

Evaluation of Demographic Characteristics and Biochemical Parameters with Echovirus Infection in Children at Thi-Qar Province/Iraq

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Abstract: The current study was conducted in Thi-Qar province, with One hundred blood specimens were collected from patients in Mohammed Al-Mousawi Hospital for Children (ages between 2 days - 3 years, males and females), at the period between November 2021 to February 2022. This study aimed to reveal the relationship between different characteristics (sex, age and clinical symptoms) with viral infections, and diagnosis by WBC COUNT, platelet and C-reactive protein for each patient. Based on the results recorded among 100 children have different diseases, but only, 9% of patients were infected with the Echovirus, and 91% were negative for viral infection, the results also noted a significant difference in viral prevalence in children at p value < 0.05 . Results also noted a non-significant difference according to children's gender at p value < 0.05 . Most children infected with Echovirus was in 6-8 and 8-10 month 25%, while the age groups (3day- < 2 month), (2 - < 4 month), (12 - < 14 month), and (14 - < 16 month), were non-infected with Echovirus. The results also noted a significant difference according to age groups at p value < 0.05 . The results of present study showed that CRP and WBC count were increased, while the platelet count was low or normal in children.

Keywords: Echovirus, Children, Demographic, Biochemical parameter, Thi-Qar.

I. INTRODUCTION

In both developing and developed countries, enteric viruses are still one of the most common causes of acute gastroenteritis. Despite their major impact on human morbidity and mortality, many elements of gastrointestinal (GI) physiology and viral pathogenesis that

occur during viral infections of the GI tract are poorly understood (Lanik *et al.*, 2018). Enteroviruses infect millions of people of all ages around the world. Nonpolio Enteroviruses produce 10–15 million infections and tens of thousands of hospitalizations in the United States annually, according to data from the Centers for Disease Control and Prevention in America. (Yinda *et al.*, 2017). Also, the seasonality of EV infections is notable. They are predominant in summer and autumn in the Western countries and in winter and spring in the Eastern countries (Alhazmi *et al.*, 2020). The Echovirus is responsible for a wide range of human illnesses, including asymptomatic or acute febrile sickness in newborns and young children, as well as deadly encephalitis, aplastic anemia, and pulmonary hypertension. It's also the most common cause of aseptic meningitis (Suppiah *et al.*, 2016). A defining attribute of virus infection biology is its absolute reliance on the host translation machinery to produce the polypeptides required for virus reproduction (Stern-Ginossar *et al.*, 2019). Echoviruses are quite small (less than 30 nm). Echoviruses are members of the Enterovirus genus they have about 30 serotypes (Wells *et al.* 2021). Echovirus usually causes mild and nonspecific symptoms echoviruses are found all across the world, and infection rates vary with season, locality, age, and socioeconomic factors of a population known to cause infection throughout the year in the tropics and sub-tropics. In populations of low socioeconomic status, infection is

attributed to socioeconomic status, infection is attributed to overcrowded living conditions, and poor hygiene (Mazaba et al., 2016). The study aimed to revealed the relationship between different characteristic (sex, age and clinical symptoms) with viral infections., and detection of laboratory parameters such as WBC count, platelet, and C reactive protein for each patients.

II. PATIENTS AND METHODS

A. Design of Study

The current study was conducted in Thi-Qar province, with One hundred blood specimens were collected from patients in Mohammed Al-Mousawi Hospital for Children (ages between 2 days - 3 years, males and females), at the period between November 2021 to February 2022.

B. Methods

Five ml of venous blood was drawn from symptomatic children, 1ml was placed in an EDTA tube, and 4 ml in a gel tube. The blood with EDTA was used for detecting white blood cell, and platelets. Then gel tube containing blood was centrifuged at 4000 RPM for 5 minutes to obtain serum for CRP (C-reactive protein) titer assay. The Colter is an automated hematology system providing 20 parameters including , platelet counts, and WBC counts. CRP testing on the Cobas C311 is an immunoturbidimetric assay for the in vitro quantitative determination of CRP in human serum and plasma on Roche/Hitachi Cobas c systems. Human CRP agglutinates with latex particles coated with monoclonal anti-CRP antibodies. The aggregates are determined turbidimetrically.

