Home Management Of Childhood Diarrhea Including Zinc Supplementation Among Mothers Attending Primary Health Centers In An Urban Community In Lagos

[1]F.A.Olatona, [1] O.E Obrutu, [2]O.F Adeniyi

Departments of [1]Community Health and Primary Care, [2]Paediatrics,
College of Medicine of the University of Lagos, Lagos, Nigeria

Abstract

Diarrhoea has been reported to account for more childhood deaths than Acquired Immune Deficiency Syndrome (AIDS), malaria and measles combined. This study determined knowledge and practices of home management of childhood diarrhoea, including the use of zinc supplements among mothers of under-five children attending Primary Health Centers in an urban community in Lagos.

It was a descriptive cross sectional study conducted among 253 mothers of under five children attending primary health centers in Ojodu community in Lagos. Three out of the five primary health centers in the community were selected using simple random sampling. All mothers of children below five years of age attending the selected health centers were included in the study until the sample size was attained. Data was obtained from the mothers with the aid of interviewer-administered structured questionnaires and analyzed using the Epi-info version 6 software. Significance level was set as < 0.05.

Diarrhoea was correctly defined by 60.1% of respondents. Most of them (72.4%) knew that unsafe water and contaminated food could cause diarrhoea while others attributed it to wrong causes. Most of them (83.4%) knew that oral rehydration solution (ORS) should be used in the home management of diarrhea but only 4.3% knew the importance of zinc supplements in its management. Only 28% of the respondents had high level of overall knowledge of oral rehydration therapy (ORT). ORT knowledge was significantly associated with older age ($p=0.0002$), higher educational status ($p=0.000$), source of information ($p=0.000$) and previous history of diarrhea in the children. Only 44.3% (112) had used ORS for children with diarrhea while only 34.1% and 51.0% of those who had used pre-packaged ORS and salt sugar solution prepared it correctly respectively. Major constraints to utilization of ORT were taste and inadequate information. Use of zinc supplements was employed by only 5.4% of those who practiced ORT.

Knowledge and correct use of ORT and zinc supplements was low. Campaign for correct use of low-osmolality ORS and zinc supplements should be intensified.

Key words: Oral rehydration therapy, zinc supplements, childhood, diarrhea, mothers, children under five years of age.

Correspondence to:

Dr. F. A. Olatona
Department of Community Health and Primary Care,
College of Medicine,
University of Lagos, Lagos, Nigeria
folaton@gmail.com
08033163216

Introduction

Every year, an estimated 2.5 billion cases of diarrhoea occur among children under five years of age all over the world, and estimates suggest that overall incidence has remained relatively stable over the past two decades.[1] The major associated problems are the resulting dehydration from fluid loss and malnutrition which are major causes of morbidity and mortality among children preceded only by pneumonia globally.[2] Diarrhoea is common in malnourished children and malnutrition also results from diarrhea. Children are at greater risk compared to adults of life-threatening dehydration since water constitutes a greater proportion of their bodyweight.[2] Moreover, young children use more water over the course of a day given their higher metabolic rates, and their kidneys are less able to conserve water compared to older children and adults.[2] Diarrhoea has been reported to account for more childhood deaths than Acquired Immune Deficiency Syndrome (AIDS), malaria and measles combined.[3] the combination of adverse effects of repeated diarrhoeal infection on nutrition and increased susceptibility to diarrhoea in malnutrition makes it a difficult problem linked in a vicious cycle that is worse in developing countries. Nearly one in five child deaths – about 1.9 million each year – is due to diarrhoea.[1] In Nigeria, diarrhea prevalence rate is 18.8%; and it accounts for over 16% of child deaths and an estimated 150,000 deaths mainly amongst children under five.[3]

Since the 1970s, oral rehydration therapy (ORT) has been the cornerstone of treatment programmers to prevent life-threatening dehydration associated with diarrhoea.[4] A solution made from pre-packaged oral rehydration salts (ORS) has been the gold standard. Other alternatives are the recommended home fluids (RHFs) which include salt-sugar solution (SSS), rice-water solution, cereal-based solutions and additional fluids. In 2004, the new low-osmolality ORS formula was adopted by the World Health Organization (WHO) as the current recommendation in addition to

continued feeding and more recently, the administration of zinc supplements. [5,6] The new ORS has been proven to give better clinical benefits like decreased stool output, less vomiting and reduced need for intravenous (IV) therapy.[7]

