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Evaluation of Glucose, AST, ALT, Urea and Albumin Parameters in Children with Rotavirus Diagnosis

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Keywords
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Abstract: This study aims to evaluate glucose, AST, ALT, urea and albumin parameters in patients diagnosed with rotavirus. Children who applied to Şırnak State Hospital Pediatrics Polyclinics (6 months to 18 years of age), whose fecal samples were sent to the laboratory by the pediatrician considering the diagnosis of rotavirus, and whose microbiological examinations were confirmed by immunochromatographic methods (6 months to 18 years), were included in the study by scanning the system. When the mean ages of glucose, ALT, AST, urea, and albumin data of the rotavirus negative group were evaluated, they were found to be 1.82±2.66, 1.77±2.72, 1.76±2.72, 1.69±2.68, 1.87±2.88, respectively. and in rotavirus positives, respectively; It was found to be 1.16±1.35, 1.09±1.31, 1.09±1.31, 1.10±1.32, 1.11±1.30. While the median values of glucose, AST, ALT, urea and albumin in rotavirus negatives were 84 mg/dl, 36 U/L, 19 U/L, 14 mg/dL, 3.79 g/dL, respectively, the median values in rotavirus positives were 75 mg, respectively. /dL, 45 U/L, 26 U/L, 18 mg/dL, 3.98 g/dL were detected. All parameters were statistically significant ($p<0.01$). We think that laboratory parameters (glucose, AST, ALT, urea and albumin) in gastroenteritis due to rotavirus should definitely be evaluated in determining the prognosis of patients with rotavirus diagnosis.

Rotavirüs Tanılı Çocuklarda Glukoz, AST, ALT, Üre ve Albümin Parametrelerin Değerlendirilmesi

Anahtar Kelimeler
Rotavirüs,
Glukoz,
AST,
ALT,
Üre,
Albümin

Öz: Bu çalışma rotavirüs tanılı hastalarda glukoz, AST, ALT, üre ve albümin parametrelerinin değerlendirilmesini amaçlamaktadır. Şırnak Devlet Hastanesi Çocuk Hastalıkları Polikliniklerine başvuran çocuklardan, pediatrist tarafından rotavirüs tanısı düşünülerek laboratuvara fekal örnekleri gönderilen ve mikrobiyolojik tetkikleri immünokromatografik yöntemler ile Rotavirüs tanısı doğrulanmış (6 aylık-18 yaş arası) çocuklar sistemden taranarak çalışmaya dahil edildi. Rotavirüs negatif grubun glukoz, ALT, AST, üre, albumin verilerilerinin ortalama yaşları değerlendirildiğinde sırasıyla 1.82±2.66, 1.77±2.72, 1,76±2,72, 1,69±2,68, 1,87±2,88 yaş ortalamasına, rotavirüs pozitiflerde ise sırasıyla; 1.16±1.35, 1.09±1.31, 1.09±1.31, 1.10±1.32, 1,11±1,30 olduğu tespit edildi. Glukoz, AST, ALT, üre ve albüminin rotavirüs negatiflerde medyan değerleri sırasıyla 84 mg/dl, 36 U/L, 19 U/L, 14 mg/dL, 3,79 g/dL iken, rotavirüs pozitiflerde ise medyan değerleri sırasıyla 75 mg/dL, 45 U/L, 26 U/L, 18 mg/dL, 3,98 g/dL tespit edildi. Tüm parametreler istatistiksel olarak anlamlı bulundu ($p<0.01$). Rotaviruse bağlı gastroenteritlerde laboratuvar parametrelerinden (glukoz, AST, ALT, üre ve albüminin) rotavirüs tanılı hastaların prognozunun tespitinde mutlaka değerlendirilmesi gerektiğini düşünmekteyiz.

1. INTRODUCTION

Rotavirus has been reported as the most important cause of mortality and morbidity related to acute gastroenteritis in children worldwide [1]. Rotaviruses have 11 segments and non-enveloped double-stranded RNA (dsRNA). dsRNA segments encode 12 viral proteins, six of which are structural viral proteins (SVP1, SVP2, SVP3, SVP4, SVP6, SVP7) and six nonstructural viral proteins (NSVP1, NSVP2, NSVP3, NSVP4, NSVP5, NSVP6) [5]. Rotavirus infection is a major cause of acute

