

Home Management of Childhood Diarrhoea in Southern Nigeria

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ABSTRACT

Diarrhoea is a major public health problem and the second leading cause of under-five mortality globally. Low osmolality oral rehydration solution and Zinc tablets are critical components of the World Health Organization (WHO) treatment guidelines for the home management of childhood diarrhoea. The study was conducted among caregivers of under-fives admitted in the Children's Emergency Unit (CHEU) of the University of Uyo Teaching Hospital (UUTH). A validated semi-structured proforma was used to collect relevant information relating to the home management of diarrhoea by their caregivers. The data obtained were entered and analyzed using Microsoft Excel 2007. The children's characteristics were described using frequencies and percentages. Significance test was done using Chi-square test which was deemed statistically significant if p value was < 0.05 . A total of 100 caregivers were enrolled into the study. Home fluid was used by 59 caregivers (59.0%) in the management of childhood diarrhoea. The fluids commonly used were Oral rehydration solution (ORS) alone by 31(31.0%), salt sugar solution (SSS) by 16(16.0%) and ORS with Zinc tablet by 9(9.0%). Of the 59 caregivers that used home fluids, 41(68.5%) gave less amount of fluid while 15(25.4%) gave more fluid. The use of ORS was significantly associated with high social class ($p = 0.025$). Antibiotics, analgesics, and local enema were the frequently used medications. The home management of childhood diarrhoea in this study was generally sub-optimal. Only about one-tenth of caregivers gave low osmolality ORS with Zinc tablets supplementation as recommended by WHO.

Keywords: Childhood, diarrhoea, under-fives, home, management

INTRODUCTION

Diarrhoea remains a leading cause of childhood morbidity and mortality globally with an estimated 1.7 billion cases and 525,000 deaths annually.^{1,2} Though a preventable and treatable disease, diarrhoea is still a major public health problem especially in regions of Africa and South Asia where lack of potable water, poor sanitary conditions and low childhood immunization coverage are known risk factors for the disease.³ Diarrhoea diseases are often complicated by dehydration, electrolyte imbalance and malnutrition which might eventually result in death.^{4,5}

The WHO and the United Nations Children's Fund, 2004 jointly recommended the use of low osmolality ORS with Zinc tablet as a two-pronged approach in the treatment of acute diarrhoea in children. Home-made fluids were to be used when low osmolality ORS was not readily available.⁵ Increased breastfeeding, continued feeding and increased fluid intake were among the recommendations made by the organization for the management of the condition.⁶ These strategies for diarrhoea control in under-fives are cheap and cost-effective.^{6,7} The availability and utilization of these cost-effective interventions are expected to remarkably reduce the burden of the disease especially in regions of Africa and Asia where diarrhoea is endemic.⁷ It's over a decade since the home management of diarrhoea using the current treatment guidelines was introduced by WHO and there has not been appreciable progress in diarrhoea control in endemic regions despite the availability of cost-effective interventions for managing this condition. This worrisome

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Date manuscript was received: 15/11/2021
Date manuscript was accepted: 14/5/2022

situation may partly be attributable to inadequate implementation of the WHO guidelines on the home management of diarrhoea by caregivers in these regions.

The home management of childhood illness largely depends on the knowledge of caregivers about the condition which is often influenced by geographic and temporal factors.⁸ Thus, the home management of childhood diarrhoea is likely to vary from place to place and from time to time within a particular place. To reduce the morbidity and mortality from childhood diarrhoea, it is imperative to periodically evaluate the home management of the condition.

This study was aimed at evaluating the home management of diarrhoea among under-five children admitted in University of Uyo Teaching Hospital (UUTH) using the WHO recommended guideline as a benchmark.

MATERIALS AND METHODS

Design of the study

This was a prospective study on home management of diarrhoea conducted among children admitted in UUTH from January 2013-December 2015.

Setting of the study

The study was conducted in the Children's Emergency Unit (CHEU) of the UUTH. It is a 24 bedded unit headed by a supervising Consultant. Medical and nursing staff work round the clock in the unit. The most common paediatric emergencies seen in the unit are malaria, bronchopneumonia, and diarrhoea.⁹

Target population

The target population was under-five children admitted on account of diarrhoea disease within the study period.

