

Detection of Rota Virus by Rapid Test in Comparison with Enzyme Linked Immunoassay in Acute Diarrhea Children in Babylon Province

Ayam M. Salih

University of Babylon, Hammurabi Medical College, Iraq

Abstract

Globally, human rotavirus is considered as a major etiologic agent of acquired diarrhea which infect young kids as well as infants. For the purpose of efficient treatment, early diagnosis is of high importance. Group-A Rotavirus are in responsible for serious watery diarrhea in young kids. Rapid analysis of the Rotavirus associated diarrhea can prevent inappropriate supervision of antibiotics and help in stopping the pass on of multi- drug resistance. Rotavirus antigen is discovered by ELISA and with one step rapid antigen test showed an occurrence of 23% using ELISA and 22.5% using Rapid test respectively. Fast showed a tenderness of 96.97% and specificity of 100% in comparison to ELISA. The Rotavirus infection was maximum in age group of one years to two years (60.86%) in male and in addition to female (39.13%). Throughout the winter, the infections was at its highest levels, also it has been appeared with triad of diarrhea, fever and vomiting. Severe dehydration and watery diarrhea has been the main cases of this infection.

Keywords: *ELISA, Group A Rotavirus, Immunochromatography, Watery diarrhea.*

Introduction

Extreme diarrheal disease is a significant public health problem leading to notable rate of death and morbidity in advanced and emerging nations such as India. Globally, the infection of Rota virus is considered as the third most widespread reason of severe diarrhea in young kids^[1]. The vast majority of kids experienced the infection of Rota virus in the course of time when they are five years of age. Approximately that Rota Virus infection annually result in 111 million episodes of gastroenteritis which requires care at home, five million clinic visits, 1 million hospital admission and about 600 mortality rates in kids less than five years old throughout the world^[2]. Presently there are seven Rota virus groups seen to infect the humans, among them the most dominant is group A^[3]. WHO estimated that diarrhea is in charge of 18% deaths among children less than five years of time [4]. Every year, there are some seasonal peaks of diarrhea in Bangladesh and ICDDR, B alone has to treat more than 100,000 patients a year^[5]. The data on clinical characteristics and treatment outcome of rotavirus diarrhea are likely to be helpful for the medical professionals and health care providers working at the grass root levels who have the tendency to refer

any acute watery diarrhea with or without vomiting to other secondary/tertiary level hospital for better management^[6]. This study was intended to explore the clinical severity, nature of disease and to observe the treatment outcome of both Rota and non-rotavirus diarrhea in children of Bangladesh the justification of such a huge referral of diarrhea cases to higher centers^[7]. One of the main causes of illness and mortality in Iraqi kids is Diarrhea. Nevertheless, some researchers in Iraq reported various degrees of infectivity with Rotavirus in the governorates of Iraq. Rotavirus is accountable 30 percent of acute diarrhea in hospitalized kids in Baghdad, 18.5 percent in Tikrit, 24 percent in Basra, 37 percent in Erbil^[8-10]. So, the presented research has been conducted for estimating the spread of Rotavirus in the governorate of Babylon through utilizing 3 commercial diagnostic kits, followed by a study to detect the rotavirus genotyping circulating between populations through the use of RT-PCR molecular diagnostic kit^[11].

Materials and Method

The presented study has been carried out from January 2018 to October 2018. 200 sample of stool was collected in sterilized box from children have diarrhea

and transport to microbiology section. Samples stored at 4°C and tested within twenty four hours of collection. Forty six samples was positive for rotavirus antigen. ELISA test for human Rotavirus Antigen kit (USA) can be defined as a qualitative determination of the Rotavirus antigen in feces. The above mentioned test has been implemented in accordance with the specifications of the manufacturer. The one step test device for the Rotavirus (Acon, Germany) can be considered as rapid chromatographic immunoassay for qualitative detection of Rotavirus in the specimens of human feces for the purpose of aiding the process of diagnosing the infection of rotavirus.

