Awareness of Diarrhoea Among Caregivers of Children Younger Than Five Years in the Wake of Acute Diarrheal Disease Outbreak and Declaration of Public Health Emergencyin Karaikal, Puducherry

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Abstract:
Back ground: Diarrhoea is the second most common cause of death among children younger than five years globally and is third commonest in India. There is a worldwide documentation of increased diarrheal disease outbreak in coastal areas which are more prone for natural disasters like cyclones and floods, that could alter the regular water supply, sanitation and sewage system. Karaikal one of the four districts in the Union territory of Puducherry in South India, having a long coast line is more vulnerable for various kinds of natural disastersand exacerbation of infectious diseases. Recently in July 2022 a public health emergency was declared by the health and family welfare department of union territory of Puducherry in Karaikal district, south India, in the wake of an out-break of acute diarrheal disease and deterioration of drinking water supply. The care-givers of the affected children play a crucial role in minimising the burden of such paediatric diarrheal disease. **Aim:** To assess the knowledge about diarrhoea among care givers of under five children after the acute diarrheal disease outbreak and declaration of public health emergency in Karaikal, Puducherry. **Methods:** A cross-sectional study comprising 150 participants was conducted between January and July 2023 in the department of paediatrics at VMMC Hospital Karaikal. A standard and structured questionnaireadapted from UNICEF guidelines on LQAS household surveywas given to the care givers. Each questionnaire was reviewed for completeness and consistency after collecting the data. The responses were entered into Epi Info version 3.1 and analysed using SPSS software. The descriptive statistical analysis was used for frequency, percentage of the findings. **Results:** Of the 150 participants, majority (70%) of the care givers were mothers and 22% were grand-mothers, 38.7% and 23.3% of them had primary and secondary level of education respectively. The source of drinking water for 47.3% was through pipe line and 52% of the participants were aware of boiling the water for purification. 77.3% of children in the study suffered from diarrhoea in the preceding month and 67.3% of the respondents believed that contamination was the cause of the disease. Many of the study subjects have knowledge regarding feeding practices, clean drinking water, maintenance of good hygiene, hand washing and also the use of ORS or home-made fluids during diarrhoea. **Conclusion**: Though majority of the care givers in this study have the knowledge about diarrhoea and its preventive measures, a few were insufficiently knowledgeable. Hence this targeted population are in need of continuous health education and an insight regarding improving sanitation, hygiene and feeding practices to prevent and manage paediatric diarrhoea.

Key words: Diarrhoea, outbreak, care-givers, under five children, knowledge, prevention, Karaikal.

Introduction:

Diarrheal disease is one of the chief and frightening causes behind global mortality and morbidity in infants and young children.[1] World Health Organization (WHO) defines diarrhoea as passing loose, watery or liquid stools three or more times in twenty-four hours or increased frequency of passing stools than is normal to the individual.[2,3] This involves intestinal loss of fluid, electrolyte imbalance and nutritional deficiency which can progress to severe dehydration and eventually death.[4] Nearly 9% of lives were lost to

diarrhoea in under five children across the world in 2019 accounting to more than 1300 childhood deaths in a day or around half a million annually.[5] The National Family Health Survey (NFHS) states that India has made steady progress in reducing mortality of children less than five years from 9.2 to 7.3 from 2016 to 2021.[6,7] Successful implementation of various universal Programs such as Expanded program on immunization, Program for the control of diarrheal diseases and acute respiratory infection made possible for remarkable decrease in prevalence of diarrhoea[8,9], but the proportional mortality of the disease still stands high and is the third most common reason for under five deaths in India.[9,10]

Children suffer from diarrhoea at least three times a year in developing countries, in 2005 diarrheal disease was responsible for 14% of total deaths of children below five years of age in India.[7] Childhood diarrhoea has become a public health concern and is still alarming in our country.[1] The incidence of diarrheal disease is high during infancy due to starting of weaning by caregivers, though an important practice, contaminated weaning food or inappropriate feeding may lead to loss of protection provided by breast milk, as the child's immune system is still immature.[11]