Sampling methods

This entailed sequential enrollment of under-fives admitted on account of diarrhoea in CHEU of the UUTH within the study period following caregivers' consent.

Data collection tools

A validated semi-structured proforma was used for data collection. The information obtained from the caregivers were the child's biodata, duration, frequency and severity of diarrhoea, the presence of blood in stool, nutritional history, immunization history, home management of diarrhoea based on type of fluid used; low osmolality ORS alone, Salt and Sugar Solution (SSS) or any other home-made fluid, the volume of fluid given, the use of Zinc tablet and other medications.

Ethical issues

Approval for the conduct of this study was obtained from the Health Research Ethics Committee of the UUTH. Parental consent was also obtained before enrollment of the children in the study.

Data management

The data collected were entered into *Microsoft Excel* 2007. The children's characteristics were described using frequencies and percentages. Data were analyzed using simple descriptive statistics. The test of significance for categorical variables was determined using Chi-square test and was deemed statistically significant if the p-value was <0.05 .

RESULTS

Demographic characteristics of study participants

A total of 100 caregivers of under-fives with diarrhoea disease participated in this study. The level of education of the caregivers was primary in nine of them (9.0%), secondary in 44(44.0%), tertiary in 46(46.0%) while the level of education was not specified in one (1.0%) of them. Of the 100 children that had diarrhoea, 54(54.0%) were males, 41(41.0%) were females. The gender was not specified in five (5.0%) children. The children were aged 1 month-50 months with a mean age of 16.4 ± 13.9 months. The mean age of the males was 16.4 ± 14.0 months while that of the females was 16.5 ± 14.2 months.

Social class of caregivers of children admitted for diarrhoea

Most of the caregivers (41.0%) were of the low social class as displayed in Table 1 below. Home fluid was used by 59 caregivers (59.0%) in the management of childhood diarrhoea against 41 caregivers (41.0%) that did not use any home fluid. The commonest home fluid used by the caregivers was low osmolality ORS. Thirty-one caregivers (31.0%) used low osmolality ORS alone, 16 caregivers (16.0%) used SSS while 9 caregivers (9.0%) used low osmolality ORS with Zinc tablet as displayed in Table 2.

Estimated fluid volume given by caregivers

Of the 59 caregivers that used home fluid in the management of diarrhoea, 41(69.5%) gave less volume of fluid, 15(25.4%) gave more volume of fluid while 2 (3.4%) gave the usual volume of fluid to the children as shown in Table 3.

Social class of caregivers and use of home fluid for childhood diarrhoea

Home fluid was used by 17/31(54.8%) of caregivers in the high social class, 14/28(50.0%) of those in the middle social class and 28/41(68.3%) of those in the low social class. The association between social class and use of home fluid was not statistically significant ($p = 0.269$). ORS was used by 15/17(88.2%) of those in the high social class, 12/14(85.7%) of those in the middle social class and 13/28(46.4%) of those in the low social class. The use of ORS was significantly higher in the high social class when compared to the low social class (Fisher's Exact = 0.0045). Increased fluid was given by 6/17(35.3%) of caregivers in the high social class 4/14(28.6%) of those in the middle social class and 5/28(17.9%) of those in the low social class. The association between social class and fluid volume given was not statistically significant (Fisher's Exact=0.1987).

Association of some demographic characteristics and home management of diarrhoea

The home management of diarrhoea was not significantly associated with the level

of education of caregivers ($\chi^2 = 0.207$; $p = 0.902$), gender of the children ($\chi^2 = 1.208$; $p = 0.374$) or the age category of the children ($\chi^2 = 0.447$; $p = 0.503$) as displayed in Table 5.

Medications used by caregivers in the home management of diarrhoea

The frequently used medications by the caregivers in managing childhood diarrhoea were antibiotics 31/73(42.5%), analgesics 18/73(24.7%) and local enema 8/73(11.0%) as shown in Table 6.

