INTERNATIONAL JOURNAL OF CURRENT RESEARCH IN CHEMISTRY AND PHARMACEUTICAL SCIENCES
(p-ISSN: 2348-5213: e-ISSN: 2348-5221)
www.ijcrcps.com
(A Peer Reviewed, Referred, Indexed and Open Access Journal)
DOI: 10.22192/ijcrcps Coden: IJCROO(USA) Volume 10, Issue 4 - 2023

Research Article

DOI: http://dx.doi.org/10.22192/ijcrcps.2023.10.04.003

Prevalence of Rota-virus diarrhoea among children 3-24 months at Fort Portal regional Referral hospital, Uganda

Goretty Laker[1], Jolly Nankunda[1], Bernis Maren Melvis[1], Martin Nduwimana[1], Joel Kimera[1], Dickson Kajoba[1], Richard Justine Odong[1], Isaac Edyedu[2] and *Emmanuel Ifeanyi Obeagu[3]

[1]Department of Pediatrics and Child Health, Kampala International University Teaching Hospital, Uganda.
[2]Department of Surgery, Kampala International University Teaching Hospital, Uganda.
[3]Department of Medical Laboratory Science, Kampala International University, Uganda.

Abstract

The study was done to determine the prevalence of rotavirus diarrhea among children 3 to 24 months old at Fort Portal Regional Referral hospital.This was a hospital based cross sectional, descriptive and analytical study design to determine the prevalence, dehydration status and factors associated with Rota-virus diarrhea in children 3- 24 months in Fort Portal Regional Referral hospital. The study was carried out at Fort Portal Regional Referral Hospital pediatric (ward, OPD, Nutrition unit). In this study, one test result was invalid. Forty-two tests were positive representing a prevalence of 15.7% as shown in figure 1 below. The prevalence of Rota-virus diarrhea was low in the post Rota-virus vaccination period. Majority of the participants with rotavirus diarrhea had some dehydration.

Keywords: prevalence, rotavirus, diarrhea, children, 3-24 months, Uganda

Introduction

Globally rotavirus diarrhea is one of the leading causes of mortality and morbidity with 258 million diarrhea episodes and a 0.42 cases per child-year and 128500 mortalities [1-8].

Annually, there are 231 fatalities, more than 87,000 hospital admissions, and over 700,000 outpatient visits in Europe because 1 in 7 children have clinical Rota-virus diarrhea [9]. And in developing countries. It is estimated that rotavirus causes over 500,000 deaths annually [10] with the peak age of 3-24 months and the highest

incidence of severe disease among children aged 6-11months [11-12].

Diarrhea in Uganda is still ranked among the top 10 causes of morbidity and it is due to its being highly contagious and highly associated with severe dehydration leading to mortality via shock and multiorgan failure secondary to hypovolemia [13-14].

Pre-vaccination era in Uganda saw Rotavirus diarrhea prevalence of 32.8% - 45.4% in children below 5 years with majority of children (95%) being less than 24 months [14-15]. However post Rota-virus vaccination population-based estimates and the impact of Rotavirus vaccine introduction on diarrheal deaths in Africa are not available [16]. Therefore, the impact of rotavirus immunization is not well established.

According to a recent database of Fort Portal Regional Referral Hospital (2022), total number of admissions in the past 3 months (may-August) was 630 patients out of this 90 were cases of diarrhea in children less than 5 years and 27 were dehydrated, however the causes of diarrhea were not determined.

It is against this background that the researcher seeks to determine the post rotavirus vaccination diarrhea prevalence, dehydration status and factors associated with rotavirus among children aged 3-24 months attending Fort Portal Regional Referral Hospital.
The study was done to determine the prevalence of rotavirus diarrhea among children 3 to 24 months old at Fort Portal Regional Referral hospital.

Methodology

Study Design

This was a hospital based cross sectional, descriptive and analytical study design to determine the prevalence, dehydration status and factors associated with Rota-virus diarrhea in children 3- 24 months in Fort Portal Regional Referral hospital.

