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Original Article

Knowledge of Rotavirus Gastroenteritis and its Current Preventive Strategies in Children, among Healthcare Providers in Ilorin, North-Central Nigeria

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Abstract

Context: Rotavirus is a leading cause of severe gastroenteritis in children aged less than 5 years. Healthcare providers are responsible for implementing strategies for control of rotavirus gastroenteritis. **Aims:** To determine knowledge of healthcare providers regarding rotavirus gastroenteritis, its burden, management, and prevention. **Materials and Methods:** The study was a crosssectional descriptive survey of healthcare providers working in facilities caring for children. A selfadministered questionnaire was given to subjects containing questions on demographics and knowledge covering burden of rotavirus gastroenteritis, modes of transmission, age of occurrence, prevention, and rotavirus vaccines. Statistical analysis used: Data analysis was carried out with SPSS version 20. **Results:** Questionnaires were issued to 75 participants of which 65 (response rate = 86.7%) returned filled questionnaires. Majority (70.8%) of the subjects were females. Subjects included medical doctors (33.8%), nurses (32.3%), community health extension workers (27.7%), and laboratory scientists (4.6%). Most [39, 60.0%] subjects identified rotavirus as the commonest cause of diarrhea and only 21 (32.3%) indicated rotavirus contributed over 30% to the burden of diarrhea in these children. Fecooral route was recognized as a route of transmission by most subjects (95.4%) and 67.7% identified vaccination as a modality for prevention. Only six (9.2%) respondents could name any rotavirus vaccine. None of the demographic or occupational characteristics of the subjects was significantly related to awareness of effective rotavirus vaccines (all $P > 0.05$). **Conclusions:** Healthcare providers were aware of rotavirus as a cause of gastroenteritis in underfive children but most had poor understanding regarding its burden, prevention, and existing vaccines.

Keywords: Children, knowledge, rotavirus, vaccines

Introduction

Diarrhea is a major contributor to deaths of children under 5 years of age globally being responsible for approximately 9% of the 6.3 million deaths of children aged less than 5 years that occurred in 2013.[1] Most of these deaths occur disproportionately in developing countries, such as Nigeria, where in 2016, 10.1% of the under-5 deaths that occurred were caused by diarrhea.[2]

Rotavirus is a leading cause of severe diarrheal disease and was responsible in 2013 for about 215,000 global deaths in children <5 years of age.[3-5] In 2013, more than half (N = 121,000) of such deaths occurred in sub-Saharan African children.[5] Recent global estimates suggest rotavirus is responsible for between 36 and 45% of hospitalizations for diarrhea among children ages less than 5 years.[5]

Access this article online

Quick Response Code:

Website: www.njbcs.net

DOI: 10.4103/njbcs.njbcs_31_18

One of the most important strategies for the control of rotavirus infection is vaccination.[6] World Health Organization (WHO) recommends rotavirus vaccines should be deployed in routine immunization programs worldwide.[7] Several rotavirus vaccines have been developed and are at various stages of prequalification by the WHO. These include the Rotarix®, Rotatec®, Rotavac®, and RotaSil® vaccines, among others.[8]

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Received : 28-11-2018 **Revised :** 22-10-2019
Accepted : 06-11-2019 **Published :** 30-05-2020

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How to cite this article: Abdulkadir MB, Aderibigbe SA, Ibraheem RM, Fadeyi A. Knowledge of rotavirus gastroenteritis and its current preventive strategies in children, among healthcare providers in Ilorin, North-Central Nigeria. Niger J Basic Clin Sci 2020;17:42-5.

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The Government of Nigeria plans to introduce the rotavirus vaccine into the routine immunization program by 2019. Healthcare providers are expected to be at the forefront of educating patients about the disease, and the importance of vaccination against rotavirus as part of the implementation plan.

Thus, the objectives of the study were to determine the knowledge of the various cadres of healthcare providers in Ilorin, North-Central Nigeria about rotavirus gastroenteritis in children aged less than 5 years, its burden, management, and prevention.

