

Burden of Rotavirus Gastroenteritis Among Under Five Years Children at Al-Alwaiya Paediatric Hospital

Sinan Ghazi Mehdi *, Amjad Daoud. Niazi **, Faisal Ghazi Alhamdani ***

ABSTRACT:

BACKGROUND:

Rotavirus is the main cause of diarrhea in <5 years children causing high rates of hospitalizations and high mortality.

OBJECTIVE:

To estimate the burden of rotavirus gastroenteritis among less than five years children attending Al-Alwaiya Pediatric Hospital. To examine the validity of ELISA and Latex screening tests and to find out the concordance rates.

METHODS:

Cross sectional study involved under five years (1-59 months) children with acute gastroenteritis attending Al-Alwaiya Pediatric Hospital for the period from 1st of January 2008 to 31st of May 2008. The questionnaire used depended on WHO protocol of the National Rotavirus Gastroenteritis Surveillance Program. LATEX and ELISA tests were used for diagnosis. The period of study included two seasons: Winter and Spring.

RESULTS:

Stool samples of 342 children with acute gastroenteritis were investigated by general stool examination, stool culture, LATEX and ELISA tests for the presence of any parasite, bacteria and/or rotavirus antigen respectively. Rotavirus was detected in 162 (47.4%) of children with acute gastroenteritis either by LATEX, ELISA or both. Total concordance rate between the two tests was as high as 85.4%. Females were 61 (37.7%) and males were 101 (62.3%). Age group mostly affected was (>6-12) months which was (31.4%).

CONCLUSION:

Rotavirus cause 47.4% of acute gastroenteritis cases of the studied sample with no significant statistical difference between rotavirus and other causes of gastroenteritis regarding demographic features (except for gender, more in males), clinical features, and type of treatment and course of disease (except time of onset). Concordance rate between ELISA and Latex was found to be high confirming their validity.

KEYWORDS: under 5 years children, rotavirus, gastroenteritis.

INTRODUCTION:

Acute gastroenteritis is one of the most common diseases in humans, and continues to be a significant cause of mortality and morbidity worldwide⁽¹⁾. Viral gastroenteritis is a serious illness and is contagious. It affects people in all parts of the world and occurs in people of all ages and backgrounds. However, some viruses tend to cause diarrheal disease primarily among people in specific age groups. Rotavirus infection is the most common cause of diarrhea in infants and young children under 5 years old^(1, 2, and 3).

The clinical features and stool characteristic of rotavirus diarrhea are nonspecific, and similar illness may be caused by other pathogens. As a result, confirmation of a diarrheal illness as rotavirus requires laboratory testing⁽⁴⁾. It is the leading cause of diarrhea hospitalization among children worldwide^(3, 4, 5), and vaccines that are being developed and tested potentially could prevent much of the morbidity and mortality due to this disease^(6, 7).

In 2002, the World Health Organization has published a generic protocol for hospital-based surveillance and community-based survey of rotavirus⁽¹⁰⁾, and studies using this protocol are currently being conducted or planned in > 30 countries in Asia, Africa, the Middle East, and Latin America⁽⁵⁾.

*Ministry of Health

** Scientific Council of Community Medicine and Family Medicine, Iraqi Board for Medical Specialization

*** Director of Virology Section, Central Public Health Laboratory

AIM OF STUDY:

To estimate the burden of rotavirus gastroenteritis among less than five year's children attending Al-Alwaiya pediatric hospital. To examine the validity of ELISA and Latex screening tests and to find out the concordance rates.

PATIENTS AND METHODS:

From first of January to 31st of May, 342 stool samples were collected from <5 years children that attended Al-Alwaiya paediatric hospital complaining of acute gastroenteritis as a primary illness and should satisfy WHO criteria for the national rotavirus gastroenteritis surveillance program with its inclusion and exclusion criteria⁽¹⁰⁾. Stool examination included general stool examination for evidence of parasite, stool culture for bacterial growth (only Salmonella and Shigella), latex test and Enzyme Linked Immune Sorbent Assay (ELISA) test for rotavirus antigen.

Statistical Analysis :

Epi InfoTM version 3.3 was used for data entry and analysis. Chi square test was used to analyze association between qualitative variables. P-value ≤ 0.05 is considered as a cut-off value for significance. Agreement and disagreement between the results of ELISA and Latex tests was calculated as concordance and discordance rates.