Study Site

The study was carried out at Fort Portal Regional Referral Hospital pediatric (ward, OPD, Nutrition unit).

Study Population

Target Population

The targeted population for the study was Children aged 3-24 months attending care from Fort Portal Regional Referral hospital. The age category was selected because Rota-virus infection among children peaks between age 3-24months. In this study, 3 months was the lower limit because at this age rotavirus immunization is complete. The upper limit of 24 was chosen because 3-24 months marks the peak of rotavirus infection [12, 15]. In Uganda, Rota-virus vaccine (Rotarix) is given as two separate doses at 6 and 10^{th} week of life.

Eligible Population

All children 3-24months old who presented with diarrhea at Fort Portal Regional Referral hospital for medical care during the study period.

Study Participants

The study participants were children 3-24 months with diarrhea and their caretakers attending Fort Portal regional referral hospital.

Inclusion Criteria

1. Child with acute diarrhea aged 3-24months old and their caregiver.
2. Children 3-24months with acute diarrhea whose caregivers had consented to the study.

Exclusion Criteria

1. Children aged 3-24month with diarrhea whose caregivers had not consented for the study.
2. All children with persistent or chronic diarrhea

Time Scope

The study was carried out in a period of 3 months. This is because Fort Portal Regional Referral hospital receives a total number of children aged 3-24 months of about 100 per month thus 3 months was sufficient to achieve the desired sample size.

Technique of Sampling Participants

Consecutive sampling technique was used until the desired sample size was obtained

Sample Size Determination

Using a sample size formula by **Kish Leslie** for cross-sectional studies:

$N= Z\alpha 2P (1- P)/ \delta 2$

Where N= sample size
Zα = Standard normal deviation at 95% confidence interval corresponding to 1.96
P= assumed true population prevalence of Rota-virus diarrhea, using Prevalence of rotavirus infection among children with acute diarrhea after rotavirus vaccine introduction in Kenya, of 14.5% [17].
1-P = the probability of not having Rota-virus diarrhea,
δ = Acceptable error of 5%.
The calculated sample size N = 190 children

Diagnosis of Rota-Virus Diarrhoea

The study used immunochromatographic assay (Fastep kit sensitivity- 90%, specificity- 93%) for the diagnosis of Rota-virus diarrhea, this was because they are easy to perform, they provide rapid results and with a high sensitivity [18]. A study in tertiary Care Hospital in Bangladesh showed ICT sensitivity of 90.70% and specificity of 93.88% in comparison to ELISA the gold standard (Habib et al., 2020) while in India it had a sensitivity of 95.24% and specificity of 97.47% [19].

Data Collection Instruments

A semi-structured questionnaire with closed ended questions was used to obtain social demographic, child and family social factors associated with rotavirus diarrhea. This was administered and filled by the principal investigator and research assistant.

Data collection tools

Stool specimen collection

Sample collection was done by the help of a rectal tube. A 5 ml syringe was attached to a rectal tube size 10 which was inserted into a rectum following aseptic technique [14]. The tube was inserted approximately 2 cm in the rectum while the child was held on the mother's thighs in prone position and aspirate about 5mls of stool was taken. The sample was placed into a sterile, clean dry screw-top stool container. The container was labelled with a unique identifier of the study participant.

Rotavirus Immunochromatography Test (SD bioline)

This study adopted the methodology used by Sharma [20]) in his study "Comparison of A Rapid Immunochromatography Test with Elisa to Detect Rotavirus"

Preparation of Extracted Sample

1. Assay diluent was taken in a disposable dropper up to the line marked on it and then transferred into the sample collection tube. This was done twice.

3. Sample collection swab was put in to the stool sample and then inserted into the tube containing assay diluent (sample collection tube).

4. Sample collection Swab was then swirled ten times in the sample collection tube until the sample dissolved into the assay diluents. The swab was discarded while squeezing it against the wall of tube.

Test Procedure

1. Test device was removed from the foil pouch and placed on a flat, dry surface.
2. Dropping cap was assembled on the sample collection tube.
3. 4-5 drops of the sample were added to the sample well of the test device.
4. As the test began to work, purple color moved across the result window in the center of the test device.
5. Test results was interpreted at 10-20 minutes.