Results and Discussion

Positive Rota virus antigen has been identified in 46 from 200 samples 23 percent via ELISA, and 22 percent via rapid test table (1 and 2). The percentage of females in Rota virus positive patients have been 39.13 percent, while the percentage of males have been 60.86 percent. Most of the Rotavirus positive cases have been spotted in kids younger than six years of age and kids in the age group of (1-2) years indicating the highest percentage of infectivity 19.5%, whereas the age group (4-5) years revealing the lower percent of rotavirus infection 6.52%. While the age (5-6) years do not show any rotavirus infection the percentage was 00.0% table (3). Rapid test indicated a specificity of 100 percent and sensitivity of

96.97 percent as shown in table (4). ELISA is clearly the most sensitive method for detection of rota viruses and is perfect for screening large number of fecal specimens in a single sitting. The infection was maximum during the winter months as show in table (5).

Worldwide, there has been a decrease in the mortalities related to diarrhea, mostly due to the improved therapeutic interventions in addition to the provision of safe water drinking, enhancement of sanitation and popularization of main activities related to healthcare^[12]. Many studies across the world indicated that the Rotavirus is considered as a cause of diarrhea in kids both in advanced and emerging nations^[13]. We conducted this study to estimate the diarrheal disease burden due to rotavirus infection amongst under five years-old children with diarrhea in Bangladesh^[14]. The infections rotavirus was identified to follow seasonal pattern in our region, in which it is related with drier atmosphere and cooler temperatures. The seasonal distribution related to this infection during cooler months was indicated before for temperate regions^[15]. Like our study, significant association of nausea and vomiting with rotavirus diarrhea is also evident in some other studies^[16-17]. Many studies across the world have indicated the importance of Rotavirus as a cause of diarrhea in kids both in advanced and emerging nations^[18-21].

Table 1: Age & Sex Distribution of Diarrhea Cases

Age	Male	Female	%	Total	%	%
1-2 years	39	32	16.00%	71	35.5%	19.5%
2-3 years	31	25	12.5%	56	28.00%	15.5%
3-4 years	19	15	7.5%	34	17.00%	9.5%
4-5 years	16	7	3.5%	23	11.5%	8.00%
5-6 years	10	6	3.00%	16	8.00%	5.00%
Total	115	85	42.5%	200	100.00%	57.5%

Table 2: Diarrhea in various Age Groups

Age	Total No. of cases	ELISA No. (+/-)	Rapid Test No. (+/-)
1-2 years	71	19/52	18/53
2-3 years	56	14/42	14/42
3-4 years	34	8/26	8/26
4-5 years	23	5/18	5/18
5-6 years	16	0/16	0/6
Total	200	46/154 23.00%	45/155 22.5%

Table 3: Age & Sex Distribution of Rotavirus Positive Cases by ELISA

Age	Male	%	Female	%	Total	%
1-2 years	11	23.91%	8	17.39%	19	41.3%
2-3years	9	19.56%	5	10.86%	14	30.42%
3-4 years	5	10.86%	3	6.52%	8	17.38%
4-5 years	3	6.52%	2	4.34%	5	10.86%
5-6 years	0	0.00%	0	0.00%	0	0.00%
Total	28	60.86%	18	39.13%	46	100.00%

Table 4: Comparison of Rapid Test with ELISA

Sensitivity	96.95%
Specificity	100.00%
Positive Predictive Value	100.00%
Negative Predictive Value	99.17%
Accuracy	99.33%

Table 5: Monthly Distribution of Rotavirus Positive Cases

Number of Rotavirus Positive Cases by ELISA	Number of cases	Months
8	40	Jan
6	30	Feb
8	29	Mar
5	24	April
4	21	May
4	14	June
4	11	July
3	11	Aug
1	10	Sep
1	10	Oct
46	200	Total

Conclusions

This study revealed that the prevalence of rotavirus infection among children under the age of five is high. Also, the study shows that the male have higher rotavirus infection than female. The findings also provide useful information to the existing national program for the fight against diarrhea and to all other actors developing targeted interventions for preventing childhood diarrhea. The rotavirus infection occurs in winter more than in hotter month.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Iraq

Conflict of Interest: The authors have no conflict of interest.

Funding: Self-funding.