The burden of communicable diseases like diarrhoea disproportionately affects people among low socioeconomic group due to lack of basic amenities, infrastructure and ignorance to available health services.[11,12] It can be lowered by creating awareness regarding improving hygiene, proper sanitation, timely vaccination, safe water supply and availability of simple public health services.[7] Since prevention and management of child hood diarrhoea usually begins at home,World health organization (WHO), United Nations Childrens Fund (UNICEF) and integrated management of child hood illness has recognised and advocated home management to reduce impact of diarrheal disease among young children.[3]

There is a worldwide documentation of increased diarrheal cases in coastal areas which are more prone for natural disasters like cyclones and floods, such incidents alter the regular water supply, sanitation and sewage system.[13,14] Karaikal one of the four districts in the Union territory of Puducherry in south India, having a long coast line of 24 kilometres (16 miles),is more vulnerable for diarrheal diseases.[17]On 30 December 2011, a severe cyclonic stormformed in Bay of Bengal named '*Thane*' approached the southern states of India and made landfall near Puducherryalso affecting Karaikal district. The storm created havoc in its pathway causing great destruction in Puducherry and nearby districts of Tamil Nadu,which deranged the livelihood and infrastructurein the area.This resulted in flooding with stagnation of rain water leading to scarcity and lack of safe drinking water due to damaged pipe lines. As a consequence,a week later cases of acute diarrhoea were reported in two localities in Puducherryon 7 January 2012.[13]Similarly acute diarrheal outbreak was documented at Thirupur, Tamil Nadu in December 2016 due to contamination of drinking water supply from damaged pipelines.[14]In 2018 diarrheal outbreak was reported from Valatheru, PHC Kovilpathu, block Karaikal. The reason of the outbreak was investigated and identified by District RRT as fault in water pipeline.[15]Latelyon 4 July 2022 the director of health and family welfare services of Puducherry declared a public health emergency in Karaikal region, since a huge population was affected with acute diarrheal disease,the primary cause of outbreak being sewage contamination of drinking water supply.[16] Therefore, sufficient knowledge of diarrhoea and its prevention is vital for caregivers to combat the life-threatening consequences like dehydration leading to death. Hence this present study was under taken.

Methodology:

A cross-sectional study was conducted between January and July 2023 in the department of paediatrics at VMMC Hospital, Karaikal. Face to face interview was employed by using standard and structured questionnaire adapted from UNICEF guidelines on LQAS household survey.[17] The questionnaire had information regarding caregiver and child, knowledge, management and preventive strategies of diarrheal disease among caregivers. The caregiver of a 0-5 year old child was chosen for the study as there is a need to evaluate the perception about cause of diarrhoea and its management, so that gap in their knowledge about paediatric diarrhoea can be identified.Caregivers of children less than five years with history of diarrhoea in the last one month and who gave consent were included in the study. Physically impaired (can't hear or talk) caregivers were excluded from the study.

Written informed consent was obtained from all the respondents, the questionnaire was translated to local language and also, they were made to understand that their participation is purely voluntary, any decision of notparticipating in the study would not affect them in any way. Each questionnaire was reviewed for completeness and consistency after collecting the data. The responses were entered into Epi Info version 3.1 and analysed using SPSS software. The descriptive statistical analysis was used for frequency and percentage of the findings.

Results:

A total of 150 caregivers met the inclusion criteria and participated in this study,

Table-1 Caregiver and child's information

Table-I Caregivers and childs informatior

Among the total participants involved in the study37.3% were aged between 15–24 years, 28% were 25-34 years,9.3% were35 -44 years and 25.3% above 45 years.More than half of the children(52%) were in the age group of 6-24 months. A higher proportion of caregivers(70%) were mothersand 22% were grandmothers. Among them 38.7% had primary, 23.3% secondary, very few 8%tertiary level of educationand 32.7% werewithout anyformal education. The majority (57.3%) of the respondents were homemakers, 24%self-employed and only 18% were government employees or working in non-government organizations.

