



Knowledge and Use of Low Osmolarity Oral Rehydration Salt Plus Zinc in Diarrhea Management among Mothers in Port Harcourt, Nigeria

Golda O. Ekenedo^{1*} and Esther David Jaja¹

¹*Department of Human Kinetics and Health Education, University of Port Harcourt, Nigeria.*

Authors' contributions

This work was carried out in collaboration between the two authors. Both authors designed the study, author GOE wrote the protocol, managed the analysis and wrote the first draft of the manuscript. Author EDJ managed the literature searches and collection of field data. Both authors read and approved the final manuscript.

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ABSTRACT

Aim: To investigate the knowledge and use of low osmolarity ORS plus Zinc in the management of diarrhea among mothers living in Port Harcourt, Nigeria.

Study Design: The study was a cross-sectional survey.

Place and Duration of Study: Primary Health Centres in Port Harcourt. Data was collected from December 2017 – February 2018.

Methodology: A sample of 483 mothers participated in the study. A self-structured and validated close-ended questionnaire with reliability indices of 0.83 and 0.81, for knowledge and use sections respectively was used for data collection. Data collected were analyzed using percentages and Chi-square set at 0.05 alpha level.

Results: The mothers were found to have average knowledge (44.49%) about low osmolarity ORS plus Zinc, and 38.1% used it appropriately for the management of diarrhea in infants. Age, level of education and parity all significantly influenced knowledge of the mothers (all $P = .000$) and their use ($P = .000, .001$ and $.000$ respectively) of low osmolarity ORS plus Zinc.

*Corresponding author: E-mail: golda.ekenedo@uniport.edu.ng;

Conclusion: It was concluded that mothers in Port Harcourt did not possess enough knowledge about low osmolarity ORS plus Zinc to convincingly apply it in treating diarrhea in infants. Aggressive social marketing and peer education were recommended for achieving effective diffusion of the innovation among mothers.

Keywords: *Low osmolarity ORS plus zinc; diarrhea management; knowledge; diffusion of innovation; Nigeria.*

1. INTRODUCTION

The use of oral rehydration salts (ORS) in the treatment of diarrhea in children is a long-standing practice among mothers since the 1970's when oral rehydration therapy (ORT) was introduced into the Nigerian health care delivery. The regimen gained wide acceptance from mothers then such that mortality from diarrheal diseases was reduced by half [1]. However, scientific advances by WHO/UNICEF in 2004 led to the introduction of a new treatment package known as Low Osmolarity ORS plus Zinc. It is actually an improvement over the previous ORS. The advantage lies in the fact that low osmolarity ORS contains lower levels of glucose and salt which curtails the duration of the diarrhea while the zinc supplementation in an acute diarrhea brings down the duration and severity of the episode and in addition reduces the incidence and re-occurrence for 2-3 months. The previous ORS had a total osmolarity of 27.9 grams/litre while the reduced osmolarity has 20.5 grams/litre. [1]. It has been proven that the low osmolarity ORS brings about a decrease in stool and vomiting by 20% and 30% respectively [2].

Nevertheless, death from diarrheal diseases is again surging. Diarrhea accounted for approximately 9 per cent in 2015, and 8 per cent in 2016 of all deaths among children under age five worldwide [3,4]. This translates to over 1,400 young children dying each day or about 526,000 children dying in one year. Out of the 1.3 million global deaths from diarrhea recorded annually, over half of those deaths occur in just five countries: India, Nigeria, Afghanistan, Pakistan and Ethiopia [5]. Worse still, it is projected that Sub-Saharan Africa will experience 10% increase in the deaths in 2030 as compared to 2013 [6]. This invariably implies retrogression from the preceding years if the situation is not checked. Record has it that about 194,000 children under five years die in Nigeria each year from diarrheal diseases [5].

The above statistics is unacceptable and undermines child survival which is critical to

national development. These deaths occur in the face of available simple remedies. If the non-chalant attitude of governments in handling this matter persists, around 24million children will die from pneumonia and diarrhea by 2030, but if the needed interventions are scaled up, approximately 5.6 million lives could be saved from diarrhea [7].

Although many countries have included low osmolarity ORS plus Zinc in their diarrhea management policies, gap still exist between the policy change and adequate implementation resulting in inappropriate treatment of diarrhea in children [8] subsequently leading to rise in mortality rate. Nigeria was among the eleven countries in Africa with low practices in diarrhea management out of twelve countries studied in 2016 [9].

