A Review of the Sociodemographic Characteristics of Children Immunized with the Rotavirus Vaccine in Adonai Hospital, Karu Local Government Area, Nasarawa State, North-Central Nigeria

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Abstract

Introduction: There is a dearth of literature on existing rotavirus immunization services offered in Nigeria; with only very little information has been documented about it. This study aims to conduct a clinical audit of all children immunized with rotavirus vaccine in Adonai Hospital, Karu Local Government Area, Nasarawa State, north-central Nigeria. **Materials and Methods:** This study was a hospital-based study which adopted a retrospective study design. The population included in this study was children who had received rotavirus vaccine at Adonai Hospital. The study instrument was a data extraction form which obtained information about the sociodemographic data and clinical data of the children registered in the child immunization register. Only the data of all children immunized with rotavirus vaccine at the facility were obtained. **Statistical Analysis Used:** Data collected were analyzed using SPSS version 20 software. **Results:** A total of 111 children had been immunized with rotavirus vaccine in the health facility, 51.4% of them were males, 20.7% were from Igbo ethnicity, 86.5% came from Christian families, and all were residing in urban areas. All the children were within the age of 6 weeks to 40 weeks as the time of rotavirus vaccination. The dropout rate for rotavirus vaccine among the immunized children was 17.1%. Only 2.7% of all the children that received the vaccine developed an adverse event following immunization (AEFI), of which all were minor AEFIs. **Conclusions:** This study recorded a low rate of AEFI among children immunized with rotavirus vaccine in Adonai Hospital. Furthermore, the observed dropout rate in our facility is relatively very low when compared with the general dropout rate observed among children receiving immunization services in Nigeria. Notwithstanding, we recommend that investigations need to be done to explore the reasons why some children have dropped out of the rotavirus vaccination program at the surveyed facility.

Keywords: Children, clinical audit, immunization, rotavirus

Introduction

Worldwide, diarrheal disease is one of the top two leading preventable and curable causes of death in under-five children.[1] Every year, about 525,000 children die of the disease, according to the World Health Organization.[1] Furthermore, on yearly basis, about 1.7 billion cases of diarrheal diseases are reported in the world,[1] with most of the cases being recorded in developing nations including Nigeria.[2-4]

The causes of diarrheal disease in children, especially among infants, are diverse, and they include bacteria, viruses, and parasites.[5,6] Rotavirus is one of the leading causes of viral diarrheal diseases among young children.[7,8] Before or by the age of 3–5 years, virtually all children will be infected with rotavirus, irrespective of where they live, be it in a developed or a developing country.[8-10] However, due to high rate of poverty, ignorance, poor sanitation and hygiene, poor diagnostic techniques, and a couple of other factors, children infected with rotavirus in the developing countries often have poorer clinical outcomes than those residing in the developed countries.[11-14]

Rotavirus is a highly contagious pathogen; it spreads among children through feco-oral route and respiratory route and

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physical (manual) contact with contaminated surfaces.[15] In fact, there had been reported cases of detection and outbreak of the virus among children in child day care and hospital settings.[16-19] It can also spread at household level.[15] The major symptoms of rotavirus diarrheal disease include watery diarrhea, abdominal pain, vomiting, and fever.[8] In severe manifestation of these symptoms, the affected child can develop some serious complications (such as severe dehydration, encephalopathy, seizures, etc.) which may ultimately result into death.[8,20,21]

So far, some public health interventions, such as provision of potable pipe-borne water to the populace, environmental sanitation and hygiene, and a host of others, had been introduced to curb the spread of rotavirus infection among children; however, unfortunately, these interventions have not significantly prevented the spread of the virus.[10,22,23] Vaccination against rotavirus is still the most effective way to protect young children from its diarrheal disease.[10] Due to this, many developed countries of the world have introduced rotavirus vaccination into their national routine immunization programs. Unfortunately, developing countries like Nigeria have yet to introduce rotavirus vaccine into their national routine immunization program.

Currently, only very few health facilities in Nigeria offer rotavirus immunization services. Fuerthermore, there is a dearth of literature on existing rotavirus immunization services offered in Nigeria; with only very little information has been documented about it. This study aims to conduct a review of the sociodemographic characteristics of all children immunized with rotavirus vaccine in Adonai Hospital – a private health facility offering routine immunization services to children in Nigeria.

Materials and Methods

Study design

This study was a retrospective hospital-based study.

