DIARRHOEAL DISEASES

Pages with reference to book, From 1 To 4

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Diarrhoeal diseases cause high morbidity and mortality in children and adults in Pakistan; the cause being over crowding, poor sanitation and ignorance of hygiene. Diarrhoea is defined as the passage of 3 or more loose or watery stools per day. The consistency of the stool is more important than the number of stools per day in determining the severity of the illness. Diarrhoea can be acute or chronic. Acute diarrhoea is usually bacterial or viral in origin , sudden in onset and its symptoms may persist for several days. Chronic diarrhoeas are caused by infections and their complications like mal absorbtion. It can last for more than 3 weeks or vary from day to day.

Diarrhoea can be caused by bacteria, parasites and viruses. Among the bacteria are Campylobacter jejuni, Yersinia enterocolitica, Salmonella, Shigella, Vibrio cholerae, enteropathogenic, entero-toxigenic and enteroinvasive E. coli and vibrio species.

Campylobacter jejuni has become an important cause of acute diarrhoeal disease. It is a slender gram negative S-shaped organism with tapering ends. The incubation period varies from 2 to 5 days but may exceed 10 days.[1] Symptoms include headache, weakness, nausea, abdominal cramps and diarrhoea.[2] Dehydration and electrolyte imbalance also occurs. Infection varies from asymptomatic excretion, mild symptoms to severe disease. Diarrhoea due to Campylobacter affects all age groups but is more common in males[3] and during summer months[4]. Infection spreads due to animal sheddings,[5] contaminated cow's milk[6], water[7], person to person transmission and through food handlers. Diagnosis can be made by gram staining of faeces[8], phase contrast microscopy, examination of ileal aspirates[9], culture of fresh feces and blood on selective medias[10] Serological tests such as agglutination,[11] compliment fixation[12], serum bactericidal assay[13] and immuno fluorescence tests are useful. Though the disease is self limiting but bacterial shedding is shortened[14] in antibiotic treated (erythrocin) group.

Yersinia enterocolitica is another new pathogen causing diarrhoeal disease. It is a gram negative bacteria which grows on selective media at 22°C. Symptoms are acute watery diarrhoea lasting upto 14 days, right lower quadrant pain, fever, vomiting leucocytosis and elevated ESR[15]. Dehydration, intestinal ulceration and peritonitis can also occur. Septicemia occurs in rare cases[16] All, age groups and both sexes are affected but children under five years are more affected. Frequency of infection decreases with age.[17] Transmission occurs from person to person, nosocomial infection and a large variety of wild and domestic animals are also a source of infection. Food and milk can be contaminated with Yersiniaenterotoxin.[18] Diagnosis is made by direct isolation from feces,[19] pus and post operative wound infection. [20] Serological tests such as compliment fixation ELISA test,[21] and infant mouse assay are used for diagnosis,[22]Antibiotics eradicate the organism. Septicemia if present can be treated with Gentamycin.

Diarrhoeal disease due to Salmonella results from ingestion of contaminated food and water. These organisms also cause food poisoning resulting in acute gastroenteritis. Salmonella are gram negative actively motile bacilli. Infection usually originates from animal source, they multiply and are mostly confined to the intestine but in some cases bacteraemia and septicemia occur. Frequency of Salmonellosis as a cause of food borne disease varies and depends upon dietary habits and hygienic standards in food production.[17] Nosocomial out-breaks of Salmonella enteritis do occur. Diagnosis is by stool culture on selective medias.

Shigella species produces diarrhoea in all age groups, They are gram negative non motile bacilli which