Despite the established efficacy of the low osmolarity ORS plus Zinc and its advantage over the previous regimen it appears not to be a popular choice among mothers. Changing from old ways of doing things is not always easy. Some mothers may be hesitant in trying out the new management regimen for reasons ranging from uncertainty to lack of knowledge. Also, given that the process of adopting a new idea as explained in Diffusion of Innovation doesn't happen instantaneously among a population, the use of low osmolarity ORS plus Zinc in the management of diarrhea in children may be slow in diffusing among mothers in Nigeria and other low-income countries.

The Diffusion of Innovation (DOI) theory propounded by E. M. Rogers in 1962 explains how new ideas or innovations are accepted and applied by individuals and organizations, and how an understanding of this process can hasten the dissemination of new ideas into a population [10]. Diffusion is a process by which people learn and adopt a new idea such as an evidence-based approach to improving health care. [11] Rate and time of diffusion varies among members of the public while it may not occur at all in some [11]. Consequently, five degrees of adopters are identified according to the time it

takes for the adoption to occur namely: innovators, early adopters, early majority, late majority and laggards [12].

Changes that occur as a result of diffusion can manifest as differences in knowledge, attitude, and practices, disproportionate access to government and commercial services, and health inequality [13,14,15]. It is, expected that the success of low osmolarity ORS plus Zinc in the management of diarrhea in children should manifest in very high knowledge, and in the actual application of it in the management of diarrheal diseases in children among mothers who are major stakeholders. Instead, researches have continued to show evidence of low knowledge, poor attitude and practices among low income countries, particularly Africa including Nigeria [9,16,17,18,19,20].

Adoption or failure to adopt a new idea does not occur without the weighing of pros and cons. Among the common pros and cons to be weighed include cost in terms of cash, time and other expense in adopting the new idea (low osmolarity ORS plus Zinc), effectiveness especially compared to previous practice (ORT) which the innovation intends to displace; ease of understanding and application; how compatible the innovation is with established ways of achieving the same goal; the visibility of the outcome of using the innovation and the reversibility of the innovation [11].

The role of effective communication in facilitating adoption has been strongly emphasized [11,12]. Information is disseminated to potential adopters usually through social, mass and specialized media. However, for innovations that require complex implementation such as the low osmolarity ORS plus Zinc, offices are better established among the population to enable one-on-one process as against one-to-many as in the use of mass and social media [11]. The successes recorded in the 1970's with ORS in Nigeria can be largely credited to massive use of the media, both print and electronic, in the dissemination of information on the diarrheal management formula. Inadequate use of the media in marketing the new low osmolarity ORS plus Zinc can result in the reported low level of knowledge [20], [21], and use [21] even among health care workers [22] and the increasing mortality from diarrheal diseases.

Increasing mortality of children from preventable diseases like diarrhea can be checked if mothers

are knowledgeable about the right steps to take. And this knowledge can be acquired through listening to information and gathering experiences from government and public sources as well as from social contacts. Knowledge changes perceptions, attitudes, values and behavior. For example, there is a perception by some mothers that if a child opens bowel more than normal, it is attributed to teething in toddlers and they believe it is a normal event and as such actions taken may be short of the desired. Again, the practice of giving herbal treatment or things that will harden the stool is one that can further endanger the life of the child. Of essence, is the fact that the wide acceptance received by the simple ORT among Nigerian mothers may result to skepticism regarding the new low osmolarity ORS plus Zinc. More so, the latest innovation may be considered complex because of the addition of Zinc tablet.

Experts have found that rate and time of adoption of innovation is dependent on some personal characteristics [10]. Socio-demographic variables such as education have been found to influence mother's knowledge and attitude towards health issues [23]. Good education, for instance, helps women make better decisions about many health and disease factors like basic hygiene, nutrition, immunization, family planning and prenatal care which are vital in reducing the leading causes of death in children under five amongst which is diarrhea.

In the light of the above, it becomes imperative to ascertain the knowledge, and use of low osmolarity ORS plus Zinc among mothers in Port Harcourt, Nigeria, particularly since no study of this nature has covered the study area in the past. Such information can go a long way to further provide baseline data for development of appropriate interventions for application in low income areas. Port Harcourt is an urban cosmopolitan city with people of diverse educational and socioeconomic levels. It has its fair share of slums and high-density areas, which may have implications for disease outbreaks.