Study area

This study was conducted at the Immunization Section of the Adonai Hospital, Karu Local Government Area, Nasarawa State, north-central Nigeria. Adonai Hospital is a private hospital that was established in 1994. The facility has an intensive care unit, three wards, and 25 beds. The hospital runs 24-h clinical services, including immunization services. The immunization section of the facility was established on January 2013. Since its establishment, the section had been providing routine immunization services till date. On January 2018, rotavirus vaccination was included into the routine immunization services offered by the facility's immunization section.

Study population

The population included in this study was children who had received rotavirus vaccine at Immunization Section of the Adonai Hospital.

Study instrument

The study instrument was a data extraction form which obtained information about each child that has ever received rotavirus vaccine at Adonai Hospital. The information obtained was the sociodemographic data (tribe, gender, family religion, and place of residence) and clinical data (age of receipt of rotavirus vaccine doses, number of doses received, history of adverse event following immunization (AEFI), AEFI type, and history of drop-out) of the eligible infants.

Selection criteria

Only those children who received rotavirus vaccine at the Immunization Section of Adonai Hospital were considered eligible for the study.

Data source

We obtained our study data from the child immunization register of the Immunization Section of Adonai Hospital. Hence, our data were a secondary data.

Data collection

Using the study instrument (a data extraction form), we obtained the data of all infants who had received rotavirus vaccine at the Immunization Section of Adonai Hospital, from the time of commencement of rotavirus vaccination at the facility till date, i.e., from January 2018 to October 2020. Regarding the dropout status of the children, only those children, who defaulted from collecting the second dose of Rotavirus vaccine at Adonai Hospital after being due for the dose, were considered to drop out of the rotavirus vaccination program of the hospital.

Data analysis

Data collected were computed using SPSS version 20 software (IBM Corp., Armonk, NY, USA). Frequency distributions of all data variables were determined. Results were presented in words and tables.

Ethical considerations

Approval to conduct the study was obtained from the Office of the Medical Director, Adonai Hospital, Karu, Nigeria.

Results

The data of all children ($n = 111$) immunized with oral rotavirus vaccine in Adonai Hospital were included in this study. Roughly half (51.4%) of the immunized children were males, 20.7% were from Igbo ethnicity, 86.5% came from Christian families, and all (100.0) were residing in urban areas [Table 1].

All the children immunized, irrespective of the dose (1st or 2nd dose), were within the age of 6 weeks to 40 weeks. Out of all the children immunized with oral rotavirus vaccine, only 78.4% ($n = 87$) of them had received the second dose of the vaccine so far [Table 2].

Nineteen children were found to be due for the second dose of oral rotavirus vaccination, based on age and immunization history, but have not yet received the dose. Hence, the dropout

Table 1: Sociodemographic characteristics of children immunized with oral rotavirus vaccine

Characteristics	Frequency, *n* (%)
Sex	
Male	57 (51.4)
Female	54 (48.6)
Tribe	
Hausa	10 (9.0)
Yoruba	16 (14.4)
Igbo	23 (20.7)
Others*	62 (55.9)
Family religion	
Christianity	96 (86.5)
Islam	15 (13.5)
Traditional	0
Atheism	0
Others	0
Place of residence	
Urban	111 (100.0)
Rural	0
Semi-urban	0

*The following tribes: Ibibio, Idoma, Thanca, Igbira, Kamwe, Fulani, Orom, Sukur, Jaba, Siyawa, Eggon, Katan, Isoko, Dadiya, Urobo, Yalla, Marigi, Kute, Igala, Nwabhadul, Babro, and Katas

rate for rotavirus vaccination among the eligible children was 17.1% (19/111).

Only 3 (2.7%) out of all the children that received oral rotavirus vaccine developed an AEFI, of which all of them were vomiting (a minor AEFI type) [Table 3].

Discussion

To the best of our knowledge, this article is the first literature to review the sociodemographic characteristics of children immunized with rotavirus vaccine in a private health facility in Nigeria. The findings obtained from this study are noteworthy. The gender distribution of the children immunized with rotavirus vaccine was fairly even, although the number of male children was slightly higher when compared to the females. This finding suggests that there is no associated gender inequality in the access to and utilization of rotavirus vaccine in the surveyed health facility.

The rate of dropout as regards routine immunization among Nigerian children is very high.[25,26] In a recent systematic review of the coverage of childhood immunization in Nigeria, it was reported that the average immunization dropout rate of Nigerian children was 65.6%; the factors given for the high rate were "vaccine safety concerns," "mothers" "low level of education," and "poor information on immunization."[26] However, in our study, we observed a relatively very low dropout rate – 17.1% – for rotavirus vaccination. The reasons why there was a low dropout rate at the surveyed health facility could not be ascertained as the exploration of such reasons was not within the scope of the study. However, it can be suggested that the rate was low because the caregivers of the children immunized in the surveyed facility were living in an urban setting. Furthermore, being a private health facility, it is believed in the Nigerian context that such children would most likely come from a well-to-do family.

