

Predominance of G2P[4] among adults with rotavirus gastroenteritis in Brazil, 2004-2011: potential impact on vaccination?



GOVERNO DO ESTADO DE
SÃO PAULO

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INTRODUCTION

Group A rotavirus (RVA) infection and circulating genotypes in Brazilian children has been well characterized, nevertheless, limited information is available on the genotype infecting adults. A high prevalence of G2P[4] was lately reported in Brazil and correlated with universal RVA vaccination program using a G1P[8] live oral vaccine suggesting that this monovalent vaccine possibly created conditions in which G2P[4] could acquire selective advantage over P[8] genotypes. The molecular characterization of RVA genotypes circulating in adults could help to solve this question. The aim of this work was to monitor rotavirus (RV) infections in adults ≥ 18 years old with acute gastroenteritis during 2004-2011 Brazilian surveillance. In addition, characterized the RVA strains (G- and P-type) circulating in the adult community during this study period in order to gain insight into the supposed vaccine selective pressure imposed to Brazilian children population.

MATERIAL E METHODS

This is a retrospective and descriptive study conducted with convenient clinical samples from São Paulo (SP), Mato Grosso do Sul (MS), Paraná (PR), Tocantins (TO), Goiás (GO), Santa Catarina (SC) States, and Federal District (DF) (Fig 1). A total of 2102 stool samples were tested. RVA was detected using commercial immunoenzymatic assay and genotyped by RT-PCR. RVA negative samples were tested for the presence of group C rotavirus (RVC) by SDS-PAGE.