C. Statistical Aanalysis

The data of the present study was analysis by using SPSS (Statistical Package of Sociot Science version 26) based on Descriptive Chi-Square, Non-parametric Chi-Square, independent t. test at and person correlation p. value < 0.05.

III. RESULT

The current results recorded that among 100 child have different symptoms, only 9% of patients infected with Echovirus, and 91% were negative for viral infection.

The results also noted a significant difference in viral prevalence in babies patients at p. value < 0.05 as shown in figure 1.

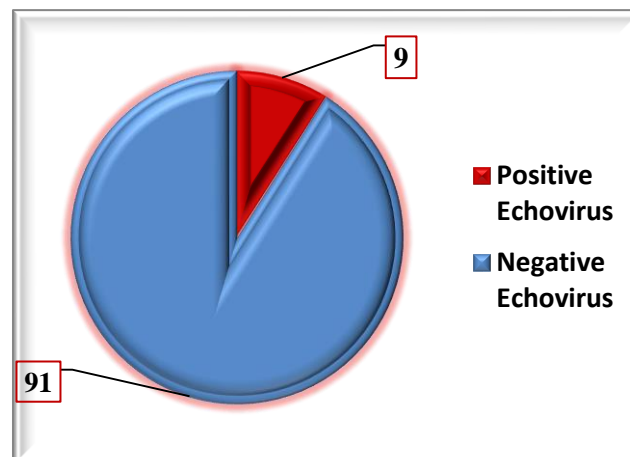


Figure 1: Echovirus in children with different symptoms.

CalX ² = 76.2	TabX ² = 3.84	DF= 1	p. value < 0.001
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Prevalence of Echovirus in children According to Gender

The current results illustrated that most children infected with Echovirus was male 9.7%, and the lowest infected was female at 7.9%, while, the female was the most non-infected group at 92.1%. The results also noted a non-significant difference according to children' gender at p. value < 0.05 as in table 1:

Table 1: Prevalence of Echovirus in children according to gender

Gender	Positive Echo virus No. & %	Negative Echo virus No. & %	Total No. & %
Male	6 (9.7)	56 (90.3)	62 (62.0)
Female	3 (7.9)	35 (92.1)	38 (38.0)
Total	9 (9.0)	91 (91.0)	100
CalX ² = 0.244	TabX ² = 3.84	DF= 1	p. value 0.621

Prevalence of Echovirus in children According to Age Groups

The current results showed that most children infected with Echovirus was in 6-8 and 8-10 month 25%, while the age groups (3day-< 2 month), (2 - < 4 month), (12 - < 14 month), and (14 - < 16 month), were non-infected with Echovirus. The results also noted a significant difference according to age groups at p. value < 0.05 as in table 2:

Table 2: Prevalence of Echovirus in children according to age groups

Age Groups	Positive Echo virus No. & %	Negative Echo virus No. & %	Total No. & %
3 day – < 2 month	0 (0.0)	22 (22.0)	22 (22.0)
2 - < 4 month	0 (0.0)	12 (12.0)	12 (12.0)
4 - < 6 month	2 (11.1)	16 (88.9)	18 (18.0)
6 - < 8 month	3 (25.0)	9 (75.0)	12 (12.0)
8 - < 10 month	1 (25.0)	3 (75.0)	4 (4.0)
10 - < 12 month	1 (10.0)	9 (90.0)	10 (10.0)
12 - < 14 month	0 (0.0)	3 (100)	3 (3.0)
14 - < 16 month	0 (0.0)	0 (0.0)	0 (0.0)
16 - < 18 month	1 (10.0)	9 (90.0)	10 (10.0)
> 18 month	1 (11.1)	8 (88.9)	9 (9.0)
Total	9 (9.0)	92 (92.0)	100
CalX²= 49.15	TabX²= 15.51	DF= 8	p. value 0.000