2. METHODOLOGY

This study adopted the cross-sectional survey design. Ghasemi et al successfully employed the design in researching on knowledge of mothers in management of diarrhea in under-five children in Kashan Iran [24]. The sample for the study comprised 483 women who possessed the needed characteristics of having at least one

child below five years. In selecting the sample, Port Harcourt was first clustered into three zones. A simple random sampling technique of balloting without replacement was used to select six primary health centres from the existing twelve, two from each cluster. Accidental sampling was used in selecting 500 mothers attending under-five clinics at the primary health centres as at the time of the study.

A structured and validated questionnaire developed by the researchers and referred to as Questionnaire on Knowledge and Use of Low Osmolarity ORS plus Zinc was used to elicit data from the respondents. The questionnaire consisted of two sections. Section A contained six items which elicited socio-demographic data of respondents. Section B contained fourteen knowledge items and nine items on use of low osmolarity ORS plus Zinc. The question items had dichotomous response options of 'True' or 'False' for knowledge and 'Yes' or 'No' for use.

The instrument was subjected to face and content validity through the scrutiny of experts in the field of Measurement and Evaluation and Health Education. The instrument was pilot-tested on 30 mothers attending under five clinics at the Model Primary Health Centre, Oyigbo, an urban suburb of Port Harcourt using the test – retest method of reliability testing. A reliability coefficient of 0.83, and 0.81 were obtained respectively for knowledge and use sections after analysis was done using Pearson Product Moment Correlation.

Ethical clearance was obtained from the Research Ethics Committee of University of Port Harcourt. Informed consent was obtained from participants before administering the instrument. The instrument was administered in the six health centres with the aid of six health care workers in the health centres after they were duly instructed on what to do. Seventeen copies of the questionnaire were dropped because they were not properly filled. Hence, 483 copies were used for data analysis. Data analysis was done using the Statistical Package for Social Sciences, version 10. Simple percentage was used to analyze the data collected.

In determining level of knowledge of mothers on low osmolarity ORS plus Zinc in the management of diarrhea, scores below 20 per cent were considered very low level of knowledge (VLK), 20- 39 per cent was considered low level of knowledge (LK), 40-59

per cent was considered average level of knowledge (AK), 60-80 per cent was considered high level of knowledge (HK) while a score above 80 per cent was considered very high level of knowledge (VHK).

Chi-Square was employed to analyze the difference in knowledge and use with regards to age, level of education and parity at 0.05 level of significance.

3. RESULTS AND DISCUSSION

The result of the study as shown in Table 1 indicated that 44.49% of the respondents had correct responses on the knowledge items about low osmolarity ORS plus Zinc, whereas percentage of incorrect responses was 55.51. Specifically, 196 (40.6%) of the respondents knew that low osmolarity ORS was used for the management of diarrhea while majority 288 (59.6%) were not aware that it had reduced level of glucose and salt. Whereas 345 (71.4%) of the respondents were aware that a prepared ORS should be used up within 24 hours, only 171 (35.4%) had knowledge on the addition of Zinc to the treatment. Results further revealed that age (χ^2 cal. 46.828 > crit. χ^2 9.49, 4; $P = .000$), level of education (χ^2 cal. 39.903 > crit. χ^2 7.82, 3; $P = .000$), and parity (χ^2 cal. 33.893 > crit. χ^2 5.43, 2; $P = .000$) all affected the mothers' responses on knowledge about low osmolarity ORS plus Zinc Table 2.

The result of the study in Table 3 showed that only 184 which represent 38.1% of the respondents always prepared and used low osmolarity ORS plus Zinc whenever their child had frequent stooling. On the right quantity of water to mix the solute, 105 representing 21.7% used it correctly, majority 378 (78.3%) did not use the right quantity of water. Majority of the respondents 266 (55.1%) made correct use of zinc when their child had frequent stooling and also used up the prepared solution within 24 hours (64.6%). Again, it was revealed that age (χ^2 cal = 50.163 > χ^2 crit. = 9.49, 4; $P = .000$), educational level (χ^2 cal 15.893 > χ^2 crit. = 7.82, 3; $P = .001$), and parity ($\chi^2 = 25.901 > 5.99, 2; P = .000$) had significant effects on the use of low osmolarity ORS plus zinc in the management of diarrhea among mothers [Table 4].

