

ORIGINAL ARTICLE

Prevalence of Rotavirus Diarrhea among Children Up To 2 Years in a Hospital-Based Study

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ABSTRACT

Aim: To determine the prevalence of Rotavirus diarrhea among children up to 2 years of age

Study design: A cross-sectional study

Place and Duration: This study was conducted at Khairpur Medical College Hospital Khairpur Mir's, Pakistan from June 2019 and December 2020.

Methodology: The children's clinical profiles were examined, and the presence of rotavirus antigen in their stool with the ELISA method was detected.

Results: The study included a total of 135 children who were suffering from diarrhea, among them 65 (48.14%) were boys, and 70 (51.85%) were girls. It was observed that minimum participation was from zero to 5 months (n=27, 20%), and a maximum number of the patients were in the age group 6 to 12 months (n=41, 30.37%). Rotavirus diarrhea was reported in 48.88% (n=66) of the children. In the age group of 19 to 24 months, 55.88% were Rotavirus positive. No significant association between the age and presence and absence of Rotavirus has been observed. ($X^2 = 1.3241$, $P = 0.723$). A significant association has been observed between the feeding habits and the occurrence of Rotavirus diarrhea. ($X^2 = 26.5539$, $P < 0.00001$)

Conclusion: Rotavirus infection was found in 48.88 % of these children, and there is a link between rotavirus infection and the method of feeding.

Keywords: Infant, Diarrhea, Rotavirus, Breastfeeding

INTRODUCTION

Diarrheal diseases kill an estimated 1.5 million children worldwide each year, making them the second greatest cause of death in children. (1) Viruses that cause diarrhea are the most common of them. In all children, Rotavirus is the most prevalent viral cause of diarrhea. (2) A rotavirus infection might be asymptomatic or cause severe, life-threatening diarrhea. Rotavirus is thought to be responsible for 29 % of all diarrheal deaths in children under the age of five, with South Asia accounting for 23 % of rotavirus deaths. (3) About half (49%) of these Rotavirus deaths are thought to have happened in four underdeveloped nations, one of which is Pakistan, which has a Rotavirus infant mortality rate of 67.6 per 100,000 children. (4)

Studies have reported that Rotavirus affects most children below the age of 60 months, regardless of socio-economic or environmental issues, and causes dehydration more commonly than other causes. (5) Improvements in cleanliness and hygiene have lowered the prevalence of other gut microbial infections, whereas Rotavirus occurrence has remained relatively unchanged. (6)

Rotavirus vaccinations are being used as a potential remedy. Due to the availability of effective rotavirus vaccines, significant epidemiological research on rotavirus diarrhea has been conducted. (7)

With this in mind, the purpose of this study was to determine the prevalence of diarrhea due to Rotavirus in children up to 2 years and to check if there is an association of feeding habits with the occurrence of Rotavirus diarrhea.

METHODOLOGY

A cross-sectional study was conducted between June 2019 and December 2020 on children who presented to an outpatient department and were admitted in hospital with diarrhea. Permission was taken from the ethical review committee of the institute. All children under the age of two years who had acute diarrhea met the inclusion criteria. Children with dysentery, diarrhea lasting more than 14 days, or diarrhea starting after hospitalization for any reason were excluded. A pre-designed proforma was used to collect clinical data. Feeding histories were obtained and were divided into three categories. Those on only breastfeed (BF), those on top feeds only (FF), and those on both breastfeed and top feeds (MF).

The WHO recommendations for diarrhea management were used to classify dehydration and manage it. Depending on the severity of dehydration, the children in the study were given oral rehydration therapy or intravenous fluids. Stool samples were taken from children when they arrived at the hospital for treatment. Stool samples were collected in sterile containers. The rotavirus antigen in stool was determined qualitatively using an ELISA-based technique. The data were examined using SPSS version 21 software and relevant statistical tests performed.

RESULTS

A total of 135 samples were collected between June 2019 and December 2020, and clinical data, including the type of feeding, symptomatology, the severity of dehydration, and

the type of treatment given, were recorded and analyzed. Data analysis of 135 samples revealed that there were 65 (48.14%) boys and 70 (51.85%) girls. It is observed that minimum participation was from zero to 5 months (n=27, 20%), and a maximum number of the patients were in the age group 6 to 12 months (n=41, 30.37%). [As shown in Figure 1]

Rotavirus diarrhea is reported in 48.88% (n=66) of the children. Evaluated data showed that the maximum number of positive rotavirus cases are found in the age group of 19 to 24 months. Out of 34 samples, 19 (55.88%) were Rotavirus positive. In 6 to 12 months, 18 (43.90%) positive cases were found. No significant association

between the age and presence and absence of Rotavirus has been observed. ($X^2= 1.3241, P=0.723$). [As shown in Table 1]

In the current study, 25.92 % (n=35) of the children were solely on BF, 31.85% (n=43) were on top Feed and 42.22% (n=57) were on both. In the BF group, Rotavirus diarrhea is present in the children's 11.42% (n=4). In comparison, those children on FF and MF reported Rotavirus diarrhea in 62.79% (n=27) and 61.40% (n=35) cases, respectively. A significant association has been observed between the feeding habits and the occurrence of Rotavirus diarrhea. ($X^2= 26.5539, P< 0.00001$). [As shown in Table 2]

