

Minireview paper

DIARRHEA DISEASE: A CONCERN FOR DEVELOPING COUNTRIES

ABSTRACT

Diarrhea is a symptom associated with several gastro intestinal tract diseases. At initial stage of diarrhea illness, diarrhea often goes unnoticed and as it progresses diarrhea present with visible signs and symptoms. Diarrhea ranges from mild, moderate to severe. It can occur suddenly for just a short while (acute) and can likewise persist for a long period of time (chronic).

The rate of death among children under five due to diarrhea in developing countries is an issue of concern. This paper describes the prevalence of diarrhea, factors contributing to it and the manner of its management among mothers/caregivers in developing countries. Hence this paper will serves as a reference document for improving diarrhea prevention and management in developing countries.

Low socio economic status and lack of basic facilities such as safe water and appropriate waste disposal techniques of developing countries are responsible for prevalence of diarrhea in developing countries. In addition to this is the fact that many mothers/ care givers lack knowledge of diarrhea and its home management. Management of diarrhea should start at home in order to prevent the resultant complications which include dehydration, malnutrition and death. The recommended and effective way diarrhea can be well treated at home is through the use of Oral Rehydration Solution (ORS) and continuous feeding which includes breast feeding. Studies have reported several home management practices among mothers/care givers in developing countries which are based on religious and cultural factors. However preventing diarrhea is quite safer and cost effective than treating it. There is need for all stakeholders to join efforts together to put in place all preventive strategies in developing countries.

KEYWORDS

Diarrhea, Developing, Countries, Dehydration, Malnutrition, Oral –Rehydration – Solution (ORS)

1. INTRODUCTION

Diarrhea is a significant childhood disease which is also associated with some infections such as malaria, measles and upper respiratory tract infections and all these make it more deadly [1]. It is mostly first identified by mothers at home and if not treated promptly at home diarrhea can result into dehydration and malnutrition [2]. Diarrhea is a major killer disease amongst the poor especially in developing countries [3]. Globally an estimation of 2.5 billion cases of diarrhea occurs each year [4]. Many cases of diarrhea have been admitted into the hospital because of its consequences such as dehydration and malnutrition, which often result into death if not treated promptly and adequately [5].

Available reports indicated that more than 800,000 deaths of children under five years are recorded annually as a result of diarrhea disease despite global and local efforts in reducing it [6]. The rate is quite high in developing countries than the developed countries because of their low standard of living evidenced by nonavailability of basic facilities such as safe water and appropriate waste disposals techniques. Diarrhea is prevalent in developing countries due to poor socioeconomic development of this part of the world. Nigeria is ranked 54th among the 78 poorest countries of the world [7]. In addition Nigeria is among the first five poorest countries Worldwide. This is due to the poor standard of living, low literacy level and lack of essential facilities such as safe water and this contributes to high prevalence of diarrhea disease in most of the rural communities in this country [8].

2. WHAT IS DIARRHEA

Diarrhea is a symptom of a disease condition which affects people of all ages [9]. It is passage of three or more loose or liquid stools per day [10]. Common pathogens causing diarrhea are *Escherichia coli*, *Campylobacter jejuni*, *Vibrio cholerae*, *Shigella* spp., *Salmonella* spp., *Cryptosporidium parvum*, *Rotavirus* and *Giardia lamblia* [6,11]. Diarrhea occurrence depends on predisposing factors such as poor sanitation, poor water among many others. Most often diarrhea is of sudden onset and of short duration. However it can become chronic in people with poor nutritional and low immune status [12]. Age is a strong determinant of severity of diarrhea. Severe diarrhea affects children below the age of two years than those above two years. The reason for this is that children aged less than two years have less

immunity against any disease and could be easily susceptible to infection than older ones [13]. Diarrhea can be categorized into acute, persistent and chronic. Acute diarrhea is a type of diarrhea that lasts less than 14 days [14]. Diarrhea which starts acutely but lasts at least 14 days is considered as persistent diarrhea [15]. Chronic diarrhea lasts longer than 14days and may extend to 28days [14].

