



## Microbiological Study of Pediatric Diarrhea with Special Emphasis on Rota Virus

### KEYWORDS

Pediatric diarrhea, Rota virus

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**ABSTRACT** A microbiological study of pediatric diarrhea was undertaken in 150 patients to determine the prevalence of Rota virus and other bacterial, fungal and parasitic pathogens causing pediatric diarrhea. Bacterial, fungal & parasitic pathogens were identified by standard conventional methods. Group A Rota virus was identified by antigen sandwich ELISA. PCR was done to detect diarrheogenic strains of E.coli. Antibiotic sensitivity was also performed. Pathogens were detected in 97 samples (64.67%). Bacterial pathogens were found in 69 (46%), group A Rota virus in 17 (11.33%), parasites in 8 (5.3%) and fungi in 3 (2%) cases. E.coli was the commonest bacterial pathogen (32.67%) with EPEC as the most common diarrheogenic type (59.18%). ETEC strains were highly resistant to antibiotics. Rota virus was commonly found in males (82.35%). The commonest age group affected by Rota virus was 6-12 months age. 23.53% patients suffered from mixed infection with Rota virus and EPEC.

### Introduction-

Diarrheal diseases are second only to cardiovascular diseases as a cause of death worldwide. Gastroenteritis is the leading cause of morbidity and mortality among infants and young children, especially in developing countries<sup>[1]</sup>.

In developed countries Rota virus is the most common cause of pediatric diarrhea followed by other bacterial pathogens. In developing countries, Enterotoxigenic E.coli (ETEC) is the most common cause followed by Enteropathogenic E.coli [EPEC]. But ETEC is more common in outpatient group and Rota virus in inpatient group. Thus, although ETEC is the most common cause of pediatric diarrhea in developing countries, Rotavirus is the agent constantly identified in severe diarrhea<sup>[2]</sup>.

### Aims of the study are

1) determine the prevalence of Rota virus and other bacterial, fungal and parasitic pathogens causing pediatric diarrhea 2) to find out antibiotic sensitivity patterns of bacterial pathogens 3) to observe the seasonal variation for Rota virus 4) to find out association of Rota virus with other pathogens in mixed infections.

### Materials and methods-

The study was conducted in a tertiary care hospital from Aurangabad during May 2006- April 2007. A total 145 children with diarrhea were included in the study. Written consent was taken from all patients. Diarrhea was defined as passage of four or more liquid stools in at least 1 day<sup>[3]</sup>.

10 ml of stool was collected from each patient in a sterile plastic container and transported immediately to laboratory. Alkaline peptone water was used as a transport medium whenever Vibrio cholerae was suspected. Gross and microscopic examinations were done. Samples were inoculated on blood agar, Macconkey's agar. TCBS and DCA were used as selective media whenever required. Pathogens were identified by standard conventional methods<sup>[4]</sup>. All samples were stored at -20°C for subsequent screening of Group A Rota virus which was detected by antigen sandwich ELISA at NIV,Pune. (Kit manufactured by NIV pune). Isolated E.coli strains were sent to CRI, Kasauli for serotyping and to NICED, Kolkata for detection of diarrheogenic types by PCR. All V.cholerae strains were also sent to NICED for phage typing.

All patients positive for RV antigen were graded according to Vesikari clinical severity score for RV disease<sup>[5]</sup>.

Observation and results-Out of 150, maximum number of patients were between 1-5yrs (38%) followed by 6mths -1yr (36%) of age group. Male to female ratio 3:1. Dehydration was mild to moderate in maximum patients (92%). Pathogens were detected in 97 samples (64.67%). Bacterial pathogens were found in 69 (46%), RV in 17 (11.33%), parasites in 8 (5.3%) and fungal pathogen in 3 (2%) cases. Age wise distribution of pathogens is shown in Table 1. E.coli was the commonest bacterial pathogen (32.67%) with EPEC (59.18%) as the most common diarrheogenic type. ETEC strains were found to be highly resistant to antibiotics. (Table 2) All V. cholerae belonged to biotype El tor. Serotype Ogawa was common in year 2006 while Inaba in year 2007. All strains belonged to phage type Basu and Mukharjee 22, new scheme 27. Common serogroups of E.coli are shown in table 3.

RV was commonly found in male children (82.35%). RV was commonly found in winter season, while E.coli was found in summer. (Fig 1) The commonest age group affected by RV was 6 – 12 months (70.59%). 23.53% of patients suffered from mixed infection caused by RV and EPEC.

### Discussion-

We could detect pathogens in 64.67% of samples which correlates well with other studies<sup>[6,7]</sup>. This may suggest involvement of other viral agents causing diarrhea, as we have detected only group A RV.