Materials and Methods

The study was a descriptive cross-sectional survey of healthcare providers conducted in July 2018. Ilorin, the study area is the capital of Kwara state, located in North-Central Nigeria and consists of three local government areas: Ilorin West, Ilorin East, and Ilorin South. There is one teaching hospital, three general hospitals, and numerous private hospital and primary health centers/cottage hospitals in Ilorin, that provide health services to people from within and outside the State. Subjects were healthcare providers (doctors, nurses, community health extension workers) attending a workshop on diarrheal disease in children and the survey was conducted prior to commencement of the workshop, whereas subjects were awaiting registration. There were 78 participants at the workshop. Study participants were drawn from public and private hospitals in Ilorin.

A minimum sample size of 63 was calculated using a confidence level of 95% and degree of accuracy of 5%. Subjects were included if they were healthcare providers and were working in a designated health facility that manages children. Subjects were excluded if they were facilitators at the workshop, took part in the design of the study, or had prior knowledge of the study. Ethical approval was obtained from the institution Ethical Review Committee as part of a larger study. Written informed consent was obtained from all prospective subjects. A self-administered questionnaire designed by the authors was issued to all subjects who had given consent. The questionnaire had been pretested prior to this on nurses and doctors in a tertiary hospital for accuracy and validity of the questions. All questions were written in English and in simple language to ensure comprehension. Subjects were given 10 min to respond to the questions on the questionnaire. The questionnaire sought information on demographic characteristics of subjects, place of work, occupation, knowledge about diarrheal disease, rotavirus epidemiology, complications, management, and prevention. Specific knowledge about rotavirus vaccines was also requested.

Data were analyzed using SPSS version 20 (IBM). Data were described using simple frequencies, proportions, and percentages. Quantitative data were described using mean and standard deviation. Tests of statistical significance, such as Student's *t*-test and Chi-square, were used as appropriate. A *P* value less than 0.05 was considered to be statistically significant.

Results

Questionnaires were distributed to 75 subjects who satisfied the inclusion and exclusion criteria of which 65 filled the questionnaires and returned them with an 86.7% response rate. The characteristics of nonresponders could not be determined as their basic demographic data could not be captured.

There were 46 (70.8%) females and 19 (29.2%) males with a female to male ratio of 2.4:1. The age distribution of the subjects is as shown in Table 1. There was no significant difference in age distribution between male and female subjects ($P = 0.562$).

Regarding occupation of the subjects, 22 (33.8%) were medical doctors; 21 (32.3%) were nurses; 18 (27.7%) were community health extension workers; and 3 (4.6%) were laboratory scientists. One health worker (1.5%) did not indicate her/his occupation. Most of the subjects (31; 47.7%) worked in private hospitals; 19 (29.3%) were in employment with primary health care centers; 8 (12.3%) worked in a tertiary level hospital; and 7 (10.8%) were employed in secondary level hospitals (general hospitals).

Regarding the leading cause of diarrhea in children less than 5 years of age, 39 (60.0%) subjects correctly identified rotavirus as the leading cause of diarrhea. Other responses included *Shigella spp* by 9 (13.8%) subjects; *Salmonella spp* by 9 (13.8%) subjects, *Escherichia coli*, Vibrio cholera, and "viruses" by 2 (3.1%) subjects each; and unknown by 1 (1.5%) subject. In response to a question on the relative contribution of rotavirus to etiology of diarrhea and the peak age of occurrence of rotavirus diarrhea, responses are shown in Table 2 below.

The most commonly identified mode of transmission by the subjects was the fecooral route with 62 (95.4%) subjects responding in the positive to this mode of transmission. Other responses to mode of transmission are as shown in Table 3.

