ROTAVIRUS INFECTION IN CHILDREN UNDER 2 YEARS OF AGE AT TERTIARY CARE HOSPITAL

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ABSTRACT

Objective: To determine frequency of rotavirus infection in children under 2 years of age presenting with acute watery diarrhea at tertiary care hospital.
Study Design: Cross sectional study.
Place and Duration of Study: Department of Pediatrics, MH Rawalpindi, from Jan to Jun 2016.
Material and Methods: Total 246 children, hospitalized with complaints of non-bloody acute watery diarrhea at the time of admission were included. Stool samples were collected and transported to Armed forces institute of Pathology (AFIP) for stool antigen detection for Rotavirus. Descriptive statistics were calculated. Stratification was done and post stratification Chi-square test was applied. A *p*-value <0.05 was considered as significant.
Results: There were 48.8% (120) male and 51.2% (126) female children. Mean no. of stools per day were 6.62 ± 1.92 in children whose stools for Rotavirus antigen were positive in 174 (70.7%) patients, no. of stools per day was significantly associated with positive results.
Conclusion: Rotavirus was found to be positive in majority of children causing substantial morbidity. There was significant association of rotavirus infection with increased no of watery stools per day.

Keywords: Acute watery diarrhea, Children, Pakistan, Rotavirus infection.

INTRODUCTION

Diarrhoeal infections are significant and major cause of morbidity and mortality in both infants and children worlwide[1]. Rotavirus is the main etiological factor of such infections affecting children less than 5 Years[2]; commonly between 12 months to 17 months[1]. Estimations suggest that more than 2 million hospital admissions are made for Rotavirus infection. Rotavirus alone is responsible for 527,000 deaths per year among children less than 5 years. Ninety percent of the mortalities resulting from Rotavirus occur in Asia and Africa[1].

Rotavirus belongs to Reoviridae family with triple coated virion particle that is icosahederal with 11 segmented Ds RNA genome enclosed in it[3]. Depending on the genetic and antigenic characteristics. It has been divided into seven heterogenic groups A to G where humans are affected by only group A, B and C and group A is the most frequently involved[4]. Rotavirus is further classified into several genotype groups depending upon the VP6 Capsid gene and G1P[8], G2P[4], G3P[8], G4P[8] are the important genotypes that cause infection worldwide[5]. It is the most common cause of Gastroenteritis in young children. It may also cause encephalopathy, diabetes-associated auto-antibodies and myasthenia gravis[6,7]. Analysis of 34 studies showed that Rotavirus can cause disease from autumn to spring being more prevalent in winter[5] but such seasonal fluctuation was not seen in Pakistan highlighting the disease burden throughout the year especially early and late months of the year[1]. Frequency of Rotavirus is 80.3% in children less than 3 years of age[9]. A study carried out in 5 cities of Pakistan back in 2014 revealed that 2039 out of 6679 children were positive for Rotavirus stool test making its prevalence 30.5% for the particular study. Rotavirus infection frequency varied from 16.3%

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to 39.4% in the 5 hospitals being highest in Lahore. About 61% of all rotavirus cases were in infants under one year of age[10]. Data on the disease burden caused by rotavirus is required in Pakistan to help in formulating the recommendations for use of Rotavirus vaccine. The objective of our study was to determine frequency of rotavirus infection in children under 2 years presenting with acute watery diarrhea to avoid the irrational use of antibiotics in acute watery diarrhoea caused by Rotavirus. This was done to emphasize the need for including rotavirus vaccine in extended programme of immunization to minimize this preventable cause of morbidity and mortality in children.

Table -I: Frequency of antigen for Rotavirus according to residence (n=246).

	Antigen for Rota Virus		Total	*p*-value
	Positive (n=174)	Negative (n=72)		
Gender				
Female	85	41	126	0.248
Male	89	31	120	
Total	174	72	246	
Age Group				
1-6 months	12	3	15	0.412
7-12 months	127	56	183	
13-18 months	30	13	43	
19-24 months	5	0	5	
Total	174	72	246	
Stools Frequency				
3/day	3	0	3	0.004
4/day	19	1	20	
5/day	43	8	51	
6/day	42	18	60	
7/day	29	14	43	
8/day	23	18	41	
9/day	6	3	9	
10/day	6	4	10	
12/day	2	4	6	
13/day	1	0	1	
14/day	0	2	2	
Total	174	72	246	
Residential Area				
Rawalpindi	115	50	165	0.001
Attock	5	0	5	
Chakwal	10	12	22	
Gujar Khan	15	0	15	
Haripur	6	0	6	
Nowshera	13	0	13	
Sawat	10	10	20	
Total	174	72	246	

MATERIAL AND METHODS

This cross sectional study was carried out at the department of Pediatrics, Military Hospital

Rawalpindi for the duration of six months from Jan to Jun 2016. Samples were sent to Armed Forces Institute of Pathology for antigen detection of Rotavirus in stool samples of admitted children. Sample size was calculated by WHO calculator (Sample size n=246). Non-probability consecutive sampling was used. Any child (male or female) under 2 years hospitalized with the complaints of acute watery diarrhea, non bloody diarrhea and diarrhea at the time of admission but less than 15 days duration was include in the study. Childeren hospital with acquired infection with severe combined Immunodeficiency, malabsorp-tion syndrome or being evaluated for chronic diarrhea, toddlers diarrhea, vaccinated against Rotavirus and any systemic illness like Pneumonia, UTI causing diarrhea were excluded from the study.