Study Procedure

Children within the required age group who presented with acute diarrhea at OPD, emergency, and ward within the first 24hours of admission were identified by the principal investigator or research assistant. Informed consent was sought from the care giver then a questionnaire was filled, physical assessment for dehydration signs was done and sample was taken for Immunochromatographic test for rotavirus detection. Each study participant was given a unique identifier, which was also written on their files to avoid double entry in case a patient comes for review or develops another episode of diarrhea during the study period.

Laboratory tests

For every 20 samples, one sample was taken to a reference laboratory to check for consistence of the result finding.

The researcher had a hands-on training for 1 week on how to carry out the rotavirus rapid diagnostic test and interpretation in KIUTH

The study was overseen by a laboratory technologist.

Data Analysis

Data was entered in Microsoft excel software, cleaned and sorted and thereafter exported to SPSS version 22 for further analysis. Data analysis was carried out as per specific objective.

Ethical Considerations

For the study to be ethical, the following were considered;

Institutional consent

Ethics clearance from Kampala international university research ethics committee was sought. This was followed by seeking approval to conduct research from the medical director of FPRRH.

To pre-test the questionnaire, permission was sought from chief executive officer KIUTH.

Privacy and confidentiality

Questionnaires did not bear individual participant names in order to ensure anonymity and the completed questionnaires together with soft copy files were only accessible to the principal investigator and kept under lock and password protected respectively.

Informed consent

Written informed consent was voluntarily sought from the individual participants after thorough explanation of the study protocol and the procedures to be done. The participant was then asked to put a thumb print or a signature on 2 consent forms, one for the participant and another was to remain with the principal investigator. Consent forms were both in English and Lutoro and patient were free to withdraw from the study anytime.

Respect of individual persons

Participants were allowed to with draw from the study at any point without any repercussion impeding their health care.

Results

In this study, majority of the children enrolled with diarrhea were females 135(50.4%) aged ≤12 months 177 (66.0%) with a duration of diarrhea less than 5 days 220 (82.1%). Majority were still breastfeeding 187(69.8%) and had no other person with diarrhea at home 239 (89.2%). Only 1 child was going to a day care. The rest of the baseline characteristics are shown in table 1 below.

Table 1: Baseline characteristics of study participants

Characteristic	Frequency	Percentage
Child's age (months)		
≤12	177	66.0
>12	91	34.0
Sex		
Male	133	49.6
Female	135	50.4
Mother's age (years)		
≤ 20	57	21.3
21 – 30	164	61.2
>30	47	17.5
Mother's education		
None	32	11.9
Primary	112	41.8
Secondary	83	31.0
Tertiary	41	15.3
Duration of diarrhea (days)		
< 5	220	82.1
5 – 7	43	16.0
>7	5	1.9
Still breast feeding		
Yes	187	69.8
No	81	30.2
Exclusive BF duration		
<6	120	44.8
6	148	55.2
Rota Immunization		

None	12	4.5
Partial	55	20.5
Complete	106	39.6
Not sure	95	35.4
HIV status		
Negative	141	52.6
Exposed	27	10.1
Positive	3	1.1
un known	97	36.2
Other person with diarrhea at home		
Yes	29	10.8
No	239	89.2
Child in day care		
Yes	1	.4
No	267	99.6
Under-fives at home		
None	95	35.4
1-2	145	54.1
>2	28	10.4
Number of people at home		
<3	114	42.5
3-5	96	35.8
>5	58	21.6
Bread winner's occupation		
Peasant	119	44.4
Business	101	37.7
Formal employment	48	17.9
Water Source		
Tap	126	47.0
Borehole	56	20.9
Protected spring	46	17.2
Well	40	14.9
Drink Boiled water		
Yes	187	69.8

No	81	30.2
Toilet Type used		
Pit latrine	167	62.3
VIP Toilet	28	10.4
Mud and wattle	73	27.2

BF=breast feeding, HIV=Human immunodeficiency syndrome VIP=ventilated improved pit latrine

In this study, one test result was invalid. Forty-two tests were positive representing a prevalence of 15.7% as shown in figure 1 below.