RESULT:

Rotavirus gastroenteritis represented 47.4% of the sample size. General stool examination showed 1 sample with Giardia and 2 samples with Entamoeba, one of them was rota positive. Rotavirus was found in all age groups, but it was more among 6-12 months of children that were liable for dehydration more than other groups (table 1). Males (62.3%) were affected more than females (37.7%). Place of residency showed no significant statistical association with rotavirus gastroenteritis. There was no significant difference regarding clinical features (fever, diarrhea, vomiting), management and outcome of treatment. It was found that 79% of rotavirus gastroenteritis was treated with antibiotic (2 or 3 types), 74% of cases were treated with IVF and 29.6% were treated with ORT. Of those, 75.3% (35.6% of the total study sample) were treated as inpatient and 24.7% (11.7% of the total study sample) were treated as outpatient, those may give an idea about medical and non-medical burden of rotavirus gastroenteritis. It was found that 69.1% of rotavirus gastroenteritis was diagnosed by both Latex and ELISA, 13.6% and 17.3% of cases were diagnosed by only ELISA or Latex respectively. Validity of Latex test results was compared with that of Elisa and it was found that latex test had a sensitivity and specificity of

83.6% and 86.5% respectively (table 2). Also it was found that the positive concordance rates between the two tests was 32.7%; negative concordance between the two tests was 52.6%; total concordance rate was 85.4% and total discordance rate 14.6%.

DISCUSSION:

Rotavirus gastroenteritis represented 47.4% of the sample size which was in agreement with the results found by other studies done in Iraq^(14,15) and within the world range (29%-45%) of rotavirus gastroenteritis⁽⁵⁾.

Rotavirus was found in all age groups, but it was more among 6-12 months of children and this goes with other studies in Iraq^(13,14,15) and with studies done worldwide^(4,10). Males were affected more than females, which goes with one study done in Iraq⁽¹⁴⁾.

Place of residency revealed no statistical significance in this study which coincide with other studies in Iraq^(14,15) and worldwide^(4, 8, 11, 12).

There was no significant difference regarding clinical features (fever, diarrhea, vomiting), management and outcome of treatment. These are the clinical features which characterize acute rotavirus gastroenteritis; but they are nonspecific and similar illness may be caused by other pathogens^(3, 4, 9, and 10).

Regarding type and place of treatment, results reached goes with studies done worldwide (3,4, and 5). It was found that the disease was more common during cold months which go with other studies in Iraq (15) and worldwide (10).

Although no significant statistical association was found between type of feeding with any cause of gastroenteritis, rotavirus or other causes; but it was found that two-third of rotavirus gastroenteritis were bottle fed while breast fed were 25.0%, this goes with studies done in Iraq^(14, 15). So breast feeding may be protective during course of illness. Comparison of validity of latex test with that of Elisa approximates the results found in other studies^(15,16, 17). Concordance rates calculated strengthen the validity of the two tests.

CONCLUSION:

Rotavirus infection was found in 47.4% of under 5 years children with acute gastroenteritis cases during study period. It was observed in >6-12 months children; and in males more than females. Place of residence was not significant for occurrence of rotavirus gastroenteritis; the same was for type of feeding. Clinical features (fever, diarrhea and vomiting), management and outcome of treatment were not significant with rotavirus gastroenteritis. Majority of rotavirus gastroenteritis

ROTAVIRUS GASTROENTERITIS

cases were treated with antibiotics (2 or 3 types). Significant association of onset of acute rotavirus gastroenteritis was found with cold months. Sensitivity and specificity of Latex is 83.6% and 86.5% respectively as compared with ELISA. Concordance rates between the two tests was high.

Recommendation:

Latex test is simple, inexpensive and sensitive to detect rotavirus antigen in stool, so it should be available in primary health centers and hospitals in

positive cases. Building capacity of the laboratories in the health facilities regarding the diagnosis of various causes of gastroenteritis

order to be used as a screening test and to decrease the abuse of antibiotics for diarrheal cases.

ELISA test should be available in all paediatric hospitals and also used as a confirmatory test for.

Table(1) : Distribution of Gastroenteritis Cases by Age Group in Months

Stool Test Findings Age group(month)	Rota	Others*	Total
0-3 Col (%)	34 (21.0)	49 (27.2)	83 (24.3)
>3-6 Col (%)	46 (28.4)	47 (26.1)	93 (27.2)
>6-12 Col (%)	51 (31.4)	44 (24.4)	95 (27.8)
>12-24 Col (%)	21 (13.0)	28 (15.6)	49 (14.3)
>24-59 Col (%)	10 (6.2)	12 (6.7)	22 (6.4)
Total Col (%)	162 (100.0)	180 (100.0)	342 (100.0)

