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Review Article

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Maternal Knowledge, Attitudes, and Practices of Oral Rehydration Solution for Under-Five Children in Enugu, Nigeria

Okechukwu Chime Ogbodo*, Praise Chinecherem Ekwunife, Kosisochukwu olachi Emeshiobi and Paschal obumneme Enem

Department of Community Medicine, College of Medicine, Enugu State University of Science and Technology College of Medicine, Enugu, Nigeria

***Corresponding author**
Okechukwu Chime Ogbodo, Department of Community Medicine, College of Medicine, Enugu State University of Science and Technology College of Medicine, Enugu, Nigeria.

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ABSTRACT

Introduction: Globally, diarrhea is the third major cause of death among under 5 children, contributing 9% of all under-5 deaths. Oral rehydration solution (ORS) is an affordable, comprehensive, and easy-to-use intervention that is fundamental in management of diarrhoea in under 5 children, and has prevented almost 54 million deaths since 2007.

Objective: To assess Oral rehydration solution knowledge, attitude and practice amongst mothers of under five children attending Enugu State University Teaching Hospital, Enugu, Nigeria.

Methodology: The study was a descriptive cross-sectional study. Data was presented in tables, and chart. Summary statistics such as mean, frequency and proportion were used to represent quantitative data. Chi-square was used, at 95% confidence interval, and P-value was set at 0.05.

Results: Only 32.8% of the mothers have good overall knowledge of Oral Rehydration solution (ORS). Majority (65.2%) of the mothers have good overall attitude towards ORS. Majority (78.9%) have good practice regarding ORS use.

Conclusion And Recommendations: The respondents have poor knowledge but good attitude and good practice regarding ORS. Therefore, there should be increased community education, media campaigns, and integration of ORS training into antenatal and postnatal care to ensure better understanding of ORS and its importance.

Keywords: Knowledge, Attitude, Practice, Oral Rehydration Solution.

Introduction

Worldwide, diarrhea is the third major cause of death among under 5 children, contributing 9% of all under-5 deaths [1]. Oral Rehydration Solution (ORS) is a mixture made up of water and an oral powder containing glucose, sodium chloride, potassium chloride, and sodium citrate. After being dissolved in the required volume of water, it is used for the prevention and management of dehydration due to diarrhoea. ORS is an affordable, comprehensive, and easy-to-use intervention that is fundamental in management of diarrhoea in under 5 children, [2] and has prevented almost 54 million deaths since 2007 [3].

Oral rehydration therapy (ORT) is the gold standard for treating fluid loss from acute diarrhoea [4,5]. Glucose in ORS is an aid for sodium absorption, not as an energy source.

Experience has shown that using ORS almost never results in a blood sodium level that is higher than normal, and when it does, it is usually very short-lived and has no clinical significance. ORS has been shown to be effective even in newborns as long as extra fluid is administered during the treatment's maintenance phase. Therefore, breastmilk, juices, or plain water should be given to young infants receiving ORS solution. Since potassium losses from diarrhea are rather large in dehydrated children, the potassium content of ORS is especially crucial for their treatment. Undernourished children who have experienced frequent episodes of diarrhea are particularly vulnerable to developing a blood

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potassium level below normal if the potassium is not replenished during rehydration. Also, acidosis which frequently results from dehydration requires the citrate bicarbonate in ORS to be treated.

Globally, diarrhoea has proven to be a leading cause of death among children under five years old. Diarrhea is the third major cause of death among under 5 children worldwide. In developing countries like Nigeria, it remains a major cause of morbidity and mortality among this age group [6]. Developing countries have a high risk of having diarrhoea as a result of inadequate water, poor sanitation, suboptimal breastfeeding, and zinc and vitamin A deficiency [7,8]. Children living in developing countries also have higher mortality rates compared to children living in developed countries due to poor access to quality health care, delay in receiving timely intervention, and efficacious treatment with oral rehydration solution (ORS) and zinc [9]. The use of ORS has reduced the incidence of associated morbidities and mortalities, however, over the period of the past 30 years its use remains low or unchanged in many regions of the world [10,11]. Despite the proven efficacy of ORS, there is insufficient knowledge regarding its use among mothers and caregivers in developing countries [12]. In Nigeria, there is also significant gap in knowledge and ORS utilization in the management of childhood diarrhea [13].

A substantial number of rural mothers are unable to correctly prepare homemade ORS, leading to unsafe solutions with excessive salt or sugar content [14]. The attitude of mothers influences the use of Oral Rehydration Solution [15]. Mothers knowledge and ability to prepare a safe and satisfactory ORS as well as motivation to practice its use are also essential for ORS to be fully effective [16,17].