Prevalence of Echovirus in Children According to Disease Symptoms

The current results showed that most children infected with Echovirus have symptoms of cough, malnutrition, and diarrhea at 2%, and children with diarrhea only at 22.2%. at the same time other children have an equal percentage of infection at 11.1%. The results also noted a non-significant difference according to disease symptoms at p. value < 0.05, as in figure 2:

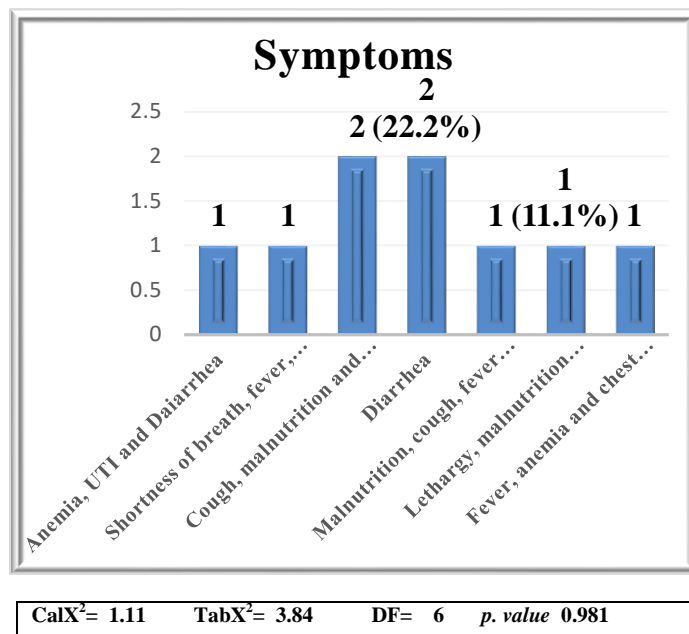


Figure 2: Prevalence of Echovirus in children according to disease symptoms

Estimation of CRP, WBC, and PLT in children and Control

The current results investigated the children recorded significant increases in studied parameters compared with the control group. The results also noted a significant difference at p. value < 0.05 as shown in table 3.

Table 3: Estimate Level of CRP, WBC, and PLT in patient and control

Groups Parameters	Mean ± SD		p. value of t. test
	Patients No. 100	Control No. 30	
CRP mg/dl	7.09 ± 1.41	1.91 ± 0.22	< 0.001
WBC *10 ³	9.16 ± 2.11	6.12 ± 0.93	< 0.001
PLT *10 ³	362.2 ± 95.0	259.7 ± 44.6	< 0.001

Estimation of CRP, WBC, and PLT in Male of children and Control

The current results showed that male children was recorded significant increases in studied parameters compared with male control group. The results also noted a significant difference at p. value < 0.05, as shown in table 4.

Table 4 : Estimate Level of CRP, WBC, and PLT in male of patient and control

Male Group Parameters	Mean ± SD		p. value of t. test
	Patients No. 62	Control No. 14	
CRP mg/dl	7.22 ± 1.64	1.97 ± 0.18	< 0.001
WBC *10 ³	9.05 ± 2.06	5.85 ± 1.01	< 0.001
PLT *10 ³	369.0 ± 96.6	242.7 ± 40.4	< 0.001

Estimation of CRP, WBC, and PLT in Female children and Control

The current results showed the female children recorded significant increases in studied parameters compared with female control group. The results also noted a significant difference at p. value < 0.05, as shown in table 5.