The responses of subjects to recommended treatment modalities for diarrhea caused by rotavirus include: Oral rehydration therapy [49 subjects, 75.4%], Oral zinc [29 subjects, 44.6%], vitamin A [8 subjects, 12.3%], intravenous hydration [35, 53.8%], antibiotics [12 subjects, 18.5%], and don't know [3 subjects, 4.6%].

Regarding strategies to prevent rotavirus gastroenteritis, 48 (73.8%) subjects indicated vaccination was an effective strategy. Others are as shown in Table 3. A total of 44 subjects (67.7%) were aware that there was effective

Table 1: Age and gender distribution of subjects

Age group (years)	Female	Male	Total	χ^2	*P*
20-30	13 (28.3)	3 (15.8)	16 (24.6)	2.052	0.562
31-40	12 (26.1)	8 (42.1)	20 (30.8)		
41-50	14 (30.4)	5 (26.3)	19 (29.2)		
>50	7 (15.2)	3 (15.8)	10 (15.4)		
Total	46 (100.0)	19 (100.0)	65 (100.0)		

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vaccination for rotavirus, but only six (9.2%) could correctly name any of the existing rotavirus vaccines. There was no relationship between occupation of health worker, place of practice, gender, and duration of practice and awareness of effective vaccination against rotavirus. (all $P > 0.05$) [Table 4].

Discussion

In this study, we evaluated the knowledge of selected healthcare providers regarding the epidemiology of rotavirus gastroenteritis and their awareness of the rotavirus vaccines.

Rotavirus is a very common cause of diarrheal disease requiring hospitalization in children and the leading cause of diarrhea mortality in children aged less than 5 years.[5] A majority of the healthcare providers in this survey recognized that rotavirus was a major contributor to the burden of diarrheal disease in these children; though few subjects appreciated it was responsible for, as much as, over 30% of severe diarrheal disease in children of this age. Similar findings were reported by Seale *et al*.[9] in Indonesia, where most of the health workers interviewed were aware of rotavirus being a major cause of diarrhea, particularly requiring hospitalization. Considering healthcare providers are at the forefront of interventions for diarrhea, it is worrying that two-fifths of them believed bacteria were the commonest causes of diarrhea in children less than 5 years. These have significant implications for disease control as healthcare providers are expected to educate parents about the significance of rotavirus and by extension the rotavirus vaccines. In a country where vaccines have often been mired in controversy by false beliefs of chemicals put in vaccines to cause adverse events, addition of new vaccines may be met with resistance by the populace.[10] Health workers that should educate parents must be well informed themselves about the burden of the disease and the importance of the vaccine.

Table 2: Relative contribution of rotavirus to burden of diarrhoea and peak age of occurrence

	Frequency ($n=65$)	Percentage
Relative contribution		
<5%	4	6.2
5-10%	12	18.5
11-20%	5	7.7
21-30%	3	4.6
>30%	21	32.3
Unknown	20	30.8
Peak age of occurrence of rotavirus diarrhea		
0-12 months	26	40.0
13-24 months	13	20.0
25-36 months	14	21.5
37-48 months	1	1.5
49-<60 months	2	3.1
Unknown	9	13.8

Table 3: Responses of subjects regarding mode of transmission (multiple responses allowed)

	Frequency (%)
Mode of transmission	
Fecooral	62 (95.4)
Respiratory droplets	17 (26.2)
Transmission via fomites	33 (50.8)
Water-borne	40 (61.5)
House flies	19 (29.2)
Don't know	1 (1.5)
Effective preventive strategies for rotavirus	
Vaccination	44 (67.7)
Personal hygiene	28 (43.1)
Provision of safe potable drinking water	15 (23.1)
Proper refuse disposal	12 (18.5)
Proper sewage disposal	11 (16.9)
Proper food cooking	8 (12.3)
Don't know	1 (1.5)

Majority of the subjects had good knowledge about mechanisms of transmission of rotavirus. Transmission of rotavirus is largely person to person via the fecooral route, though transmission through fecally contaminated water, and via fomites also occur commonly.[11]Although transmission of rotavirus via airborne droplets has been suspected in the past, there has been no conclusive evidence that transmission by this route is indeed possible.[11,12]

