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Nosocomial diarrhea in children: is astrovirus the leading pathogen?

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ABSTRACT

Objective: To screen for the presence of mixed infection with rotavirus. **Methods:** The present study included 140 children aged less than 2 years with acute diarrhea. Fecal samples of all these patients were analyzed for the presence of astroviral antigen by enzyme immunoassay. Also 40 rotavirus positive fecal samples were screened for the presence of astrovirus. **Results:** In case of acute diarrhea in children the prevalence of astrovirus was around 34% (48/140). It was seen that even in rotavirus positive cases astrovirus co infection was 25%. **Conclusions:** Astrovirus is a growing problem which is often underrecognised. With the rotavirus vaccine licensure being imminent astrovirus will emerge out as the single most important cause of viral diarrhea

1. Introduction

Acute gastro-enteritis is a common cause of mortality and morbidity in children worldwide. In recent years rotavirus, enteric adenovirus, calicivirus and astrovirus have been seen to be associated with gastroenteritis in infants and young children[1-4].

Human astroviruses are small non-enveloped single-stranded RNA viruses, firstly identified in 1975 by electron microscopy in diarrheal stool sample[5]. Astrovirus has been identified as an important cause of diarrhea from communities, schools, geriatric care facilities, hospitals and child care centres[6-8].

Initially studies of astroviruses were confined to a few laboratories due to limited availability of diagnostic tests. Development of more advanced method of detection such as enzyme immunoassay (ELISA) and RT-PCR have revealed that astroviruses are only second to rotavirus as the cause of viral gastro-enteritis in children[7,9].

In humans, astroviruses predominantly affect children under the age of 2 yeras, the elderly and immunocompromised individuals[10].

Though astrovirus is increasing recognized by as significant gastro-intestinal pathogen , the studies on their prevalence in cases of acute diarrhea are limited especially in India.

Hence the present study was an endeavor to evaluate the prevalence of human astrovirus in cases of acute diarrhea in children less than 2 years of age and further determine the presence of co-infection with rotavirus in a few samples.

2. Materials and methods

In the present study 140 children of age less than 2 years presenting with acute watery diarrhea of unknown cause were included (Group A) .The children were admitted in the pediatric wards of Lok Nayak Hospital. The study also included 50 age and gender matched healthy controls without any symptoms of diarrhoea(Group B) .

Acute diarrhea was defined as either increased frequency or decreased consistency of stool with the current episode being less than 4 weeks in duration.Any child with alternative diagnosis during the course of study was excluded.

Fecal samples were collected from the patients and stored at -20 ℃till further processed. Astroviruses were detected using commercially available ELISA from DRG instruments GmbH, Germany . These ELISA had a sensitivity of 96% and specificity of 100%.

The ELISA test used was capable of detecting all the 7 serotypes of astrovirus as polyclonal anti-astrovirus coated wells were used. The tests were performed as instructions. ELISA for detection of astroviruses from fecal sample was also performed in 20 rotavirus positive samples (Group B) with

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the same kit.

3. Results

The mean age of astrovirus +ve group was 10.4 months and 11.3 months in astrovirus −ve group. Among the 140 samples 48 were positive for astrovirus. 30 males and 18 females had infection. And the male− female ratio was 1.4 ∶ 1.

The mean age was 11.8 months in astrovirus group, and 12.1 months in negative group. Among the 40 rotavirus positive samples tested, 10 were positive for astrovirus. There were 4 maled and 6 females with astrovirus positive. And male: female ratio was 1 ∶ 1.5.

There was statistically no significant difference in the prevalence of astroviral diarrhea either alone or as concurrent infection with rotavirus in males or females. Enzyme immunoassay showed that all 50 healthy controls were negative for the presence of astrovirus.

4. Discussion

Most diarrheal cases world-wide often do not receive an etiologic diagnosis. By convention only bacterial and parasitic pathogens are sought which are negative in most cases. It is seen that almost 40-50% cases of acute diarrhea in children aged less than 2 years have viral etiology. Rotavirus is the commonest viral agent causing acute diarrhea in children aged less than 2 years and astrovirus accounts for many additional cases. Knowledge about this has implications for diagnosis and treatment since viral diarrhea are best treated with oral dehydration therapy and unnecessary use of antibiotics can be curtailed.

The present study showed that astrovirus accounted for almost 33% cases of acute diarrhea. Furthermore, 25% of rotavirus positive patients also had astrovirus co-infection. Thus in this part of India, astrovirus accounts for about one-third of cases of acute diarrhea which is much more than reports from previous studies. These studies indicated that the prevalence of astrovirus was around 2-6% and that of co-infection was 3-5%[11]. Higher prevalence in the present study could be because the studies from India were much earlier and now astrovirus might be a growing problem. The sensitivity of the currently available antigen based ELISA might be higher as compared to previous studies and also the serotype of astrovirus varies in different geographical area. Although, such higher prevalence of astrovirus has also been reparted by other researches[9].

Public health concerns regarding astrovirus results from their ability to cause sporadic diarrhoea, large outbreaks of gastroenteritis in hospitalized patients or death especially in malnourished patients, patients with immuno-deficiency disorders or with underlying gastro-intestinal disease. Furthermore, if rotavirus vaccine is licensed which is likely in near future astrovirus will emerge as the most important agent of viral diarrhea in young children.

Improved surveillance and application of sensitive diagnostic tests have caused increased awareness and have reduced diagnostic gap regarding unknown causes of non-bacterial gastroenteritis. But further studies are required to define the epidemiology of astrovirus as there is a huge difference in the prevalence of astrovirus according to different geographical area, a point well-emphasized in the present study. A limitation of the present study was that the serotype of astrovirus prevalent in this region could not be determined. Nevertheless, in cases of nosocomial diarrhea the prevalence of astrovirus is on a increasing trend.

Formulating prevention strategies including vaccination will be a worth-while goal especially in countries like India where many children are suffering from PEM and so it is likely to experience complication as a result of astrovirus infection.

Conflict of interest statement

We declare that we have no conflict of interest.

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