Zinc supplementation for the treatment of diarrhoea is a critical treatment intervention and since 2004, zinc has been recommended by WHO and UNICEF as the only treatment to be coupled with oral rehydration salts for the treatment of all diarrhoea episodes. Supplementary zinc benefits children with diarrhoea because it is a vital micronutrient essential for protein synthesis, cell growth and differentiation, immune function, and intestinal transport of water and electrolytes. [8,9] Zinc supplements reduces the severity, duration and recurrence of childhood acute diarrhoea for 2–3 months [5],

The discovery and promotion of oral rehydration therapy, coupled with programmes to educate caregivers on its appropriate use, resulted in major reduction in child deaths (from 5 million deaths annually to 1.5 million).[2] However, it appears that these efforts lost momentum as the world turned its attention to other global emergencies. Today, only 39 per cent of children with diarrhoea in developing countries receive the recommended treatment, and available data suggest that there has been limited progress since 2000.[2] Research shows that only 55.2% and 39.4% of mothers could identify correct causes of childhood diarrhea and correctly manage diarrhea at home in Enugu Nigeria. The level of knowledge of oral rehydration therapy has dropped in our locality since its inception in the early 1990s. [10] Moreover, awareness of the use of zinc in the management of diarrohea disease is low (35%) though adherence to 10-day zinc supplementation among those who are aware is encouraging at 75.5%.[11] Little is known about the current level of knowledge and practices of oral rehydration therapy as well as zinc supplements in Lagos, Nigeria. This study therefore determined the knowledge, oral rehydration therapy and feeding practices as well as zinc supplementation in the management of childhood diarrhoea among mothers of under-fives in Ojodu community in Lagos.

Materials and methods

The study was a cross-sectional descriptive study conducted among mothers of children less than five years of age attending primary healthcare centers in Ojodu community in Lagos State. There are five primary health centers (PHC) in the community: Ogba/Oluwole PHC, Akiode PHC, Aguda PHC, Oke-Ira PHC and Ojodu PHC. The total number of patients seen in all the facilities in 2010 was 10,716. [12] Average attendance at the healthcare centers ranges from 5 (Akiode PHC) to 70 people per day (Ojodu PHC). Sample size was determined using the formula designed by Cochran: $n = z^2pq/e^2$ for population greater than 10,000. The minimum size calculated was 217 but two hundred and seventy one (271) mothers were interviewed.

Simple random sampling was employed to select three out of the five primary health centers in the LCDA. All mothers of under-five children attending the selected health centers were included in the study until the sample size was attained.

Data was collected using interviewer-administered questionnaires. Information on socio-demographic characteristics, knowledge on oral rehydration therapy, usage patterns of ORT and other measures applied with ORT in the home management of diarrhea were obtained. Data was analyzed using the Epi info 3.5.1. Software. Questions on knowledge were scored and graded to determine the level of knowledge. The total score obtainable was 15. Those who scored between 0 and 5 points were graded as having poor level of knowledge, between 6 and 10 points as having fair level of knowledge and between 11 and 15 points as having good level of knowledge. Ethical approval was obtained from the Health Research and Ethics Committee of the Lagos University Teaching Hospital.

Results

The mean age was 29.5 years $\pm$ 4.73. Majority of the respondents were Christians (85.4%) and were married (98.4%). Secondary education was the highest level of education for a larger proportion (42.7. The average number of children each woman had was 2 $\pm$1.1.

Mother's knowledge of diarrhea and use of ORT

Diarrhoea was correctly defined by 60.1% of respondents. Majority (72.4%) of respondents knew that bad water and contaminated food could cause diarrhoea while 36.4% thought it is because of growing teeth. Majority (83.4%) knew that ORT, only 5.3% knew that zinc should be used while some others wrongly perceived that anti diarrhoea drugs (17.8%), antibiotics (28.5%) and herbal preparations (agbo) (4.7%) should be used in the home management of diarrhoea (Table 1)

Only 71(28.1%) of respondents had good level of knowledge about ORT, Majority of the respondents (64.1%) received the information on ORT from health workers (Table 2).