Similarly, majority of the subjects identified correctly that vaccination was an effective strategy for prevention of rotavirus gastroenteritis. Most subjects also, wrongly, indicated other measures, such as safe water supply, personal, and environmental hygiene as strategies to reduce transmission. This suggests the subjects were perceiving prevention of rotavirus gastroenteritis as similar to other causes of diarrheal disease where these measures have been shown to be effective. Seale *et al*. in Indonesia documented similar findings with majority of the healthcare providers suggesting these measures were effective in preventing rotavirus gastroenteritis.[9] There is a need for healthcare providers to get this message right to avoid confusing the populace. Although issues of hygiene, clean water supply, and refuse/sewage disposal are generally helpful in preventing other causes of diarrhea, they have little or no role to play in control of rotavirus gastroenteritis.[9,11]

The most effective strategy for prevention of rotavirus gastroenteritis remains rotavirus vaccination given in infancy, and as such the World Health Organization recommends that "rotavirus vaccines should be included in all national immunization programs and considered a priority, particularly in countries with high rotavirus gastroenteritis (RVGE)-associated fatality rates, such as in South and South-eastern Asia and sub-Saharan Africa."[7] Routine use of the vaccine in earlier studies in Africa revealed effectiveness rates of 52–78% with the highest efficacy being within the first 12 months of life.[13] Recent reports suggest planned introduction of the rotavirus vaccine in Nigeria in 2019. Thus, it is important that healthcare providers are aware

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Table 4: Relationship between sociodemographic/occupational characteristics and awareness of effective rotavirus vaccine among subjects

Characteristics	Awareness of effective rotavirus vaccine		Total (%)	χ^2	*P*
	Aware, *n*=44(%)	Not aware, *n*=21(%)			
Duration of practice (years)					
<5	8 (18.2)	5 (23.8)	13 (20.0)	1.290	0.525
5-10	19 (43.2)	6 (28.6)	25 (38.5)		
>10	17 (38.6)	10 (47.6)	27 (41.5)		
Gender					
Male	12 (27.3)	7 (33.3)	19 (29.2)	0.252	0.771
Female	32 (72.7)	14 (66.7)	46 (70.8)		
Occupation*					
Medical doctor	15 (34.1)	7 (33.3)	22 (34.4)	2.361	0.797
Nurse	14 (31.8)	7 (33.3)	21 (32.8)		
Lab scientist	3 (6.8)	0 (0.0)	3 (4.7)		
Community health extension worker	11 (25.0)	7 (33.3)	18 (28.1)		
Place of practice					
Private health facility	21 (47.7)	10 (47.6)	31 (47.7)	3.414	0.332
Primary health facility	13 (29.5)	6 (28.6)	19 (29.2)		
Secondary health facility	3 (6.8)	4 (19.0)	7 (10.8)		
Tertiary health facility	7 (15.9)	1 (4.8)	8 (12.3)		

*One worker did not indicate their occupation and is excluded from this analysis

of the vaccine. Majority of the healthcare providers in this survey were aware of the vaccine, though only six (9.2%) could actually name any of the rotavirus vaccines. Seale *et al*.[9] in Indonesia also reported poor knowledge of the health workers regarding the rotavirus vaccine in a prevaccine introduction era. This suggests that health authorities need to intensify sensitization efforts for healthcare providers, across the various cadres on the rotavirus vaccine.

Conclusion

The study has demonstrated that healthcare providers are aware of rotavirus as a cause of diarrhea in children less than 5 years of age, but they have poor knowledge regarding its contribution to the burden of diarrhea, strategies for prevention, and the rotavirus vaccines.

Declaration of patient consent

Informed consent was obtained from all participants and the study protocol conforms to the ethical guidelines of the 1975 Declaration of Helsinki.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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