

Characteristics of Rotavirus Diarrhea in Hospitalized Children in Kosovo

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ABSTRACT

Background: Diarrhea is a leading cause of child mortality worldwide. Rotavirus is one of the most common causes of severe diarrhea and dehydration in children. Authors reviewed epidemiological and clinical data of the rotavirus diarrhea in Kosovo. **Methods:** This is a prospective study carried between January 1st and December 31st 2011. All data, comprising demographics, nutrition, clinical presentation, laboratory findings, management and outcome of the rotavirus diarrhea are collected on the specially designed form. **Results:** 116 children with rotavirus diarrhea are included in the study. The majority boys (74.4%) and children aged 0 – 12 months (82.75%). Mean age of children in the study was 16.38 months. Almost every third child in the study was hypotrophic (29.2%). More than half of the infants (55.2%) were on mixed food, somewhat more than every third was breast feeding (36.45%), and every twelfth (8.33%) was on artificial milk (animal or formula). Apart from diarrhea, present in all patients, vomiting (97.41%) and fever (43.96%) were characteristics of the clinical presentation of the diarrhea. Two thirds of the children had mild grade dehydration (70.7%). All patients recovered with no sequels. **Conclusion:** Rotavirus continues to be responsible for a significant portion of acute diarrhea in Kosovo. Clinical features, epidemiological data and the agglutination test are safe enough to establish the diagnosis. Treated correctly rotavirus diarrhea has a favorable outcome.

Key words: Acute diarrhea, rotavirus, Kosova.

1. BACKGROUND

Since 1973 when discovered by Bishop (1), rotavirus was found responsible for one third of the children hospitalization for acute diarrhea worldwide (2,3). Rotavirus diarrhea is a cause of 440 thousand deaths, 2 million hospitalizations, 25 million outpatients visit and 111 million episodes of domiciliary diarrhea among children. The aim of this study is to analyze the epidemiology of the acute diarrhea inflicted by rotavirus, demographics of the patients and clinical presentation of the disease in children hospitalized at the Department of Pediatric Gastroenterology of the University Clinical Center of Kosovo in Prishtina, Republic of Kosovo.

It is a busy metropolitan center serving population of around 2 million inhabitants of the Republic of Kosovo. Country itself a decade ago emerged from the devastating war and is the poorest in Europe. As found by the Kosovo Agency of Statistics, 46% of the population in country is younger than 18 years, 28% is younger than 14 years and 8% younger than 5% (4).

2. METHODS

This is a prospective study carried between January 1st and December 31st 2011. All data, comprising demographics, nutrition, clinical presentation, laboratory findings, management and outcome of the rotavirus diarrhea are collected on the specially designed form.

Rotavirus is confirmed in the stool of patients using Latex agglutination test LTA s.r.l. – Via Milan with sensitivity and specificity of 96%.

3. RESULTS

Of 1011 children admitted at the Hospital for acute diarrhea during the study period, every third is tested for rotavirus. Of 337 tested, 116 were positive on rotavirus (34.42%).

The majority of the children in the study were boys (74.4%) and infants (82.75%). Average age of children in the study was 16.38 months. Almost every third child in study was hypotrophic (29.2%). The hypotrophy was more frequent in girls than in boys (41% vs. 23.5%).

Only 20 children were not infants (17.2%). More than half of the infants (55.2%) were on mixed food, somewhat more than every third was breast feeding (36.45%), and every twelfth (8.33%) was on artificial milk (animal or formula).

Data on demographics, nutritional status and feeding habits are presented in table 1.

Apart from diarrhea, present in all patients, vomiting (88.8%) and fever (43.96%) were characteristics of the clinical presentation of the diarrhea. Vomiting was more frequent in boys than in girls (97.4% vs. 71.8%) as well as temperature (46.7% vs. 38.5%). Two patients in the study (1.7%), one boy and one girl have had a convulsion at the admission. The frequency of

the convulsions was equal (each 1.7%)

All patients in the study had moderate or severe dehydration with the later present in almost every third patient in the study (29.3%). There are no significant differences in the degree of the dehydration between girls and boys.

Clinical presentation of the rotavirus diarrhea and the degree of dehydration at the admission are presented in table 2.

Only about one third of the patients with rotavirus diarrhea in our study had associated diseases (36.2%). The most frequent one was bronchopneumonia that was present in 31.9% of our patients. Less common were upper urinary tract infections (1.7%), upper respiratory tract infections (0.9%) and gastro esophageal reflux (1.7%). Both urinary tract infections in our study were in girls (5.1% of the girls).

Data on associated conditions and diseases in patients with rotavirus diarrhea are presented in table 3.

Paralytic ileus was the most common complication of the rotavirus diarrhea. In our study it occurred in 9.5% of patients or almost in every tenth patient. The incidence of this complication was for a little more frequent in girls than in boys (15.4% vs 6.5%). There was also a single case of ascites among our patients (0.86%). One patient presented with neurological symptoms (seizures).

