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Management of Diarrhoeal Disease in Children

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ABSTRACT

Diarrhoea is the most common cause of death among children, mainly below 5 years of age. Increase in the frequency of defecation, fluidity of stools, and abnormal consistency of stools are the main indications of diarrhoea. It can be managed by rehydrating the children with ORT like ORS, continuing the feed, breast feeding up to particular age group. ORS helps mainly in reducing the frequency, fluidity, consistency of stools. Now-a-days conventional ORS was replaced with low osmolarity ORS, which has reduced the IV infusion and prolonged hospital stay. Zinc supplementation along with ORS reduces diarrhoeal deaths. Children should be fed with Nutritious food i:e foods containing high micronutrients like folic acid, zinc, vitamin A which helps in controlling and reducing diarrhoeal episodes. Factors like maintaining hygiene, supplying adequate pure and safe water, washing hands with soap, proper sanitation and immunization mainly for Rota virus and measles helps in preventing childhood diarrhoea. Prevention of stunting also plays a main role in preventing diarrhoeal episodes in children. Educating the mother about the disease helps in reducing episodes and preventing childhood deaths.

Keywords: Diarrhoea, ORS, zinc supplementation, vitamin A, stunting.

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INTRODUCTION

WHO defines diarrhoea as the “passage of loose or watery stools at least three times in a 24 h period”, but emphasizes the importance of change in stool consistency rather than frequency, and the usefulness of parental insight in deciding whether children have diarrhoea or not.[1] Diarrhoea is normally defined as increase in the frequency of defecation, fluidity of stools, and abnormal consistency of stools.[2] Blood in the stools can be used as factor to differentiate dysentery and acute diarrhoeal illness irrespective of frequency[3, 4]. The acute childhood diarrhoea is further classified in three types based on potentiality of life threatening. They are 1) acute watery diarrhoea 2) bloody diarrhoea 3) persistent diarrhoea. Acute watery diarrhoea: it includes cholera along with significant fluid loss and rapid dehydration in an infected person lasting from several hours to few days and causative organisms are *V.C*holera or E.coli bacteria and *R*ota virus. Bloody diarrhoea: also called as dysentery, is identified by blood in the stools associated with intestinal damage and nutrient loss. The causative organism is Shigella the most severity causing agent. Persistent diarrhoea: an episode of diarrhoea with or without blood and lasts for 14 days and is mostly developed in undernourished children and with other illness like AIDS[5]. The diarrhoea is mainly caused by bacterial agents, viral agents and parasitic agents. During summer the bacterial agents and parasites are the major cause of diarrhoea when compared with viruses. In developing countries and industrialized areas viral agents are main cause of acute diarrhoea. Parasitic agents are restricted only to travelers[6].

Management of diarrhoea

In 1980 WHO lead up a special program for control of diarrhoeal disorder in children. By enhancing the case management skills of health-care workers, health-care system, and enhancing family and community practices through education of mothers, fathers, other caregivers and members of the community with a focus on health-care seeking behavior, compliance, care at home, and overall health promotion. The main aim of Integrated Management of Childhood Illness Programe was to reduce the mortality and morbidity in children.[7]