Methodology

The study site

The study site was Enugu State University Teaching Hospital, a State tertiary health institution located in Enugu, Enugu State, Southeast geo-political zone of Nigeria. Enugu State is located between latitude 6o 30' N and longitude 7o 30' E within an area of 7,161 square kilometers. The estimated population of Enugu State based on the 2006 Nigeria's census, and a growth rate of 2.33% is 4,411,100 [18]. Females constitute 50.1% of the population of Enugu State. Women of reproductive age (15 to 49 years) constitute 26% of her population [18].

Study Design

The study was a facility-based, observational, descriptive, cross-sectional study

Study Population

The study population was mothers of under-5 children with at least parity one who presented to the Children Out-Patient clinic (CHOP), Children Emergency Room (CHER), and immunization clinic of Enugu State University Teaching Hospital, Enugu, Enugu State, Nigeria.

Sample Size Determination

The sample size was determined using the Fisher's formula for sample size determination for cross sectional study [19]. The total number of respondents was 204.

Sampling technique

Systematic sampling technique was used to select the participants. In the first stage, the average numbers of mothers who attended Children Out-Patient clinic (CHOP), Children Emergency Room (CHER), and immunization clinic at the facility in one month's using the facility register were calculated to be 50, 50, and 150 respectively. In the second stage, the average monthly attendance was calculated by dividing 720 with three 720/3=240. Therefore, the sampling frame was 240. In the third stage the sampling interval was calculated by dividing the sampling frame which was 240 with the estimated sample size which was 204 (240/204 = 1.17) Therefore the sampling interval was 1. In the fourth stage, the index participant was selected by simple random sampling technique by balloting, and the remaining participants were selected using the sample interval which was 1 until the sample size (204) was met. The study period for this study was one month. It was done in the month of November, 2025.

Study Instruments

This was a pretested, semi-structured, interviewer administered questionnaire adapted from World Health Organization guidelines and questionnaires.

Outcome Measures

The scoring system was adjusted to reflect mothers' responses. As regards Knowledge, a score of zero to seven (0 – 5) was considered poor knowledge, and eight to sixteen (6 – 11) was considered good knowledge. The participants attitude was graded: Zero to 10 is considered poor attitude and 11 to 15 was considered good attitude. The participant's practice level was graded: Zero to four (0 – 4) as poor practice and five to eight (5 – 8) as good practice.

Statistical Analysis

The SPSS (Statistical Package for Social Sciences) statistical package version 28 was used for data entry and analysis. Data was collected and edited manually same day to detect omissions and to maintain uniform coding. Data was presented in tables and charts. Summary statistics such as mean, frequency and proportion were used to represent quantitative data. Chi-square test of significance was used to test any relationship between variables. The analysis of data was done at 95% confidence interval. P-value was set at 0.05.

Ethical Considerations

Ethical approval and informed consent process for the study was obtained from Enugu State University Teaching Hospital, Enugu, Enugu State ethical committee. All information from this study was confidential and no individual who participated in this study was linked to any information The participants were allowed to withdraw at any point during the study without any consequences to them.

Limitations

This study was a descriptive cross-sectional study and therefore did not draw conclusions about causality. Knowledge and Contraceptive practices are sensitive amongst mothers and therefore some mothers would not want to participate in the study or would not be honest with their responses.

Results

This study involved a total of Two hundred and four (204) respondents.

Table 1: Socio-demographic data of respondents

Variables	Frequency (N=204)	Percentage (%)
Age (in years) Mean ± SD = 31.21 ± 5.570		
18-20	7	3.4
21-25	26	12.8
26-30	58	28.4
31-35	67	32.8
36-40	43	21.1
>/=41	3	1.5
Ethnicity		
Igbo	198	97.0
Others	6	3.0
Marital Status		
Married	187	91.6
Single	13	6.4
Divorced/Separated	4	1.5
Widowed	1	0.5
Religion		
Christian	202	99.0
Muslim	1	0.5
Traditionalist	1	0.5
Educational Level		
No formal	6	2.9
Primary	2	1.0
Secondary	56	27.5
Tertiary	98	48.0
Postgraduate	42	20.6
Occupation		
Business Woman	66	32.4
Skilled Worker	38	18.6
Civil Servant	26	12.7
Teacher	23	11.3
Petit Trader	13	6.4
Banker	6	2.9
Others	32	15.7

Table 1 shows that the mean age of the participants was 31.21 years. But majority of the participants' age fall between 31-35 years. The predominant ethnic group was Igbo (96.6%). Most of the participants were married (91.5%) and were Christians (98.5%). Majority of the participants had bachelor's degree (48%), while 27.5% had post primary education. Most of the respondents were business women (32.4%), 18.6% were skilled workers, while 12.7% were civil servants.