Chi-square 3.48

P-value 0.48

Others mean other causes of gastroenteritis

Table(2): Evaluation of LATEX Validity as Compared with ELISA for detection of rotavirus antigen in stool

$$\text{Sensitivity of latex test} = \frac{112}{134} = 83.6\%$$

$$\text{Specificity of latex test} = \frac{180}{208} = 86.5\%$$

$$\text{Positive predictive value of latex test} = \frac{112}{140} = 80\%$$

$$\text{AccuracyRate} = \frac{292}{342} = 85.4\%$$

$$\text{Positive concordance rate} = \text{agreement in positivity of ELISA and Latex} = \frac{112}{342} \times 100 = 32.7\%$$

$$\text{Negative concordance rate} = \frac{180}{342} \times 100 = 52.6\%$$

$$\text{Total concordance rate} = \frac{112 + 180}{342} \times 100 = 85.4\%$$

$$\text{Total discordance rate} = \frac{28 + 22}{342} \times 100 = 14.6\%$$

isa Latex	+ Ve	- Ve	total
+ Ve	112	28	140
- Ve	22	180	202
total	134	208	342

ROTAVIRUS GASTROENTERITIS

REFERENCES:

1. Okitsu-Negishi S, Nguyen TA, Phan TG. Molecular epidemiology of viral gastroenteritis in Asia. *Pediatr Int*. 2004 ;46,245-52. www.healthinternetwork.org
2. Centers for Disease Control and Prevention, National Center for Infectious Diseases USA. *Viral Gastroenteritis*. Atlanta: CDC; 2005. <http://www.cdc.gov/ncidod/dvrd/revb/gastrofaq.htm>
3. Centers for Disease Control and Prevention, Department of Health and Human Services. *Rotavirus and Drinking Water from Private Wells*. Summer 2003. <http://www.cdc.gov/ncidod/healthywater>
4. Centers for Disease Control and Prevention .*Rotavirus. Morbidity and Mortality Weekly Report* 2006; 55(No.RR-12):1-13. <http://www.cdc.gov/ncidod/dvrd/revb/gastrofaq.htm>
5. Parashar U,Christopher J ,Bresse J ,Glass R &Gibson C. Rotavirus and Severe Childhood Diarrhea. *Emerging Infectious Diseases*. www.cdc.gov/eid 2006;12,304-306.
6. Gentsch JR, Glass RI and the Vietnam Rotavirus Surveillance Network. The Epidemiology and Disease Burden of Rotavirus in Vietnam. *The Journal of Infectious Diseases* 2001;183,1707-12. www.cdc.gov/eid
7. WHO,Vaccine and Biologicals, Report of the Meeting on Future Directions for Rotavirus Vaccine Research in Developing Countries, Geneva 9-11 February 2000. www.who.int/vaccines-documents/
8. Parashar U,Glass R,Bresse J ,Hummelman E,Miller M.Global Illness and Deaths Caused by Rotavirus Disease in Children. *Emerging Infectious Diseases*. 2003;9. www.cdc.gov/ncidod/EID/eid.htm
9. WHO,Vaccines for Routine Use, updated 2008. www.who.int/ith/vaccines/2007_routine_use/en/print.html
10. WHO, Vaccine and Biologicals .*Generic Protocols for Hospital-Based Surveillance to estimate the Burden of Rotavirus Gastroenteritis in Children* .November 2002. www.who.int/vaccines-documents/
11. Gentsch JR, Glass RI, and the members of Asian Rotavirus Surveillance Network. First Report from the Asian Rotavirus Surveillance Network. *Emerging Infectious Diseases*2004;10,988-995. www.cdc.gov/eid
12. Parashar U,Glass R,Bresse J,Gentsch J, Turcios R & Jiang B. *Rotavirus Vaccines*.PAHO,Wash.,DC:Scientific&Technical Pub. 2004;593: 111-119. www.cdc.gov/eid
13. Al-Bayatii, E.N. Isolation and Characterization of Some Enteric Bacteria and Rotavirus from Children with Diarrhea. M. Sc.Thesis in Community Medicine Al-Mustansyria University 1998.
14. Abbas, M. Hussein. Prevalence of Rotavirus Infection among Hospitalized Children with Acute Watery Diarrhea. Thesis for partial Fulfillment of the Requirement for the Degree of Fellowship of the Iraqi Commission for Medical Specialization in Paediatrics 1999.
15. Al-Nakshabendi,T.Y. Rotavirus Gastroenteritis among Infants and Young Children in Mosul. M. SC.Thesis in Community Medicine, Mosul University 1993.
16. Paul SK,Tabassum S , Islam MN, Ahmed MU, Haq JU, Shamsuzzaman AK. Diagnosis of human rotavirus in stool specimens: comparison of different methods. *Mymensingh Med J*. 2006 ;15,183-7. www.healthinternetwork.org
17. Raboni SM, Nogueira MB, Hakim VM, Torrecilha VT, Lerner H, Tsuchiya LR. Comparison of latex agglutination with enzyme immunoassay for detection of rotavirus in fecal specimens. *Am J Clin Pathol*. 2002 ;117,392-4. www.healthinternetwork.org