Diarrhoeal Diseases

Diarrhoea, Dysentery & Food Poisoning

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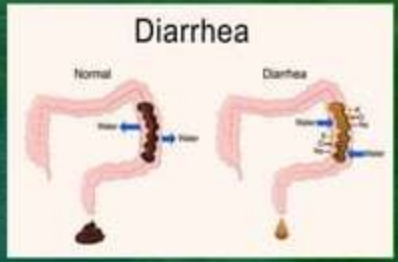
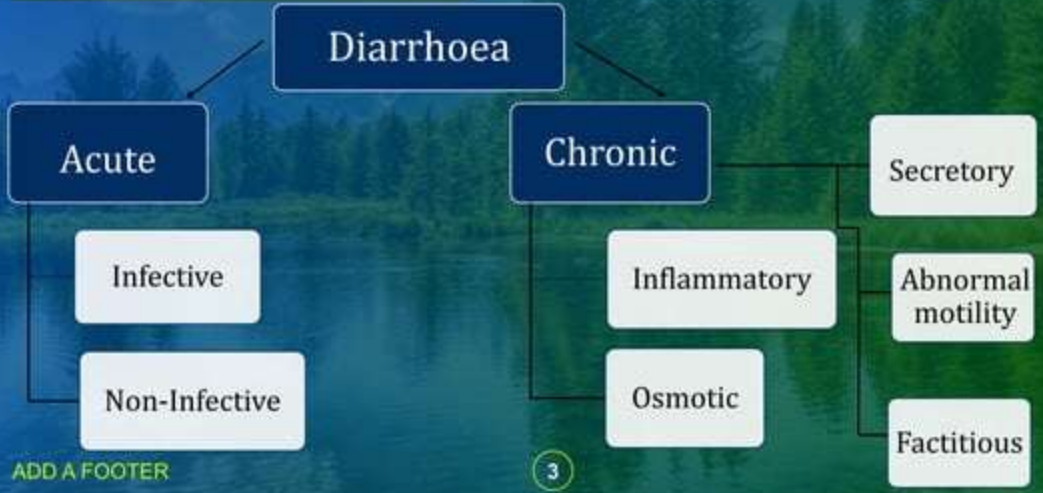
Definition

- The term 'diarrhoea' refers to frequent loose stools. i.e. , more than 3 loose stools in a day.
- Quantitatively, it is defined as faecal output more than 200gm per day
- Practical definition is passage of liquid or unformed stools at an increased frequency



Classification



Acute Diarrhoea

- It is invariably infective, (90% cases) and is also called 'non-specific' Diarrhoea as the causative organism is difficult to be distinguished.
- It evolves over a period of minutes to hours and lasts for < 2 weeks.

- Clinical Features
- Fever, headache
- Myalgia, malaise
- Anorexia
- Vomiting and Diarrhoea along with abdominal discomfort,

Infectious

- Viral
  - Rotavirus
  - Norwalk agents
  - Cytomegalovirus*
- Bacterial
  1. Preformed toxin
     - *S. aureus*
     - *B. cereus*
     - *Clostridium perfringens*
  2. Enterotoxin induced
     - Enterotoxigenic *E. coli* (ETEC)
     - *Vibrio cholerae*
  3. Cytotoxin production*
     - Enterohemorrhagic *E. coli* (EHEC)
     - *Clostridium difficile*
  4. Mucosal invasion*
     - *Shegella*
     - *Campylobacter jejuni*
     - *Salmonella*
     - Enteroinvasive *E. coli* (EIEC)
     - *Yersinia enterocolitica*
- Protozoal
  - *Entameba histolytica**
  - *Giardia lamblia*
  - *Cryptosporidium*

• Traveller's Diarrhoea

Non-infectious

- Diverticulitis
- Inflammatory bowel disease (ulcerative colitis, Crohn's disease)
- Metabolic (DKA, carcinoid)
- Sepsis
- Drugs (NSAIDs, antibiotics)
- Ischemic colitis

Ampicillin, cholinergics, Mg containing antacids

Pathogenesis of Acute Diarrhoea

a. *Toxin production:* Bacterial toxins either preformed or produced in the gut can cause diarrhea. Such toxins are exotoxins and include enterotoxins, cytotoxins, and neurotoxins.

