

# Evaluation of pediatric patients installed due to acute gastroenteritis

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## ABSTRACT

**Objectives:** Acute gastroenteritis is one of the most prevalent causes of death and morbidity in children and a significant health issue in Turkey, as well as developed and developing nations. The purpose of this study is to analyze retrospectively the patients with acute gastroenteritis who sought treatment at the Kızıltepe State Hospital in Mardin.

**Methods:** This study was designed as a single-center retrospective study in which demographic variables were evaluated by taking fresh stool samples from the patients who applied to the Mardin Province Kızıltepe State Hospital between 01/11/2020 and 31/10/2021 with the complaint of diarrhea. The information of rotavirus, enteric adenovirus and amoeba viruses in stool samples was investigated by qualitative immunochromatographic test. The researcher assessed the research data utilizing the hospital's file archive materials and three factors set by the researcher. The researcher extracted the information about these factors from the patient files and stored it in a Microsoft Office Excel file.

**Results:** According to the gender variable of the research participants, Amoeba positive rates were considerably higher in males than in girls (35.8% versus 22.6%,  $p = 0.046$ , respectively). According to the age groups variable, rotavirus antigen positive was statistically significantly greater in the 5-24 month age group compared to other age groups ( $p = 0.034$ ). Similarly, Amoeba positive was statistically substantially higher in the 5-24 month age group compared to other age groups ( $p = 0.001$ ). There was no significant variation between age groups in the distribution of adenovirus. According to the seasonal variable, rotavirus antigen positivity was most prevalent in the spring, and the difference between the spring and other seasons was statistically significant ( $p = 0.001$ ), whereas amoeba positivity was most prevalent in the summer, with no statistically significant difference between the seasons ( $p = 0.003$ ). The frequency of undiscovered variables was greater during the spring-summer months, and a statistically significant difference ( $p = 0.041$ ) was identified between the groups. The seasonal variation in the prevalence of Adenovirus antigen positive was not statistically significant ( $p = 0.394$ ).

**Conclusions:** As a result, in poor and underdeveloped nations, it is among the top five causes of death in children under the age of five, in relation to acute gastroenteritis. Furthermore, the majority of these deaths may be minimized by preventative and prevention strategies. It is the responsibility of governments, health professionals, and families to foster a safe and healthy environment for all infants and children during their infancy



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and development. Community-based health strategies should be undertaken to lower the morbidity and death rates of millions of people worldwide who are exposed to harmful environmental conditions and malnutrition.

**Keywords:** Acute gastroenteritis, kid, adenovirus, rotavirus, amoeba

**A**cute gastroenteritis ranks third among infectious causes of mortality worldwide. Acute gastroenteritis is one of the primary causes of baby and child morbidity and death, particularly in underdeveloped nations [1-3]. More than 80 percent of the five million under-five deaths in 2020 occurred in African and South Asian countries. The main causes of these deaths are; infectious diseases, including pneumonia, diarrhea, and malaria, complications of preterm birth, birth asphyxia, and trauma and congenital anomalies. [1, 4, 5]. In Turkey, gastroenteritis is the fourth leading cause of mortality among children aged 1 to 5 years old. Deaths from gastroenteritis are avoidable or curable if all nations have access to cost-effective health and sanitation programs. In order to reduce diarrhea-related fatalities, it is crucial to determine the underlying causes and environmental variables and to exhibit preventative measures.

Depending on its length, gastroenteritis is classed as acute, persistent, or chronic. Acute gastroenteritis is typically characterized by three or more loose, watery stools within 24 hours. Although acute gastroenteritis lasts shorter than seven days, it does not last more than fourteen days [1, 2, 6, 7]. In particular, the fact that the stool consistency is more dense than the previous consistency, rather than the decrease in the number of stools, is an important indicator of recovery from acute gastroenteritis. Although chronic gastroenteritis is defined as diarrhea lasting longer than 30 days, it is frequently seen in diseases such as metabolic diseases and malabsorption.

In the etiology of gastroenteritis, viruses, bacteria, and enteroparasites play a significant role. The incidence of acute gastroenteritis and the frequency of bacteria, viruses, and parasites in the etiology are directly connected to the patient's region's geographical and socioeconomic characteristics [8]. While enteropathogens can be transmitted by person-to-person contact, other infections, such as cholera, are often caused by food and water pollution [1, 8-11]. In the etiology of gastroenteritis, there are variations in the frequency of the pathogenic bacteria based on geog-

raphy, age, and seasonality. Rotavirus is the leading cause of AGE in children across the world [1, 8, 10].

