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Rota Virus Gastroenteritis in Children Upto Five years of Age

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Background: To estimate the proportion and peak age of rotavirus diarrhoea among children of age two months to five years

Methods: In this descriptive study five hundred patients with acute watery diarrhoea (AWD) were screened for rotavirus. Stool sample of about 5 ml was taken & tested in the laboratory for group A rotavirus antigen by Enzyme immunoassays (EIA).

Results: Mean age of patients with AWD was 12.5 months . Out of 500 patients 147 (29.4%) were positive for group A rotavirus. Majority of positive patients 116/147 (78.9%) were in the age group 2 months to 12 months.

Conclusions: As there are many types of rotavirus i.e. A, B, C, D, and E so overall burden for all serotypes will be much higher. Rotavirus vaccine is an effective preventive measure available against rotavirus diarrhea.

Key Words: Acute watery diarrhoea; AWD ; Rotavirus

Introduction

Rotaviruses are most common cause of acute watery diarrhea in children worldwide. It is estimated that Rotavirus causes 125-million diarrheal cases/year. Rotavirus diarrhea deaths account for 20-40 deaths/year in developed countries and 440,000 deaths/year in developing countries. About 1/3 of these deaths occur in Indian subcontinent.[1]

Rotavirus diarrhea is more common during winter season in temperate climate. Peak age of Rotavirus diarrhea in children is 3 months to 2 years.[2] Rotavirus infection is transmitted through feco-oral route. After incubation period of 48 hours, patient develops fever and vomiting followed by profuse watery diarrhea lasting for 5 to 7 days.[2]

Many studies are being done worldwide to estimate the incidence and prevalent strains of rotavirus gastroenteritis which will help in decision making for implementation of immunization against rotavirus. In India, there is marked diversity of rotavirus strains reported by studies performed in 18 Indian cities. Rotaviruses were detected in 23.4% of patients presenting to hospital with diarrhea.[3] In Australia, most prevalent serotype is G1 strain.[4]

A study conducted in America from 2002 to 2005, has shown diversity of group A rotavirus strains, most common G genotype detected was G9. Changes in the G genotype frequency were observed from year to year.[5]

It is estimated that in Asia 171,000 children will die of rotavirus diarrhea, 1.9 million will be hospitalized and 13.5 million will require outpatient visit by the time Asian cohort reaches 5 years of age and medical cost will approximate $191million.Rotavirus vaccine could be cost-effective and valuable in preventing rotavirus diarrhea associated morbidity and mortality.[6] China is 2nd highest in mortality due to rotavirus and the only country licensed for rotavirus vaccination.[7]

Clinically rotavirus diarrhea mimics any other cause of acute watery diarrhea and is treated with standard management protocol, i.e., oral rehydration therapy and continued feeding. Anti- infective agent - nitazoxanide has reduced the duration of severe Rotavirus diarrhea in a study of hospitalized children in Egypt. [8] Use of probiotics for treatment of Rotavirus diarrhea has shown improvement in mild cases but no role in dehydrating disease.[9] Hence the only cost-effective option is prevention of rotavirus diarrhea through rotavirus vaccination. [10] Currently two new live, oral, attenuated pentavalent and monovalent vaccines against rotavirus diarrhea have been licensed by the European Medicines Agency and the US Food and Drug Administration, respectively, in 2006.[11] Pentavalent Human-Bovine reassortant rotavirus vaccine (HBRV) directed against rotavirus is being tried. HBRV vaccine has shown 68.8%-76.6%efficacy against any rotavirus diarrhea and 100% efficacy against severe rotavirus diarrhea.[12] The pentavalent vaccine protects against rota virus diarrhea when administered as 3 dose series at 2,4, and 6 months of age. The 1st dose should be administered between 6 and 12 weeks of age, with all three doses completed by 32 wk of age. Clinical trials in Europe, Latin America, and the US have demonstrated that these vaccines are safe and highly efficacious for preventing rotavirus-associated severe gastroenteritis.[13]

In Pakistan, very little research is conducted

regarding frequency of rotavirus diarrhea. This study was done to estimate burden and peak age of rotavirus diarrhea, so as to justify the recommendation and use of rotavirus vaccination at particular age as a preventive measure/tool.

Patients and Methods

It was a descriptive case series study conducted in the Department of Paediatrics, Rawalpindi General Hospital in 1 year duration from 6th November 2006 to 5 th November 2007.

