


Research Article

Epidemiological-Clinical and Evolution Profile of Rotavirus Infection in Four Hospital Structures in Kinshasa

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Abstract

Context: The Democratic Republic of Congo is counted among the 11 countries in the world that share the heavy burden of mortality from rotavirus gastroenteritis, so its epidemiological and clinical situation has not been sufficiently reported. The objective of the study was to contribute to improving the management of rotavirus gastroenteritis by determining its epidemiological, clinical and evolution profile in children in Kinshasa.

Methods: This was a cross-sectional and descriptive study from August 1, 2011 to July 31, 2012, carried out on the stools of 454 children aged 0 to 5 years admitted for acute gastroenteritis in 4 study sites. The search for rotavirus in the stools was carried out using the immuno-enzymatic technique ELISA SANDWICH. The usual descriptive analyzes were carried out.

Results: Rotavirus diarrhea accounted for 66.5% of acute gastroenteritis; the mean age of infected children was 8.56 ± 4.52 months; we noted a male predominance with a sex ratio of 1.5 and the frequency of rotavirus gastroenteritis increases during the dry or cold season (May, June, July and August).

Conclusion: Rotavirus gastroenteritis in children under 5 years old in our environment remains a major challenge and small infants (before 12 months) are the most affected.

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Introduction

Rotavirus group A (RVA) remains the most important etiological agent of severe diarrhoea, especially in remote areas with difficult or non-existent access to Health infrastructures and inadequate domestic sanitation conditions [1,2]. It is the second leading cause of morbidity and mortality worldwide after pneumonia and accounts for 15% [3] of all deaths in children under 5 years of age. In 2016, 258 million episodes of Rotavirus-associated diarrhea and 128,500 Rotavirus-associated deaths worldwide occurred in children under 5 years of age, over 80% of them in the sub-Saharan African region [4] with the highest attributable percentage in infants [5,6]. The Democratic Republic of Congo (DRC) along with Angola, India, Nigeria, China and Pakistan share more than half of Rotavirus-associated deaths worldwide [7-10].

In Africa, a few studies have been carried out on rotavirus infections and have reported prevalence around 25%, except for the Botswana study which reported 17% [11] (25% in Tunisia [12], 25.1% in Congo Brazzaville [13],

27.9% in Ivory Coast [14]). In the Democratic Republic of Congo (DRC), some work has been done to determine the prevalence of rotavirus gastroenteritis such as in 2015, Kabuya MS reported a prevalence of 53.8% [15] in a district of DRC (Lubumbashi). According to Nganda et al [16] in 1986, in the DRC, the rotavirus was responsible for 25% of deaths in Kinshasa. And recently, as part of rotavirus surveillance for vaccine introduction, a study conducted over a 10-year period (2009-2019) in sentinel sites across the country noted a prevalence of 99.5% [17]. Over the past decade, an increased research effort on the epidemiology and disease burden of AVR infection has been made. However, few studies have described the clinical picture of the disease in children infected with this virus. Hence the realization of this which had as its objective, the description of the epidemiological, clinical and evolutionary profile of children infected with rotavirus in 4 hospital structures in Kinshasa.

Methods

This study was cross-sectional and descriptive, it took place from August 1, 2011 to July 31, 2012.

It focused on children admitted for gastroenteritis in four medical units in the city chosen according to their high attendance in pediatric patients namely, the Kinshasa University Clinics (CUK), the Kalembelembe Pediatric Hospital, the Kingasani Health Center and the Monkole Hospital Center. All children under 5 years of age who presented diarrhea with or without vomiting lasting less than 7 days were included in this study. We did not include all children whose parents or guardians had not given their consent.

The children were recruited from the emergency rooms and outpatient departments of the hospitals selected for the study.

The socio-demographic characteristics (age and sex), the symptoms of the disease, the history of the disease, the physical examination, the duration of the disease were reported on the collection sheet.

A stool sample was taken from each child included in the study, in a jar whose lid was fitted with a spoon to facilitate sampling, then kept in the refrigerator of the hospital laboratories where the samples were taken before their transfer to the CUK using an isothermal box containing the cold accumulators. From there, this sample was transferred to the CUK for viral identification by the immuno-enzymatic technique with the Prospect Rotavirus kit.