Table 1: Social class of caregivers of children admitted for diarrhea

Social Class of Caregivers	Number	%
High	31	31.0
Middle	28	28.0
Low	41	41.0

Table 2: Home fluid used by caregivers for childhood diarrhoea

Home fluid used	No. of children	%
None	41	41.0
ORS alone	31	31.0
SSS	16	16.0
ORS with Zn	9	9.0
Garri water	1	1.0
Glucose water	1	1.0
Plain water	1	1.0

Table 3: Estimated volume of home fluid given by caregivers

Estimate of home fluid given	No. of Children	%
Less volume	41	69.5
More volume	15	25.4
Normal volume	2	3.4
Not specified	1	1.7

Table 4: Association between social class and home fluid for childhood diarrhoea

Social Class	Use of home fluid		Choice of home fluid		Volume of fluid used	
	Used	Not used	ORS	Others	Increased	Reduced
High	17	14	15	2	6	8
Middle	14	14	12	2	4	10
Low	28	13	13	15	5	23
Test for significance	$\chi^2 = 2.623$ $p = 0.269$		0.0045*		0.1987*	

*Fisher's Exact Test ORS = Oral rehydration solution

Table 5: Association of some demographic characteristics with diarrhoea home management

Sociodemographic characteristics	Number of participants	Home fluid used	Home fluid not used	
Maternal level of education	9(9.0%)	6	3	$\chi^2 = 0.207$
Primary	44(44.0%)	26	18	$p = 0.902$
Secondary	46(46.0%)	27	19	
Tertiary	1(1.0%)	0	1	
Not specified				
Gender of children				
Males	54(54.0%)	35	19	$\chi^2 = 1.208$
Females	41(41.0%)	22	19	$p = 0.374$
Not specified	5(5.0%)	2	3	
Age category of children				
1- 23 months	81(81.0%)	46	35	$\chi^2 = 0.447$
24- 50 months	19(19.0%)	13	6	$p = 0.503$

Table 6: Medications used for home management of childhood diarrhoea

Type of medication	Number	%
Antibiotics	31	42.5
Analgesics	18	24.7
Enema	8	11.0
Multivitamins	4	5.5
Antimalarials	4	5.5
Antidiarrhoeal	3	4.1
Antiemetics	2	2.7
Anthelmintics	1	1.4
Antifungal	1	1.4
Herbal drink	1	1.4

DISCUSSION

The current WHO recommendation on the home management of childhood diarrhoea hinges on the use of ORS, increased fluid intake, continuous feeding, and use of

Zinc tablets. In this study, 59.0% of the caregivers used one form of home fluid or the other in managing under-fives with diarrhoea. This indicates that about 40.0% of under-fives with diarrhoea diseases did not receive

any home fluid in the course of the illness. The non-administration of home fluid to children with diarrhoea puts the affected children at risk of developing life-threatening complications like severe dehydration, electrolyte imbalance, hypoglycemia, and malnutrition.¹⁰

The use of home fluid in this study was much higher than 8.8% reported in the Northwest of Nigeria by Ogunrinde *et al.*, 44.3% in Lagos by Olatona *et al.* and 49.7% in Port Harcourt by Boma *et al.*^{11,12,13} The observed difference in the use of home fluid between this study and the others might be due to difference in the level of education of the caregivers. Majority of the caregivers in this study had formal education against that of Ogunrinde *et al.* in the Northwest of Nigeria where less than 30.0% of them had formal education.¹¹ The use of home fluid was however lower than 76.4% and 73.1% reported at different time points among caregivers of under-five children with diarrhoea in Enugu by Adimorah *et al.* and Uchendu *et al.* respectively.^{14,15} Home management of diarrhea has been shown to improve with increasing level of maternal education.¹¹ Maternal education and childcare practices have been shown to be the important determinants of child survival as they impact on childhood nutrition, immunization and treatment seeking for common childhood illnesses like diarrhoea.⁸

The main fluids used by the caregivers in the management of diarrhoea were low osmolality ORS and SSS. A proportion of caregivers that used ORS gave it along with Zinc tablets. The use of ORS alone in the home management of diarrhoea in this study was comparable to the 30.8% reported for Akwa Ibom State in the 2018 National Demographic Health Survey (NDHS).¹⁶ Oral rehydration solution with Zinc was reported in 9.0% of the caregivers in this study against 15.3% reported for the State in the 2018 NDHS. Whereas none of the caregivers in this study used Zinc alone in managing the condition, the 2018 NDHS report shows that 17.4% of caregivers in the State used the intervention in the home management of

diarrhea among under-fives. This observation indicates a remarkable improvement in the use of ORS with Zinc in the home management of childhood diarrhoea in the State. While this observed improvement is highly commendable, it is worthy of note that it is still below the 100% utilization target recommended by WHO.¹ So, a lot more still must be done to scale up the utilization in ORS with Zinc in home management of diarrhoea in children as recommended by WHO.