gastroenteritis in children under 5 years of age, mostly in the first 2 years of life. While infection is usually asymptomatic or mild depending on the presence of maternal antibodies, it can cause death in infants aged 3-24 months as a result of rapid dehydration due to severe diarrhea, malaise, fever and vomiting [2, 3, 4]. Globally, 114 million cases of rotavirus infection were reported in children under 5 years of age in 2003, while an estimated more than 200,000 cases of rotavirus diagnosis were associated with death in 2013 [5]. It has been reported that with diarrhea caused by rotavirus in children under the age of 5 in the USA, seventy thousand cases are admitted to home care, two hundred thousand cases are admitted to the emergency departments, and an average of four hundred thousand patients are hospitalized each year, resulting in death in an average of 60 cases per year [6]. In studies conducted in our country, it has been reported that rotavirus causes 15-40% of diarrhea in children under the age of 5 [7]. Rotavirus is the most important pathogen causing gastroenteritis in children in Turkey as in the world [8]. Studies reporting the results of laboratory markers in the clinical management of patients are limited. In this study, it is aimed to retrospectively evaluate the relationship between various biochemical parameters (glucose, aspartate aminotransferase (AST), alanine aminotransferase (ALT), urea and albumin) in rotavirus-positive patients with gastroenteritis symptoms in the years 2020-2022.

2. MATERIAL AND METHOD

The study was approved by Şırnak University Ethics Committee (decision no: 2023/56246-1, date: 06.01.2023). Children (6 months-18 years old) who applied to Şırnak State Hospital Pediatrics Outpatient Clinic between 2020-2022, whose stool samples were sent to the laboratory on suspicion of rotavirus diagnosis and whose microbiological examinations were performed, were included in the study. Age, gender, detection of rotavirus and biochemical parameters of the patients were evaluated retrospectively. Each biochemical parameter (Glucose, AST, ALT, Urea, Albumin) was evaluated according to gender, and rotavirus positive patients were statistically compared with rotavirus negative patients.

2.1. Statistical Analysis

Statistical analysis of the data was performed using the SPSS 25.0 package program. Data were expressed as median [min-max value], qualitative data as percentage and non-normally distributed data as Median (IQR, Inter QuntifierRatio, 25%-75%). In data analysis, the distribution of continuous variables was determined by Kolmogorov-Smirnov and Shapiro-Wilk normality tests. Since the data were not normally distributed, the Mann-Whitney U test was used to determine the relationship between the paired groups. Frequency distributions, number, median, minimum and maximum values were given in descriptive statistics. A p value of <0.05 was considered significant.

3. RESULTS

Gender distribution and mean age by groups are given in Table 1. According to the table, when the sex distribution of glucose, ALT, AST, Urea and Albumin data in rotavirus negatives is examined, 56.4%, 57.1, 59.6, 56.6 and 60.5 percent of them were males, respectively; It was determined that 43.6, 42.9, 43.1, 43.4, 39.5 were girls. On the other hand, when the sex distribution of the glucose, ALT, AST, Urea and Albumin data of the rotavirus positive patients was examined, it was determined that 61.3, 62.8, 62.8, 63.1, 60.4 were boys, 38.7, 37.2, 37.2, 36.9, 39.6 were girls, respectively. When the mean ages of rotavirus negative glucose, ALT, AST, urea, and albumin data are evaluated according to the table, 1.82±2.66, 1.77±2.72, 1.76±2.72, 1.69±2.68, 1.87±2.88 years, respectively. average, in rotavirus positive, respectively; It was found to be 1.16±1.35, 1.09±1.31, 1.09±1.31, 1.10±1.32, 1.11±1.30. The evaluation of glucose, AST, ALT, urea and albumin parameters are given in Table 2. Accordingly, the median value of glucose was 84 mg/dL in rotavirus negatives, and 75 mg/dL in rotavirus positives, and it was found to be statistically significant ($p<0.01$). While the median value was 36 U/L in AST rotavirus negatives, the median value was 45 U/L in rotavirus positives, which was statistically significant ($p<0.01$). While the median value was 19 U/L in ALT rotavirus negatives and 26 U/L in rotavirus positives, it was found to be statistically significant ($p<0.01$). It was revealed that the median value of urea was 14 mg/dL in rotavirus negatives, and 18 mg/dL in rotavirus positives, which was statistically significant ($p<0.01$). The median value of the urea negative group was 3.79 g/dL, and the median value of the positive group was 3.98 g/dL, and it was statistically significant ($p<0.01$).

