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Original research article

An Investigation Of Rotavirus Infection In Children Under The Age Of Five Who Have Acute Diarrhea

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Abstract

Background and objective: Diarrheal diseases cause around 1.5 million fatalities worldwide annually, making it the second most common cause of death among children. Annually in India, the mortality rate due to rotavirus diarrhea is 1 in every 250 children.
Method: A prospective study was conducted on 120 unique stool samples from children under the age of 5 who were hospitalized in the pediatric unit due to acute diarrhea. The stool samples were analyzed using the premier rotaclone enzyme immunoassay methodology to detect the presence of rotavirus antigen, following conventional laboratory safety measures.
Result: In our scenario, the prevalence of acute diarrheal illnesses was 5.86%. The ELISA approach detected the presence of rotavirus in 29% of the patients.
Conclusion: The enzyme immunoassay (EIA) for detecting rotavirus antigen is a dependable test due to its quantitative nature and its excellent sensitivity and specificity. Therefore, it can be regularly utilized to prevent significant illness and death in children, particularly those under the age of 5.
Keywords: Acute diarrhoea, rotavirus, children, mortality, EIA.

Introduction

Diarrheal diseases account for the majority of global deaths, making them the second leading cause of mortality in infancy. In India, diarrhea accounts for 14% of child mortality in children under the age of 5. Diarrhea is a prominent contributor to mortality in children aged below five years worldwide, resulting in around 1.5 million child fatalities annually. Rotavirus infection continues to be the most prevalent cause of severe dehydration diarrhea in children globally. Annually, rotavirus is responsible for around 111 million instances of diarrhea that can be managed at home, 2 million hospitalizations, and 400,000 deaths among children under the age of 5. It is worth noting that 82% of these cases occur in children residing in the most impoverished nations [1-3]. The documented incidence of rotavirus-induced diarrhea, as reported by global surveillance networks and investigations conducted in hospitals, varies from 6% to 56%. Although rotavirus diarrhea is equally common in both rich and underdeveloped countries, there are differences in the causes linked with it. Several research have yielded contradictory findings regarding the impact of dietary status on the likelihood of experiencing rotavirus diarrhea. Additional research has indicated that factors such as exposure to diarrhea outside of the home, inadequate food hygiene, dehydration, lower educational attainment, living in accommodations with fewer than five rooms, bottle-feeding, low birth weight, being male, maternal smoking, and maternal age below 20 years are associated with an increased likelihood of experiencing rotavirus-induced diarrhea. Curiously, there has been no correlation observed thus far between HIV and rotavirus-induced diarrhea [4-7].

Diarrhea can be caused by various sources including viruses, bacteria, protozoa, and helminths. Within developing nations, around 50-60% of instances of this ailment are attributed to bacterial infection. Out of these instances, Escherichia coli is accountable for 25%, Campylobacter jejuni for 10-15%, Salmonella species for 5%, and Shigella species for 5%. Viruses are responsible for the remaining 35% of infections, with rotavirus accounting for 15-25% of these cases. Often, the etiology of the illness remains uncertain or is a result of a confluence of bacterial and viral infections.

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Although acute diarrheal illness usually recovers spontaneously, it is crucial to undertake a comprehensive investigation and provide appropriate treatment for the infectious etiology [8-10].
Rotavirus infection is the leading viral cause of hospitalizations in children under the age of 5 in India, comprising 20-30% of cases. It is anticipated to result in approximately 527,000 deaths each year.
Hence, this investigation was carried out to promptly detect rotaviral infections with the aim of preventing unwarranted administration of antibiotics and prolonged hospitalization.

Material and Method

This study was a prospective cross-sectional study conducted at the Department of Microbiology, Hi-Tech Medical College & Hospital, Bhubaneswar, India from January 2008 to December 2008. The Department collected stool samples from patients admitted in the paediatric ward. The study encompassed a total of 120 patients.

Inclusion criteria

1. The study included all children under the age of 5 who were admitted to the hospital with acute diarrhea.
2. None of the enrolled youngsters were inoculated against rotavirus.

Exclusion criteria

1. Diarrhea lasting longer than 14 days, often known as chronic diarrhea.
2. Children who have tested positive for HIV.
3. Children suffering from dysentery.
4. Ambulatory patient
5. The patient is withholding consent.