The use of ORS for childhood diarrhoea in this study was lower than 83.4%, 59.0% and 49.7% reported by Olatona *et al.* in Lagos, Uchendu *et al.* in Enugu and Boma *et al.* in Port Harcourt respectively.^{12,13,15} It was comparable to 34.4% reported by Omole *et al.*¹⁷ in Kaduna but higher than 5.9% reported by Ogunrinde *et al.* in the Northwest of Nigeria.¹¹ While Zinc supplementation was higher than the 4.3% reported by Olatona *et al.*, it was lower than 36.9% reported by Boma Okoh and Alex Hart in Port Harcourt.^{12,13} The caregivers in the Enugu study did not use Zinc at all in the treatment of under-fives with diarrhoea diseases.¹⁵ The observed variation in the utilization of ORS with Zinc in home management of diarrhoea in the different parts of the country may indicate a difference in the knowledge of caregivers on the current WHO treatment recommendations for childhood diarrhoea. Zinc plays a critical role in the management of childhood diarrhoea by reducing its frequency, severity, duration, and likelihood of recurrence after an episode.¹⁸ Efforts should therefore be made to increase the coverage of Zinc supplementation as adjunctive therapy to low osmolality ORS in the management of childhood diarrhoea in the country.

It is worthy of note that some of the caregivers used SSS as recommended for situations in which low osmolality ORS is not readily available. The use of SSS in this study was comparable to 19.3% and 22.0% use reported by Uchendu *et al.* in Enugu and Boma *et al.* in Port Harcourt respectively.^{15,13} It was lower than 36.9% reported in

India.¹⁹ Caregivers of high social class in this study were more likely to use ORS than SSS in the management of childhood diarrhoea. Most often ORS is purchased by out-of-pocket payment which caregivers of high social class can easily afford while those of low social class were more likely to use salt and sugar available at home to prepare SSS for their children with diarrhoea. While the use of SSS by some of the caregivers in this study is commendable, its preparation could be a bit of a challenge when compared to the pre-packed low osmolality ORS. The preparation of SSS requires a high level of accuracy in estimating the quantity of salt, sugar, and water against the pre-packed low osmolality ORS which only requires the caregivers to know the right volume of water for dissolving the salt. Uchendu *et al.* observed that 60.9% of children received incorrectly prepared ORS while 27.3% received incorrectly prepared SSS for the home management of diarrhoea in Enugu.¹⁵ This paradoxical observation buttresses the need for proper training of caregivers on the preparation and use of home fluids in the management of childhood diarrhoea.

About a quarter of the caregivers gave more than the usual amount of fluid to the children while more than two-third gave less amount of fluid than usual to the children during the illness. Giving less fluid to children with diarrhoea as observed in this study goes contrary to the WHO recommendation on home management of diarrhoea. Diarrhoea diseases usually result in fluid deficit and dehydration. Consequently, more fluid should be given to children in event of diarrhoea illness to correct the fluid deficit and associated electrolyte derangement. This will prevent intravascular contraction and ensure adequate tissue perfusion. Since adequate fluid replacement is critical to recovery from childhood diarrhoea, the children that received less amount of fluid than required were at risk of developing complications like hypovolaemia and electrolyte imbalance. Most local studies on the home management of childhood diarrhoea have focused on the type of home fluid used by caregivers without

much attention to the volume of fluid given. Increased fluid intake should be emphasized when enlightening caregivers on the home management of diarrhoea in under-fives. The proportion of caregivers that gave less fluid in this study is greater than in Ethiopia where less fluid was given by about half of the caregivers.²⁰ When the caregivers in the Ethiopian study were disaggregated based on place of residence, it was observed that caregivers in rural areas were more likely to give less fluid when compared to those in urban areas. Use of less fluid which is a common practice in the home management of diarrhoea disease is generally associated with poor knowledge of caregivers about the disease. The proportion of caregivers without formal education in this study was less than that of the Ethiopian study and as such, less fluid administration was expected to be more frequent in the Ethiopian study which, however, was not the case. This paradoxical observation might be because the number of participants in the Ethiopian study was much higher than this study. It is therefore necessary that in future studies on home management of childhood diarrhoea in the country, attention is given to the amount of fluid administered by caregivers.