Table 1. Gender Distribution and Average Age of the Parameters by Groups

Parameters	Rotavirus negative			Rotavirus positive			Total
	Gender		Age	Gender		Age	
	Male n(%)	Female n(%)	Mean ±SD	Male n (%)	Female n (%)	Mean ±SD	
Glucose	181(56,4)	140(43,6)	1,82±2,66	46 (61,3)	29 (38,7)	1,16±1,35	**396**
AST	224(57,1)	168(42,9)	1,77±2,72	54 (62,8)	32 (37,2)	1,09±1,31	**478**
ALT	219(56,9)	166(43,1)	1,76±2,72	54 (62,8)	32 (37,2)	1,09±1,31	**471**
Urea	194(56,6)	149(43,4,)	1,69±2,68	53 (63,1)	31 (36,9)	1,10±1,32	**427**
Albumin	193(60,5)	126(39,5)	1,87±2,88	65 (60,4)	43 (39,6)	1,11±1,30	**427**

Table 2. Glucose, AST, ALT, Urea and Albumin parameters in groups

Parameters	Rotavirüs	N	Median	Min-Max	IQR	P value
Glucose (mg/dL)	Negative	321	84	54-115	17	<0.01
	Positive	75	75	42-105	17	
AST(U/L)	Negative	392	36	11-69	16	<0.01
	Positive	86	45	24-70	15	
ALT (U/L)	Negative	385	19	6-44	12	<0.01
	Positive	86	26	10-59	17	
Urea (mg/dL)	Negative	343	14	2-33	13	<0.01
	Positive	84	18	2-54	17	
Albumin (g/dL)	Negative	208	3,79	3-4	1	<0.01
	Positive	66	3,98	3-5	1	

4. DISCUSSION AND CONCLUSION

In our study, we aimed to evaluate the glucose, AST, ALT, urea and albumin of rotavirus positive patients diagnosed with immunochromatographic methods in the microbiology laboratory and registered in the automation system. Rotavirus infection creates a serious financial burden on the economy every year, especially in developing countries. Although the hospitalization rates differ according to the countries, the average cost of rotavirus-infected patients to the country every year; It is estimated to be 7 million New Zealand dollars in New Zealand, 890 million dollars in the USA, 27 million dollars in Italy and 40-70 million dollars in India [9-12]. For Turkey, this rate covers the whole country for children under the age of 5; A comprehensive cost analysis cannot be performed because there are no reliable records regarding outpatient admission, rotavirus positivity, and hospitalization [13]. 70% of rotavirus diarrhea in Turkey is seen in children under the age of two [14]. In our study, we found that those diagnosed with rotavirus were under the age of two. It is known that adequate fluids containing physiological concentrations of glucose and electrolytes should be provided to compensate for gastrointestinal losses and to meet maintenance needs [15]. Karsligil et al. In a study on rotavirus gastroenteritis and its effect on lactose intolerance in children aged 0-6 years, they reported that patients with low glucose were also diagnosed with rotavirus [16]. In our study, we found that the positive group had a lower glucose level than the negative group and it was statistically significant. A 2-fold increase in liver enzymes is observed in approximately 2/3 of the patients hospitalized with the diagnosis of rotavirus [17]. Işık et al. reported that AST and ALT were higher in patients diagnosed with rotavirus compared to the negative group [18]. In our study, we found that both AST and ALT were higher in positive patients compared to the literature, and we found it statistically significant. The reason for this may have varied depending on the electrolyte abnormality or the severity of the infection. Çubuk et al. reported that no significant difference was found between CRP, hematological and biochemical parameters in their study [19]. Qadori et al. in a study evaluating sodium, potassium, urea, creatinine and glucose in gastroenteritis, stated that they did not detect major electrolyte disturbances other than hypoglycemia in gastroenteritis [20]. Asena et al. In a study evaluating laboratory parameters, it was found that no difference was found between the control group and the group positive for Rotavirus, hemoglobin, platelets, eosinophils, basophils, glucose, creatinine, total protein, albumin, sodium, potassium, calcium, chlorine, and CRP, but it was higher in the white blood cell and neutrophil control group. While they were found to be higher in lymphocyte, urea, AST and ALT positive groups, they were found to be slightly higher, but they reported that they could not find it statistically significant [21]. In our study, we found that both urea and albumin positive groups were higher and statistically significant compared to the negative group.

Rotavirus gastroenteritis is an important health problem that is common in Turkey as well as in almost every country in the world, causing hospitalizations and morbidity. Considering the results of the study, it is thought that laboratory parameters (glucose, AST, ALT, urea and albumin) in gastroenteritis due to rotavirus should definitely be evaluated in determining the prognosis of patients with rotavirus, and detailed analyzes should be performed in larger populations, since there are few studies on the subject in our country.

Limitations of the Research

The main limitation of the study is that it is a retrospective study. However, the fact that the vaccination status of the patients was not recorded is an important limitation.

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