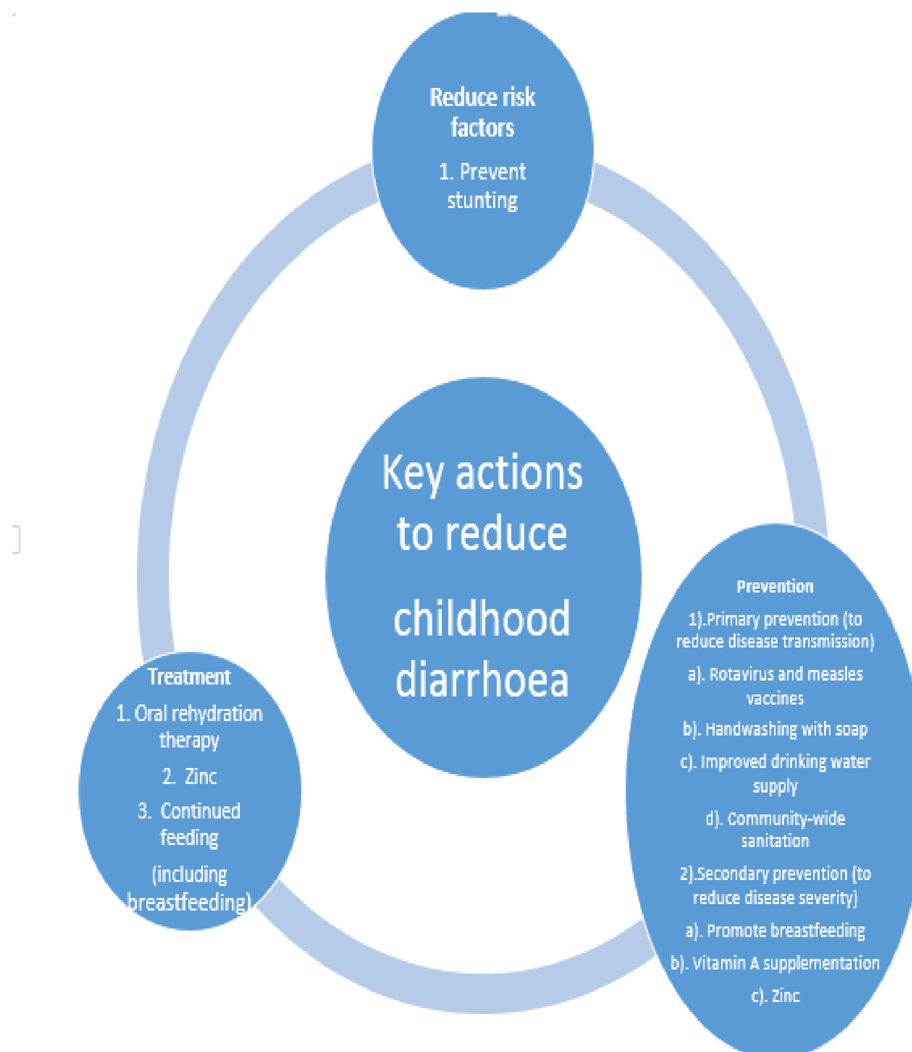

Figure 1: Nutrition, health and environmental factors all play a role in preventing and treating childhood diarrhoea

Treatment

ORT:

ORT is the main choice for diarrhoeal disease, and this includes ORS or homemade fluids like soups, rice water, yoghurt drinks or clean water. In order to prevent fluid loss plenty of fluids were recommended during diarrhoea.[8] Zinc supplementation was recommended along with ORS, by WHO during diarrhoea.[9] Specific concentrations of sodium, glucose, potassium, chloride and alkali (bicarbonate or citrate) in water were main components of ORT[10, 11]. ORT is the administration of appropriate solutions orally to correct or protect from diarrhoeal dehydration. In both developed and developing countries the cost-effective method for treating acute gastroenteritis and reducing hospitalization is by using ORT. The salts used in ORS for oral rehydration therapy helps in replacing the salts that are lost through diarrhoeal stools. The

standard ORS is replaced by new lower – osmolarity ORS with reduced sodium and glucose concentrations followed by less vomiting, less stool output, lesser chance of hypernatremia and by reducing necessity of intravenous infusions. Including cholera for all types of diarrhoea this formulation is suggested for every age group.[6]

Table 1: Composition of conventional ORS

Ingredients	Quantity
Sodium	75 mmol/l
Chloride	65 mmol/l
Anhydrous glucose	75 mmol/l
Potassium	20 mmol/l
Tri sodium citrate	10 mmol/l
Total osmolarity	245 mmol/l

In children with mild to moderate dehydration ORT is as effective as intravenous fluid in rehydration without any difference in failure rate or hospital admission rates[12] and is more advantageous when compared to IV therapy.

Advantages

ORT can be easily administered at home, reduces the outpatient and emergency department visits, and reduces emergency department staff time, hospital stays. More parents were satisfied by using ORT therapy during visit.[13] The same fluids used in ORT can be used for rehydration, maintenance, and replacement of stool losses. When compared with IV therapy ORT can be started easily[14]. Due to preparation errors, commercial ORS solutions are recommended over homemade solutions.[15] clear sodas and juices should not be used for ORT as it may develop hyponatremia.