Table 5: Estimate Level of CRP, WBC, and PLT in female patient and control

Female Group Parameters	Mean ± SD		p. value of t. test
	Patients No. 38	Control No. 16	
CRP mg/dl	6.88 ± 0.93	1.98 ± 0.25	< 0.001
WBC *10 ³	9.35 ± 2.22	6.36 ± 0.82	< 0.001
PLT *10 ³	351.3 ± 92.6	274.5 ± 44.0	0.003

IV. DISCUSSION

The current study indicates an outbreak of echovirus in children. Although most echovirus infections are asymptomatic and usually mild, they are a public health concern, as the virus is easily transmitted via the fecal-oral route, and the virus is released from infected individuals for several weeks. In addition, Echovirus is a cause of several diseases in children, including sepsis and aseptic meningitis. The current study recorded that the percentage of echovirus in the present study was at 9%. Where the present study agreed with study of *Danthanarayana et al., (2015)*, have detected echovirus 9 by RT-PCR, in nine the pediatric patients who presented with fever, six with headache, and seven with vomiting. Similar to our percent. In contrast the present study disagreed with a study performed by *Al-hilaly and Al- sayidi, (2013)*. from Iraq showed that Echoviruses (ECHO) had the highest prevalence affecting 79 cases (26.33%) out of 101 NPEVs, which was more than our percent. The current study recorded the percentage of Echovirus in male was 9.7%. And in female group 7.9%, The current study agreed with study of *Chen et al., (2020)*. Males comprise a higher ratio, with 65.3 and 68% cases in probable cases panel and laboratory-confirmed cases panel. In a study conducted in Greece, all patients with Echovirus 15 infection were male with a mean age of 7.7 years (2 months–13 years), and all recovered successfully (*Frantzidou et al., 2007*). Their study agrees with our study from Gantt that the majority are males. The current

results showed most children infected with Echovirus were in 6-8 and 8-10 month at 25%. The current study agreed with study of *Fazelipour et al., (2019)*, which have detected The highest rates of EVs in patients' age group of < 12 months. While the present study disagreed with study performed by *Holmes et al., (2016)*, from the UK, Echovirus 30 was the predominant serotype overall, identified in 43 (25.3%) of samples, with a significantly higher proportion in the adult age group (37.3%) compared to the infant age group (12.3%). The current results showed that most children infected with Echovirus where have symptoms of Cough, malnutrition, and diarrhea at 2%, and the children with diarrhea only 22.2%. While other children have an equal percentage of infection at 11.1%. Where the present study disagreed with *Lo et al. (2010)*, Which proved that episodes of diarrhea caused by Enterovirus infection was not frequent (occurring in 9.7% of infected patients) in Taiwan. Concerning of C-Reactive protein, the results recorded the concentration of was high during Echovirus infection status, suggesting a greater inflammatory activity related to Echovirus infections. The same is true for white blood cells, which recorded a significant increase, While the platelet count was low or close to normal in patients. *Mantadakis et al.,(2013)* have detected high white blood cell count and C-reactive protein during Echovirus infection status. These findings agree with current study results. *Zheng et al.,(2016)*,with the current study on the side and different on the other hand, they recorded that the white blood cells in the cerebrospinal fluid (CSF) exceeded the normal range in all patients, but they did not agree with us, because they also recorded CSF protein levels higher than normal in half of the patients, while we had high protein level in all patients.

V. CONCLUSION

The Echovirus prevalence rate was recorded at 9% in Thi-Qar province. Echovirus infection is considered not related to children' gender. Most children infected with Echovirus was in 6-8 and 8-10 month at 25%. The results also recorded an increase in the concentration of

CRP,WBC count, while the platelet count was low or close to normal in patients.

VI. ACKNOWLEDGMENT

We are grateful to everyone who helped us collect samples at the Mohammed Al Moussawi Children's Hospital. We also extend our thanks and gratitude to the Department of Life Sciences, Faculty of Science – Thi-Qar University.

VII. ETHICAL CONSIDERATION

The ethical permission was obtained from the Mohammed Al Moussawi Children's hospital and from all participants in this work (patients and healthy) to conduct the research.

VIII.CONFLICT OF INTEREST

The authors declare no conflicts of interest

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