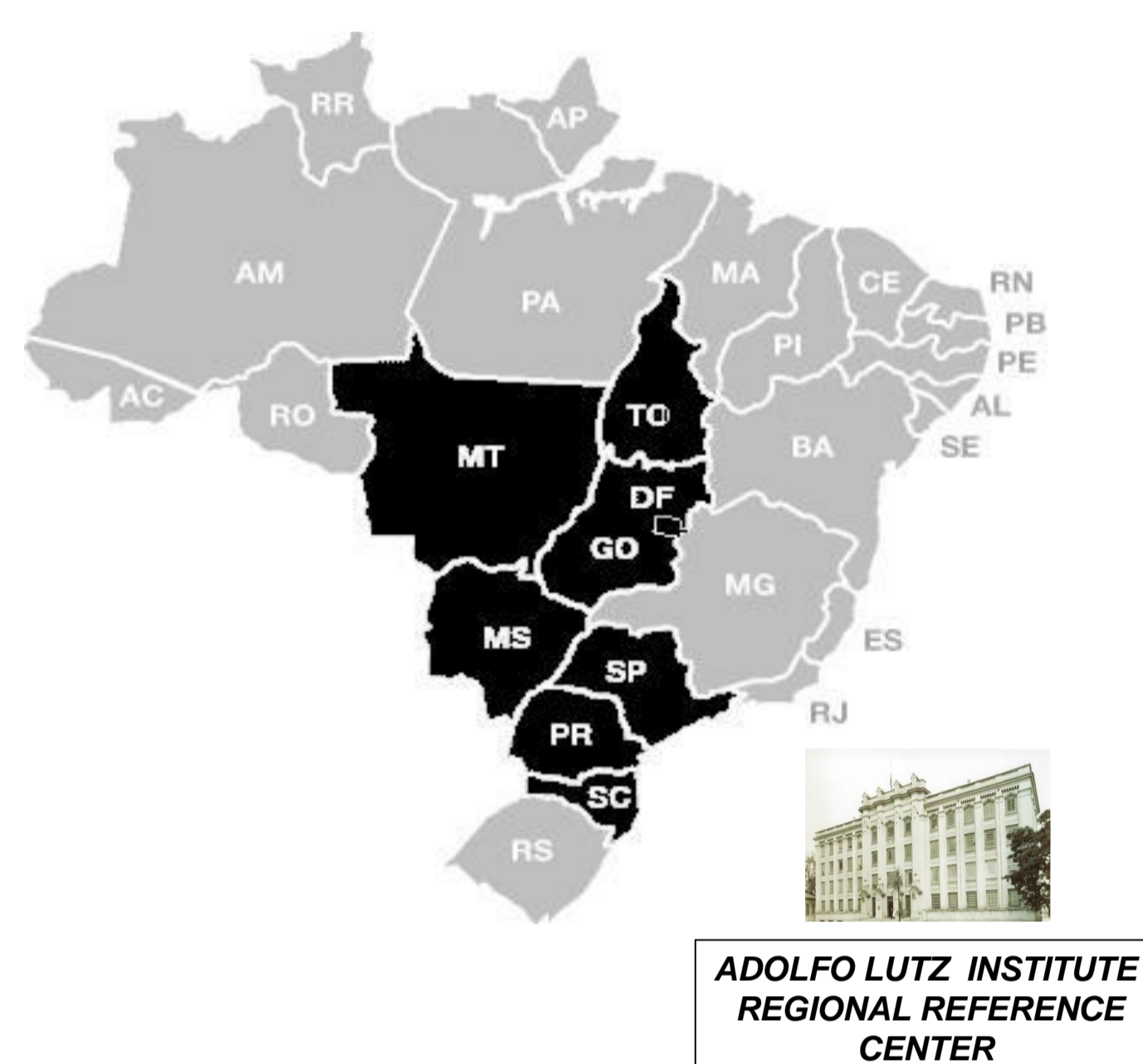


Figure 1. The states highlighted in black screened positive stool samples and sent to the Enteric Diseases Laboratory, Adolfo Lutz Institute, reference centre for rotavirus surveillance.