Generally diarrhea affects children than adults in terms of dehydration which is one of its major complications since water constitutes the largest proportion of children's body-weight [16]. Another significant complication of chronic diarrhea in children under five years is malnutrition and this depends on the duration of diarrhea, the cause of diarrhea and the state of the gastro intestinal tract [17]. It is important to know that malnutrition does not only accompany diarrhea, it can also precede diarrhea. A malnourished child has high tendency to develop diarrhea. The state of a child nutritional status does not impact only diarrhea but also other diseases. The major underlying cause of deaths due to childhood illness is malnutrition [18]. Malnutrition causing diarrhea or resulting from diarrhea which ever form it takes affects child's physical growth and development, and may lead to long term disability and morbidity in the future. Hence the need to emphasize through health education the benefits of continuous feeding during episodes of diarrhea [19].

3. WHY DIARRHEA IS A CONCERN IN DEVELOPING COUNTRIES

Despite several interventions that have brought about serious drop in diarrhea morbidity and mortality rate in developed countries, diarrheal diseases still remains a public health concern of developing countries. Such interventions include treating diarrhea using ORS, counseling mothers on how to prepared homemade remedies, advising mothers/care givers on need to continuing feeding child when child has diarrhea to mention but a few. With all these it has been observed that the prevalence of diarrhea in developing countries has not changed much since 1990s till 2003 with 3.5 episodes per child per year in 1993 and 3.2 episodes per child per year in 2003 [20]. Although on the average across the nations of the world, deaths due to diarrhea has reduced from 4.6 million in the 1980s to 3.3 million in the 1990s and to 2.5 million in the year 2000 [21] and by 2011 diarrhea accounted for 750,000 deaths [22]. However there has not been serious reduction in mortality rate in developing countries. In the 1990 it was

2.1 million deaths per year and by 2000 it reduced to only 1.6 million deaths per year. It is worth noting that diarrhea still remains one of the diseases responsible for death among children less than five years in developing countries. The continuity of any society depends on child bearing and child rearing. Any disease that can affect this process needs to be taken care of [20].

Children are the most vulnerable group susceptible to diverse form of illnesses due to their level of immunity and developmental changes. Poor socio economic status and some socio cultural beliefs and practices in developing countries are the leading causes of malnutrition among children under five years [23].

Diarrhea if not treated early easily leads to dehydration and malnutrition which are life threatening [10]. The rate of hospital admission due to these complications is still on the increase and many of such has led to death among children under five years in developing countries [24]. The relationship that exists between nutritional status and diarrhea is very significant and an important factor to be considered [25]. The impact of repeated or persistent diarrhea on nutrition and the effect of malnutrition on making children to be susceptible to diarrhea are interwoven. It is thus crucial children under five years are well nourished to prevent episode of diarrhea and when there is diarrhea, children nutritional status should be enhanced so as to prevent malnutrition [26].

4. FACTORS RESPONSIBLE FOR PREVALENCE OF DIARRHEA IN DEVELOPING COUNTRIES

Diarrhea is a disease of the rich and poor, the old and the young people in developed countries and those in developing countries alike, yet a strong relationship exists between diarrhea and the following interacting factors Socio economic factor, sanitation and water related factor, behavioural factor, host factor, mothers/caregivers knowledge and management of diarrhea to mention but a few [5,20, 27].

4.1 Socio Economic factor/poverty

Socioeconomic status of any group people is a strong determinant for their standard of living. Poor housing, unhygienic environment, inadequate safe water, cohabitation with domestic animals that may carry human pathogens and lack of storage facilities for food with resultant diarrhea diseases are due to poverty in most developing countries [20]. The prevalence of this disease is attributed to its sensitive mode of spread which is mainly through drinking or cooking with contaminated water and poor hygienic condition [28]. Accessing safe water and ensuring a healthy environment have been a problem of the poor populace in developing countries [29]. Poverty does not only impact these set of people living environment, it also impacts the way and manner they daily feed children and the quality of care they give children with diarrhea disease [20].

4.2 Sanitation and Water related factor

Poor hygienic environment and access to safe water are major factors responsible for prevalence of diarrhea in developing countries. The incidence of diarrhea in developing countries is high in communities and households where toilet and basic sanitation facilities are lacking [5,27,29]. Globally, It has been estimated that an average of 700 million people lack access to clean water and 3 billion people are living in an unclean environment. However this is mostly predominant in developing countries. Many households dispose refuses and feaces indiscriminately, and obtained water from unprotected sources [29-30]. Water obtained from these sources is used for either cooking or drinking hence resulting into diarrhea [31-32]. In addition lack of water often makes many to eat with and feed children with unwashed hands [28].