Little more than two of three patients in our study were treated without antibiotics (36.2%) and only eight patients (6.9%) were given concentrated erythrocytes or fresh frozen plasma. Ceftriaxone was the most commonly used antibiotic in our practice. The drug was given to 50% of the patients as the only antibiotic and in another 11.2% of patients combined with aminoglycosides – amikacin or gentamicin. Amikacin was given as the only drug in 2.6% of patients and Bactrim (sulfamethoxazole and trimethoprim) in 0.9% of patients.

Data on the use of antibiotics and blood derivatives are presented in table 4.

Assessment of the seasonal distribution of the rotavirus diarrhea has shown that the disease most commonly occurred in autumn, winter and early spring with peaks in September, November and January (Graph 1). All patients recovered without sequels.

Gender	Number		Average age (months)	Eutrophic		Hypotrophic				Feeding							
										Breastfeeding				Infant on animal milk or formula			
	N	%		N	%	I		II		Infants							
						N	%	N	%	N	%	N	%	N	%	N	%
Girls	39	25.9	16.5	23	59	10	25.6	6	15.4	10	25.6	3	7.7	19	48.7	7	7.7
Boys	77	74.4	16.3	59	76.6	15	19.5	3	3.9	25	32.5	5	6.5	34	44.1	13	11.2
Total	116	100	16.4	71	61.2	25	21.5	9	7.7	35	30.2	8	6.9	53	45.7	20	17.2

Table 1. Demographics, nutritional status and mode of feeding of the patient with rotavirus diarrhea in the study

	Symptoms								Degree of dehydration					
	Vomiting		Temperature		Diarrhea		Convulsions		Mild		Moderate		Severe	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Boys (N=77)	75	97.4	36	46.7	77	100	1	1.3	0	0	55	71.4	22	28.5
Girls (N=39)	28	71.8	15	38.5	39	100	1	2.6	0	0	27	69.2	12	30.7
Total (n=116)	103	88.8	51	43.9	116	100	2	1.7	0	0	82	70.7	34	29.3

Table 2. Symptoms and degree of dehydration of the patient with rotavirus diarrhea at the admission

Gender	Associated conditions and diseases									
	With no associated disease		Bronchopneumonia		Urinary tract infection		Upper respiratory tract infection		Gastroesophageal reflux	
	N	%	N	%	N	%	N	%	N	%
Boys (N=77)	49	63.6	26	33.8	0	0	1	1.3	1	1.3
Girls (N=39)	25	64.1	11	28.2	2	5.1	0	0	1	2.6
Total (n=116)	74	63.8	37	31.9	2	1.7	1	0.9	2	1.7

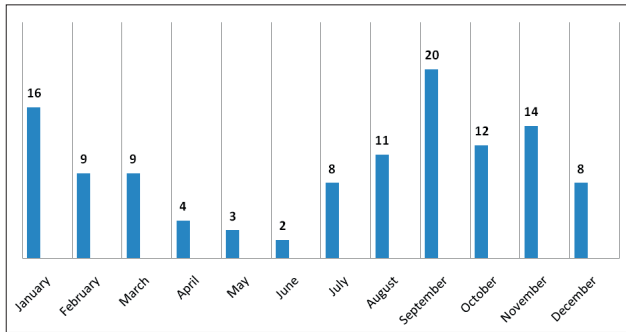
Table 3. Associated conditions and diseases in patient with rotavirus diarrhea in our study

Gender	Antibiotics										Blood and blood derivatives					
	With no antibiotics		Ceftriaxone		Amikacin		Bactrim		Combined*		With no blood derivatives		Erythrocytes		Fresh frozen plasma	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Boys (N=77)	28	36.4	41	53.2	2	2.6	1	1.3	5	6.5	72	93.5	1	1.3	4	5.2
Girls (N=39)	14	35.9	17	43.5	0	0	0	0	8	20.5	36	92.3	0	0	3	7.7
Total (n=116)	42	36.2	58	50.0	2	2.6	1	0.9	13	11.2	108	93.1	1	0.9	7	6.0

Table 4. The use of antibiotics, blood and blood derivatives for the treatment of patients with rotavirus diarrhea in study. *Ceftriaxone in combination with amikacin or gentamicin

4. DISCUSSION

Rotavirus is the common cause of diarrhea of the infant worldwide. According to Parashar [5] and associates, who reviewed the Global mortality associated with Rotavirus disease among children, rotavirus is responsible for 527,000 deaths



Graph 1. Seasonal distribution of the rotavirus diarrhea

(95% confidence interval, 475,000-580,000 deaths) annually or 29% of all deaths due to diarrhea among children <5 years of age. This translates into approximately 1440 deaths due to rotavirus disease per day (1 of 237 children born each year would die of rotavirus disease by 5 years of age).

Although rotavirus is ubiquitous and the incidence of disease is similar among children in industrialized and developing countries, there is a great disparity in mortality associated with rotavirus. Whereas very few deaths due to rotavirus disease occurred in affluent countries, countries with the greatest level of child mortality accounted for approximately 86% of all deaths due to rotavirus disease. In fact, 6 countries (India, Nigeria, China, Pakistan, Ethiopia, and Democratic Republic of Congo) accounted for >50% of all deaths due to rotavirus disease, with India alone accounting for one-fourth of the deaths.