Table-II Care-givers knowledge about diarrheal disease and its management among under five children

Table-II Caregivers knowledge about diar

Majorityof the caregivers (86%)were able to define diarrhoea correctly. Around three fourths (77.3%) of the children suffered from diarrheal diseasein the preceding month. Many of the respondents (67.3%) believed that diarrhoea was due to contamination, 24% of them thought it could be due to teething and a few (8%) assumed an evil eye and 7.3% had no idea about the reason for diarrhoea. During the diarrheal episode many of the children (41.3%) were given more breast milk than usual, 32% were given their regular quantity, 8% were fed less than usual and 18.7% were not breast fed at all.Regarding the consumption of water, more than half of the children(57.3%) were offered extra drinking water than usual, followed by 26% same as the usualvolume,15.3% less than the usual and1.3% were not given waterto drink.About the food intake 51.3% of the children were cateredto with more than the usual quantity, 28% with same as usual quantity, 17.3% less than usual and 3.3% nothing to eat. In the management of diarrhoealess than half (45.3%) of the children received ORS and 35.3% home-made fluids.Of the total respondents 64.7% agreed that childhood diarrhoea is a preventable disease and manageable at home. Mostof the participants soughthelpfordiarrhoea, of themnearly half (49.3%) visited the hospital, while 20%, 14.7%, 10%, took help from pharmacy, family members/relatives and herbalist respectively.

Table-III Care-givers knowledge about preventive measures of diarrheal disease among under five children

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Concerning the source of drinking water, 47.3% used pipeline water, 30.7% bottled water, few7.3% and 6.7% had surface water and bore or tube well water respectively. More than half (52%) were aware that boiling can make water safe for drinking, 21.3% used water filtersand 24% thought addition of bleach makes thewater safe for consumption.86% of the respondents knew that giving clean water to the child can prevent diarrhoea. With regard to the personal hygiene, 65.3% of the participants washed their hands before cooking,82.6% before feeding the childand92% after defecation/urination.

Discussion:

This study was intended to assess the awareness about diarrhoea, its managementand preventive measures among the care givers ofchildren younger than five years oldfollowing diarrheal disease outbreak and

declaration of public health emergencyin Karaikalbythe director of health and family welfare services of Puducherry. Karaikal with an area of 161 sq.km.and a coastline of 26kms (16 miles) along the Bay of Bengal is one among four districts of the union territory of Puducherry in south India.[18,25]According to latest census (2011) Karaikal had a population of 2,00,222; of this 22,263(11.12%) were children aged between 0-6 yrs.[25] As it is falling under the highly vulnerable area of cyclonic hazards, the population here is more prone for outbreak of post cyclonic infectious diseases. Such outbreaks are attributed to flooding, unsafe drinking water and improper sanitation facility.[19]Few areas of the union territory Puducherry were affected by diarrheal outbreaks in 2012, 2018and 2022[13,15,16]consequentlyin July 2022 a public health emergency was declared in Karaikal by the health and family welfaredepartment.[16]

The variouspredictors influencingdiarrheal diseasedirectly or indirectly includes child age andsex, maternal age and education, house hold income, breast feeding and nutritive status, drinking water quality and sanitation condition.The demographic characteristics in the present study has shown that a high proportion of children (52%) affected with diarrhoea are in the age group of 6-24 months, which may be due to introduction of weaning foods that are prepared under unhygienic conditions or with unsafe water and more exposure of the child to the environmental conditions while achieving the various milestones like crawling and walking. NFHS II also reported a similar trend in the age of the children in the prevalence of diarrhoea.[20]Breast feeding and minimal exposure to contaminating agents may be the cause of protection in infants between 0-6 months from diarrheal diseases as breast milk is rich in maternal antibodies, anti-inflammatory agents and balanced nutrients. Present study reflects few cases (21%)in this age group which is in accordance withA. Meriton Stanly et al[21] and Efunshile et al.[22]Our study revealed that birth order of the child showed a positive association with childhood diarrhoea. With increase in birth order and number of children there was a notable rise in diarrheal episodes. This finding is in consistent with Saha J et al.[23] As the number increase the quality of care and attention of parents towards their children decreases making them more prone to infectious diseases like acute diarrhoea.

Encouraging women education can improve the care-givers understanding about prevention and management of diarrhoea thereby reducing the fatality of diarrheal disease in children. In 2011total literates in Karaikal district were 87.05% of which 92.37% and 82.02% were male and femalerespectively.[25]Mothers with lower educational status put their children at higher risk of diarrhoea.[23]In this study 70% of the care-givers are mothers, 32.7% of them are illiterates and majority had primary to secondary level (38.7% and 23.3%) of educationrespectively. Similar findings were reported by Efunshile et al[22]and Saha J et al.[23]Ladies being the primary care-takers in a family, their literacy plays a crucial role in adopting preventive measures and maintenance of proper health. A good number of the caregivers (57.3%) are home-makers in our study. Impact of mother's occupation on diarrheal disease in children differed in various studies which might have been due to difference in economic activities at places where studies were carried out.