4.3 Behavioural factors

There are many behavioural practices common among caregivers/mothers of underfive children in developing countries [33]. Breast feeding practices in developing countries among mothers is a serious issue of concern. Many mothers either partially breast feed or do not breast feed their children at all [29]. Both categories of mothers put their children at risk of diarrhea. Such children are exposed to diarrhea

infection easily basically through contaminated feeding bottles or utensils because their immunity level is low [33]. Breast feeding exclusively for the first 6months of life have been the recommended way of feeding infants. It does not only offer maternal benefits more significantly are the benefits for young children. Apart from the fact that it helps in children growth and development specifically it reduces the risk of diarrhea in babies [34]. The act of storing water in dirty containers, exposing stored water even when such water is safe and preserving food at room temperature are part of wrong practices common among mothers in developing countries [33]. In addition food sold by street vendors is another major source of diarrhea in developing countries. Due to poverty many people cannot afford to prepare their food, hence they purchase food from food vendors. Furthermore behavioural practices common among mothers/care givers in developing countries especially among rural dwellers include poor or no hand washing after using toilet or cleaning up children feaces, eating with unwashed hands, eating raw foods, cooking in an unhygienic environment and using dirty utensils to drink or eat among many others [28].

4.5 Host factor

Children in developing countries are affected by preventable diseases such as measles, pneumonia, and malaria than children residing in developed countries [35]. This couple with malnutrition affects children immune status in developing countries. Hence such affected children lack the ability to resist and fight invading micro organism [36-37]. It is important to note that malnutrition itself alone is enough to make child immunity low, thus giving room for infection such as diarrhea. Malnutrition does not only give room to infections such as diarrhea, it also increases its severity and mortality [38]. Diarrhea likewise is an important cause of malnutrition in children underfive in developing countries. This is because such affected children intestinal wall ability to absorb nutrient has reduced and most often there is also loss of appetite. Furthermore Children with history of repeated diarrhea infection have high chances to be easily re-infected with diarrhea due to their poor immune resistant status [33].

Diarrhea is one major clinical manifestation and complication of HIV infection in all age group with worst cases among children under five in most countries of the World [33]. However this is more serious in developing countries where there are inadequate basic facilities such as good disposal system, safe

water, prompt medical services and the like. Diarrhea is more likely to occur in children with HIV/AIDS than non infected children. It is the main cause of death among children living with HIV/AIDS [39].

4.6 Mothers/caregivers knowledge and management of diarrhea

Poor knowledge has been one major factor responsible for the prevalence of many diarrhea diseases in developing countries. Many mothers/caregivers don't have adequate knowledge of diarrhea, its causes, complications and management [40-41]. This is however common among people living in rural setting than urban setting [13]. Furthermore it has been reported that children whose mothers did not attend formal education were more likely to develop diarrhea compared to children whose mothers attend any formal education [5, 41]. Generally, mothers' education, occupation, economical status, and experience have been observed to have significant relation with knowledge of diarrhea in developing countries [42].

Apart from the conventional methods of managing diarrhea, mothers have used different remedies and traditional therapies in managing diarrhea. This includes oral and topical medicines made from plants (leaves, stems, and roots) and amulets placed around the waist or wrist [43]. Some mothers believe that diarrhea should be managed by both traditional and modern approaches. The local available foods commonly used in the management of diarrhea include loose soft rice and pulse water [9]. In addition some mothers in developing countries are of the opinion that certain foods are to be avoided such as spicy, oily and rotten foods and that milk are harmful and should be stopped whenever a child experiences diarrhea [24].

Quick and safe recovery from diarrhea will require prompt and appropriate treatment of diarrhea at home by caregivers/mothers hence the need for them to have knowledge on the use of appropriate home remedies in treating diarrhea. Such readily available homemade remedies and interventions for treating childhood diarrhea include fresh fruit juices, fluid based foods, milk, salt sugar solution, and breast milk. The treatments of diarrhea should be right from its mild stage with focus on restoring lost fluids via oral rehydration solution and continuous feeding [13,44-45]. Continuous feeding is important for reducing the nutritional consequences of diarrhea illness. Meanwhile continuous breast feeding should be highly promoted among children in low income countries, where the burden of diarrhea and malnutrition is

greatest [3]. In addition continuous feeding with locally available foods should be promoted for all diarrhea cases in children already on complementary feeding in developing countries. This continuous feeding helps in maintaining body immune status [13]. The use of ORS has been advocated for in the management of diarrhea. It is highly effective, cheap and easy to prepare. It is very effective in preventing and reducing dehydration and diarrhea mortality. However, its use depends on mothers/caregivers knowledge and attitude towards it [41].

