

ASPECTS OF NOSOCOMIAL GASTROENTERITIS WITH ROTAVIRUS IN CHILDREN HOSPITALIZED IN CONSTANTA-ROMANIA

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ABSTRACT

Background: The infection with rotavirus is a frequent cause of acute diarrheal disease in infants and young children anywhere in the world.

Objective: The aim of this study was to evaluate the clinical characteristics and the severity of nosocomial gastroenteritis with rotavirus.

Material and methods: We conducted a descriptive, observational, non-interventional, prospective and retrospective study (2011-2012), performed on two groups of patients with acute rotavirus gastroenteritis and nosocomial rotavirus gastroenteritis hospitalized in the pediatric ward of the Clinical Infectious Diseases Hospital of Constanta. The diagnosis was confirmed by a positive test for determining latex agglutination rotavirus in faeces.

Results: From 505 cases of rotaviral gastroenteritis, 98 were nosocomial infections (19.4%). There were no statistical significant difference between the two groups-with or without nosocomial infection regarding the average age ($p=0.64$), the number of vomiting per day ($p=0.34$). There were statistical significant differences between two studied groups regarding the number of stools per day ($p=0.001$), the value of maximum temperature ($p=0.001$), the duration of hospitalization ($p=0.001$).

Conclusions: Our study highlighted that nosocomial rotaviral gastroenteritis in children presented more severe symptoms and prolonged hospitalisations.

Keywords: acute gastroenteritis, rotavirus, nosocomial infection, children.

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Introduction

Nosocomial infections are infections that patients acquire during hospitalization and treatment for another disease. The rotavirus is transmitted via faeces and sometimes airborne by droplets. Rotavirus remains infectious for a long period of time on surfaces. Several features, namely the low infective dose (less than 10 viral particles can cause the infection), the large number of particles present in the stool, the resistance of the virus to the external environment, and to a certain extent the resis-

tance to disinfectants suggests transmission through food^(1,2).

Diarrheic syndrome is favored by many factors and pathogens. Rotavirus infection is of particular interest, being a frequent cause of acute diarrheal disease in young children. International studies estimate that nearly all children aged up to 5 years went by infection with this virus^(3,4).

According with Eurostat data in Romania about 200,000 children born annually⁽⁵⁾. Compared to the entire population, the number of confirmed acute infection with rotavirus hospitalized is under

5,000 / year in a cohort of 1 million children aged up to 5 years, which represent about 0.5%^(6,7).

For Romania, a country situated in Central and Eastern Europe, Rotavirus vaccination is not included in the National Programm of Immunization. However the vaccines for Rotavirus are available in Romania and vaccination for Rotavirus can be done in some situations. Constanta city and county is situated in the South – East part of Romania and Clinical Infectious Disease Hospital of Constanta is a tertiary hospital which serves the Dobrogea region (this region is formed by the counties of Tulcea and Constanta).

Regarding the epidemiology of rotavirus gastroenteritis (RGE) in Central and Eastern Europe, including Romania there are very few data^(8,9,10). The proportion of RGE among all acute gastroenteritis reported in Romania in the last decade ranged between 15.0-50.0% with highest number of cases reportend between January - May, aged 6-12 months^(10,11,12,13,14). The RGE burdern for Romania is not very well evaluated because of limited data in absence of mandatory reports of disease and routine testing from Rotavirus all over the country⁽¹⁰⁾. However the studies performed in Romania before estimated the incidence of RGE in Romania as high as in other developing countries^(4,10).

Objectives

The primary objective of our study was to evaluate the particularities and incidence of nosocomial rotavirus gastroenteritis (NRGE) in children admitted to the Infectious Diseases Hospital Constanta in a period of two years (1st January 2011 - 31st December 2012).

The secondary objectives were:

- To evaluate clinical and laboratory aspects of nosocomial RGE compared with clinical and laboratory aspects of RGE.
- To evaluate the gravity factors for nosocomial RGE in the mentioned period.

Material and methods

It has been realized a descriptive, observational, non-interventional, prospective and retrospective study (2011-2012), performed on patients with RGE hospitalized in the pediatric ward of the Infectious Diseases Clinical Hospital of Constanta during a period of 2 years.

Inclusion criteria:

- Children hospitalized with acute RGE;
- Diagnostic confirmed by a positive test for determining latex agglutination rotavirus in faeces.

Statistical analysis

The experimental data was processed using the IBM SPSS Statistics 20 Statistical Processing Program. The procedures used were: Descriptive statistics (for the characterization of discrete and continuous variables defined at the database level); Charts; Non-parametric statistical tests (the χ^2 association test, the relationship between two categorical variables, with the determination of the risk / OR chance and relative risk Rr); Parametric statistical tests (Independent Samples t-Test). It was considered statistically significant $p < \alpha = 0.05$.

Ethic committee agreement and parents/guardian inform consent were obtained in order to publish patient's data in scientific point of view.