Zinc supplementation

In developing countries providing zinc along with ORT helps mainly in minimizing the episodes of diarrhoea along with reducing the severity of diarrhoea in children. Regardless of diarrhoea type WHO and UNICEF mainly recommended zinc therapy for children. Administering zinc sulfate for 3 months helps in reducing the non-accidental diarrhoeal deaths[6]. During diarrhoea regular zinc supplementation significantly reduces the stool frequency, stool amount and duration of diarrhoea[16]. A daily dose of 10mg zinc for infants and 20mg zinc for children was recommended for 10 – 14 days. Various forms of acceptable zinc salt formulations like zinc sulfate, acetate, and gluconate are available. Zinc sulfate is effective, safe and is easily accessible at low cost. Zinc sulfate tablets with 20mg of elemental zinc are also available in the dispersible form and can be dispersed in breast milk, oral rehydration solutions or in water on a small spoon.

Older children can chew or swallow the tablets with water. Pediatric zinc sulfate tablets are also available with pediatric doses.[17]

Interactions

staple foods like cereals, corn, and rice should not be taken along with zinc as they contain phytate, which decreases zinc absorption from composite meals. Zinc absorption is reduced by, calcium supplements, penicillamine and other chelators oral tetracyclines. zinc absorption is inhibited by coffee and iron supplements. Absorption is enhanced by other low-molecular-weight ions, such as EDTA and organic acids (e.g., citrate), Amino acids, such as histidine and methionine, and. Zinc inhibits the absorption of copper from intestine, and reduces absorption of Ciprofloxacin, Levofloxacin, and Ofloxacin. Both zinc salts and ferrous salts absorption will be reduced if administered at same time. Zinc excretion is increased through urine on administering thiazide diuretics.[17 – 19]

Probiotics

Many strains of probiotic microorganisms inhibits the enteropathogenic microorganisms (Salmonella, Shigella, enterotoxigenic E. coli, or Vibrio cholera) growth, metabolic activity and adhesion to intestinal cells[20-22],for regulating the intestinal microflora temporarily and to have immune stimulatory or regulation properties. These are the most usual applications as most of the health effects attributed to them are related to gastrointestinal tract directly or indirectly. It can be easily understood that probiotic microorganisms are used for prevention or therapy of gastrointestinal disorders[23]. Probiotics are live microbial flora and naturally present in digestive tract. These are thought to be beneficial and are sometimes considered as friendly bacteria. Enhancing the immune function, improving the protective barrier of digestive tract, serving to yield vitamin K and prohibiting the powerful bacterial growth are some of the factors considered to promote health[24].

Continued feeding (including breast feeding)

Raising the importance of exclusive breast feeding in first 4-6 months of life helps in reducing both the occurrence of diarrhoea and related deaths, are mainly helpful for infants.[25-26] some studies in developing countries like India[27], Malysia[28], and Srilanka[29] stated that breast feeding has

stronger protective effect against diarrhoea.

Prevention of diarrhoea

The following are necessary to make children healthier and less likely to develop infections that causes diarrhoea i:e maintain clean environments, support of communities and caregivers in constantly reinforcing healthy practices over time[5].

Water, sanitation and hygiene:

By enhancing the availability of safe water, appropriate sanitation and developing good hygiene helps in preventing childhood diarrhoea.[30] the factors include discarding human excreta in sanitary manner, washing hands with soap, raising availability of safe water, enhancing water quality, and by storing water safely. Enhancing sanitation helps in stopping the environmental contamination and reduces transmission of pathogens leading to diarrhoea[31]. Washing only one hand is also an important carrier of transmission.so washing both hands with soap can reduce the occurrence of diarrhoea by over 40 percent.[32] Enhancing the availability of water has motivated in developing better hygiene, mainly hand washing. Even though the water availability is enhanced, diarrhoea rates also depends on available source of water.[33] Enhancing water quality at source along with processing of household water and safe storage systems had reduced the diarrhoeal occurance.[34]chlorination, filtration, combined flocculation and disinfection, boiling, and solar disinfection are the various processing factors of house hold water.