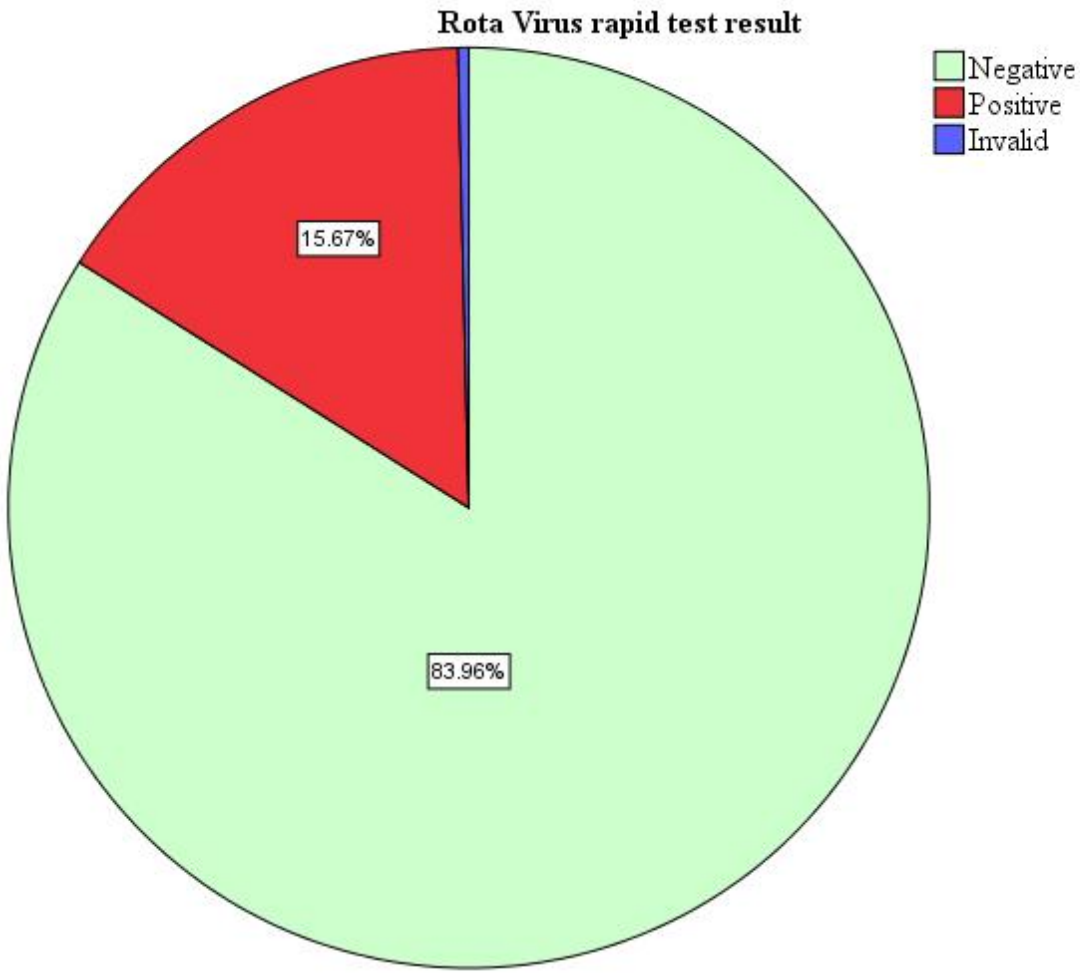

Figure 1: Prevalence of Rota-virus Diarrhea among children aged 3-24 months old attending Fort Portal Regional Referral hospital.

Discussion

The study finding established a post Rota vaccination prevalence of 15.67% among infants 3-24 months of age attending fort portal regional referral hospital. This reflects a 29.73% decline in rotavirus gastroenteritis in Uganda from 45.45% in Mulago national referral hospital. [14].This reflects the effectiveness of rotavirus vaccination in reducing the burden of rotavirus gastroenteritis [21].