There was no difference in the use of home fluid based on social class of the caregivers. The use of home fluid in this study was expected to be significantly higher among caregivers of the high social class but this was not the case. However, the use of ORS when compared to other “recommended home fluids” like SSS, garri water, glucose water and plain water was significantly higher in the high social class. This observation might either corroborate the findings of Boma and Alex-Hart in Port Harcourt that reported a significantly better knowledge and practice of home management of diarrhoea among caregivers of high social class or because the commodity was obtained by out-of-pocket procurement.¹³ Caregivers of low social class that are financially constrained will opt for the other “recommended home fluids” which have little or no cost implication rather than

the low osmolality ORS.²¹ Low osmolality ORS is known to be more suitable for correcting fluid and electrolyte deficits from diarrhoea than the other "recommended home fluids". Thus, children of high social class are likely to recover faster from diarrhoea diseases than those of the low social class.

There was no significant difference in the home management of diarrhoea based on the age category of the children (age group of 1-23 months versus 24-50 months). About 80% of children with diarrhoea in this study were within the age bracket of 1-23 months. The risk for diarrhoea diseases and diarrhoea-related mortality is highest in this age group.²² A 5 year review of under-five diarrhoea morbidity conducted by Jiwok *et al.*²³ in Plateau State, Nigeria revealed that 50% cases of childhood diarrhoea occurred in infancy. Thus, focusing diarrhoea control measures on this age group can significantly reduce childhood diarrhoea deaths and hasten the attainment of the child health-related sustainable development goals.²⁴ The association between home management of diarrhoea and gender of the child in this study was not statistically significant. Gender preferences is a factor that can influence childcare practices. There is a perception of gendered cultural norms in developing countries regarding health seeking behaviour that favour medical care for male than female children.²⁵ Jarman *et al.* in a secondary data analysis of under-fives with acute diarrhoea in Bangladesh showed no gender bias in care-seeking for the condition as was the case in this study.²⁶ However, contrary to the perceived sociocultural male preference in the care for childhood diarrhoea, Kebede *et al.* in Ethiopia, reported better home management for diarrhoea in female than male children.²⁰

Antibiotics, analgesics, and local enema were the medications frequently used by the caregivers to treat childhood diarrhoea. Diarrhoea diseases in under-fives are mainly due to *Rotavirus* infection and enterotoxigenic *Escherichia coli* for which medications are not usually indicated. Prompt and appropriate fluid replacement with Zinc supplementation remains the mainstay of

managing most cases of childhood diarrhoea. Antibiotics, antidiarrheal and antimalarial were the top three medications used for managing childhood diarrhoea in the Northwest of Nigeria.¹¹ The major problem with inappropriate use of medications for childhood diarrhoea is the waste of valuable time that could have been used for fluid replacement. Indiscriminate use of antibiotics could prolong the duration of diarrhoea illness while the use of enema could have a toxic effect on the gut or worsen the diarrhoea depending on its composition and the volume given to the child.²⁷

CONCLUSION

The home management of childhood diarrhoea was generally sub-optimum with only about one-tenth of the caregivers using low osmolality ORS with Zinc supplementation as recommended by WHO. A large proportion of the caregivers did not administer any home fluid while most of the caregivers that did, gave inadequate amount of fluid. The use of antibiotics and enema that could be deleterious to the health of the children were considerably high. Education of caregivers of under-fives on the current WHO treatment recommendations for the home management of childhood diarrhoea will go a long way in improving the home management of the condition and reducing the high diarrhoea-related morbidity and mortality in endemic regions.

Acknowledgements

We sincerely wish to thank the staff of CHEU of the UUTH and caregivers of the children for their support and co-operation during the conduct of the study.

Conflict of interest statement

The authors have no conflict of interest to declare.

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