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Review Article

Management of Acute Diarrhea in Primary Health Care

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Abstract

Background: The clinical of acute diarrhea is commonly known as infective gastroenteritis, but other medical conditions can have similar symptoms as acute diarrhea that causes mainly intra-abdominal illnesses. Acute diarrhea is known as the passage of three or more loose or watery stools within 24h, or the movement of one or more bloody stools within 24h acute diarrhea means a condition that does not last more than 14 days.

Aim: This review provides an overview of diagnosis, and management of diarrhea in primary care settings.

Conclusion: Acute diarrhea is common in both adults and children; the mortality because of it is high especially in developing countries where personal hygiene is neglected. The management starts mainly by compensating for the lost fluid using ORS or ORT (Oral rehydration therapy), other medications that act as antidiarrheal can also be used, each group have its own mechanism of action, but all of them share that they lower the frequency and amount of stool but not stopping diarrhea.

Keywords: *Diarrhea; Acute Diarrhea; Management of Acute Diarrhea; Primary Care Settings; Primary Care and Diarrhea*

Introduction

In general practice, acute diarrhea is classified as one of the most known and serious conditions [1,2], where the morbidity is high because of its effects worldwide [3-5]. Acute diarrhea is known as the passage of three or more loose or watery stools within 24h or the movement of one or more bloody stools within 24h acute diarrhea means a condition that does not last more than 14 days [6]. Death due to diarrhea is common not only in children but also in adults too; it is considered a dangerous disease with high mortality in both especially in developing countries and during epidemics.

The reasons behind the high prevalence of diarrhea especially between adults are many such as poor hygiene, contamination of water and food [6]. The incidence of acute diarrhea in developed countries is about 0.5 - 2 episodes per person per year; this number becomes higher in developing and non-developed regions. In the USA, 25% of hospitalization is because of diarrhea with 85% of death-rates in elderly people because of diarrhea. Also, about 99 million episodes of diarrhea occur every year out of 200 million people who live in USA [7]. The effect of diarrhea extends to affect the economy of the country so big economic loss is because of diarrhea, also the resources of both money and labor forces are wasted during caring for the patients [8].

Children are also affected with acute diarrhea, as statistics show that high death -rates between children is because of acute diarrhea [9]. The efforts and plans conducted by the World Health Organization (WHO) in promoting the rehydration solutions had a great impact on the prevalence of acute diarrhea among children as the number of cases decreased by 75% between 1980 and 2008 through the world, although this results are very promising, it is not enough and the incidence of death because of acute diarrhea is still high especially because it did not improve along the last 5 years [10]. In developing countries diarrhea is considered the second leading cause for death after pneumonia [11,12]. While in developed countries the severity of the disease diminishes a lot so it is only a mild self- limited disease.

The clinical of acute diarrhea is commonly known as infective gastroenteritis, but other medical conditions can have similar symptoms as acute diarrhea that causes mainly intra-abdominal illnesses. The probability of this disease should be excluded e before starting the treatment especially in cases such as peritonitis that requires surgery and other conditions such as inflammatory bowel disease, Adnexitis and Ischemic enterocolitis [6]. Acute diarrhea is mostly known as drug -induces or toxin -induces diarrhea, but other kinds such as cholera, which is an epidemic disease requires special and urgent treatment, also diarrhea in elderly people and those with cardiac condition requires specific management strategies [6]. The patients presented with acute diarrhea are mostly classified then to watery diarrhea or bloody diarrhea.

This review provides an overview of diagnosis and management of diarrhea in primary care settings.

Diagnosis

Acute diarrhea is a symptom in infectious and non -infectious, so determining the cause of the diarrhea by different diagnostic techniques is important to set up the proper treatment regimen.

Taking history: The patient should be asked for many information such as age, diarrhea initiation and extent, nature of the stool (watery, loose or bloody), rate and amount of stool, development of diarrhea severity, Vomiting presence and intensity, fever presence, severity and duration of vomiting, stomach pain and position and nature of vomiting, and cramps. The last time of urination is also important in patients with dehydration diarrhea. If the diarrhea occur after eating certain food, the time between eating and the beginning of diarrhea should be mentioned also it should be taken into consideration if other people who ate the food felt the same [13]. The contaminated food is another cause so the water supply should be diagnosed especially in outbreaks [14]. Patient should also be asked if s/he travelled to any place recently as some places have certain known pathogens in specific seasons.

