</td>
<td>Man is the only reservoir/Contaminated blood and blood products. Virus found in saliva, semen &amp; vaginal secretions.</td>
</tr>
<tr>
<td>Incubation period/ Period of communicability</td>
<td>45-180 days (average 100 days)/ usually several months, occasionally (years)</td>
</tr>
<tr>
<td>Mode of Transmission</td>
<td>1. Parental Route (Infected blood and blood products) 2. Perinatal Route (from HBV carrier mothers to their babies) 3. Sexual transmission) 4. Others (Bed bugs and mosquitoes), horizontal.</td>
</tr>
<tr>
<td>Treatment</td>
<td>▪ No specific treatment ▪ Hepatitis B Vaccine</td>
</tr>
</tbody>
</table>
Methods of prevention

• **General Measures**
  1. All blood donors should be screened for HBV infection
  2. Use of disposable syringes
  3. Sterilization of instruments
  4. Personal hygiene
  5. Use of barrier method of contraception

• **Hepatitis-B Vaccine**
  1. Plasma derived vaccine (03 divided doses with booster doses given after 3 to 5 yrs)
  2. RDNA Yeast derived vaccine (Booster dose not recommended). 10-20 ug initially & then 1 & 6 mth.

• **Hepatitis B Immunoglobulin** (0.05-0.07 ml/kg I/M 2 doses 30 days apart)
HEPATITIS C

- WHO estimates about 3% of population is infected with HCV.
- 170 million chronic carriers.
- In USA 4 million people have contacted the disease. 30,000 new cases & 8000-10,000 deaths occur annually.
# Hepatitis C
(NANB)

<table>
<thead>
<tr>
<th>C.Agent</th>
<th>HCV, Identified in-1989</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Incubation period</strong></td>
<td><strong>06-07 wks</strong></td>
</tr>
<tr>
<td><strong>Mode of Transmission</strong></td>
<td><strong>Same as for HBV</strong></td>
</tr>
</tbody>
</table>
| **Treatment**    | ▪ Interferon  
▪ No vaccination  
▪ General measures similar to HBV infection  
▪ Screening of donated blood can reduce the risk from 10% to 01% |
Hepatitis D
(Delta virus)

• A new form of hepatitis which always occur in association with Hepatitis B carrier state.
• Mode of transmission and its prevention & control are same as for Hepatitis B
• Immunization against Hepatitis B also protects against Delta Infection
FOOD POISONING

• Food poisoning is an acute gastro-enteritis caused by ingestion of food or drink contaminated with either living bacteria or their toxins or inorganic chemical substances and poisons derived from plants and animals.
Types of Food Poisoning

Non Bacterial
Caused by chemicals
• Arsenic
• Cadmium
• Mercury
• Fertilizers
• Pesticides

Bacterial
• Salmonella species
• Staphylococcus aureus
• Clostridium Botulinum
• Clostridium perfringens
• Bacillus Cereus
Salmonella Food Poisoning

• **Agent:** Salmonella Typhimurium, S. enteritidis, S. cholera-suis.

• **Source:** A disease of animals. Man is infected by ingesting contaminated meat, milk, sausages, custard & egg.

• **Incubation Period:** 12-24 hours.

• **Clinical Symptoms:** chills, fever, nausea, vomiting & diarrhoea.
Staphylococcus Food Poisoning

- **Agent:** Staphylococcus aureus—05 enterotoxins identified. Toxin is heat stable.
- **Source:** Organism found on Skin, Nose & Throat of man & animal.
- **Incubation Period:** 1-6 hours.
- **Clinical Features:** Toxin acts on intestines & CNS. Sudden onset of vomiting, abdominal cramps and diarrhoea.
Botulism

• **Agent:** Clostridium Botulinum

• **Source:** Organism widely distributed in soil, dust & intestinal tract of animals. Enters food as spores. Preserved food frequently cause botulism. Toxin is heat labile.

• **Incubation Period:** 12-36 hours.

• **Clinical Features:** Dysphagia, diplopia, ptosis, blurring of vision, muscle weakness. Most serious but rare disease, kills two third of its victims.
Clostridium Perfringens Food Poisoning

• Agent: Clostridium perfringens
• Source: Organism is found in faeces of animals and humans. Contaminated meat and poultry products.
• Incubation Period: 6-24 hours. Spores are heat stable.
• Clinical Symptoms: Diarrhoea, abdominal cramps, little or no fever. Recovery is rapid.
Bacillus cereus Food Poisoning

• Agent: Bacillus cereus

• Source: Spores are found in soil, raw, dried & processed food. Spores are heat stable.

• Incubation Period: 1-5 hours & 12-24 hrs.

• Clinical Features: Emetic form—vomiting, abdominal cramps & diarrhoea.
  Diarrhoeal form—diarrhoea, abdominal cramps with little or no vomiting.
Investigation of Food Poisoning

• Complete list of people involved and their history.
• Laboratory investigations
• Environmental study
• Data analysis
Prevention & Control

1) Food Sanitation:
   a) Meat inspection
   b) Personal hygiene
   c) Sanitary improvements
   d) Food handling techniques
   e) Health Education

2) Refrigeration: Below 4 deg. C

3) Food Surveillance
Thank you
OSPE Exercise

• The basic health unit Jhatla is located in tehsil Gujar Khan District Rawalpindi. The medical officer in charge of the BHU Jhatla noticed doubling of the cases of diarrheal diseases in the catchment area during the last two weeks of September 09. Enlist the measures he has to take for prevention and control of this issue of public health importance.
OSPE Exercise

• The population of a geographically defined area is 100,000 at a specified point of time. Five deaths were reported in the child-age group of >2 Years due to acute severe diarrhea during the rainy season. If the population of children age group is 10%

a. Which of the epidemic is in suspicion.

b. Calculate the cause specific mortality rate due to this diarrheal disease.