E.coli was the commonest bacterial pathogen followed by V.cholerae. This finding correlates well with other studies<sup>[8,9]</sup>. EPEC was the commonest diarrheogenic type in our study. But various studies have reported ETEC as the commonest type in developing countries<sup>[9,10]</sup>. The probable reason for this may be maximum number of patients in our study belonged to less than 5 yrs of age group. ETEC is more common in children more than 5 yrs, while, EPEC in less than 5 yrs. of age<sup>[6]</sup>.

Candida albicans was detected in 2% of patients. All children presented with chronic diarrhea and were on prolonged antibiotic treatment. Patients responded to antifungal drugs.

High percentage of antibiotic resistance was noted in ETEC isolates, followed by some V.cholerae strains. Other authors have also reported similar findings<sup>[10,11]</sup>. We have also detected an uncommon strain of E.coli which reacted with eagg (enteroaggregative) as well as eae (EPEC) primers.

Group A RV was detected in 11.6% of patients. All patients presented with fever, vomiting and loose motions with vomiting as the most common and first symptom. They were admitted for treatment of moderate dehydration. Other findings like seasonal prevalence, age group affected matched with various studies [6,8,10].

**Conclusion-**

E.coli was the commonest pathogen causing pediatric diarrhea. Prevalence of RV was 11.7% in Aurangabad. Antibiotic resistance is becoming common in ETEC strains. A strong seasonal pattern was noted in various pathogens and RV can be associated with other pathogens as mixed infection.

But there is need to study the prevalence of other viral pathogens causing unexplained pediatric diarrhea.

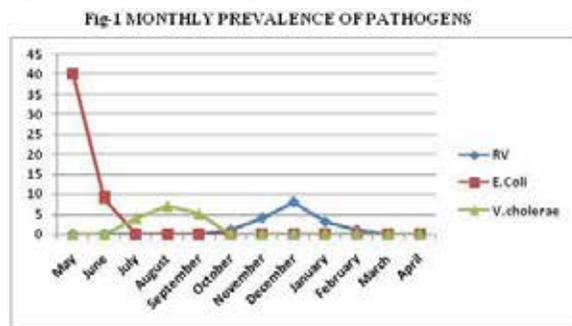
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**Figure 1 Legend-Monthly prevalence of pathogens**



**TABLE – 1 AGE-WISE POSITIVITY OF VARIOUS BACTERIAL, FUNGAL AND PARASITIC ISOLATES**

SrNo	Pathogens (No.isolated)	Age-wise positivity				
		<6m	6-12 m	1-5 yrs	5-10 y	10-15 y
1	E.coli (49)					
	a) EPEC (29) [eae/bfpA]	--	4	15	10	--
	b) ETEC (9) [est/elt]	--	--	--	7	2
	c) Eagg EC (9) [eagg]	--	--	4	5	--
	*d) Eagg EC +EPEC (1)	--	--	--	1	--
	e) EIEC (1) [stx1/stx2]	--	--	--	1	--

2	V.cholerae(16)	--	1	7	6	2
3	Salmonella spp (2)	--	--	--	2	--
4	Pseudomonas aeruginosa(1)	--	--	1	--	--
5	Staphylococcus aureus (1)	--	--	--	1	--
6	Candida albicans(3)	--	--	1	2	--
7	E.histolytica(2)	--	--	--	2	--
8	G.lamblia(4)	--	--	2	2	--
10	RV (17)	--	12	5	--	--
11	H.nana(1)	--	--	--	--	1
12	Taeniaspp (1)	--	--	--	--	1

**TABLE – 2 ANTIBIOTIC RESISTANCE**

Pathogen (No.)	Percentage resistance						
	SXT	GEN	AMP	CRO	CIP	CAZ	CXM
EPEC (29)	33.33	0.00	16.67	0.00	0.00	33.33	0.00
ETEC (9)	100.0	100.0	100.0	50.00	100.0	100.0	100.0
EaggEC (9)	0.00	0.00	50.00	0.00	0.00	0.00	0.00
EaggEC + EPEC (1)	100.0	100.0	0.00	0.00	0.00	0.00	0.00
EIEC (1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Salmonella spp. (1)	100.0	0.00	100.0	0.00	0.00	0.00	0.00
Antibiotics Percentage Resistance							
TET		NOR		ERY		FUR	
V.cholerae (16)	20.00	0.00	30.00	70.00			

**Table-3 Common serogroups of E.coli**

Serogroups	Number
O101	18
O9	01
O64	04
O68	15
O6	01
O52	02
O2	02
O102	04
O16	01
Rough	01
Total	49

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