Although norovirus is the second most prevalent cause of acute gastroenteritis overall, it has been recognized as the leading cause in several studies and is predicted to rank first globally following rotavirus vaccination programs [12, 13]. Inflammatory gastroenteritis is the gastroenteritis that develops as a result of inflammation caused by the invasion of the intestinal wall and increasing intestinal motility and secretion of metabolites. Inflammatory gastroenteritis may also contain blood, mucus, and leukocytes in the stool due to inflammation. In this type of gastroenteritis, diarrhea caused by bacteria and amoeba can be given as an example. [1, 9, 10]. The aim of this study is to retrospectively examine pediatric patients admitted to Mardin Province Kızıltepe State Hospital with the diagnosis of acute gastroenteritis.

## METHODS

This study was designed as a single-center retrospective study in which demographic variables were evaluated by taking fresh stool samples from the patients who applied to the Mardin Province Kızıltepe State Hospital between 01/11/2020 and 31/10/2021 with the complaint of diarrhea. The information of rotavirus, enteric adenovirus and amoeba viruses in stool samples was investigated by qualitative immunochromatographic test. The researcher assessed the research data utilizing the hospital's file archive materials and three factors set by the researcher. The researcher extracted the information about these factors from the patient files and stored it in a Microsoft Office Excel file.

The study gained permission from the Mardin Artuklu University Non-Interventional Clinical Research Ethics Committee under the number 66597 (Date: 21.10.2022, Decision no:70891).

A total of 934 patients aged 1 month to 14 years who applied to Mardin Province Kızıltepe State Hospital between 01/11/2020 and 31/10/2021 and satisfied

the inclusion criteria for the study sample comprised the study sample.

Patient inclusion criteria for the study are the following: Patients with rotavirus, adenovirus, or amoeba as the causal agent; children between 1 month and 14 years old. Patient exclusion criteria from the study also are patients older than 14 years and those with insufficient/incomplete information in their files.

### Statistical Analysis

Using the IBM SPSS 25.0 Version application, statistical analysis of the study data was conducted. Using the Chi-square Test, the link between categorical characteristics and groups was investigated. The significance level of  $p < 0.05$  was acceptable in statistical analysis.

## RESULTS

Distribution of demographic and causal features of the patients are shown in Table 1. Rotavirus was discovered in 297 (31.8%) of the clinical samples obtained from the patients enrolled in the study, Adenovirus in 30 (3.2%), and Amoeba in 62 (6.6%) of the clinical samples, but the agent was not detectable in 545 (58.4%) of the clinical samples. Males had greater rates of rotavirus and adenovirus positive, but there was no statistically significant difference between the two groups. Rates of amoeba positive were substantially greater in males than in girls (35.8% vs. 22.6%,  $p = 0.046$ ; respectively). Rotavirus antigen positive was statistically significantly higher in the 5-24 month age group compared to all other age groups ( $p = 0.034$ ). Similarly, amoeba positive was statistically substantially higher in the 5-24 month age group compared to other age groups ( $p < 0.001$ ). There was no significant variation between age groups in the distribution of adenovirus.

During the 12-month research period, rotavirus antigen positive was most prevalent in the spring, and the seasonal variation was statistically significant ( $p < 0.001$ ). The frequency of amoeba positive was highest during the summer, and the difference between seasons was statistically significant ( $p = 0.003$ ). The frequency of undiscovered variables was greater during the spring-summer months, and a statistically significant difference ( $p = 0.041$ ) was identified between the

**Table 1. Displays the demographic and etiological features of the patients who participated in the research**

Features	RV (+) (n = 297)		AV (+) (n = 30)		Amoeba (+) (n = 62)		Other Factors (n = 545)		Total (n = 934)	
	n	%	n	%	n	%	n	%	n	%
<b>Gender</b>										
Female	136	14.6	13	1.4	27	2.9	211	22.6	387	41.4
Male	161	17.2	17	1.8	35	3.7	334	35.8	547	58.6
<b>Age groups</b>										
≤4 months	32	3.4	1	0.1	3	0.3	60	6.4	96	10.3
5-24 months	245	26.2	28	3.0	39	4.2	425	45.5	737	78.9
25-60 months	16	1.7	1	0.1	14	1.5	38	4.1	69	7.4
6-14 years	4	0.4	0	0	6	0.6	22	2.4	32	3.4
<b>Seasons</b>										
Autumn	35	3.7	6	0.6	15	1.6	84	9.0	140	15
Winter	69	7.4	4	0.4	6	0.6	73	7.8	152	16.3
Spring	116	12.4	7	0.7	12	1.3	198	21.2	333	35.7
Summer	77	8.2	13	1.3	29	3.1	190	20.3	309	33.1

RV = Rotavirus, AV = Adenovirus

groups. The seasonal variation in the prevalence of Adenovirus antigen positive was not statistically significant ( $p = 0.394$ ).