Data were entered on a micro computer (SAMSUNG) and analyzed using EPI INFO version 3.5.1 and SPSS version 10 software. The usual descriptive statistics were used. Quantitative variables with normal distribution were presented as mean ± standard deviation, those with non-

symmetrical distribution as median with extremes. Variables in categories are presented in percentage. Pearson's chi-square test was used for the comparison of proportions ; Student's t test for comparison of means. The significance level was set at $p \leq 0.05$.

This work was carried out within the framework of the surveillance of rotavirus gastroenteritis by the Ministry of Public Health for which an authorization from the Ministry of Health had been obtained. Data confidentiality was respected.

Results

We analyzed 454 stool samples collected from August 2011 to July 2012 from children received in the hospitals mentioned above and meeting the study inclusion criteria (Figure 1).

ELISA Results

A total of 454 stool samples were analyzed using the Elisa Sandwich technique (Figure 2). Rotavirus antigens were detected in 302 samples, giving a prevalence of 66.5% [95% CI; 61.9–70.6].

As in acute gastroenteritis, cases of rotavirus diarrhea occur throughout the year but with the peaks observed in the months of May, June, July and August and these months correspond to the dry (cold) season of the year. The study shows us that there is an association between the season and the occurrence of rotavirus.

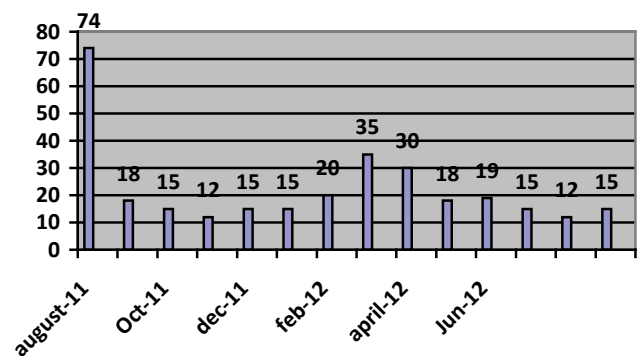


Figure 1: Seasonal distribution of gastroenteritis cases in general in Kinshasa.

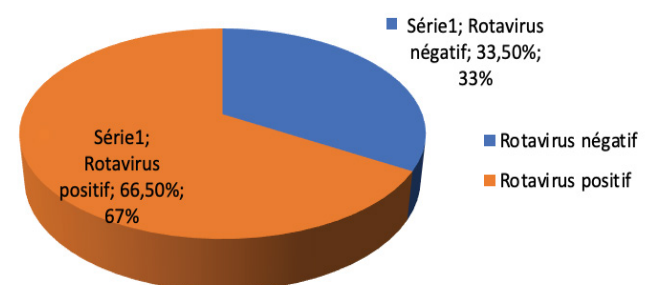


Figure 2: Prevalence of rotavirus during gastroenteritis in Kinshasa.

Seasonal distribution of cases of acute gastroenteritis and acute rotavirus gastroenteritis (Figure 3)

Severe dehydration was found in half of the children who had 6 or more stools per day and in 25% of those who had less than 6 stools per day (Table 1).

Associated Major Signs

Figure 4 illustrates the percentage distribution of children with diarrhoea, vomiting, dehydration (moderate and severe) and fever of children with AGE and rotavirus AGE.

Discussion

According to the WHO, the DRC is ranked among the 11 countries in the world that share the heaviest burden of mortality due to rotavirus gastroenteritis.

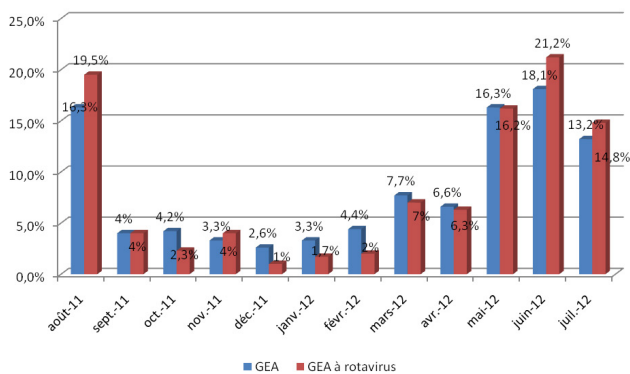


Figure 3: Seasonal distribution of cases of acute gastroenteritis and acute rotavirus gastroenteritis.