References

- Desselberger U, Huppertz HI Immune responses to rotavirus infection and vaccination and associated correlates of protection. *J. Infect. Dis.*; January 2011,203(2):188–95.
- Webb A, Starr M Acute gastroenteritis in children. *Australian family physician*; 2005,34(4):227–31.
- Szajewska H, Dziechciarz P Gastrointestinal infections in the pediatric population. *Curr. Opin. gastroenterol.*; 2010,26(1):36–44.
- Meloni A, Locci D, Frau G, Masia G, Nurchi AM, Coppola RC Epidemiology and prevention of rotavirus infection: an underestimated issue. *J. MaternFetaland neonatal Med.*2011,24:48–51
- Herish M, Ahmed J, Brian SC, Osamu Nakagomi CA, HartJamal M, Zaki Abas A, Al-Rabaty Winifred D, Nigel AC Molecular Characterization of Rotavirus Gastroenteritis Strains, Iraqi Kurdistan. *Emerge. Infect. Dis.*; 2006,12(5):824-826
- Forster J. and Hammerschmidt T. Burden of acute rotavirus gastroenteritis (RV-AGE) in Germany: a comparison of federal statistics and epidemiological data. *Gesundheitswesen* 2007,69(4): 227-32.
- Bryce, J., Boschi–Pinto, C., Shibuya, K., Black, R.E. WHO estimate so the causes of death in children *Lancet*, 2005,365(9465): 1147-52.
- Kim, J., Kim, H.S., Kim, H.S., Kim, J.S., Song, W., Lee, K.M., et al. Evaluation of an Immunochromatographic Assay for the Rapid and Simultaneous Detection of Rotavirus and Adenovirus in Stool Samples. *Ann. Lab. Med.*, 2014,34(3): 216–22

10. Glass, R.I., Parashar, U.D., Bresee, J.S., Tureios, R., Fischer, T.K., Widdowsen, M.A., et al. Rotavirus Vaccines: Current Prospects and Future Challenges. *Lancet*, 2006,368: 323-32
11. Bern C, Martines J, de Zoysa I, Glass RI The magnitude of the global problem of diarrhea disease. *Bull World health Organ.* 2007,70:(6):705-714.
12. Webb A, Starr M Acute gastroenteritis in children. *Australian family physician*; 2005,34(4):227–31.
13. Wilhelmi I, Roman E, Sánchez-Fauquier A Viruses causing gastroenteritis. *Clin. Microbiol. Infect.* 2003,9(4):247-62.
14. Kurugol Z, Geylani S, Karaca Y, et al. Rotavirus gastroenteritis among children under five years of age in Izmir, Turkey. *Turk J Pediatr.* 2003;45(4):290- 4.
15. Parashar UD, Gibson CJ, Bresse JS, et al. Rotavirus and severe childhood diarrhea. *Emerg Infect Dis.* 2006, 12(2): 304-6.
16. Bern C, Martines J, de Zoysa I, Glass RI The magnitude of the global problem of diarrhea disease. *Bull World health Organ.* 2006,70(6): 705-714.
17. Herish M, Ahmed J, Brian SC, Osamu Nakagomi CA, HartJamal M, Zaki Abas A, Al-Rabaty Winifred D, Nigel AC Molecular Characterization of Rotavirus Gastroenteritis Strains, Iraqi Kurdistan. *Emerge. Infect. Dis.*; 2006,12(5):824-826
18. Azim T, Zaki MH, Podder G, et al. Rotavirus-specific subclass antibody and cytokine response in Bangladeshi children with Rotavirus diarrhea. *J Med Virol.* 2003,69(2);286-95.
19. Hasan KZ, Pathela P, Alam K, et al. Etiology of diarrhea in a birth cohort of children aged 0-2 year(s) in rural Mirzapur, Bangladesh. *J Health Popul Nutr.* 2006, 24(1):25-35.
20. Qadri F, Saha A, Ahmed T, et al. Disease burden due to enterotoxigenic Escherichia coli in the first 2 years of life in an urban community in Bangladesh. *Infect Immun.* 2007, 75(8):3961-8.
- 21-. Tanaka G, Faruque AS, Luby SP, et al. Deaths from rotavirus disease in Bangladeshi children: estimates from hospital-based surveillance. *Pediatr Infect Dis J.*, 2007, 26(11):1014-8