## DISCUSSION

One of the most prevalent causes of sickness and mortality in children is gastroenteritis [1]. Approximately 360 000 children die annually from gastroenteritis, infections, and nutrition-related reasons [5, 10, 11]. Every year, 30,000 children are lost to gastroenteritis in our nation. Approximately 80% of fatalities associated with gastroenteritis occur in infants, and the majority are caused by viruses [14]. In recent years, technical advancements have increased the pace at which viral agents may be discovered. Regarding the etiological agents, it is known that viral infections account for 30-40% of the cases [15]. Rotavirus is the most prevalent cause of diarrhea, especially in children under five years old [16]. Rotavirus is the leading global cause of serious diarrhea in newborns and young children [17]. 10-20% of infantile diarrhea in the globe is caused by rotavirus on average. In various locations of Turkey, the incidence of gastroenteritis caused by rotavirus has been estimated between 10 and 30%. In investigations done in a low socioeconomic status district of Ankara, the prevalence of rotavirus was found to be 29 and 22.7%, respectively [18]. In various parts of Turkey, rotavirus positive was found to be 39.8% in Izmir, 21% in Malatya, 25.7% in Kahramanmaraş, 29.1% in Ankara, and 32.0% in Istanbul (19, 20). In the United States, Germany, India, Pakistan, Kenya, and Saudi Arabia, the rotavirus positive rate in acute gastroenteritis ranges from 17 to 69 percent [21, 22]. In light of these findings, it may be concluded that the incidence of the disease does not change much between industrialized and developing nations. In a retrospective research done in our nation, rotavirus was detected in 37.3% of 0-18-year-old children hospitalized with acute gastroenteritis [23]. Similarly, in our study, 30% of hospitalized patients with acute gastroenteritis tested positive for rotavirus.

Although rotavirus infection can occur in all age groups, the prevalence of symptomatic infections is highest in children under the age of two [23]. The research indicates that rotavirus diarrhea is most prevalent in children aged 6 to 24 months, and between 9

and 12 months. It is said that it peaks in months [24]. We find that the rate of rotavirus antigen positivity in the 5-24 month age group is statistically higher than that in other age groups when we look at the distribution of the factor positivity rates by age groups in our study. It is possible to argue that issues related to acute gastroenteritis occur more frequently as population ages decline.

There are research indicating that there is no gender difference in the incidence of viral gastroenteritis, but there are other studies demonstrating a substantial gender difference [25]. In a research done in Istanbul, girls tested positive for rotavirus somewhat more frequently than boys [26]. In our study, while rotavirus and adenovirus positivity rates were higher in males, no statistically significant difference was found between the two groups. Rates of amoeba positive were substantially greater in boys than in girls.

In temperate countries, rotavirus outbreaks are found in a period of 4-5 months, notably in cold months (late autumn, winter, early spring), and rotaviruses are the cause of nearly 50% of pediatric diarrhea in winter months [27]. Although seasonal variability is detected in studies done in our nation according to the climatic circumstances of the location where the study was conducted, it is noticed more commonly in winter and spring seasons, as in this study (28). In the research, spring had the highest prevalence of rotavirus antigen positive, however the difference between spring and other seasons was statistically significant. While amoeba positive was reported most commonly in summer months, the difference between seasons was statistically significant.

Diarrhea remains one of the top five causes of child and newborn death, despite a decline in worldwide mortality rates over the years. Reducing diarrhea-related mortality is anticipated to result in improvements in baby and child nutrition, rotavirus vaccine programs, and treatment techniques [1, 8-10].

## CONCLUSION

In conclusion, it is among the top five nations in the world in terms of the death rates among children under five caused by diarrhea. Additionally, the majority of these fatalities may be decreased by preventative and



prevention strategies. Governments, medical professionals, and families have a responsibility to establish a safe environment that will allow all children to experience infancy and childhood in a way that is both healthy and safe. In order to lower the morbidity and death rates of millions of harmful environmental conditions and malnutrition worldwide, community-based health policies should be put into place. It can be advised to improve their access to housing and community resources, to create health policies that are approachable, to give kids hygienic and healthy environments at home, school, and in their social environments, and to maintain methods of preventing diseases that will arise in this context. On the other hand, adopting prevention approaches specified by WHO are basic safety measures.

#### *Authors' Contribution*

Study Conception: ÖO; Study Design: ÖO, MB; Supervision: ÖO, MB; Funding: ÖO, MB; Materials: ÖO; Data Collection and/or Processing: ÖO; Statistical Analysis and/or Data Interpretation: ÖO, MB; Literature Review: ÖO; Manuscript Preparation: ÖO, MB and Critical Review: ÖO, MB.

#### *Conflict of interest*

The authors disclosed no conflict of interest during the preparation or publication of this manuscript.

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