The age group 32 – 41years had the highest proportion with good knowledge about ORT. Older age of respondents was significantly associated with the overall knowledge of ORT (p=0.002). Educational level, source of information and previous history of diarrhea in children were all significantly associated with knowledge about ORT (p=0.000) (Table 3).

Table 1: Knowledge of diarrhea and its home management

Knowledge of diarrhea	Frequency
Correct definition of diarrhea	152(60.1)
Correct cause of diarrhea	184(72.7)
Perception about methods of home management of diarrhea(Multiple Responses)	**Frequency**
Oral Rehydration	211(83.4)
Zinc supplements	11(4.3)
Anti-diarrhoea drugs	45(17.8)
Antibiotics	72(28.5)
Herbal tea (Agbo)	12(4.7)
No treatment	35(13.8)

Figure 1: Other measures applied with ORT in home management of diarrhoea by mothers

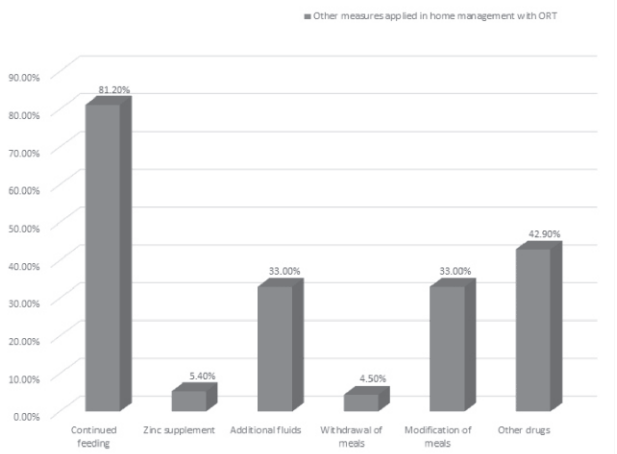

Table 2: Mothers' knowledge about oral rehydration therapy (ORT)

Knowledge of ORT	Frequency
Correct knowledge of usefulness of ORT	209 (82.6)
Previously seen a pre-packaged ORS	169 (66.8)
Types of ORS known (Multiple Responses)	
Pre-packaged ORS	175(69.2)
Salt-sugar solution	186(73.5)
Rice-water	3(1.2)
Sources of Information on ORT	
Health worker	164(64.8)
Family members/friends	35(13.8)
Media	18(7.1)
None	36(14.3)
Level of overall knowledge of ORT	
Good	71(28.1)
Fair	132(52.1)
Poor	50(19.8)

Mothers Practices of oral rehydration therapy

Only 44.3% (112) of all the respondents have used ORT for children with diarrhea. Majority of those who used ORT to manage diarrhoea (78.6%) had used pre-packaged oral rehydration salt (PPORS) while 47.3% had used salt-sugar solution (SSS). Some mothers had used both. Only 34.1% of those who had used pre-packaged ORS prepared it correctly (1sachet of pre-packaged ORS added to 1litre of water) while about half (51.0%) of those who used SSS had prepared it correctly (1teaspoon of salt added to 10 teaspoons of sugar/or 5 cubes) + 70cl of safe water) (Table 4)

Majority (63.4%) initiated ORT immediately symptoms of diarrhea were noticed while others waited between 2 hours to 2 days before they initiated the therapy. The correct practice of giving small amounts of the oral rehydration solutions in less than 1 hour intervals was used by 44.6% of mothers. Sufficient quantity of rehydration solution (≥1litre) was given by 47.3% of mothers within twenty four hours. Others (52.7%) gave less than 1litre. ORT was stopped immediately symptoms resolved among 71.4% while 21.4 % correctly continued therapy for 12 – 24 hours after they resolved. Majority of mothers (87.5%) correctly discarded prepared solutions after 24 hours. Some others did so after 2 – 3 days while 4.5% erroneously kept them the entire duration of illness. (Table 4)