Micro nutrients:

The main risk factor for developing diarrhoeal disease and diarrhoeal deaths globally is malnutrition.[35] mainly Micronutrient malnutrition decreases the immune function leading to increase in vulnerability to child infections by postponing full recovery and raising the chances of developing intense illness. The important micronutrients for health are zinc, folic acid and vitamin A and are studied for preventing and treating diarrhoeal disease in children.

Vitamin A

The main leading cause for preventable blindness, increasing the mortality and morbidity risk followed by infectious diseases is vitamin A deficiency (VAD).[36] VAD is mainly caused by insufficient intake of foods containing high quantity of vitamin A like animal sources, dark green leafy vegetables and yellow, orange colored non-citrus fruits[37]. Beaton et al. after conducting large scale trails on vitamin A supplementation reviewed the results and stated that an overall reduction of 23% mortality rate in children between age group of 6-59 months.[38]Diarrhoea specific mortality rate was reduced 32% by Vitamin A supplementation.

Zinc

The necessary micro nutrient for growth, development, and appropriate immune function is zinc. The major cause of stunting among children <5yrs of age and growth retardation in adolescent

boys was mainly due to zinc deficiency[39]. In infants zinc deficiency is due to insufficient concentration of zinc in breast milk, or in case breast milk is replaced with low bioavailable zinc containing foods.[40]

Immunization

Rotavirus and measles vaccine

In many studies, Rota virus was shown to have main role of causing diarrhoea in children in both developing and developed countries.[41,42] It can also infect adults along with children[43,44] and can occur in any age group.[45] The occurrence of infection varies with age and young children are more prone to infection. Measles is self-limiting acute viral infection. Diarrhoea along with serious side effects can be experienced by some children who are insufficiently nourished and having impaired immune system. Diarrhoea is one of the most common cause of death along with measles worldwide.[5]

Reducing risk factors

Prevent stunting

The stunting is mainly done for the children whose food is lacking of proteins, thiamin and riboflavin.[46] Inappropriate feeding to infants either less than 6 months or more than 8 months are potential to get stunted due to under weight. Longer breast feeding can lead to both moderate and severe stunting. children with low birth weight or low length are more prone to stunting.[47,48] the low birth weight and length are due to insufficient O_2 supply to placenta and fetal uptake which occurred as a result of indoor pollution.[49]

Plans required for reducing child deaths from diarrhoea

1. Mobilize and provide resources for diarrhoea control.
2. Reinstate diarrhoea prevention and treatment as a cornerstone of community-based primary health care.
3. Low osmolarity ORS and zinc should be encouraged in all countries during diarrhoea.
4. The effective interventions should reach every child.
5. Increase the speed in provision of basic water and sanitation services.
6. Use new strategies to increase the acceptance of proven effective measures against diarrhoea.
7. Awareness should be created with community involvement, by educating and by promoting health activities.
8. Monitor progress at all levels, and make the results count.
9. To curb the diarrhoea make the health systems to work.
10. Make the prevention and treatment of diarrhoea everybody's business.

CONCLUSION

Diarrhoea is one of most common causes of death in children. It can be prevented by providing safety water, improving sanitation and hygiene. Children should be breast fed in order to provide sufficient immunity for preventing diarrhoea. Immunization should be done according to age group and particularly measles and Rotavirus vaccine should be given as they are main causes of diarrhoea and related deaths. ORT homemade fluids like soups and rice water are recommended inorder to prevent dehydration Feeding should be continued with fluids in case of unavailability of ORS. ORS along with zinc is highly recommended as it helps in reducing the diarrhoeal episode and frequency of diarrhoea. Zinc tablets should be given for a period of 10 – 14 days. Certain foods should be avoided during zinc therapy. Conventional ORS was replaced with low-osmolarity ORS inorder to provide better effect and it reduced the IV infusion and long hospital stay. Adequate nutrition should be provided to prevent diarrhoea especially micronutrients like zinc, vitamin A and folic acid. Probiotics helps in promoting health by prohibiting bacterial growth. Stunting should be reduced in children as it is the also a risk factor leading to diarrhoea and it can be reduced by educating the mother about providing proper diet and care to children.

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