The study findings are similar to that observed in Nairobi Kenya (15.2%) 5years post vaccination rollout [22].Possibly due to a similar setting in the two countries, effectiveness of the rota virus vaccine 5 years pst introduction in both countries. Additionally, the post Covid-19 era could have led to improved hand washing practices in communities and this could have contributed in breaking the fecal oral cycle.

Higher prevalence was seen in; Tanzania (Moshi) 26.4% [23], possibly due to; large sample size, slightly longer study duration (5months) and also the study was carried out in four different facilities. 32% in Malawi [24] possibly due to the larger sample size used in Malawi.

Conclusion

The prevalence of Rota-virus diarrhea was low in the post Rota-virus vaccination period.

Majority of the participants with rotavirus diarrhea had some dehydration.

References

1. Troeger C, Khalil IA, Rao PC, Cao S, Blacker BF, Ahmed T, Armah G, Bines JE, Brewer TG, Colombara DV, Kang G, Kirkpatrick BD, Kirkwood CD, Mwenda JM, Parashar UD, Jr WAP, Riddle MS, Steele AD, Thompson RL, … Jr RCR. Rotavirus Vaccination and the Global Burden of Rotavirus Diarrhea Among Children Younger Than 5 Years. *JAMAPediatrics*. 2018; *98121*(10), 958–965.
2. Ugwuzor NU, Ifeanyi OE, Onyenweaku FC. Bacteriolcgical Assessment of Stream Drinking Water from various Sources in Umuahia Metropolis. World Journal of Pharmaceutical Research. 2015; 4(6):122-37.
3. Esimai BN, Obeagu EI. Prevalence of Isolated Agent in Diarrheal Infections of Children O-3 Years in Anambra State in Relation to Sex: A Survey of Five Rural Communities. J Biomed Sci. 2022; 11(8):73.
4. Ojo BO, Abdulrahman OA, Haassan AO, Obeagu EI, Olamijuwon PB, Oyeromi BO, Oluwanisola DO, Kelvin U. Plasmid Profiling of Bacteria Associated with Gastroenteritis among Children in Owo, Ondo State. Asian Journal of Research and Reports in Gastroenterology. 2022; 6(2):29-41.
5. Ezimah UA, Obeagu EI, Ezimah CO, Ezimah A, Nto NJ. Diarrhoeal diseases of acquired immunodeficiency syndrome stimulate more depletion of total antioxidant status. Int. J. Adv. Multidiscip. Res. 2016; 3(4):23-5.
6. Ibekwe AM, Obeagu EI, Ibekwe CE, Onyekwuo C, Ibekwe CV, Okoro AD, Ifezue CB. Challenges of Exclusive Breastfeeding among Working Class Women in a Teaching Hospital South East, Nigeria. Journal of Pharmaceutical Research International. 2022; 34(46A):1-0.
7. Obeagu GU, Obeagu EI. Diarrhoea disease: A dangerous childhood disease. CPQ Women Child Health. 2019; 1(6):01-8.
8. Ifeanyi OE. A review on free radicals and antioxidants. Int. J. Curr. Res. Med. Sci. 2018; 4(2):123-33.