Table 2: Characteristics of children immunized with the first and second doses of oral rotavirus vaccine

Characteristics	First dose (*n*=111), *n* (%)	Second dose (*n*=87), *n* (%)
Age (weeks)		
6	66 (59.5)	NA
10	24 (21.6)	47 (42.3)
14	7 (6.3)	20 (18.0)
16	9 (8.1)	2 (1.8)
20	2 (1.8)	13 (11.7)
24	2 (1.8)	3 (2.7)
28	0	1 (0.9)
36	1 (0.9)	0
40	0	1 (0.9)
Sex		
Male	57 (51.4)	45 (51.7)
Female	54 (48.6)	42 (48.3)
Tribe		
Hausa	10 (9.0)	9 (10.3)
Yoruba	16 (14.4)	13 (14.9)
Igbo	23 (20.7)	16 (18.4)
Others	62 (55.9)	49 (56.3)
Religion		
Christianity	96 (86.5)	75 (86.2)
Islam	15 (13.5)	12 (13.8)
Traditional	0	0
Atheism	0	0
Others	0	0
Place of residence		
Urban	111 (100.0)	87 (100.0)
Rural	0	0
Semi-urban	0	0

This is so because the minimum age for the first dose of oral rotavirus vaccine is 6 weeks while that for the second dose is 10 weeks.[24] *n*: Number of children per category, NA: Not applicable

AEFIs are untoward events that are associated with immunization. They can be classified as minor or major events. Examples of minor events include vomiting, fever, and pain at injection site, while examples of major events include anaphylactic shock, convulsion, and syncope. In Nigeria, there is a huge paucity of literature on AEFI surveillance and reporting. As far as rotavirus immunization is concerned in Nigeria, there is little to no scientific documentation on AEFI with rotavirus vaccine. In order to provide scientific data on this area, this study included an exploration of such data as a part of its scope. In this study, it was found that only 2.7% of the children that received rotavirus vaccine developed AEFI, of which they were vomiting – a minor AEFI type.

However, this study has its limitations. First, this study was a hospital-based study; only those children that visited Adonai Hospital, the surveyed health facility, for oral rotavirus

Table 3: Characteristics of children with oral rotavirus vaccine-associated adverse events following immunization

Characteristics	Minor AEFI (*n*=3), *n* (%)	Major AEFI (*n*=0), *n* (%)
Age (weeks)		
6	0	0
10	1 (33.3)	0
14	1 (33.3)	0
16	1 (33.3)	0
20	0	0
24	0	0
28	0	0
36	0	0
40	0	0
Sex		
Male	2 (66.7)	0
Female	1 (33.3)	0
Tribe		
Hausa	0	0
Yoruba	1 (33.3)	0
Igbo	0	0
Others	2 (66.7)	0
Religion		
Christianity	3 (100.0)	0
Islam	0	0
Traditional	0	0
Atheism	0	0
Others	0	0
Place of residence		
Urban	3 (100.0)	0
Rural	0	0
Semi-urban	0	0

n: Number of children per category, AEFIs: Adverse events following immunizations

vaccine immunization were included in the study. Hence, other children that might have been immunized at other Nigerian health facilities were excluded. Second, this study failed to provide information on the reasons why there was associated dropout among those children that received rotavirus vaccine at the surveyed health facility. Based on the above, it might be difficult to make unguided generalizations based on the data of this study. This therefore calls for the need for further studies to deeply and extensively explore issues pertaining to oral rotavirus vaccination in Nigeria.

Notwithstanding, the above-stated limitations, this study is probably the first published study, to the best of the authors' knowledge, that has provided crucial information on rotavirus immunization utilization among Nigerian children and also on the adverse events associated with the rotavirus vaccine among Nigerian children.

Conclusions

This study provides fresh clinical data on rotavirus vaccination in Nigeria. The findings obtained in the study showed a relatively very low dropout rate regarding rotavirus immunization when compared to the national average of routine immunization dropout rate among Nigerian children. This study also showed that Nigerian children immunized with oral rotavirus vaccine can develop AEFI.

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All authors contributed equally to the study. Study conceptualization: GAO; design of study protocol: KKK, ED, and GAO; data collection: ED; data analysis: ED and KKK; manuscript drafting: KKK and ED; review of drafts: GAO; and approval of final draft: all authors.

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Conflicts of interest

There are no conflicts of interest.

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