Permission from Institutional Ethical Committee was taken. Children under 2 years of age presenting with acute watery diarrhea were selected based on mentioned inclusion and exclusion criteria. Age and gender of the patients were recorded. Detailed history and physical examinations were done. Stool samples were collected in sterile stool collecting bottles which were aseptically and properly sealed, labeled and transported to Armed Forces Institute of Pathology where stool antigen detection for Rotavirus was carried out using kits designed for this purpose (Bio Tracer-korea). Data was entered and analyzed using SPSS version 21. Quantitative and qualitative measures were taken and analyzed, mean, and SD was computed and chi-square test was performed with *p*-value significance was taken at 0.05.

RESULTS

Out of total 246 patients hospitalized with the complaint of non-bloody acute watery diarrhea at the time of admission; 120 (48.8%) were male and 126 (51.2%) were female. Mean age of study subjects was 10.39 ± 3.34 months. There was no statistically significant association of gender and age with positive rota virus result (p = 0.248, 0.412 respectively). Mean number of stools per day among study subjects was 6.62 ± 1.92. There was statistically significant association of stools per day with positive rota virus result (p-value=0.004) Cross tabulation for gender, age groups, stools frequency and specific residence area with rota virus test is given is given in table-I. Antigen for Rotavirus was detected in total 174 (70.7%) patients. A total of 129 (52.4%) patients presented with loose watery stools. Cross tabulation for different presenting complaints and laboratory result for rota virus is given in table-II. There was no statistically significant association between presenting complaints and positive rota virus test (p=0.391).

Table -II: Frequency of antigen for Rotavirus according to presenting complaints (n=246).

	Antigen for Rota virus		Total	*p*-value
	Positive (n=174)	Negative (n=72)		
Fever, Vomiting, Loose Motions	47	26	73	0.391
Vomiting, Loose Motions	35	9	44	
Watery Loose Stools	92	37	129	
	174	72	246	

DISCUSSION

Pakistan like other developing countries inhabit a high burden of gastrointestinal infections and Rotavirus is one of the main etiological factors affecting children commonly between 12 months to 17 months and in less than 5 Years[2]. Frequency of Rotavirus infection in children less than 3 years of age is 80.3%[9]. In our set up frequency was found to be 70.7%. Similar results were seen in a study conducted among low income communities at Karachi; Pakistan[11,12]. Rotavirus infection frequency varied from 16.3% to 39.4% in 5 hospitals being highest in Lahore[10]. In our study highest number was found to be

from Rawalpindi. The exact reason of this high number of rotavirus infection in urban cities is unknown. This may be because various genotypes of Rotavirus circulating in different areas as reported by some authors[13,14]. As far as presenting complaints are concerned, 52.4% patients presented with watery loose stools, 29.6% patients had fever, vomiting, and loose motions while 17.8% patients had vomiting with loose motions. Mean number of stools per day among study subjects was 6.62 ± 1.92. Analysis of 34 studies showed that Rotavirus can cause disease from autumn to spring being more prevalent in cooler months[8] but such seasonal fluctuation was not seen in Pakistan further highlighting the disease burden throughout the year especially early and late months of the year[1]. Another study done in Australia on hospitalized patients for rotavirus diarrhea had a peak in winter and spring and was lowest during summer[15,16]. It has also been revealed that higher temperature and humidity and seasonal variations are associated with a change in rotavirus related admissions in different parts of the world[17,18].

In a study on prevalence of rotavirus associated gastroenteritis in two settings of the same geographical region, it was found to be more in hospitalized children as compared to the outdoor patients[19,20]. Some studies however show no significant difference of incidence in outdoor and indoor patients[21]. We conducted our study from Jan mid of Jun on indoor patients so we cannot comment on the seasonal variability and other associated factors affecting rotavirus disease distribution round the year in our area and this increased percentage of rotavirus in hospitalized children may be because of the increased admission rate with rotavirus diarrhea.

Treatment of rotavirus has profound impact on economics of a country[22]. So, the disease burden caused by rotavirus is very essential in Pakistan to help in making recommendations for use of rotavirus vaccine. There is a great tendency of use of antibiotics in management of rotavirus[23]. The objective of our study wasto avoid the irrational use of antibiotics in acute watery diarrhea caused by rotavirus which is the main etiological agent in children. The extended program of immunization in Pakistan includes most of diseases, and is widely followed[24,25]. We emphasize the need for including rotavirus vaccine in extended program of immunization to minimize this preventable cause of morbidity and mortality in children.

It is furthermore suggested that large scale studies may be carried out in Pakistan to find the exact distribution, genotype prevalence and modes of disease presentation of rotavirus.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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