Table 2a: Respondents knowledge on the use of ORS

Variables	Frequency	Percent (%)
knowledge of ORS		
Yes	203	99.5
No	1	0.5
Source of ORS information		
Hospital	164	80.4
TV/radio	3	1.5
Social media	2	1
Church	2	1
Others	32	15.7
Used ORS before		
Yes	162	79.4
No	44	20.6
Knowledge of ORS function		
Correct answer: prevent/control dehydration	128	62.7
Wrong response	76	37.3
ORS route of administration		
Oral	189	92.6
Wrong response	15	7.4
Time to commence ORS		
Immediately diarrhoea starts	123	60.3
Wrong response	81	39.7
ORS effectiveness Vs plain water		
More effective	166	81.4
Wrong response	38	18.6
Sugar Salt Solution (SSS) similar to ORS		
Yes	141	69.1
Wrong response	63	30.9
ORS used only in children		
No	164	80.4
Wrong response	40	19.6
Forms of ORS		
Yes – sweetened/unsweetened/ both	109	53.4
Wrong response	95	46.6

Table 2 shows that majority (99.5%) of the participants have heard about ORS. Significant proportions of the respondents received information about ORS from hospital; knows that ORS should be started immediately diarrhea starts; while 53.4% 80.4% were aware of the availability of sweet and unsweetened ORS.

Table 2b: Respondents knowledge of effects of poorly constituted ORS

Knowledge of the effects of poorly constituted ORS	Yes	No

	Frequency	Percent (%)	Frequency	Percent (%)
Vomiting	77	37.7%	127	62.3%
Diarrhoea	67	32.8%	137	67.2%
Muscle weakness	56	27.5%	148	72.5%
Severe Thirst	45	22.1%	159	77.9%
Seizures	29	14.2%	175	85.8%
Confusion	27	13.2%	177	86.8%
Kidney damage	21	10.3%	183	89.7%
Cerebral oedema	18	8.8%	186	91.2%
Coma	18	8.8%	186	91.2%
Cough	13	6.4%	191	93.6%

Table 2b reveals the participants' knowledge about the effects of poorly constituted ORS. Their knowledge about the effects is as follows: 37.7% - vomiting, 32.8% - diarrhea, 27.5% - muscle weakness, 22.1% - severe thirst, 14.2% - seizure, 13.2% - confusion, 10.3% - kidney damage, 8.8% - cerebral oedema, 8.8% - coma, 6.4% - cough.

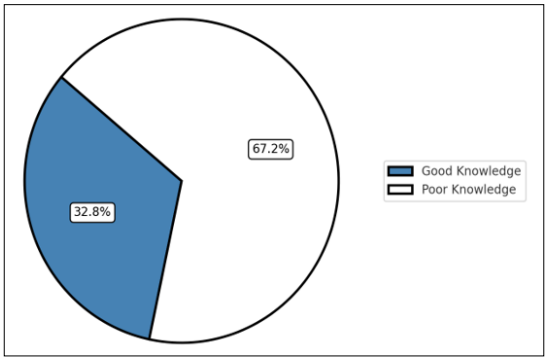

Figure 1: Overall respondents knowledge regarding use of ORS
Figure 1 shows the overall knowledge of mothers regarding use of Oral Rehydration Solution.

Majority (67.2%) of the respondents had good knowledge on the use of ORS, while 32.8% of them had poor knowledge on the use of ORS.

Table 3: Respondents attitude towards the use of ORS

Variables	Frequency	Percent (%)
Attitude towards usefulness of ORS		
Good	114	55.9
Poor	90	44.1
Attitude towards timing of ORS administration		
Good	59	28.9
Poor	145	71.7
Willingness to prepare ORS at home if sachet is not available.		
Good	138	67.6
Poor	66	32.4
Attitude towards risk of poorly prepared ORS		
Good	145	71.1
Poor	59	28.9
Attitude towards ORS storage duration		
Good	153	75
Poor	51	25

Table 3 showed that 55.9% of the study had good attitude towards usefulness of ORS, however, only 28% knows when to start ORS administration. 67.6% of them are willing to prepare ORS at home if the sachet type is not available, while 71.1% of them had good attitude towards risk of poorly prepared ORS. Majority of the respondents (75%) had good attitude towards ORS storage duration.