	Severe dehydration	Moderate dehydration	Total
	n (%)	n (%)	
Stool frequency	153	149	302
≤ 5	8 (25)	24 (75)	32
≥ 6	145 (53,7)	125 (46,3)	270

Table 1: Distribution of patients according to the severity of dehydration.

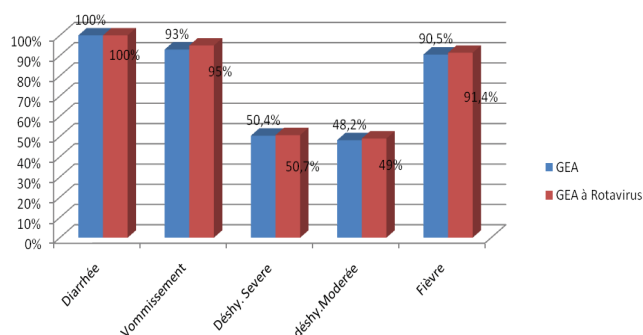


Figure 4: Symptoms associated with rotavirus AGE.

In sub-Saharan Africa, rotavirus is rife in an endemic epidemic mode. The results of our study show a prevalence of 66.5% in Kinshasa.

This prevalence is far higher than that observed elsewhere such as in the USA (Anthony et al. [18], in 2005 with 30 to 50%), Larrot et al. [19] in France in 2004 (52.5%); whereas in Italy, this prevalence was relatively low at 34.9%.

Lower prevalences have also been reported by several African countries: 25% in Tunisia [12], 25.1% in Congo Brazza [13], 41% in Kenya [20] and 17% in Botswana [11]. In the DRC in 1983, Luki et al. [15] reported a lower frequency at 42%.

This prevalence was much lower than what we found. This shows an increase in the number of cases. However, it was lower than that observed by Muyembe et al. 76% in a study carried out during epidemic periods in Kinshasa between 2003-2005.

In this study, 87% of young infants under 12 months were more affected. This difference could be explained by the fact that the Muyembe study was carried out during epidemics. Nevertheless, our results were similar to literature data on the epidemiology of gastroenteritis [5,6]. Boys were more affected (59.6%) than girls by rotavirus. This male predominance over girls has been reported by most authors (Luki et al. in 1983) [15], Muyembe et al. in 2005 [16], Nsimba et al. in 2008 [13], for Africa, Larrot et al. for France [19].

The seasonal nature of rotavirus gastroenteritis, which corresponded to the dry season period, was also reported by Muyembe et al in the DRC and Marc E et al. in France.

These results corroborate data from the literature which show that in temperate countries, Rotavirus infections occur in an epidemic and seasonal context, especially during winter [21].

This study had the limitation of not having looked for other viruses or bacterial etiology. However, it addressed for the first time the clinical aspects of Rotavirus gastroenteritis in our country.

Conclusion

Rotavirus gastroenteritis in children under 5 in our environment remains a major challenge and small infants (before 12 months) have been the most affected.

Nevertheless, this study showed the relevance of the introduction of the anti-rotavirus vaccine in the national vaccination schedule of the DRC, which was only effective several years later.

Declaration of interests

The authors declare that they have no competing financial interests or known personal relationships which might appear to influence the work reported in this article.

Contribution of the authors

MUJINGA Virginie led this work, from data collection to analysis and writing of the manuscript.

AKETI PAIZANOS Loukia designed the project and oversaw the workflow.

MUYEMBE Jean-Jacques et Tshibassu Pierre provided some of the equipment and supervised the analyzes in the laboratory.

BYAMUNGU MBOKO Freddy collected the data and sent the samples.

SHIKU DIAYISU Joseph supervised the execution of the work.

Thanks

We would like to thank the INRB team for providing the sampling equipment and the families of the children who authorized the collection of data.

Declaration of conflicts of interest

This work was carried out in some rotavirus surveillance sites in the DRC.

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