- Enterotoxins disturb normal secretory mechanisms and cause profuse watery diarrhea
- Cytotoxins lead to inflammatory diarrhea by causing destruction of mucosal cells.
- Neurotoxins produced by *S. aureus* and *B. cereus* act on the nervous system to produce vomiting.

b. *Invasion:* Inflammatory diarrhea or dysentery results from the invasion and destruction of mucosal cells by *Shigella* or Enteroinvasive *E. coli.*

Intraepithelial multiplication and spread to adjacent cells also occurs.

c. *Penetration:* *Salmonella typhi* and *Yersinia enterocolitis* penetrate intestinal mucosa and multiply in Peyer's patches or intestinal lymph nodes. They disseminate from these lymph nodes and cause fever

Clinical Features of Infective Diarrhoea

- Incubation Period
- It is few hours (1-6 hrs) in case of preformed toxin induced diarrhea while 12-24 hours in infective diarrhea.

- Acute Viral Diarrhea (gastroenteritis) occurs rapidly, producing a large number of watery stools and much less stool content. It is due to transient malabsorption of fat and xylose due to abnormal morphological changes in intestinal mucosa.
- It persists for 1-3 days. (short-lived)

- Bacterial Diarrhoea develops within 12 hours of consumption of contaminated food or drinks.
- Diarrhoea occurring after a period of 1-3 days indicates *Salmonella* induced diarrhoea.
- The stools are loose, watery, >10 in a day, with scanty blood, pus cells and mucus.
- Fever, abdominal cramps. There is severe tenesmus.

Table 2.6.1: Bacterial causes of acute diarrhoea (food poisoning)

Pathogen	Source	Clinical features	Investigations	Recovery
Staphylococcus aureus	Contaminated food or other eatables usually	Incubation period 2-6 hours. Diarrhoea, vomiting and dehydration are symptoms	Culture the organism in vomitus or stool	***Rapid*** within few hours
Bacillus cereus	Spores in food (often rice) resistant to boiling	Incubation period is 1-6 hours. Diarrhoea, vomiting and dehydration occur	Culture organisms in stool and food	Rapid
Clostridium perfringens	Spores in food survive boiling	Incubation period 8-20 hours. Watery diarrhoea and abdominal cramps occur	Culture organisms in faeces and food	2-3 days
Clostridium botulinum	Canned or bottled food. Spores survive cooking and germinate in anaerobic conditions	Incubation period long (24-36 hours). Brief diarrhoea and gut paralysis due to neuro-muscular block	Demonstration of toxins in food and stool	10-14 days
Salmonella enteritidis, sometimes S.typhimurium	Bowels (stools) of animals Contaminated food and water	Incubation period 12-24 hours. Fever, vomiting and diarrhoea (± bloody) occur	Culture the organism in stool	Usually 2-5 days but may take 2 weeks
Campylobacter jejuni	Bowel of animals, poultry; also raw milk	Incubation period longest (1-3 days). Fever, pain abdomen and diarrhoea with or without blood	Culture organism in stool	3-5 days
Vibrio cholera (enterotoxins)	Contaminated food and eatables (shellfish, water)	Incubation period few hours to few days. Profuse, painless, watery diarrhoea (rice -watery stools), dehydration, hypotension or shock	Stool culture for organism	Variable (may be fatal)
Shigella species	Contaminated food and eatables		Stool culture for organism	Fluoroquinolone are effective
Enterotoxigenic E coli	Salad, cheese, water	Road Traveller's diarrhoea	Stool culture	Fluoroquinolone are effective

- In Cholera, Diarrhoea is frequent with rice watery stools

- Acute intestinal Amoebiasis may present Diarrhoea like symptoms or with dysentery.