The other measures applied in home management of diarrhoea by the respondents who used ORT (112) were continued feeding (81.2%), giving zinc supplements (5.4%), giving additional fluids (33.0%), modifying meals (33.0%), giving other drugs (42.9%) and withdrawing meals (4.5%). Additional fluids given include water and beverages while other drugs given include antibiotics and anti-diarrhoeal drugs. (Figure 1)

Discussion

Knowledge of diarrhoea among respondents was high (60.1%) probably because it was a facility based study and educated people are more likely to visit health centers compared to illiterates. The proportion is similar to that obtained in another study conducted in Enugu where 69% of mothers were reported to have an accurate understanding of diarrhoea. [13] The proportion though high is not adequate based on the fact that unidentified and untreated diarrhea can easily lead to high rate of child morbidity and mortality in the community.

Correct causes of diarrhoea (unsafe water and contaminated food) were identified by many of the respondents (72.4%), however a significant proportion (36.4%) also thought that teething is a cause of diarrhoea. This is similar to another study in Southern

Table 3: Factors influencing knowledge of ORT

Socio-demographic characteristics	Good	Fair	Poor	p value
Age				
<21	2(14.4)	6(42.8)	6(42.8)	
22-31	41(25.5)	89(55.3)	31(19.2)	0.0002
32-41	28(35.8)	37(44.8)	13(16.6)	
Educational level				
Primary	0(0)	7(5.4)	8(53.7)	
Secondary	23(21.9)	54(40.9)	28(26.7)	0.0000
Tertiary	48()	71(53.7)	13(26)	
Source of information				
Health workers	62(37.8)	96(58.5)	6(3.7)	
Family member/friends	5(14.2)	23(65.8)	7(20)	
Media	4(22.2)	12(66.7)	2(11.1)	0.0000
None	0(0)	1(2.8)	35(97.2)	
History of diarrhea in child				
Yes	36(31.6)	67(58.8)	11(9.6)	
No	35(27.8)	65(51.6)	26(20.6)	0.0000
I don't know	0(0)	0(0)	13(100)	

Table 4: Usage of ORT among respondents

Variable	Frequency (%)(n=253)
History of ORT use	
Previously used	112(44.3)
Never used	141(55.7)
Type of ORS used	
Pre-packaged ORS	88(78.6)
Salt-sugar solution	53(47.3)
Rice-water	1 (0.9)
Timing of initiation of ORS	
Immediately symptoms are observed	71(63.4)
2- < 24 hours after onset of symptoms	21(18.7)
1 to 2 days after onset of symptoms	20(17.9)
Correct method of ORS preparation(n=88)	30(34.1)
Correct method of SSS preparation (n=53)	27(51.0)
Frequency of administration of ORS (n=112)	
5 minutes - <1 hour intervals	50(44.6)
1 - 3 hour intervals	18(16.10
After every stooling episode	19(17.0)
When child desires water only	25(22.3)
Volume of ORS given (n=112)	
25 - <50cl	9 (8.1)
50cl - <1litre	50(44.6)
1 liter - <2 liters	52(46.4)
2 liters - <3 liters	1(0.9)
Time frame for keeping solutions (n=112)	
24 hours	98(87.5)
2 days	6(5.4)
3 days	3(2.6)
Duration of continuation of treatment after cessation of symptoms	
Immediately	80(71.4)
2-<12 hours	8(7.2)
12-24 hours	24(21.4)

Table 5: Limitations and constraints in the use of ORT

Limitations and constraints in the use of ORT	n (%)
Limitations to ORT use (n=14)	
Thinks doctor's prescription is needed	4(28.5)
Not aware of ORT	6(42.9)
No knowledge of its preparation	4(28.6)
Constraints in ORT use (n=112)	
Children do not like the taste	36(32.1)
No constraint	76(67.9)

Nigeria where many of the mothers believed in teething as a cause of diarrhoea.[14] This may be because there has been reduced emphasis on health education on diarrhea over the years. This is quite discouraging because although ORT and zinc supplements are solutions to the mortality caused by diarrhea if caregivers don't understand the cause, they may not apply the remedies.