Results and discussion

Were enrolled a total of 505 children with rotavirus gastroenterocolitis (RGE), from which 98 patients with nosocomial rotavirus gastroenterocolitis (NRGE).

The total children included in this study were divided in two groups:

- group 1 - with rotavirus gastroenterocolitis and,
- group 2 - rotavirus gastroenterocolitis aquired nosocomial.

Patients with NRGE were hospitalized in other medical units before actual hospitalization (pediatric units, surgery, intensive care units) for other diseases, and some of them in our hospital.

There are no differences between both studied groups (RGE and NRGE) regarding age, sex and environmental area. In studied groups (RGE and NRGE) the majority of children were boys (53.9% and respectively 56.1%), from urban area (72.3 and respectively 75.5%). The majority of children with RGE were with 1st degree of dehydration (69.7%), and the majority of patients with NRGE were with 2nd degree of dehydration (56.1%). In group of patients with RGE the highest number of patients were registered in March - May with 40.8% of cases, followed by June - August with 25.3% cases. In group of patients with NRGE the highest number of patients were registered also in March - May

with 46.9%, but followed by patients hospitalised in December - February with 23.5%.

The mean value of hemoglobin (Hb) level was 10.73 g/dl for RGE and 10.63 g/dl for NRGE. When we compared the two groups we found that there is no difference between mean value of the Hb level between two groups ($p = 0.68 > \alpha = 0.05$).

Number of white blood count (WBC)/mmc present a mean value of 8376.90/mmc for RGE and a mean value of 9375.71/mmc for NRGE. In children from NRGE group the value of WBC is higher than in children from RGE group ($p = 0.001 < \alpha = 0.05$).

When we take into consideration mean value of fibrinogen level (mg%) we noticed that the mean value for RGE group was 365.86 mg% and respectively 393.18% for NRGE. Comparing mean value of this parameter we found that there is no significant difference between them ($p = 0.181 > \alpha = 0.05$).

Erythrocyte sedimentation rate (ESR) had a mean value of 11.45mm/1hour in RGE group and a mean value of 14.14 mm/1 hour in NRGE group. In NRGE group value of ESR is higher than in RGE group ($p = 0.01 < \alpha = 0.05$).

The mean age in the group of NRGE was 2.522 years and in the group with RGE was 2.547 years. From statistical point of view there are no significant differences between mean values of age measured for both groups ($p = 0.642 > \alpha = 0.05$).

When we compare the mean of the period of hospitalization between 2 groups we found that it was 10.95 days in the group with nosocomial infection and 5.86 days in the other group (figure no. 1). In group of patients with NRGE there were more days of hospitalisation compared with group with RGE, difference that is significant for statistical point of view ($p = 0.001 < \alpha = 0.05$).

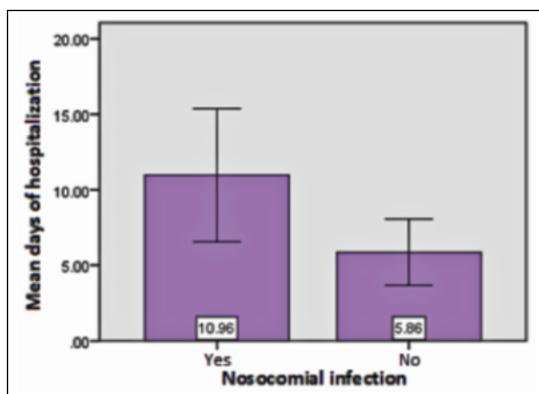


Figure 1: Mean period of hospitalization.

The mean of maximum value of the temperature was 38.29 Celsius degrees in the group of NRGE, and 37.90 in the group with RGE (figure no. 2). According with our results in the group of patients with NRGE the mean of maximum temperature is higher than the mean maximum temperature in the RGE group, difference that is with statistical signification ($p = 0.001 < \alpha = 0.05$).

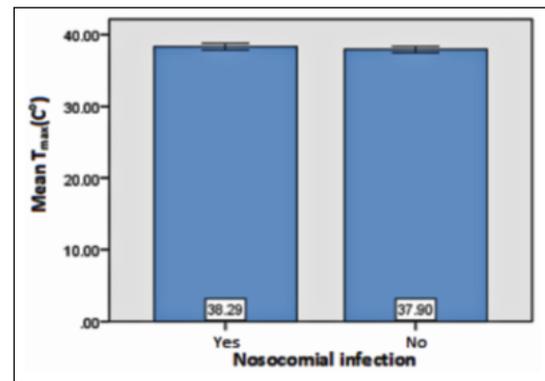


Figure 2: Mean of maximum temperature.

The risk of having fever in patients with rotavirus nosocomial infection (NRGE) group is 7.859 times higher than in the group of patients without rotavirus nosocomial infection - RGE (OR= 7.859; 95%CI for OR is (1.066, 57.933)).

The proportion of patients from group with NRGE and fever is 1.07 higher than the patients with RGE and fever (RR= 1.07; 95%CI for RR is (1.036, 1.105)).