Papers discussing the prevalence of diarrhea caused by rotavirus in the Republic of Kosovo are lacking. At the moment, there are only two papers, one presented by Azemi alone (6) and another presented by Azemi with coworkers (7) discussing this issue. According to the paper in year 1987, 24.27% of children hospitalized at the Department of Pediatric Gastroenterology of the University Clinical Center of Kosovo had acute diarrhea associated with severe dehydration (toxicosis), and, of them, 7% inflicted by rotavirus. In 2002, according to the second paper, rotavirus is found responsible for 16.8% of acute diarrhea.

In our study, the percentage is found to be significantly higher – 34.42%. It is rather reflection of better living standard of the Kosovars and health care provision than of the change in epidemiological behavior of the virus. Better feeding habits, better education of the mothers and better health care, no doubt, have made for other causes of the diarrhea to diminish.

With one third of acute diarrhea due to rotavirus (34.42%), prevalence of the disease in Kosovo is similar to the prevalence in other European countries. It is similar to the prevalence in Central and Southeastern Europe, that varies between 22% (Czech Republic) and 55.3% (Russia), with Bosnia and Hercegovina (23.9%), Hungary (27.1%), Albania (32.4%), Bulgaria (32.4%), Romania (42%) and Ukraine (42%) in between, as found by Ogilvie and coauthors in their study of burden of rotavirus gastroenteritis in the pediatric population in this region [8]. But, also similar to the prevalence found in REVEAL study that have found prevalence ranging between 27.8% in Germany and 52% in Sweden, with Spain (31.2%), France (33.5%), Great Britain (35.9%), Italy (43.6%) and Belgium (44.7%) in between (9).

The majority of children with acute diarrhea in our study were infants (48%) and boys (66%). The higher infliction of the boys with rotavirus diarrhea is noted in several other studies, both local (10-13) and worldwide (14-20), but, up to day, there

are no known reasons established. Furthermore, there are studies as well, stating the opposite (21).

Vomiting, diarrhea and temperature usually occurred at the second day after exposition, following an exposition period of less than 48 hours. Consequently, in our study, dehydration was present in all children. In almost every third child, this dehydration was severe.

The REVEAL study reported that the proportion of children with dehydration due to acute RVGE varied between 11.1% (Spain) and 71.4% (Sweden), and in most countries, was considerably higher than for those with rotavirus- negative disease. In Belgium and the UK, the prevalence of dehydration was comparable among children with or without RVGE, whereas the dehydration prevalence ratio of rotavirus versus non-rotavirus disease was 1.82, 5.54, 3.27, 3.47, and 2.18, respectively, in France, Germany, Italy, Spain, and Sweden. A second prospective multicenter study from France, Germany, Italy, Spain, and the UK reported that dehydration was evident in 75.7% of patients with RVGE, and was severe in 11.3% of them. In comparison, only 54.5% of children with non-RVGE were dehydrated, while 4.7% had severe dehydration (25). Another study from France confirmed this trend, showing significant differences in dehydration between rotavirus-positive and negative gastroenteritis (26.8% vs.14.7%, $P < .0001$) as did a study from Greece. Further, one Italian community-based study showed that dehydration at initial presentation in primary care was associated with a higher likelihood of RVGE (OR: 1.8; 95% CI, 1.1-3; $P = 0.02$) (22).

It is interesting to find that about every third patients in our study has bronchopneumonia as associated disease and every tenth had paralytic ileus.

Although affection of the central nervous system is not common in children with rotavirus diarrhea, it occurred in two our patients. First to report association of this disease with rotavirus diarrhea were Day and coauthors (23). They reported neurological symptoms and stool virology positive for rotavirus in four children, presented within 4 weeks in Barnet and Chase Farm Hospitals NHS Trust, London, UK. Similar to our patients, all four made a quick recovery and were discharged home after a few days without medication. At 6 weeks all were well, with no further neurological episodes.

Later, Fuchigami and coauthors (24) reported a case of encephalopathy in 4 year old girl at the Department of General Pediatrics, Nihon University Nerima Hikarigaoka Hospital, Tokyo. Probably there will be more such reports in the future.

Use of antibiotics, blood and blood derivatives in rotavirus diarrhea is a matter of a worldwide discussion. In our study almost two thirds of the patients were treated with antibiotics and about every twentieth was given blood or blood derivatives. High association with bronchopneumonia may explain why.

Rotavirus diarrhea most commonly occurred in autumn, winter and early spring with peaks in September, November and January.

5. CONCLUSION

Rotavirus diarrhea continues to be a serious health problem in Kosovo. Epidemiological and clinical features of the disease and Latex agglutination test are essential tools to establish the diagnosis at the time.

CONFLICT OF INTEREST: NONE DECLARED.

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