5 FACTORS INFLUENCING THE MANAGEMENT OF DIARRHEA IN DEVELOPING COUNTRIES

Inadequate knowledge of diarrhea process is one key factor responsible for the poor management of diarrhea among mothers/caregivers in developing countries. This is high among the illiterate than the literate counterpart of mothers/caregivers in developing countries [24]. Literate mothers are believed to have better opportunity for information as regards the management and prevention of diarrhea diseases [13]. Diarrhea is defined and given diverse interpretation by many mothers/ care givers of children under five in developing countries. This has its root in their cultural and religious belief [12]. Some of the beliefs as regards the causes of diarrhea are God's will, the breach of a taboo, eating of forbidden food and/or witchcraft attack [46].

The perceptions of mothers as regards diarrhea have given rise to several local classifications of diarrhea which informed the way each has been managed. In most African countries many mothers treat diarrhea based on the characteristics of the stool, and circumstances surrounding it [24].

6 CALL FOR ACTION

Reducing the prevalence of diarrhea has for a long time been a global concern. There is need for stake holders in developing countries to take more actions towards preventing and prompt treatment of this disease. Actions that can be taken include provision of better access to clean water, provision of low cost good sanitation system, improving health education program, improving the availability of Oral

Rehydration Solution (ORS) and Zinc supplement, Improving Complementary Feeding Practices, improving the availability of vaccines, and prompt treatment of diarrhea in children with HIV/AIDS among many others [10,21,27,46-47].

6.1 Provision of better access to safe water

Unsafe water and poor sanitation are the main sources of diarrhea disease in developing countries. Providing access to safe water together with good sanitation is an important factor in reducing prevalence of diarrhea. It is crucial government invest in project that will ensure people have consistent access to safe drinking water [22]. One major way government can ensure there is supply of safe water to every household is by constructing piped - in - system. However some countries may have financial constraints in achieving this, hence such may involve private bodies. This intervention is very cost effective at the long run as families spent less on hospital bills. Apart from the build in pipe system other interventions that can be carried out in rural areas include construction of boreholes and deep wells [48].

6.2 Provision of low cost good sanitation system

Improving access to safe water at communities' level can only have impact when families and community at large live under good sanitary conditions. This requires all households' participation with the use of simple available and appropriate technology acceptable to the people. Such interventions include construction of household latrines, provision of households waste disposal bins, public incinerators and schools sanitation. Implementing this cannot be achieved only by the government there is need for collaboration with interested private organizations [49].

6.3 Improving health education program

Studies have identified the effort of health care providers on health educating mothers and care givers on importance of hygiene and safe water in preventing diarrhea. Despite this, the prevalent rate in developing countries is still relatively high [22]. Beliefs held tenaciously by the mothers/care givers in developing countries as regards diarrhea are responsible for the reason they cannot see the link between poor water/hygiene and diarrhea disease. Comprehensive health education program that focuses not only

teaspoon of sugar, half level teaspoon of salt, 1 litre boiled water, mix it well and store covered in a cool place. This is to be prepared afresh every day [39].

Apart from the use of ORS at the initial stage of diarrhea, zinc supplement use is currently part of the initial management of diarrhea at home [5,12]. Information on benefits of zinc supplement to children under five years must be given to mothers/caregivers. Its used together with ORS has proven effective in reducing diarrhea morbidity and mortality rate among children under five years globally [54-55]. Mothers should be made to know that the use of ORS will not in any way reduce the frequency, duration and volume of diarrhea [18,56]. Administration of zinc supplement in episode of diarrhea specifically helps in the reduction of duration and severity of diarrhea. The use of 20 milligrams per day for children older than six months or 10 mg per day in those younger than six months, for 10–14 days is recommended. Zinc supplement has been found to contain vital micro nutrient required for protein synthesis, cell growth, immune function and movement of fluid and electrolytes hence its administration with ORS [54-56]. Studies from developing countries have found that vitamin A supplementation also helps in reducing the severity of diarrhea in children under five years. Its use has also been proven effective in maintaining intestinal resistant to micro organism function [18].