The mean of maximum number of vomiting was 2.214 in the group of patients with RGE-N, and 1.312 in the group of patients with RGE (figure no. 3). Since $p = 0.347 > \alpha = 0.05$, that means that there are not significant differences between mean values measured variable considered for both groups.

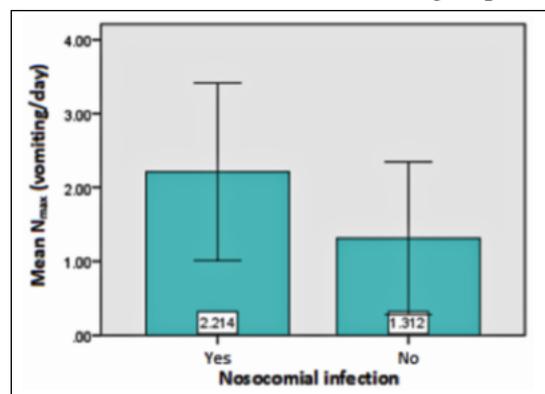


Figure 3: Mean of maximum number of vomiting per day.

The risk of having more than 4 vomiting per day among patients with nosocomial infection is 5.386 times higher than the risk of patients with

vomiting in the group without nosocomial infection (OR=5.386; 95%CI for OR is (2.446, 11.858)).

The proportion of patients with more than 4 vomiting per day is 4.804 times greater in group of NRGE than in the group with RGE (RR = 4.804; 95%CI for RR is (2.331, 9.902)).

Regarding the mean of maximum number of diarrhetic stools per day, in the NRGE group was 5,5, and in the group with RGE was 5,017 (figure no. 4). Since $p = 0.004 < \alpha = 0.05$, that means there are significant differences between mean values measured variable considered for both groups.

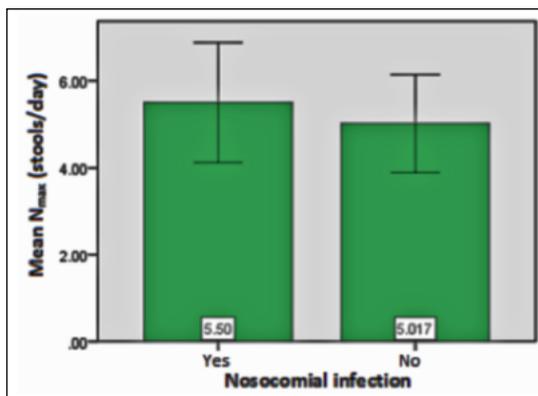


Figure 4: Mean of maximum number of stools/day.

The risc of having more than 6 stools per day among patients with nosocomial infection is 2.566 times higher than the risc of patients with more than 6 stools per day in the group without nosocomial infection (OR=2.566; 95%CI for OR is (1.631, 4.037)).

The proportion of patients with more than 6 diarrhetic stools per day is 1.911 times greater in group of NRGE than in the group with RGE (RR = 1.911; 95%CI for RR is (1.252, 1.460)) (Fig 4).

In study performed by Anca et al. in nine hospitals from Romania median duration for additional hospitalization due to NRGE was five days (range: 1-10)⁽⁹⁾.

In our study the median days of hospitalisation for NRGE was 10.95 days (range: 2-27) which is a higher value comparative with 6.84 days (range: 1-21) for children with RGE. In the same study the highest burden of nosocomial RGE was observed in children aged 12-23 months (42.34%, 58/137), unlike in our study in which median age of studied patients was 2.522 years (30.264 months)⁽⁹⁾. This mean age (30.264 months) higher than in other studies performed in Romania^(9, 12, 13, 14) and other countries^(15, 16) is linked to the fact that acute RGE is being admitted in our hospital mainly in children

older than 1 years old.

The incidence of NRGE in our study (19.4%) is much higher comparative with incidence of NRGE observed in other studies from other European countries like Italy and Spain^(17, 18).

Mean days of hospitalisation in our study for NRGE were 10.95 days comparative with mean days of hospitalisation in children from Italy with NRGE which was 8.1 days⁽¹⁵⁾. Our data were in accordance with results of other international studies which confirm that NRGE can determine increasing in days of hospitalisation^(17, 19).

The findings from our study and previous studies from Romania confirm a high burden of acute RGE disease in Romania and provide useful data to support the implementation of rotavirus vaccination in Romania^(9, 12, 13, 14).

Conclusions

Our study highlighted that NRGE in children presented more severe symptoms and prolonged hospitalisations, which represented an important problem from clinical and economical point of view.

A solution to decrease the high burden of RGE and NRGE is implementation of Rotavirus vaccination in the Romanian National Programme of Immunisation.

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Simona Claudia Cambrea – interpretation of data and revising the work critically for important intellectual content, final approval of the version to be published;

Petcu Lucian Cristian - substantial contribution by providing statistical analysis and data interpretation, final approval of the version to be published;

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