The first step in the diagnosis is excluding the non-infectious causes such as medications and toxins, so the patient is asked if s/he is taking any medication and if the answer is yes, it should be stopped immediately before preceding the treatment as some of the medications are known to cause diarrhea such as laxatives. Colchicine and alcoholic beverages. The presence of any concurrent diseases should also be known to the physician as it will affect the management of the diarrhea, important conditions that the patients should be asked for such as heart disease, renal failure and diabetes.

Physical examination: Physical signs such as those indicating dehydration, mucosal dryness examined mainly in lips and mouth and the blood pressure both sitting and standing. As some of the serious diseases could be presented as diarrhea such as appendicitis, pancreatitis and ischemic colitis, abdominal examination is important even for patients with minor symptoms. The physical examinations include both light and deep palpation. The physical examination is helpful as some symptoms such as rigidity, guarding and rebound tenderness are not common with acute diarrhea so the presence of any of these symptoms requires further investigations and different measurements [6]. Patients older than 50 years presented with acute diarrhea, rectal examination should be one of the examinations these patients subjected to. This helps the physician to determine the type of diarrhea and to analyze the stool in more accurate way, because elderly people due to health problems or problems related to sight, they mostly can't give an accurate history of their disease [15].

Stool examination: It is recommended to examine the fresh stool using electron microscope as this helps a lot in the diagnosis of the patient [16]. Using stool examination is encouraged in patients with dehydration either with watery or bloody diarrhea, but if dehydration is absent, stool examination is not necessary in this case. The data given by stool analysis could be presence of RBC and WBC in the stool > 20 cells/HPF which indicates bloody diarrhea. This test is used as a differentiation test between shigellosis and amebiasis [17]. On the other hand dark-field microscopy (DFM) is used in watery diarrhea with dehydration [18,19]. That indicates presence of shooting, motile bacteria, parasite or ova.

Stool culture: Stool culture is not necessary if the patient have mild diarrhea without dehydration, cause in most cases the patient symptoms would diminish before the results become available [20,21]. But stool culture is essential in patients with bloody diarrhea, unresponsive to the treatment or doesn't show any improvement after few days and finally severe diarrhea with dehydration [22]. The routine stool culture varies between countries and hospitals according to the feasibility, but MacConkey agar is considered the minimal requirement, and thiosulfate-citrate-bile-salt-sucrose (TCBS) agar if cholera is suspected, in bloody diarrhea *Salmonella-Shigella* agar or XLD agar is added to detect *Shigella* [23,24].

Sigmoidoscopy/colonoscopy: Used in patients diagnosed with bloody diarrhea who did not respond to the empirical treatment. A biopsy from the colon is taken together with the culture. This is done even if the appearance of the mucosa endoscopically looks normal [25].

Causes

Vomiting as the main symptom: The main symptom in acute diarrhea is known to be the diarrhea either watery or bloody diarrhea. But in some cases vomiting is ranked as the first and the predominating symptoms, in this case we suspect either food poisoning by bacterial toxin or viral gastroenteritis.

Food poisoning occur mostly after eating food infected with bacteria such as *S. aureus, B. cereus, C. perfringens*, as the toxin produced by them cause the poisoning, the diarrhea occur usually 2 - 7 hours after eating the food. The main complain in this case is nausea and vomiting not diarrhea, dehydration also is not common unless vomiting and diarrhea was severe [26]. Treating the symptoms and supporting the patient using oral rehydration is usually enough, antiemetic drugs are not effective if given orally but effective when used intramuscularly.

Viral gastroenteritis can be caused by many viruses such as coronavirus, and enterovirus but The Norwalk virus is the most known cause for it [27]. The patient usually presented with abdominal cramps that followed by vomiting and diarrhea and mild fever. These symptoms last 1 - 2 days and it improves by itself after 2 days but in rare cases it can last up to one week or more [28]. Oral rehydration is mostly enough for treatment of dehydration [29], while Bismuth subsalicylate is shown to improve the total symptoms of the patient [30].