9. Arístegui J, Ferrer J, Salamanca I, Garrote E, Partidas A, San-Martin M, San-Jose B. Multicenter prospective study on the burden of rotavirus gastroenteritis in children less than 3 years of age in Spain. *BMC Infectious Diseases*. 2016; *16*(1), 1–12.
10. GBD Diarrhoeal Disease Collaborators. Estimates of global, regional, and national morbidity, mortality, and aetiologies of diarrhoeal diseases: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet Infect Dis*. 2017; *17*, 909–948.
11. World Health Organisation. Integrated Management of Childhood Illness Distance Learning Course Module 4: Diarrhoea. 2014; 8–23.
12. Muendo C, Laving A, Kumar R, Osano B, Egondi T, Njuguna P. Prevalence of Rotavirus Infection Among Children With Acute Diarrhoea After Rotavirus Vaccine Introduction in Kenya. *BMC Pediatrics*. 2018; *18*(323), 1–9.
13. Arashkia A, Nejat B, Farsi M, Jalilvand S, Nateghian A, Rahbarimanesh A, Moshfegh F, Mohajel N, Shoja Z. Epidemiology and clinical characteristics of rotavirus and norovirus infections in hospitalized children less than 5 years of age with acute gastroenteritis in Tehran, Iran. *Acta Medica Iranica*. 2019; *57*(11), 640–644.
14. Nakawesi JS, Wobudeya E, Ndeezi G, Mworozi EA, Tumwine JK. Prevalence and factors associated with rotavirus infection among children admitted with acute diarrhea in Uganda. *BMC Pediatrics*. 2010; *10*(69), 1–5.
15. Odiit A, Mulindwa A, Nalumansi E, Mphahlele MJ. Rotavirus Prevalence and Genotypes Among Children Younger Than 5 Years With Acute Diarrhea at Mulago. *The Pediatric Infectious Disease Journal*. 2014;*33*(S1), 41–44.
16. Platts-Mills JA,Steele AD. Rotavirus vaccine impact in Africa: greater than the sum of its parts? *The Lancet Global Health*. 2018; *6*(9), e948–e949.
17. Nzisa MC.Prevalence of Rotavirus Infection among Children with Acute Diarrhoea after Rotavirus Vaccine Introduction In Kenya. *2017*.
18. Bass ES, Pappano DA, Sharon G. Rotavirus. *Gastrointestinal Disorders*. 2021; *28*(5).
19. Dhiman S, Devi B, Singh K, Devi P. Comparison of enzyme-linked immunosorbent assay and immunochromatography for rotavirus detection in children below five years with acute gastroenteritis. *Journal of Clinical and Diagnostic Research*. 2015;*9*(9), 6–9.
20. Sharma A. Comparision of A Rapid Immunochromatography Test with Elisa to Detect. *Journal of Medical Science and Clinical Research*. 2017;*05*(07): 24334–24340.
21. Kiilu C, Marete I, Apondi E, Gudu E. Factors Associated with Rota Virus Diarrhea in the Post Vaccine Period as Seen At Moi Teaching and Referral Hospital, Kenya. *East African Medical Journal*. 2017; *94*(9), 709–717.
22. Gikonyo J, Mbatia B, Okanya P, Obiero G, Sang C, Nyangao J. Rotavirus prevalence and seasonal distribution post vaccine introduction in Nairobi county Kenya. *Pan African Medical Journal*. 2019; *33*, 1–9.
23. McHaile DN, Philemon RN, Kabika S, Albogast E, Morijo KJ, Kifaro E, Mmbaga B. T. Prevalence and genotypes of Rotavirus among children under 5 years presenting with diarrhoea in Moshi, Tanzania: A hospital based cross sectional study. *BMC Research Notes*. 2017; *10*(1), 4–9.

24. Bar-zeev N, Jere KC, Bennett A, Pollock L, Tate JE, Nakagomi O, Iturriza-gomara M. Population Impact and Effectiveness of Monovalent Rotavirus Vaccination in Urban Malawian Children 3 Years After Vaccine Introduction : Ecological and Case-Control Analyses. *Clinical Infectious Diseases*. 2016; *62*(Suppl 2), 213–219.

Access this Article in Online	
	Website: www.ijcrcps.com
Quick Response Code	Subject: Medical Sciences
DOI: 10.22192/ijcrcps.2023.10.04.003	

How to cite this article:
Goretty Laker, Jolly Nankunda, Bernis Maren Melvis, Martin Nduwimana, Joel Kimera, Dickson Kajoba, Richard Justine Odong, Isaac Edyedu and *Emmanuel Ifeanyi Obeagu. (2023). Prevalence of Rota-virus diarrhoea among children 3-24 months at Fort Portal regional Referral hospital, Uganda. Int. J. Curr. Res. Chem. Pharm. Sci. 10(4): 30-39.
DOI: http://dx.doi.org/10.22192/ijcrcps.2023.10.04.003