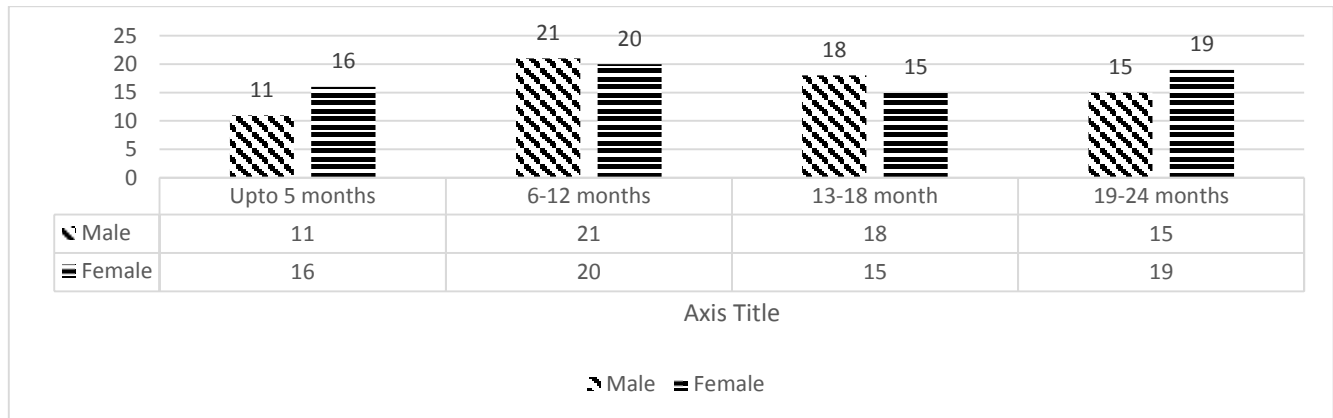


Fig 1: Gender distribution at different age groups.

Table 1: Presence of Rotavirus in children with diarrhea of different age groups

Age Group (Months)	Rotavirus		Total	X2, P-Value
	Negative N (%)	Positive N (%)		
Up to 5	13 (48.14)	14 (51.85)	27	$X^2= 1.3241, P=0.723$
6-12	23 (56.09)	18 (43.90)	41	
13-18	18 (54.54)	15 (45.45)	33	
19-24	15 (44.11)	19 (55.88)	34	
Total	69 (51.11)	66 (48.88)	135	

Table 2: Association of Diarrhea with the feeding habits

Parameter	Rotavirus		Total	X2, P-value
	Positive	Negative		
Breast feed (BF)	4 (11.42%)	31 (88.57%)	35	$X^2= 26.5539, P< 0.00001$
Top feed only (FF)	27(62.79%)	16 (37.20%)	43	
Both (MF)	35 (61.40%)	22 (38.59%)	57	
Total	66 (100%)	69 (100%)	135	

DISCUSSION

Rotavirus Diarrhea is prevalent among children, and it is directly associated with feeding habits. Breastfed children are less prone to Rotavirus diarrhea than those on top feed and both.

Diarrhea is one of the leading causes of death among children in underdeveloped countries, and Rotavirus has repeatedly been identified as the most common infection linked to severe diarrhea.

These results are compared well with previous studies wherein a study performed in Karachi, Pakistan, reported that Rotavirus was found to be positive in 63% of the children, which was a considerably higher proportion than the 37% who were confirmed to be negative for Rotavirus ($P < 0.001$). (8) In this, children up to 5 years were enrolled. Similar to our results, the children aged 7 to 12 months had the highest prevalence of Rota virus-positive cases.

Another study performed in Faisalabad, Pakistan found that 57% of the diarrhea cases were Rotavirus positive. (9) Previous research on rotavirus diarrhea in other parts of Pakistan has been reported a prevalence between 17 % to 63 %. (4, 10, 11)

The wide variation of the Rotavirus diarrhea could be due to the nature of the study. This greater incidence among hospitalized children could be due to higher rotavirus diarrhea admissions.

Rotavirus infection is highly prevalent among children aged 6 to 24 months. According to a study conducted in Washington, DC, most children had Rotavirus antibodies by the age of two years, which explain the reported lower incidence in later childhood. (12). Children aged 7–12 months are more susceptible to rotavirus infection than children of other ages. (13) The current study also demonstrated similar findings.

We observed that feeding habits had a significant association with Rotavirus diarrhea. Previous studies results favour the current study findings (14). In trials, exclusive breastfeeding appeared to protect newborns from severe rotavirus diarrhea, but this did not provide overall

protection during the first two years of life, implying that nursing just delayed rather than avoided this outcome. (15). We observed a statistically significant link between feeding and Rotavirus, with children exclusively breastfed having a lower prevalence of rotavirus diarrhea. Bottle feeding has been linked to rotavirus diarrhea on its own. (16) However, literature has reported different results. (17)

However, such prevalence of Rotavirus is a substantial public health concern, especially given its link to severe diarrhea. There is no specific therapy for rotavirus diarrhea, and it is usual to get infected again. Bacterial and parasite diarrhea have decreased significantly due to improved hygiene and sanitation, whereas rotavirus illness has had less of an impact.