Result

Table 1: Graph showing the age and gender breakdown of diarrhea cases and how they compare to rotavirus-positive cases

Age in months	Male	Female	Relative positive
Less than 6	08	06	03 (8.57)
6-12	27	27	18 (51.5)
1-2 year	20	12	11 (31.4)
>2-5 year	09	09	03 (8.57)
Total	64	56	35

Table 2: Rotavirus cases are spread out between cities and country areas

Place	No. of. cases of Rotavirus	Non-Rotavirus
Urban	15 (34.48%)	26
Rural	20 (65.5%)	59

Table 3: Demonstrating the relationship between rotavirus positive patients and the frequency of loose stools

No. of stools/ day	Rotavirus positive	Rotavirus negative
<=5	07 (20%)	26
>5<10	10 (28.5%)	29
=>10	18 (51.4%)	30

Table 4: Demonstrating the relationship between related complaints and rotavirus positive cases

Complaints	No. of cases with rotavirus	Non rotavirus cases
Only diarrhoea	06 (17.14%)	23
Diarrhoea with fever	08 (22.8%)	21
Diarrhoea with vomiting	04 (11.43%)	22
Diarrhoea with vomiting and fever	17 (48.5%)	21

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Table 5: Displaying stool macroscopy in cases of severe diarrhea

Type	No. of cases
Solid stools	10
Yellowish stools	74
Greenish stools	25

Discussion

195 cases of acute diarrhea were admitted to the pediatric ward during the time the investigation was conducted in the department, yielding a 5.86% prevalence rate in our facility. 150 cases total were chosen based on our particular inclusion criteria for the acute diarrhea study that is underway. According to the study, children between the ages of 1-2 years (31%), and 6-12 months (55.17%) had the highest percentage of rotavirus positive cases. Children under 6 months old and those between the ages of 2 and 5 had the fewest cases. In both genders, the proportion of rotavirus-positive cases is 62.06% and 37.93%, respectively. The results of the current study were similar to those previously indicated [11].

The beginning of the weaning process, which exposes babies to water and other pollutants, may be the reason for the increased frequency of cases in the 6–12 month age group. Babies also start to walk unsteadily and acquire the habit of placing things in their mouths around this time. Of the 100 children in this study who had acute diarrhea, 56 percent were male and 46 percent were female. According to a research done in Tumkur, Karnataka, between November 2007 and August 2008, 10.12% of children had diarrhea. Out of the 150 cases that were included, the majority of diarrhea cases (107 cases, or 71.3%) happened within the first 24 months of life. The age group of 6–12 years, which accounted for 13.3% of the cases, and the age group of 24–60 months, which accounted for 15.3% of the cases, followed this [12]. As a result, the results are quite similar to the current study's. 29% of the cases in the current study were caused by rotavirus. Of these cases, men accounted for 62.06% of the prevalence, while women made up 37.93%. This suggests a 1.5:1 male to female ratio. A study carried out in New Delhi in 2005 by Rajiv Bahl and associates found a 26% positive rating. According to a research done in Chandigarh by Shobha Ram *et al*. (1990), the ratio of boys to females afflicted by rotavirus infection was 3.3:1 [13].

The present investigation is consistent with the work carried out in Pune, Karachi, and Turkey by P. Sarvanan *et al*. (2004), who discovered that the frequency of rotavirus antigen was the same in boys and girls. Most of the cases in this study (88%) were found in the winter, a tiny percentage (3.44%) happened in the summer, and the remaining cases (10%) were found during the rainy season. The colder months of the year were shown to have a high prevalence of rotavirus infection, according to a study done in Calcutta by M.R. Saha *et al*. (1984).

In 2003, M. Shariff and colleagues conducted a study in Nepal and discovered that rotavirus infections were year-round. According to a research done in Vietnam, rotavirus infections happened all year round, with a winter spike. The results of a study showed a clear relationship between the ELISA test's sensitivity and specificity and those of the LA test. The LA test also shown a significant positive predictive value. According to Raj *et al*., the LA kit under investigation was an accurate and effective method. Though its limited sensitivity may make it unsuitable for regular therapeutic usage, it can be useful in some situations, such as during epidemics [14].

Conclusion

In children under five, the incidence of rotavirus cases in and around Hubballi is 29%. The analysis reveals that the age range of 6 to 24 months had the highest number of rotavirus cases. Since the samples were taken from children who had not received a vaccination, this further emphasizes the need of immunization in preventing dehydration brought on by rotavirus infection. Furthermore, a prompt EIA diagnosis of these illnesses may be helpful in determining the pro gnosis for kids with severe diarrhea and help avoid the unnecessary use of antibiotic medication and extended hospital stays.

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Conflict of interest

Nil.

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