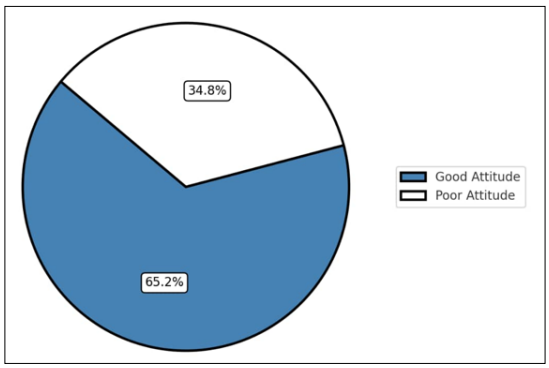

Figure 2: Respondents overall attitude on the use of ORS

Figure 2 illustrates respondents' overall attitude on the use of ORS. 65.2% of them had good attitude on the use of ORS, while 34.8% had poor attitude on use of ORS.

Table 4: Respondents regarding use of ORS

Variables	Frequency	Percent (%)
ORS preparation		
1 sachet of ORS in 1L of water	147	72.1
Incorrect preparation	57	27.9
ORS administration method		
Cup and spoon	73	35.8
Incorrect method	131	64.2
Hygiene practice		
Hand and utensil washing before ORS preparation	190	93.1
Poor hygiene	14	6.9
ORS administration rate		
Slow administration	177	86.8

Too fast/too slow	27	13.2
Frequency of ORS administration		
1 sip every 30secs	56	27.5
Wrong response	148	72.5
Vomiting after ORS administration		
Continue ORT	129	63.2
Wrong response	75	36.8
Stooling after ORS administration		
Continue ORT	138	67.6
Wrong response	66	32.4
Disposal of ORS after 24 hours		
Agree	188	92.2
Wrong response	16	7.8
Other remedies		
Going to the hospital	50	24.5
Wrong response	154	75.5

Table 4 revealed that 72.1% of participants can prepare ORS according to WHO guideline, while only 35.8% of them give ORS using cup and spoon. 93.1% of the participants practice good hygiene before ORS preparation. Majority (86.8%) of the participants give ORS slowly as in the guideline, however, 27.5% of the participants practice the correct frequency of ORS administration. Similarly, only 24.5% of the participants go to hospital as another remedy. The percentage of participants that continue giving ORS if vomiting occur after giving ORS is 63.2%, while 67.6% of them will also continue giving ORS if the child stool after ORS administration.

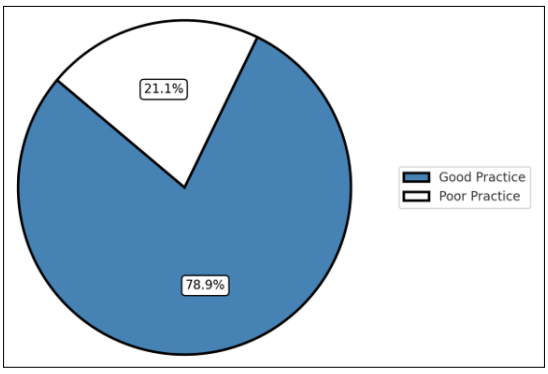

Figure 3: Overall practice regarding use of ORS

Figure 3 showed respondents overall practice on the use of ORS. 78.9% of the participants had good practice regarding use of ORS, while 21.1% of them had poor practice.

Discussion

The mean age of the participants was 31.21 years, however majority of the participants were found to be between 31-35 years of age. This could be due to the low incidence of early marriage in the study area (Southeast, Nigeria) [20]. This contrasted with the findings in a similar study done in South Rajasthan, India where majority of the participants were between 21-25 years of age and was attributed to the increased incidence of early marriage in that part of India [21]. Most of the participants (91.2%) were married. However, in Ethiopia only 54.5% of the participants were married [22]. This is also because of high incidence of teenage pregnancy in Ethiopia [23]. However, Nigeria national surveys and Demographic Health analysis highlight regional heterogeneity in child marriage practices [24]. Precisely in Nigeria, early marriage prevalence differed substantially by region: as low as 10% in the southeast, 17-18% in Southwest and Southsouth, in contrast with high prevalence (76-88%) in Northern Nigeria [25].