Diarrhea as the main symptom: Diarrhea could be watery or bloody, watery diarrhea is mostly due to enterotoxin such as cholera where there is no blood in the stool, while bloody diarrhea is mostly because of invasive enteric pathogens such as *Salmonella* and *Shigella*.

Management

Oral rehydration: ORS (Oral Rehydration Salts Solution) and ORT (Oral Rehydration Therapy) could be used. The differences between them are that Solution of oral rehydration salts relates to oral rehydration recommended by WHO formula for salts. It contains 3.5g of sodium chloride, 20g of glucose), 2.9g of trisodium citrate dihydrate (or sodium dihydrate), 2.5g of bicarbonate) and 1.5g of potassium chloride in one liter of safe potable water. This mixture should yield a concentration of 90 mEq/L sodium, 20 mEq/L potassium, 80 mEq/L chloride, 30 mEq/L HCO_3 and 111 mmol/L glucose [31]. Oral rehydration therapy is informal formula that contains sodium in a concentration less than that recommended by WHO, it is also used for electrolyte containing drinks [32].

Adults patients with acute diarrhea with severe dehydration should receive the WHO recommended ORS especially in epidemics such as cholera.in less severe cases mild formulations could be used. ORS could also be used in mild conditions in addition to free water drinking. In elderly people caution should be taken as they could develop hyponatremia or hypernatremia [33]. So, it is recommended to use ORT or ORS with less sodium concentration in elderly patients. Also, there should be a periodic detection of the electrolyte level in geriatric patients. The super ORS is also another alternative that shows high attraction this time due to the advantages over the normal ORS, it is considered as (cereal-based formulations) that contain starch or glycine. Super ORS reduce the output of stool due to low osmolality also it improve the electrolytes absorbance [34]. It also can be manipulated by adding resistant starch rich in short chain fatty acids, this is a promising alternative too [34]. Both of them ORS and ORT are taken slowly by the mouth.

Intravenous fluid replacement: Used in patients with hypovolemic shock or severe dehydration, patients with mild symptoms can also use Intravenous fluid replacement if they have severe vomiting and they cannot drink ORS. Intravenous rehydration should also be carried out for dull consciousness patients, who may have the risk of aspiration. The best replacement for different cases is Ringer's lactate, it contains up to 4 mEq/L of potassium. The fluid loss of the patient should be replaced within 4 hours, where half of the loss is replaced in the first hour [35]. The rate of administration of the fluid is dependent on the rate of stool loss and degree of dehydration. In the beginning of the treatment the goal could be keeping the rate of fluid intake equal to the rate of fluid loss. The Intravenous fluid replacement should also be given with oral potassium supplement by mouth, in fact the oral route is considered much safe than the intravenous one.

Antidiarrheal drugs: Knowing the causative agent of diarrhea is the first step to the right treatment, but most of the causes cannot be detected, so the treatment is mostly symptomatic treatment. Diarrhea is known to be a self-limited disease in most cases, but using antidiarrheal drugs is also helpful as it reduces the fluids lost by the patient and makes the course of the disease less in time. These drugs are also used to improve the quality of the patient's life. The economic impact of acute diarrhea is not well studied, but as we know that the number of people subjected to acute diarrhea is high every year especially in developing countries where personal hygiene is neglected, so it is expected that the economic impact is high with a great financial burden. This is not the same for industrialized countries where we focus more on the returning of the employee to their work quickly using the drugs so in this case the economic impact is positive [6]. Although a lot of medications are available, the choice should be based on the cost-risk-benefit ratios:

- **Anti-peristaltics or antimotility drugs**: They act mainly be modulating the intestinal movement, they also can have moderate antisecretory or proabsorptive activity. Their major actions are reduction in the volume and frequency of stool and they are used mainly in secretory diarrhea. Examples such as loperamide, diphenoxylate, codeine, and other opiates [36-38]. Loperamide is considered the first line of treatment in this group due to high efficacy so it is recommended by most physicians [39]. This group of medications is contraindicated in diarrhea caused by invasive pathogen because the prevention of defecation can cause the pathogen staying in the body for longer time, where it might invade the tissues. Other cases where antimotility drugs are contraindicated are bloody diarrhea with elevated fever, immunocompromised patients, and septicemic susceptible conditions with diarrhea. The side effects of this groups are also a lot, some of the medications can cause addiction if used for long time such as codeine, they also can cause Suppression of respiration especially in elderly patients with lung problems and children. loperamide oxide [40]; a new member of this group that have less side effects. It should be taken into consideration that the goal here is to decrease the frequency of diarrhea not to stop it, and the action differs from one patient to another.