The findings of this study regarding the knowledge of diarrhoea and its management by caregivers showed that 86% were able to define diarrhoea as passing 3 or more watery stools in one day and 67.3% assumed that contamination could be the cause for diarrheal disease. These findings are in agreement with study by Workie et al.[2] These positive findings about the knowledge of diarrhoea might be due to implementation of various health education programs through health workers andvia mass media.Good feeding practices with appropriate fluids and weaning foods which are available at home can prevent dehydration and replace electrolytes that are lost during diarrhoea. In this study only half of the children were given more than usual quantity of breast milk, water and food during the diarrheal episodes. Giving same or less amounts of fluids and food than usual during episodes of diarrhoea may be because of mis-belief or cultural belief, ignorance or out of fear that intake of milk may further increase diarrhoeaand also less intake of food would stop diarrhoea sooner. This pattern was consistent with studies done byAsif K et al[11]and A. Meriton Stanly et al.[21]

The important concerning factor regarding management of paediatric diarrhoea is use of oral rehydration solution (ORS) and home-made fluids to prevent diarrheal dehydration. ORS, the cornerstone of fluid replacement can replenish water and electrolytes that are lost through liquid stools during a diarrheal episode. Use of ORS reduces 20% of stool output and 30% of vomiting in children. Majority of care givers in our study being literates, were aware of the importance of ORS and home-made fluids in replacing the fluid and electrolyte loss during diarrheal episodes and hence supplemented their children.The results are in accordance withWorkie et al[2]and A. Meriton Stanly et al. [21] Along with this, major proportion of the care givers sought the help of hospitals in treating the children as a part of management of diarrhoeal diseases.

Acute diarrhoea in itself is not fatal, but it can be prevented by simple cost-effective measures such as maintaining personal hygiene, consuming safe water and good hand washing. Drinking water supply in Karaikal, a costal district of Puducherry is predominantly through a series of overhead tanks with a network of pipelines supplying each locality.[13] Any breaks or leaks in these pipes allows the mixing of sullage with the water supply which can cause its contamination leading to outbreak of infectious diseasesincluding acute diarrhoea.Inspiteof improvement of the water supply resources,studies have shown that water treatment practices at home such as boiling or filtration have a greater effect on the reduction of diarrhoea.[24]Drinking water source for nearly half (47.3%) of the study population was through pipelines, 30.7% are drinking bottled water, 7.3% surface water and 6.7% tube well water. Amajor group of respondents followed boiling (52%) and filtration (21.3%) of water as a method to get safe drinking water.Appropriate hygienic practices of care-givers, like washing their hands before cooking and feeding, as well as after defecation can significantly protect against diarrhoea in children.Inour study 65.3% of participants washed their hands before preparation of food, 82.6% before feeding the child and 92% after using the toilet which were in agreement with Workie et al[2], Momoh FE et al[3] andEfunshile et al[22]

During the recent diarrheal outbreak in July 2022 at Karaikal, though many suffered with diarrhoea the mortality rate was veryminimal as it was well controlled by the health department. Most of the care givers being literates could follow the preventive measures along with instructions of health educators in recognizing and managing the disease at home with ORS, other home-made fluids and also seeking medical aid when required helped in reducing the mortality to a greater extent.

Conclusion:

Childhood diarrhoea, a common contagiousdiseasecan be prevented by simple cost-effectivemeasures. Children living in Karaikal are susceptible to various infectious diseases including diarrhoea, as this being a coastal area is more vulnerable for cyclonic storms contaminating the existing drinking water source and altering the sanitary facilities. Findings of our study revealed that among the surveyed population majority of the care givers have the knowledge about diarrhoea and its preventive measures, but a few were insufficiently knowledgeable. Hence this targeted population are in need of continuouseducation and an insight regarding paediatric diarrhoea and its management as health education is the first component in primary care. To decrease the burden of diarrheal diseases among under five children, a consolidated approach and community participation is necessary to focus on improving sanitation, hygiene and feeding practices along with continuous health education.

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