3.1 Discussion

It is quite disappointing that majority of the mothers had average knowledge about low

osmolarity ORS plus Zinc for the management of diarrhea considering that the use of low osmolarity ORS plus zinc in the management of diarrhea in children under five was introduced since 2004. However, Port Harcourt is not alone in this situation since similar finding was made in Zahedan, Iran which showed that maternal knowledge regarding childhood diarrhea was moderate and only 3.7% had good knowledge [16]. In the same vein, it was found that only 28.8% of mothers in Iran had good knowledge about diarrhea diagnosis and treatment [17]. Also, results from a study in Ethiopia among mothers revealed that 182 (46.7%) had good knowledge in case management while 208 (53.3%) had poor knowledge, concluding that there was gap in knowledge. [18] Findings in North-west Nigeria, recorded abysmally low statistics, revealing that less than 1% of

caregivers was knowledgeable about home management of diarrhea [19].

The finding that only 38.1% of the mothers were making use of low osmolarity ORS plus zinc in the management of diarrhea is not quite unexpected since previous studies in other parts of Nigeria made similar findings [21,19,20]. Lack of knowledge about the regimen could be the reason they are not using the treatment package as expected. They may probably be uncertain about the effectiveness in dealing with the problem and thus prefer to continue in their old and traditional ways of management. Knowledge is a requisite for appropriate practice. The inaccurate practices regarding when and how to use Zinc tablet as reported can be attributed to lack of correct knowledge.

Table 1. Knowledge about low osmolarity ORS plus zinc in the management of diarrhea among mothers (n=483)

S/N	Knowledge items	True		False	
		F	%	F	%
1	Low osmolarity ORS is a preparation used in the management of diarrhea?	196	40.6	287	59.4
2	Low osmolarity ORS contains reduced level of glucose and salt?	195	40.4	288	59.6
3	The reduction in glucose and salt composition does not have anything to do with controlling diarrhea?	248	51.3	235	48.7
4	Since both preparations (regular ORS) and low osmolarity ORS have salt and sugar the result will be the same?	387	80.4	96	19.6
5	Low osmolarity ORS will stop the diarrhea immediately?	309	64.0	174	36.0
6	Low osmolarity ORS reduces the severity and duration of diarrhea?	275	56.9	208	43.1
7	In the management of diarrhea, it is good to give the ORS in small quantity?	301	62.3	182	37.7
8	The quantity of ORS to be given depends on the age of the child after each loose stool 50 ml for a child less than 6 months and 100ml for 2 years?	298	61.7	185	38.3
9	The amount of water used in preparing the sachet ORS is not necessary?	241	49.9	242	50.1
10	A prepared solution should be used up within 24hrs?	345	71.4	138	28.6
11	Zinc tablet should always be used together with low osmolarity ORS in the management of diarrhea?	171	35.4	312	64.6
12	Zinc tablet improves immune function in children.	185	38.3	298	61.7
13	For zinc tablet to give good result ½ tablet (10 mg) for a child, below 6months and 1 tablet for a child 6 months and above?	255	52.8	228	47.2
14	It is needful to complete the recommended 10-14 days treatment always?	148	30.6	335	69.4

Overall % of correct responses = 44.49; incorrect responses = 55.51

Table 2. Knowledge about low osmolarity ORS plus zinc among mothers based on age, level of education and parity

Knowledge of low osmolarity ORS plus zinc	N	df	χ^2 cal	Sig. (2-tailed)	Level of Sig.	χ^2 crit.
Age	483	4	46.828	0.000	0.05	9.49
Level of education	483	3	39.903	0.000	0.05	7.82
Parity	483	2	33.893	0.000	0.05	5.43

Table 3. The use of low osmolarity ORS plus zinc in the management of diarrhea among mothers (n=483)