Majority (83.4%) knew ORT but only 4.3% knew Zinc while others wrongly perceived that anti diarrhoea drugs (17.8%), antibiotics (28.5%) and herbal preparations (4.7%) should be used in the management of diarrhoea. The proportion of respondents who knew that ORT should be used is higher than the figure obtained in other studies in Ibadan (61%) and Delhi (69.8%).[15, 16] However the high proportion is not sufficient to ignore the rest of the population who could not identify ORT as treatment for diarrhoea because it can lead to dehydration and mortality of a significant proportion of children. The

wrong perception about use of drugs other than zinc supplements in diarrhea means that many of them did not understand that the most common cause of diarrhea is viral and therefore would not respond to antibiotics or anti-diarrheal therapy.

The proportion of respondents with good level of knowledge of ORT (28.1%) is too low for an urban community when compared to other studies from Ibadan (61%) [15] and south Nigeria (55.6%).[14] Older age of respondents, higher educational level, source of information and previous history of diarrhea in children were all significantly associated with increased knowledge about ORT. This low level of mothers 'knowledge about ORT is due to poor public enlightenment on this topic. It means that diarrohea management education have either diminished over the years or have not been effective thereby making the younger generation of mothers to know little about diarrohea while the older ones who benefited from earlier campaigns or had had experiences with an older child have higher level knowledge.

Respondents 'knowledge about ORT was significantly influenced by age with at least a third of the mothers in the age group 32-41 years having a good knowledge of the therapy. Mothers who were older than 31 years especially if they have children who had diarrhea in the past have been observed to have a good knowledge of ORT. [14, 17] Older mothers probably have more exposure to information and experience in the management of childhood diarrohea compared with their younger counterparts.

The importance of health workers as a recognized source of information is reinforced by the findings in this study because the respondents who heard about ORT and zinc supplements from health workers had better overall knowledge of the management. In India the use of the media has been found to significantly influence the use of ORT but only about one fifth of the mothers in this study were influenced by the media.[18] Nevertheless, all the sources of information can be used to significantly improve the diarrhoea management knowledge of under 5 mothers.

ORS usage in this study was only 44.3%. This is much lower than the usage in Lahore(81%), Enugu (74.6%), Vietnam (56%) and Kenya(50%) though higher than others in Kosova (17.8%), rural Burkina Faso (24.4%) and North-western Nigeria (8.6%) [13, 19-24] When the ORT campaign of 1991-95 by the National Diarrheal Diseases Program (NCDDP) was on-going, usage of ORT in different forms in Cross River State was 72%. This discrepancy shows that the campaign has not been sustained and the usage has decreased significantly. [25]

This finding agrees with a meta-analysis which discovered a decline in the use of the rehydration fluids in 68% of the 34 countries studied. The decline ranged from < 1% in Rwanda to 32% in Kenya and Nigeria. The decline is not encouraging about 25 years after the introduction of ORT into Nigeria by UNICEF since the target of the NCDDP was to achieve 80% coverage of the country in knowledge and application of the ORT.

Correct measurement techniques are essential for the preparation of oral rehydration solutions for its use to be effective. Correct preparation of ORS and SSS were achieved by only 34% and 51% of respondents respectively. This is very similar to the findings from another study in Enugu where only 23% and 42% prepared PPORS and SSS correctly and respectively but lower than that obtained in Lahore which was 76% for both PPORS and SSS.[17, 26] In the study conducted during the National Diarrheal Diseases Program (NCDDP), 82.9% of the mothers prepared ORS correctly, while 96% prepared SSS correctly. [23] This shows that the campaign really had effect on the use and method of preparation of ORS. The reduced osmolarity ORS containing 75 mEq/l sodium, 75 mmol/l glucose (total osmolarity of 245 mOsm/l) is as effective as standard ORS in adults with cholera and is important to prevent in-correct measurement of salt and sugar.