This study was conducted on only in-patient children with diarrhea which is a significant drawback. Both community and hospital-based investigations are necessary to obtain better results.

CONCLUSION

Rotavirus infection was found in 48.88 % of these children, and there is a link between rotavirus infection and the method of feeding. Rotavirus immunization may be considered to prevent rotavirus infection and to reduce disease load.

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REFERENCE

1. Troeger C, Blacker BF, Khalil IA, Rao PC, Cao S, Zimsen SR, et al. Estimates of the global, regional, and national morbidity, mortality, and aetiologies of diarrhea in 195 countries: a systematic analysis for the Global Burden of Disease Study 2016. *The Lancet Infectious Diseases*. 2018;18(11):1211-28.
2. Troeger C, Khalil IA, Rao PC, Cao S, Blacker BF, Ahmed T, et al. Rotavirus vaccination and the global burden of rotavirus diarrhea among children younger than 5 years. *JAMA pediatrics*. 2018;172(10):958-65.
3. Nisa TU, Ahmad A. Surveillance studies for Rotavirus vaccine implication in Pakistan. *Pakistan Journal of Medicine and Dentistry*. 2018;7(4):5-
4. Sadiq A, Bostan N, Bokhari H, Matthijnssens J, Yinda KC, Raza S, et al. Molecular characterization of human group A rotavirus genotypes circulating in Rawalpindi, Islamabad, Pakistan during 2015-2016. *PLoS one*. 2019;14(7):e0220387.
5. Malek MA, Teleb N, Abu-Elyazeed R, Riddle MS, Sherif ME, Steele AD, et al. The epidemiology of rotavirus diarrhea in countries in the Eastern Mediterranean Region. *Journal of infectious diseases*. 2010;202(Supplement_1):S12-S22.
6. Anwari P, Safi N, Payne DC, Jennings MC, Rasikh S, Waciqi AS, et al. Rotavirus is the leading cause of hospitalizations for severe acute gastroenteritis among Afghan children < 5 years old. *Vaccine*. 2018;36(51):7765-8.
7. Clark A, Tate J, Parashar U, Jit M, Hasso-Agopsowicz M, Henschke N, et al. Mortality reduction benefits and intussusception risks of rotavirus vaccination in 135 low-income and middle-income countries: a modelling analysis of current and alternative schedules. *The Lancet Global Health*. 2019;7(11):e1541-e52.
8. Habib MI, Kazi SG, Khan KMA, Zia N. RRotavirusdiarrhea in hospitalized children. *Journal of the college of physicians and surgeons Pakistan*. 2014;24(2):114.
9. Iftikhar T, Butt A, Nawaz K, Sarwar Y, Ali A, Mustafa T, et al. Genotyping of rotaviruses detected in children admitted to hospital from Faisalabad Region, Pakistan. *Journal of medical virology*. 2012;84(12):2003-7.
10. Sadiq A, Bokhari H, Noreen Z, Asghar RM, Bostan N. Magnitude of Rotavirus A and Campylobacter jejuni infections in children with diarrhea in Twin cities of Rawalpindi and Islamabad, Pakistan. *BMC Infectious Diseases*. 2019;19(1):1-10.
11. Umair M, Abbasi BH, Nisar N, Alam MM, Sharif S, Shaukat S, et al. Molecular analysis of group A rotaviruses detected in hospitalized children from Rawalpindi, Pakistan during 2014. *Infection, Genetics and Evolution*. 2017;53:160-6.
12. Yolken RH, Wyatt RG, Zissis G, Brandt CD, Rodriguez WJ, Kim HW, et al. Epidemiology of human rotavirus types 1 and 2 as studied by enzyme-linked immunosorbent assay. *New England Journal of Medicine*. 1978;299(21):1156-61.
13. Gray J, Vesikari T, Van Damme P, Giaquinto C, Mrukowicz J, Guarino A, et al. Rotavirus. *Journal of pediatric gastroenterology and nutrition*. 2008;46:S24-S31.
14. John B, Devgan A, Mitra B. Prevalence of rotavirus infection in children below two years presenting with diarrhea. *Medical journal armed forces India*. 2014;70(2):116-9.
15. Espósito M, Córdoba JP. Advantages of breastfeeding during acute infections: What the evidence says. *Current Tropical Medicine Reports*. 2018;5(3):204-10.
16. Habash SH, Habeeb SI. Rotavirus diarrhea in children under Five in Basrah: Hospital-based study. *Pediatric Infect Dis*. 2018;3(2):6.
17. Shen J, Zhang B-m, Zhu S-g, Chen J-j. No direct correlation between rotavirus diarrhea and breastfeeding: A meta-analysis. *Pediatrics & Neonatology*. 2018;59(2):129-35.