S/N	Statements	Yes		No	
		F	%	F	%
1	I always prepare and use low osmolarity ORS plus zinc whenever my child has frequent stooling.	184	38.1	299	61.9
2	I sometimes use only zinc tablet when my child has frequent stooling.	116	24.0	367	76.0
3	I use the recommended quantity of water in preparing a satchet of low osmolarity ORS.	184	38.1	299	61.9
4	I use 1 tablet of zinc in the morning and 1 tablet in the evening in the management of diarrhea.	164	38.1	319	61.9
5	I use ½ or 1 tablet of zinc daily depending on the age of the child.	266	55.1	217	44.9
6	I use 150 cl of water in preparing a satchet of low osmolarity ORS.	196	40.6	287	59.4
7	I use 1 litre of water or its equivalent 50cl (2) to prepare one satchet of low osmolarity ORS.	105	21.7	378	78.3
8	I use the prepared solution within 24hours.	171	64.6	312	35.4
9	I only use zinc tablet if the stooling persists, it does not have to be 10-14days.	105	21.7	378	78.3
Overall %		39.1		60.9	

Table 4. Summary of χ^2 analysis on the use of low osmolarity ORS plus zinc in the management of diarrhea among mothers based on their age

Use of low osmolarity ORS plus zinc	N	df	χ^2 cal	Sig. (2-tailed)	Level of Sig.	χ^2 crit.
Age	483	4	50.163	0.000	0.05	9.49
Level of Education	483	3	15.893	0.001	0.05	7.82
Parity	483	2	25.901	0.000	0.05	5.99

This average level of knowledge and low use of low osmolarity ORS plus Zinc found among the study population is a pointer to insufficient diffusion of the innovation among mothers in Port Harcourt. It corroborates the assertion that diffusion of innovation takes a longer time to achieve in low-income countries. The finding is an indication that many mothers do not have the

competency to effectively manage diarrhea in children, hence furthering the fear that mortality from diarrheal diseases will continue to increase as predicted by WHO. In order to address this, there is need to target nursing mothers in Port Harcourt with strong information dissemination strategies using electronic media and social media which is so widely in use among urban

dweller. This will increase their knowledge particularly about how to use the regimen and its benefits over the previous ORS and consequently increase their confidence in the use of it.

Several studies have pointed to the fact that mothers with no education are not knowledgeable on issues of diarrhea; as a result the simple tools that can avert the occurrence of the disease are not put in use. This is evident in the finding of this study which showed that there was significant difference in the knowledge of mothers about low osmolarity ORS plus zinc based on educational level. It also agrees with the report of a study in Ethiopia that mothers with higher education had better opportunity for information about childcare than mothers/caretakers with lower educational level. [18] According to the study there was higher prevalence of diarrhea (67.5%) in the households whose mothers could not read and write. Mothers with less educational status may not have basic knowledge on the impacts of potential risk factors, such as water supply, latrine utilization, hygiene, and sanitation, on occurrence of diarrhea. Emphasis should be in educating mothers so that they will have adequate knowledge, right attitude and utilize the two simple tools as first line management at home level in order to reduce the health hazard that the children under five are prone to as a result of the disease.

Perhaps, due to experience in child care, parity and age were found to play significant role in knowledge about low osmolarity ORS plus Zinc among the mothers. The result showed significant difference in knowledge about low osmolarity ORS plus Zinc based on parity and age. Knowledge and use of low osmolarity ORS plus Zinc increased with age and with number of children. This finding is in line with that made in Kashan, Iran which revealed that mothers with three or more children had better knowledge about the management of diarrhea. [17] Similarly, a study in Ibadan, Nigeria found that parity significantly influenced diarrheal management among mothers of under-five children. [19] The study revealed that mothers with two children and above (52.1%) did better in diarrheal management compared with mothers with 1 child (39.1%). The findings are justifiable in that the more children a woman has, the more experience she would have with diarrheal diseases in infants. All the experiences would

certainly add up to increased knowledge, better understanding and practices in subsequent cases.

4. CONCLUSION

Based on the findings of the study, it was concluded that low osmolarity ORS plus Zinc as a diarrhea management therapy was not properly diffused among mothers in Port Harcourt hence knowledge and understanding of it was weak resulting in poor use. Also, the influence of education and experience gained through age and multi-parity in knowledge and use of low osmolarity ORS plus Zinc among mothers was evident. Aggressive social marketing through mass media and internet social networks is needed in ensuring a wide reach with education programmes on the treatment regimen. Peer education using educated, older and multiparous mothers during antenatal clinics can be a promising strategy towards increasing knowledge and use of the regimen.

CONSENT

Informed Consent Was Obtained From Participants Before Administering The Instrument.

ETHICAL APPROVAL

The study received approval from UNIPORT Research Ethics Committee.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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