Admitted patients of age two months to five years with non-bloody acute watery diarrhea were screened for rotavirus. Stool sample of about 5 ml was taken in screw top container within 48 hours of admission and kept in refrigerator before being tested in the hospital laboratory for rotavirus antigen by Enzyme immunoassays (EIA).EIA test was performed by centrifuging the stool sample with reagent (DAKO IDEIA rotavirus EIA detection kit) at 20-30 C for 20 min.

Results were interpreted by 2 methods - visual and photometric determination and by comparing them with standard positive and negative controls. Limitations of test were that it detected only group A rotaviruses & test could be false negative in case of improper sampling e.g. stool sample taken after 3-5 days or not refrigerated.

In order to determine the peak age prevalence of rotavirus diarrhea, patients were divided into age groups i-e ,Group 1 =2months – 12 months ; Group 2 =13months – 24 months ;Group 3 =25months –36 months ; Group 4 =37months-48months;Group 5 = 49months – 60months

Data was analyzed using SPSS version 10.Mean ±S.D was estimated for quantitative variable i.e age. Simple Frequency tables were used for qualitative variables. Proportion was calculated for disease burden and peak age was measured using mode in frequency distribution of age.

Results

Of the 500 pts with AWD of age 2months-60months enrolled in study , 260 (52%) were male and 240 (48%) were female. Mean age of all pts with AWD was 12.5 months with SD of 11.7. Out of 500 patients screened for rotavirus 147 pts (29.4%) were positive for group A rotavirus and 355 pts(70.6 %) were negative (Fig.1), Out of 147 patients (29.4%) positive for Rota virus 116 pts (78.9%) fell into age Group 1 (2m to12m) so peak age was found to be 2months - 12months(Table.1). Mean age of rotavirus positive pts was 10.4 months with SD of 7.8.

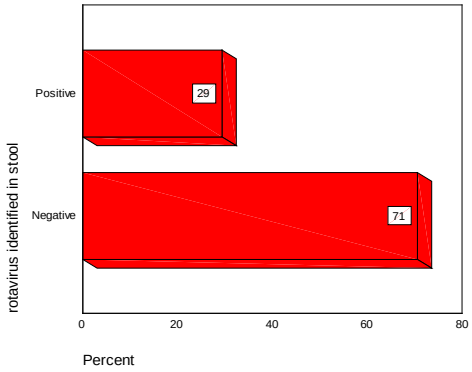

Fig 1: Rota virus positive cases in stool

Table 1: Rota virus AWD: case distribution according to age

Age groups	Frequency	Percentage
Group 1 (2 to 12 months)	116	78.9
Group 2 13-24months	23	15.6
Group 3 25-36months	6	4.1
Group 4 37-48months	2	1.4
Group 5 49-60months	0	0
Total	147	100

Discussion

In Asia 171,000 children die of rotavirus. China is 2nd highest in mortality due to rotavirus. In Bangladesh between 5,756 and 13,430 children died each year in between 2001 and 2004 from severe rotavirus gastroenteritis.[14] In Pakistan very little research is being conducted regarding prevalence of rotavirus diarrhea. Preventive measures like good hygienic measures and improved sanitation have no specific role in prevention, so vaccination is the only preventive tool.

In present study burden of only Group A rotavirus estimated was 29.4%. Similar studies from different countries have shown different results. In

Indonesia rotavirus prevalence was about 45.5%.[15] In India Rotavirus positivity rates of Group A rotavirus in hospitalized patients were 20%. [16] In another study from Italy, Rotavirus was observed in 29.5% of children with AWD[17] & in France general prevalence of Rotavirus diarrhea was 27.9%. [17]

In present study peak age of rotavirus diarrhea was 2 months to 12 months. A study conducted in Isfahan, Iran has shown that 84.2% of cases with rotavirus gastroenteritis were less than 2 years of age with peak age between 6-12 months.[18] In another study conducted in Yangon, Myanmar showed Rotavirus diarrhea most frequently occurred in children 6-17 months of age, and it was more commonly identified in boys (62%)[19] ,whereas in present study rotavirus was more commonly identified in girls(52%).A study from Denmark has shown that rotavirus diarrhea admissions peaked twice during early childhood i-e between 7-12 months of age and 79% of admissions had occurred before the age of 2 years ; proportion by sex were 56% boys and 44% girls.[20 I] In conclusion further studies are needed to find out overall burden of disease from all serotypes of rotavirus. As vaccination is the only cost-effective preventive strategy for rotavirus diarrhea so the role of vaccination against Rota virus must be highlighted

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