- The diarrhea may be profuse leading to dehydration.

a. Thirst, dry mouth, decreased sweating, oliguria and mild weight loss suggest mild dehydration.

b. Orthostatic hypotension, sunken eyes, sunken fontanelles in infants and loss of skin turgor indicate moderate dehydration.

c. Severe dehydration may result in hypotension, tachycardia, altered sensorium and shock

DEHYDRATION

Loss of skin elasticity

Sunken fontanelle

Sunken eyes

Other symptoms include:

- Thirst
- Oliguria
- Apathy
- Irritability

Dysentery

- Dysentery is defined as diarrhea due to acute inflammation of the large intestine characterized by the presence of blood and mucus in the stool.
- The two main types of dysentery are

★ *bacillary dysentery* ★ *amoebic dysentery*

Important causes of bacillary dysentery are sheigella, enteroinvasive *E. coli* (EIEC), and *Yersinia enterocolitica*..

- Clinical features

diarrhea, fever, abdominal pain and tenesmus.

Stools are usually small and contain blood or purulent material.

The colon is tender to palpate.

Food poisoning

- Food poisoning is gastroenteritis of infective or noninfective origin.
- The important infective causes are *S. aureus, salmonella, B. cereus* and *E. coli.*
- Non-infective causes are allergy to sea foods, fish or fungal toxins

Clinical Features

vomiting, diarrhea or both which usually occurs within 1-48 hours of consumption of contaminated drinks or food.

- The incubation period is short (from minutes to hours) in case of noninfective causes or due to ingestion of food with preformed toxins.

TABLE 2.7: Causes of food poisoning

Infective

Toxin mediated

- *S. aureus* (1-6 H)*
- *C. perfringens* (8-16H)
- *C. botulinum*
- *E. coli* (EHEC, ETEC) (>16 H)
- *Bacillus cereus* (1-6, 8-16H)
- *Vibrio cholerae* (>16H)

Non-toxin mediated

- *Salmonella* (>16H)
- *Shigella* (>16H)
- *Campylobacter jejuni* (>16H)
- *Bacillus anthracis*
- *Listeria monocytogenes*
- Viruses (rotavirus)

Non-infective causes

Allergic

- Shellfish, strawberries

Non-allergic

- Fish (Ciguatoxin, scombotoxin)
- Fungi (*Amanita phalloides*)
- Chemicals, metals

* Incubation period in hours

Pathogens Causing Bloody Diarrhea = SEECSY

S = Salmonella
E = E Coli (EHEC, ETEC)
E = Entamoeba (Protozoa)
C = Campylobacter
S = Shigella
Y = Yersinia Enterocolitica

Investigations and Diagnosis

- Blood for Leucocyte (total & differential)
- Stool Examination

a) Gross Examination- quantity, consistency, smell, colour, amount of faecal content, blood, pus, mucus.

b) Microscopic examination- look for polymorphs, Pus cells, Trophozoites and blood. Gram stain

c) Serum Electrolytes and blood urea

- Stool culture for pathogenic microbes.
- Specific tests for lactose intolerance and malabsortion

Management and Treatment

- *Fluid and Electrolyte Management*
- Fluid and electrolyte management is the cornerstone in the treatment of diarrhea. In most cases with non-inflammatory diarrhea, no treatment is required except adequate rehydration. *Oral rehydration solutions* (ORS) are available for fluid and electrolyte replacement. This usually contains
- 3.5 g of sodium chloride,
- 2.5 g of sodium bicarbonate,
- 1.5g of potassium chloride
- 20 g of glucose to be dissolved in one liter of water.

In severe dehydration and in infants and the elderly, intravenous fluids are required

Diet

- Liquids, semisolids, soft and easily digestible foods are permitted
- milk, high fiber, fat, caffeine and alcohol is to be avoided.