Most of the participants (62.2%) have good knowledge regarding use of ORS. Similarly, in Malaysia, mothers are equipped with reasonable knowledge regarding diarrhoea and ORS [26].

This could be because both studies were done in urban settings, and the Malaysia study was specifically done in an upper-middle-income setting. Also, majority of the mothers (93.7%) attending a tertiary hospital in Bangladesh had good ORS knowledge, probably also because the study was done in an urban setting [27].

One in five Women of reproductive age in 32 sub-Saharan African countries lacked knowledge about ORS packets or pre-prepared liquids but had overall knowledge level of 80.6% [28].

However, mothers in Senegal, Mali, and Sierra Leon showed wide variations in caregiver ORS knowledge [29]. In Port Harcourt, Nigeria maternal knowledge of use of ORS was found to be 71.6% [30]. Similarly, mothers in Yobe State Nigeria have good knowledge of ORS but lacked detailed knowledge of correct preparations [31]. These similar findings could be because all the studies were done in urban settings where it is expected that the mothers should be enlightened enough to have good knowledge of ORS.

Majority of the participants (65.2%) had good attitude regarding use of ORS. This showed that the participants level of knowledge (62.2%) is similar to the participants level of attitude regarding use of ORS. This shows that participants' knowledge about ORS is influencing their attitude towards its use, or vice versa. In Ethiopia, 94.4% of mothers had good attitude towards ORS use because of high awareness and understanding of ORS benefits and its role in preventing dehydration [32]. Also 84.0% of caregivers in another town in Ethiopia had good attitude about ORS use, but it was because caregiver education level and employment status were positively associated with better attitude [33]. This contrasts with the findings in Bangladesh, where it was observed that 59.1% of mothers have poor attitude regarding ORS use and was attributed to resource limitations in Bangladesh that prevent care seekers from receiving appropriate counselling time [34]. However, baseline assessment of mothers in India showed that only 20.7% to 25.3% of the mothers had good attitude regarding ORS use [35].

This was because of the mothers lack of education and exposure to health information. In Nigeria, the level of attitude of ORS use is varied. In Port Harcourt, 77.6% had good attitude toward ORS, probably because mothers attending clinics in urban areas had better access to health education and counselling, while 59.2% of them in Lagos had good attitude [36,37].

However, in Northwestern Nigeria only 8.6% of caregivers had good attitude regarding ORS use, and was because of the mothers low awareness of ORS benefits [38].

This study found that 78.9% of respondents demonstrated good practice of ORS use in Enugu, Southeast, Nigeria. This finding suggests a level of compliance with recommended diarrhea management practices within the study population. In contrast, in Port Harcourt, Nigeria although awareness of ORS was reported to be as high as 93.3%, only 44.4% of mothers demonstrated correct usage practice, indicating that awareness alone does not necessarily translate into proper implementation [39]. Also, in Oyo State, Nigeria, ORS were used in only 57.7% of reported diarrhea cases, with barriers including cost, availability, and inadequate caregiver knowledge [40]. In a rural setting in Nigeria, only 22.1% of rural mothers correctly prepared ORS [41]. The low rate in that study was largely linked to rural residence, limited formal education, and reliance on traditional remedies. This corresponds to the overall ORS practice from Nigeria national data analysis that showed that ORS was administered in only 39.7% of childhood diarrhea cases in Nigeria, with disparities observed across geographic regions and socio-economic groups [42]. When compared with these national and rural findings, the 78.9% good practice observed in Enugu suggests better caregiver knowledge and possibly improved access to health education and ORS commodities. In Liberia, West Africa, relatively higher ORS utilization as high as 66.3% in the country's Demographic and Health Survey has been reported [43]. This figure was attributed to strengthened community health programs and improved caregiver awareness. Nevertheless, the prevalence observed in the present study still exceeds this West African estimate, further underscoring the comparatively favorable outcome in Enugu.

Also, the overall ORS utilization rate among under five across 31 Sub-Saharan African countries was 38% [44]. The relatively low uptake across the region was associated with rural residence, poverty, limited access to healthcare services, and lower levels of maternal education. Compared to this regional average, the 78.9% reported in the present study is more than double the Sub-Saharan estimate, indicating substantial progress within the study setting.

Similarly, in Bangladesh only 27.5% of mothers demonstrated good ORS practice, with 72.5% exhibiting inadequate preparation and administration practices [45]. This was attributed to low level of correct practice, insufficient maternal knowledge, low educational attainment, and misconceptions regarding correct dilution and dosage.

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