grow on selective medias. Shigella produces fever with watery diarrhoea. Stools are mixed with blood and mucus[17] after 1-2 days. Infection is by the faecal oral route and person to person transmission is rare.Shigellosis occurs where hygienic conditions are low. Food and water borne transmission also occurs. Detection of Shigella is by stool cultures on selective medias and serotyping of isolates. Shigellosis is mostly mild so only supportive therapy is effective but if antibiotics are to be given sensitivity pattern of the isolated strain should be determined before initiating antibiotic treatment.
Three groups of E. coli act as an important diarrhoeal pathogen. Enterotoxigenic E.coli which produces enterotoxin and are an important cause of diarrhoea in children and adults, Enteropathogenic E.coli belonging to specific serotypes and Enteroinvasive E. coli which are invasive. Enterotoxigenic E. coli (ETEC) produces one or both of enterotoxin, heat labile toxin (LT) and heat stable toxin (ST)[23] The clinical illness caused by ETEC ranges from mild diarrhoea to severe cholera like disease.[24] Moderate to severe dehydration occurs. Incidence of ETEC is highest in children upto two years of age. Infection rapidly declines by four years of age and remains at a lower level due to acquired immunity. Transmission is through contaminated water and food source. Person to person transmission can occur in nurseries. Reduced gastric acidity may increase susceptibility. Asymptomatic carrier of ETEC occur in human beings[25]. Diagnosis is by isolating the E. coli strains from feces by culture on selective media. E. coli strains isolated are tested for heat labile toxin by the Biken test and heat stable toxin by the infant mouse assay. Treatment of ETEC diarrhoea is through antibiotics if necessary otherwise oral rehydration therapy can be useful.
Enteropathogenic E.coli (EPEC) strains do not produce either heat stable or heat labile toxin, they do not invade the gut but still cause diarrhoea which might be due to some different type of toxin. They cause prolonged diarrhoea, with high mortality in children. Adults may suffer from a cholera like clinical condition. The serotypes commonly found in EPEC are 055, 086, 0111, 0127, 0123 and 0142. The incubation period is 6-72 hours associated with nausea, vomiting and fever. The etiological significance of EPEC is unclear and controversial,has raised question about the value of routine serotyping of E. coli from diarrhoea cases. Treatment is with oral rehydration therapy.
Enteroinvasive E. coli (EIC), are another group of E. coli strain isolated from stools of older children and adults causing a dysentry like disease. They do not produce enterotoxin (ST or LT) but cause epithelial invasion and so are called enteroinvasive. Sereny test is often used to demonstrate this epithelial invasive property. EIEC is biochemically and antigenically similar to Shigella and may be reported as Shigellosis if not properly indentified.
Vibrio species include vibrio cholerae and Vibrio parahaemolyticus. Fresh water as well as seawater and brackish water may be an important reservoir of these pathogens. The incubation period is 8-24 hours after which the patient develops explosive watery diarrhoea, fever, abdominal pain and passage of small quantities of blood and pus. Recovery almost always follows within two to three days. Diagnosis is made by culturing on selective media and testing the isolated strain with specific sera. Oral rehydration therapy helpful.
Diarrhoeal disease can be caused by parasites especially Giardia lamblia and Entamoeba histolytica. Giardia lamblia occurs in trophozoite and cyst stage. Previously Giardia lamblia was believed to be non pathogenic but recent evidence indicates that it is a potential pathogen responsible for diarrhoea and abdominal pain. Giardia infection is symptomatic in patients with reduced gastric acidity and gastric resection.[26] Incubation period is two weeks. Infection persists for six weeks, spontaneous recovery then occurs. Symptoms are eosinophilia, intermitted fever,[27] failure to thrive retarded growth and weight loss. Infection of Giardia depends upon age,[28] malnutrition,[29]blood groups,[30] and immunological factors. Transmission of Giardia is mostly caused by oro-faecal route. Housefly and contaminated water are possible sources of infection. Duodenal aspirates and small bowel biopsies should be examined for trophozoites. Mucosal impressions should be analysed. Antigiardia antibodies can be detected in serum of patients by indirect immunofluorescence test. Prevention of infection is by

observing personal hygiene, and use of boiled and chlorinated water. Treatment is with Metronidazole, quinacrin, Tinidazole and furozolidine.

The only amoeba pathogenic in the gut is Entamoeba histolytica. Infection is acquired by swallowing the cyst which are passed in the stools of asymptomatic carriers. After ingestion of contaminated food, acid resistant cysts pass into the intestine to produce undermined colonic ulcers on a non inflamed mucosa. Amoebiasis seldom occurs in waterborne epidemics. Amoebiasis is found in countries where standards of personal hygienic and environmental sanitation is low. Climate has little effect on the incidence of the disease. Amoebic dysentry causes bloody diarrhoea usually of only moderate severity. There is often low abdominal pain or cramps preceding defaecation. Untreated amoebiasis subsides spontaneously in a few weeks. Clinical recovery is not necessarily accompanied by parasitological cure; the amoebae often continue to reside in the bowel as non-invasive commensals confined to the lumen. From time to time they may again become invasive causing recurring bouts of dysentry. Asymptomatic bowel infection may also persists for years and give rise to amoebic liver abscess without recurrence of dysentry. Diagnosis is made by finding amoebic trophozoite with ingested red cells either in stools, biopsy material or in scrapings taken from an ulcer at endoscopy. Treatment of amoebic dysentry is done by specific drug aimed at killing the amoebae in the bowel wall and eliminating them from the lumen.

Viral diarrhoeas are important; since recent evidence indicate that viruses mainly Rotavirus are responsible for the majority of diarrhoeal cases especially in infants. Rotavirus are 70 nm virus particle with a characteristic wheel like appearance when seen under electron microscope. The incubation period ranges from 1 to 7 days but is mostly less than 48 hours. Respiratory illness and vomiting mostly precedes watery diarrhoea. Mucus is found in stools but blood is rare. Fever may be present. Severe dehydration and electrolyte imbalance occurs in severe cases.[31] Children between the age group of 2 to 12 months are mainly affected[23,33] Rotavirus disease is much more prevalent in colder months.[4] It spreads by faecal oral route but the rapidity of spread and the respiratory symptom suggest droplet infection via respiratory tract.[35] A large number of rotavirus particles are excreted in stool mostly within the first 3 to 5 days after onset of symptoms. The virus particles can usually be seen by electron microscopy.[36] Enzyme linked immunoabsorbent assay (ELISA) is also used for detection of Rotavirus.[37] Treatment is by oral rehydration therapy.[38]

Pattern of diarrhoeal disease seems to change with time as observed by a study conducted on 655 children in Karachi. Bacterial and parasitic infection were more frequent in the past than in recent years. Shigella was mainly isolated followed by E. coli and Giardia lamblia.[39]

Recent reports have indicated pathogenic bacteria (5 5%), Rotavirus (30%) and Parasites (9%). Among the bacteria EPEC (34%) was mainly isolated while Giardia lamblia was isolated among the parasites.[40]

As diarrhoeal disease is rampant in our population proper steps should be taken to identify the true etiological agents so that preventive measures may be taken for its treatment and control.

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