- **Anticholinergics**: Atropine, hyoscine, hyoscyamine, and dicyclomine are among them. They are not efficient in lowering stool frequency and amount, but in specific patients, they may have some benefits such as reducing pain from abdominal cramps. Dry mouth, urinary retention, blurred vision, palpitation, ileus and exacerbation of glaucoma can be caused by a high dose of anticholinergics.

- **Adsorbents**: This group act mainly by absorbing the toxins produced by bacteria and hence preventing its adherence to the intestinal membrane. Examples of this group are activated charcoal, kaolin, pectin, Aluminum hydroxide and tannic acid. The

efficacy of this group depends on the time at which they were given, as they should be given before the toxins attach itself to the intestinal mucosa. Also, the efficacy varies from one preparation to another as dioctahedral smectite, and bismuth preparations are more effective than other preparations in adsorbing toxins [41-43]. Also Stool consistency can be improved and stool frequency decreased, but the amount of fluid loss cannot be reduced. They just disguise its significance and it does not prevent dehydration. It is necessary to prescribe these medications when maintaining adequate hydration and proper nutrition, especially for the elderly. On the other hand they are not effective in febrile bloody diarrhea and also they might interfere with other medications such as digoxin on long term usage.

- **Probiotics**: They are non-pathogenic organisms, such as *Lactobacillus acidophilus* and *Saccharomyces boulardii*, they act by multiplying in the intestine, and hence producing metabolites that increase the acidity of the stool and thus inhibit the growth of enteropathogens. They prevent bacteria from entering the tissue of the intestine and produce short Chain fatty acids that are useful for regeneration of the intestine, which improve the absorption rate of fluid and electrolytes. Studies show that the use of probiotics may decrease the disease symptoms of acute diarrhea in children [44-46]. They are primarily used in adults for persistent diarrhea and relapses of antibiotic-associated enterocolitis [47].

- **Antisecretory drugs**: Many drugs show antisecretory when used *in vitro* such as aspirin, phenothiazine and calmodulin-inhibitors. They act by different mechanisms such as inhibition of Prostaglandins, calmodulin Inhibition and effecting cyclic AMP [48]. Also, inhibition of Cl channels and intestinal hormones [49]. The problem is that to give this action *in vivo*, their dose should be very high, that is rendered by the severe side effects produced [50,51], this group is very promising for treating acute diarrhea, especially Bismuth salts, that reduces the stool passage by 50%, and also improve the other symptoms [52,53]. While its side effects are, blackened tongue, blackened stool and fecal impaction [54].

- **Herbal medicine**: There are a large number of herbal medicines that are believed to be effective in treating diarrhea around the world. However, very little clinical evidence is available to support or validate the effectiveness of these drugs or where findings are available, most of them are inconclusive and anecdotal. They are cheap, though and available locally. Herbal medicine management, that is locally approved can manage mild watery diarrhea without dehydration and is shown to be harmless. Herbal medications cannot be used in severe diarrhea.

Conclusion

Acute diarrhea is common in both adults and children; the mortality because of it is high especially in developing countries where personal hygiene is neglected. It can be watery or bloody, the stool examination can differentiate them. The main two diagnostic tests are the patient's history and the physical examinations; other examinations such as stool culture and colonoscopy are used in sever non-responsive cases. The management starts mainly by compensating for the lost fluid using ORS or ORT (Oral rehydration therapy), other medications that act as antidiarrheal can also be used, each group have its own mechanism of action, but all of them share that they lower the frequency and amount of stool but not stopping diarrhea.

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