Due to the problem of malnutrition among children under five in developing countries emphasis should be laid on exclusive breast feeding for all infants for the first six months of life. Also the need to stretch importance continuous feeding and breast feeding of any children under five years having diarrhea [18].

History has revealed the effectiveness of health education in causing a behavioural change or improvement. Mothers with decision making power and with formal education are more likely to take yield to educational interventions. However some studies revealed that older women with formal education are able to make decision better than the younger mothers. Hence the health education must be designed in such a way to meet the need of all different categories of mothers. Nevertheless irrespective of the level of education and age of the mother, there is need for health care providers to make mothers to first understand the benefits of keeping their children healthy. This will change their attitude towards educational interventional program [56].

6.4 Improving the availability of Oral Rehydration Solution (ORS) and Zinc supplement

Prompt recognition and treatment of diarrhea at home is very important for effective management of diarrhea. Over the years replacement of fluid remains the mainstay in the treatment of diarrhea. Among various home remedies used in managing diarrhea, ORS and zinc supplement are the most effective of all the interventions [25,55]. ORS is a simple, cheap and proven intervention that can be used in treating diarrhea and its complications [42,46]. However due to economic problem of some developing countries, many mothers/caregivers cannot access and afford it [27]. Improving the availability of ORS will require the contributions of private and public sectors, including pharmaceutical companies in making ORS and zinc supplement readily available at affordable cost at households' level [46].

6.5 Improving Complementary Feeding Practices

Children on breast milk are to be introduced to complementary food at the age of six months. Inappropriate and contaminated complementary food is part of the predisposing factors for malnutrition in children less than one year. The relationship between malnutrition and diarrhea is one major reason for need to improve children less than one year complementary food. The contamination of the complementary food can be reduced by health educating mothers and care givers on hygienic practices, food storage practices and the benefits of probiotics in preventing diarrhea that can subsequently lead to malnutrition [20]. The nutrients value of complementary food can be improved by adding essential micro nutrients like vitamin A and zinc [39]. Probiotics micro organisms have both preventive and curative effects. Intake of probiotic milk products or supplementing formulas with probiotics is essential for all forms of diarrhea most especially children with lactose intolerance and on complementary foods [57].

6.6 Improving the availability of vaccines

Vaccines offering protection against childhood diarrhea have the potential in reducing the prevalence of diarrhea disease in developing countries. Rota virus vaccine, measles vaccine and cholera vaccine are important vaccines for children under five years. Rota virus is one important viral infection

responsible for severe diarrhea. It accounts for most diarrhea related hospitalization and an average of 37% diarrhea related childhood death every year primarily in developing countries [20,46]. Measles infection is usually accompanied by diarrhea [27]. Cholera disease is a disease of global concern especially in the developing countries. Like rota virus, vaccines have been proven effective in preventing cholera and measles and their accompanied burdens. However problem of costs and accessibility are the major barrier towards the effective use of vaccination in developing countries. Government with support of private agencies should make these vaccines available, accessible and affordable for the poor [46].

6.7 Prompt treatment of diarrhea in children with HIV/AIDS

HIV/AIDS has added to the burden of diarrhea disease both in young and old most especially in developing countries. The rate at which children under five living with HIV/AIDS die as a result of episodes of diarrhea in developing countries is high than the developed countries. Urgent intervention using the common recommended anti retro viral drug (ART) is required. ART has been used over the years in treating HIV/AIDS. It does not only reduces viral load, it also reduces other accompany symptoms diarrhea inclusive. However its effectiveness is low in developing countries due to problems of poor nutrition and sanitation. Proper nutrition will help in supporting the chances of ART treatment reducing diarrhea disease burden in developing countries [38].

6.8 PROMOTING POLICIES

Promoting national policies that support the prevention and management of diarrhea and its complications is another important interventional strategy in reducing the prevalence of diarrhea in developing countries. Such policies should address increasing access to safe drinking-water and sanitation in developing countries. Environmental laws in most developing countries are not well implemented. In order to have hygienic environment there is need for environmental law enforcement through appropriate environmental maintenance agencies [31-32].

CONCLUSION

Diarrhea is one major illness of concern among children under five especially in developing countries. The state of development of most low income countries makes its eradication a bit difficult couple with strong cultural and religious beliefs held by the care givers in this part of the World. Eradication of this disease will require efforts of all that are involved in issue related to children health and care.

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