The utilization rate of PPORS and SSS in this study were 78.6% and 47.3%; similar to the findings in Enugu and Lahore where the percentage of rehydration fluids used was more for PPORS (38.9% and 77% respectively) compared to SSS (31% and 5% respectively). [13, 17] More respondents used PPORS probably because it is easier to use since there is no need to measure salt and sugar separately or they were aware of its recommendation. This is encouraging because WHO does not recommend homemade solutions for treating dehydration. They are meant to be given to prevent dehydration while seeking for medical attention or before PPORS can be obtained. Many young mothers use incorrect volume of water for preparing the solution or use wrong quantities of the sugar and salt in the preparation of the SSS. The new low-osmolality ORS formula adopted by WHO in 2004 is the current recommendation in addition to continued feeding and administration of zinc supplements. [7] This new ORS has been proven to give better clinical benefits like decreased stool output, less vomiting and reduced need for intravenous (IV) therapy.[7]

A low proportion of respondents (47%) gave sufficient fluids (≥1litre) to dehydrated children compared with 64.9% in Lahore. [17] The inadequate amount of solution might have been due to children's dislike of the taste of the ORS/SSS, or inadequate understanding of the minimum amount necessary for rehydration. Most mothers (87.5%) correctly discarded the rehydration solutions twenty four (24) hours after preparation. This proportion is much higher than the proportion that did so in South-South Nigeria (58.3 %).[14] Consuming ORS after twenty four hours of preparation may lead to re-infection of the child from proliferation of pathogenic organisms in the solution.

Majority of the mothers administered fluids

within short intervals regardless of the pattern of stooling. Only 17% complied with the recommendation that solutions should be given after stooling episodes. This practice may predispose to hyper-natremia especially if these children are being given hyper-osmolar fluids in the absence of fluid loss from diarrhea.

Inadequate knowledge and the perceived need for prescription to procure the ORS were the common reasons for failure to use ORT among non-users. These obstacles are similar to the ones identified in other studies in Kenya and Ibadan [21, 27] The major constraint to the use of ORT among users was failure of children to like the taste of the ORS. This reason is quite different from the constraint in another study in Kenya where lack of access to PPORS has been identified as a constraint.

Children lose a lot of fluid resulting in weakness, dehydration and malnutrition during diarrheoa. Apart from rehydration, nutrient rich foods are very important in treatment of diarrhea. This makes feeding practices very important. Continued feeding improves enteral nutrition by stimulating intestinal cell renewal and helps to avoid malnutrition. [28] Continued feeding along with ORT was employed by 81.2% of respondents but 33% of them modified their children's meals. This is much lower than the proportion of respondents who modified the children's feeds (75.2%) in a Czech study though feeding of all breast-fed children continued. [29] Modification of feeds can be attributed to popular beliefs about various foods causing or worsening diarrhoea. Withholding or modifying food can worsen the outcome of the illness due to superimposed malnutrition.

Zinc supplements ((10mg for children under 2years and 20 mg for children above 2years per day for 10 to 14 days) are recommended along with ORT in the home management of diarrhoea because they increase its uptake, reduce inappropriate consumption of other medications, reduce the severity, duration and recurrence of childhood acute diarrhoea for 2–3 months.[5] In this study, only 5.4% of caregivers used it compared to 67% in a Kenyan Study which means that the treatment of the diarrhea would not have been effective and there's a high possibility of recurrence within a short period. [30]

Meanwhile, the proportion of respondents who used other drugs (42.9%) is similar to the proportion that used them in Enugu where 34% used antimicrobials and 21% used a combination of antimicrobial, antimalarial, antacid, analgesic, and some local herbal preparations and Czech (52.4%) [13, 29]

The more common drugs given among the respondents in this study were anti-diarrhoeal drugs and antibiotics compared to probiotics in Czech. [29] Since majority of the respondents began treatment at home, it implies that medications used were mostly not on prescription, unsafe for majority of patients and non-compliant with public health recommendations for diarrhoea management.

Conclusion

Low proportion of mothers used ORT (44.3%) and zinc supplements (5.4% of those who used ORT) while many of them wrongly used antibiotics and other drugs despite high level of knowledge of diarrohea (60.1%) and ORT (88.4%). Inadequate knowledge and the perceived need for prescription to procure the ORS were the common reasons for failure to use ORT among non-users. Wrong methods of preparation and administration were identified among many respondents who used ORT.

There's a need for intensive campaign on the proper use of ORT and zinc supplements in the home management of diarrhoea. Emphasis of the health education should be on causes and course of diarrhoea, correct methods of preparation and administration of ORS as well as Zinc supplementation.

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