Antimotility/antisecretory Agents

- Antimotility/antisecretory agents are used in noninflammatory diarrhea and avoided if diarrhea is bloody and there is fever.
- Antimotility/antisecretory agents such as codeine phosphate, loperamide and bismuth subsalicylates may be used to reduce the frequency and fluidity of stools.
- Racecadotril is a newer antisecretory agent useful in acute watery diarrhea.
- Diphenoxylate should be avoided in acute diarrhea.

- *Antimicrobial Agents*
- Antibiotics are not used routinely even in inflammatory diarrhea which is generally self-limiting. However, empirical
- antibiotics are given in patients with fever, bloody diarrhea, tenesmus and in elderly or immunocompromised patients.
- The antibiotics include fluoroquinolones (ciprofloxacin 500 mg,

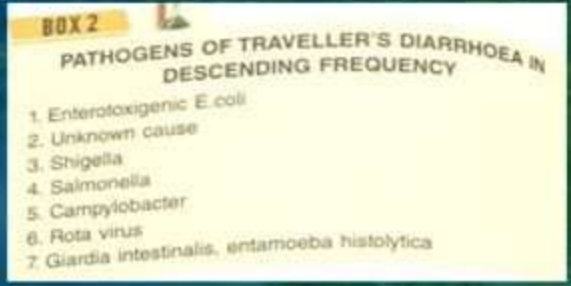
ofloxacin 400 mg or norfloxacin 400 mg twice daily) for 5-7 days.

Alternatively, doxycyclin 100 mg twice daily or trimethoprim-sulfamethoxazole 160/800mg twice daily may be used.

- Metronidazole, tinidazole or ornidazole can empirically be given if giardiasis or amoebiasis is suspected.

Traveller's Diarrhoea

- It is an acute diarrhoea, infective in origin and commonly seen in tourists.
- The high rate of diarrhoea among travellers to underdeveloped areas is related to ingestion of contaminated food and water.



BOX 2

PATHOGENS OF TRAVELLER'S DIARRHOEA IN DESCENDING FREQUENCY

1. Enterotoxigenic E.coli
2. Unknown cause
3. Shigella
4. Salmonella
5. Campylobacter
6. Rota virus
7. Giardia intestinalis, entamoeba histolytica

Clinical Features

- The attack of diarrhoea lasts for 2-3 days. The onset is sudden and stools are watery.

- Fever, abdominal pain, nausea, vomiting, anorexia are common symptoms, along with diffuse tenderness of abdomen.

Treatment

- It may resolve spontaneously. Dehydration must be prevented by salts and fluid intake and oral rehydration powder.
- Loperamide 4 mg single dose to stop diarrhoeal attacks in adults.
- Ciprofloxacin 500mg 2 doses at 12 hr interval are used to stop severe attacks.
- Doxycycline 100 mg b.i.d. / Trimethoprim 800 mg daily reduces the rate in susceptible individuals.
- If Giardiasis is the cause, it is treated with Tinidazole or Metronidazole.

Non-infective Acute Diarrhoea

Crohn's Disease or Ulcerative Colitis-

- They may start with acute diarrhoea followed bloody stools, abdominal cramps, tenesmus, fever.
- In Crohn's disease, diarrhoea may be milder if enteritis is present and it is non-bloody with pain in lower right quadrant of abdomen.
- Drug induced diarrhoea is usually milder without blood and stops after cessation of therapy.

Pseudomembranous colitis-

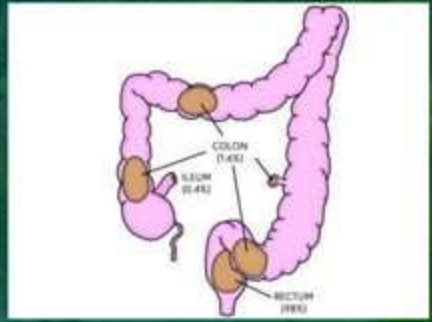
- Cause- *Clostridium difficile.*

- Occurs in immunocompromised host or after antibiotics therapy (ampicillin, clindamycin, cephalosporins) , disturbing the symbiosis of organisms in the intestine.

- Watery diarrhoea, pain, abdominal cramps, pus or mucus in stools are common symptoms.

Spurious Diarrhoea-

- It is watery, seen in old persons, occurs commonly after faecal impaction following constipation and is relieved by enema.



Chronic Diarrhoea

- Diarrhoea persisting for weeks or months is called Chronic Diarrhoea. It is usually a symptom of some underlying organic disease.
- Adominal tenderness and fever indicate inflammatory bowel disease as the cause, while their absence indicates malabsorption syndrome.
- It is broadly classified into 5 groups.

TABLE 2.8: Causes of chronic diarrhea

Inflammatory causes
- Ulcerative colitis
- Crohn's disease
- Malignancies (lymphoma, adenocarcinoma)

Chronic infections
- Giardia, Entamoeba
- AIDS related
  - CMV
  - *Microsporidium, Cryptosporidium*
  - Isospora belli

Motility disorders
- Diabetes
- Hyperthyroidism
- Irritable bowel syndrome

Osmotic diarrhea
- Medications (lactulose, sorbitol)
- Lactose intolerance

Secretory diarrhea
- Medications
- VIPoma
- Carcinoid
- Zollinger-Ellison syndrome
- Villous adenoma

Malabsorption syndromes

Classification

Table 2.8.2: Classification of chronic diarrhoea

Pathogenic mechanism	Causes	Clinical features
1. *Inflammatory* Mucosal and submucosal inflammation Mucosal damage Impaired intestinal absorption and excessive secretion	Ulcerative colitis, Regional ileitis (Crohn's disease), Radiation enteritis Eosinophilic gastroenteritis, AIDS associated enteritis	Fever, abdominal pain, blood and/or WBC in stools
2. *Osmotic* Non-absorbed or non-digested hypertonic solute in the intestinal lumen	Osmotic laxatives (Mg^{++} containing) Pancreatic insufficiency, Coeliac sprue Bacterial contamination, Disaccharide (lactose) intolerance, Whipple's disease	Improvement of diarrhoea with fasting, Bulky, greasy, foul smelling stools, Weight loss, Nutritional deficiencies, Weakness and fatigue
3. *Secretory* Excessive secretion of electrolytes and water	Bowel resection, fistula Carcinoid syndrome, Zollinger-Ellison syndrome, VIP-secreting tumours in WDHA Syndrome, Medullary carcinoma of thyroid	Watery diarrhoea that also persists during fasting, Dehydration, Other systemic effects of hormones depending on the cause.
4. *Abnormal motility (dysmotility)* Rapid transit associated, neurogenic sometimes bacterial overgrowth	Irritable bowel syndrome (lesions Faecal impaction, neurogenic diseases, post-vagotomy, thyrotoxicosis	Alternating diarrhoea and constipation and neurogenic symptoms, e.g., bladder involvement.
5. *Factitious* Self-induced	Laxative abuse	Common in women Watery diarrhoea Oedema, dehydration and weakness

Investigations

- Complete haemogram for anemia.
- Stool culture.
- Sigmoidoscopy and rectal biopsy.
- Radiological e.g. barium meal or enema studies depending on site of involvement.
- Exocrine pancreatic function tests.

Treatment

- Identify and correct the specific cause of diarrhoea. In many cases, a cause may not be identified and symptomatic therapy is given.
- Antimotility drug like Loperamide, Phenoxylate may be helpful in secretary diarrhoea of mild to moderate severity.
- However, they are contraindicated in diarrhoea due to infective agent as the stasis may enhance invasion by the organisms or delay their clearance.


Thankyou