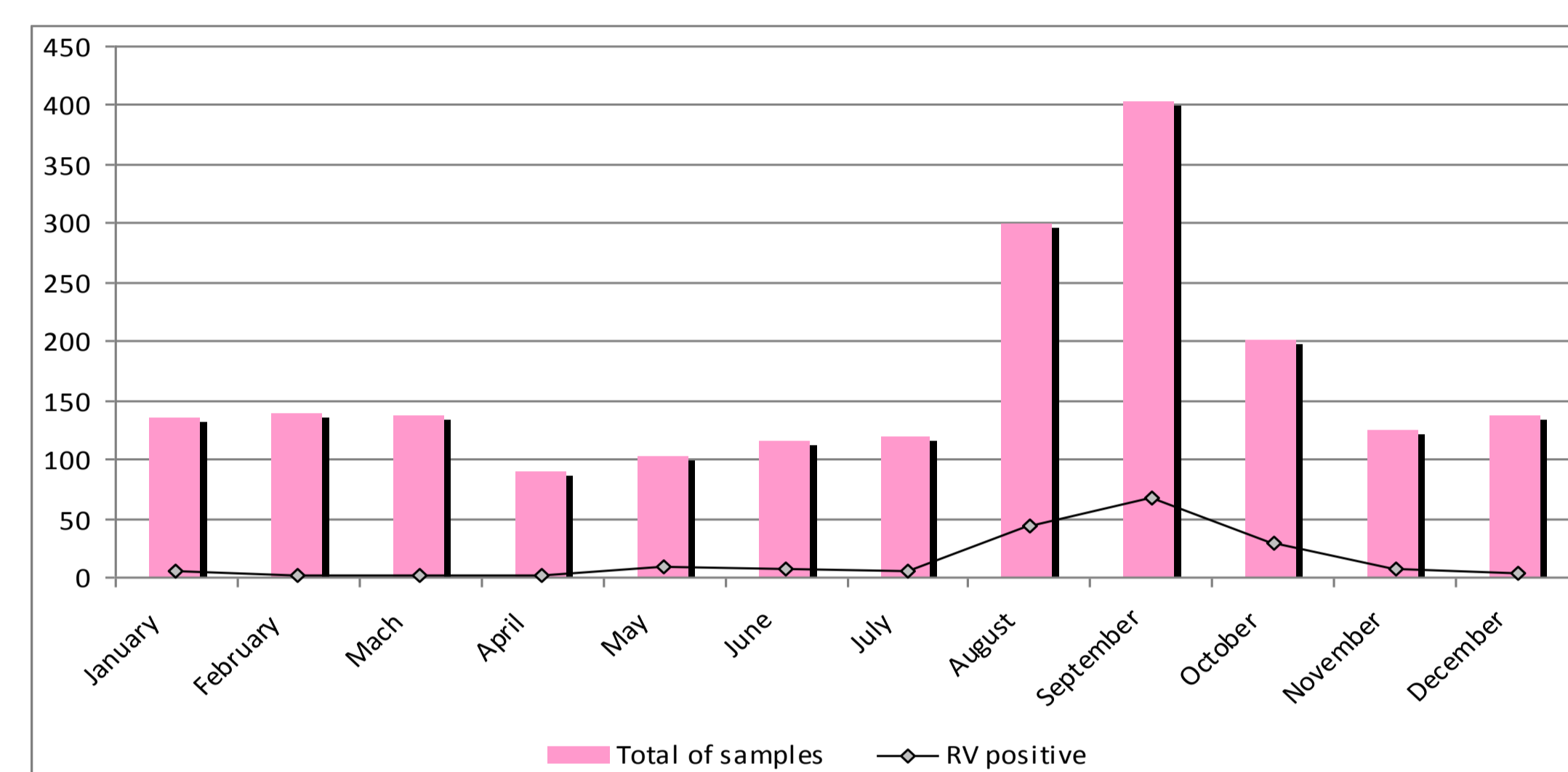


Figure 2. Temporal distribution of RV positive samples from adults ≥ 18 years old with acute gastroenteritis, Brazil, 2004-2011.

RESULTS

RV was detected in 9.6% (203/21,2) (Table 1). RV infection was found predominantly in the winter and in drier months (Fig 2). RVA infection was detected in 9.4% (197/2102) and RVC in 0.3% (6/2102). RVC cases were detected only in 2008 (3.4%; 6/178). The most frequent genotypes detected in 2004 and 2005 were G9P[8] (38.5%; 5/13) and G1P[8] (54.5%; 6/11), respectively. The dominant genotype identified from 2006 to 2011 was G2P[4] (64.5%; 116/180). Detection rate varied during the 8-year period of the study (Table 1).

Table 1. Rotavirus genotyping results from adults ≥ 18 years old presenting acute gastroenteritis, Brazil, 2004-2011.

Rotavirus Genotype	Year								Total % (No.)
	2004 % (No.)	2005 % (No.)	2006 % (No.)	2007 % (No.)	2008 % (No.)	2009 % (No.)	2010 % (No.)	2011 % (No.)	
G1P[4]	-	-	1.9% (1)	25.0% (2)	-	-	-	-	1.7% (3)
G1P[8]	30.7% (4)	54.5% (6)	7.7% (4)	-	-	-	-	-	7.8% (14)
G2P[4]	-	-	59.7% (31)	62.5% (5)	77.3% (17)	-	90.4% (57)	60% (6)	64.5% (116)
G3P[8]	-	9.1% (1)	-	-	-	-	4.8% (3)	-	2.2% (4)
G9P[8]	38.5% (5)	9.1% (1)	9.6% (5)	-	-	-	-	10% (1)	6.7% (12)
G2+G9P[NT]	-	-	3.8% (2)	-	-	-	-	-	1.1% (2)
G2+G3P[4]+[8]	-	-	-	-	-	-	1.6% (1)	-	0.5% (1)
G9P[NT]	15.4% (2)	-	-	-	-	-	1.6% (1)	-	1.7% (3)
G1P[NT]	-	-	5.8% (3)	-	-	-	-	-	1.7% (3)
G2P[NT]	-	-	1.9% (1)	-	4.5% (1)	-	-	20% (2)	2.2% (4)
GNT[8]	7.7% (1)	-	-	-	-	-	-	-	0.5% (1)
GNT[4]	-	-	-	-	-	-	-	10% (1)	0.5% (1)
GNT[NT]	7.7% (1)	27.3% (3)	9.6% (5)	12.5% (1)	18.2% (4)	100% (1)	1.6% (1)	-	8.9% (16)
Total of Genotyped Samples	68.4% (13)	91.7% (11)	96.3% (52)	80.0% (8)	95.6% (22)	100% (1)	92.6% (63)	100% (10)	91.4% (180)
RT-PCR Negative	31.6% (6)	8.3% (1)	3.7% (2)	20.0% (2)	4.4% (1)	-	7.4% (5)	-	8.6% (17)
Total RVA ELISA positive	7.8% (19)	4.3% (12)	11.2% (54)	4.6% (10)	12.9% (23)	0.7% (1)	20.0% (68)	4.6% (10)	9.4% (197)
RVC	-	-	-	-	3.4% (6)	-	-	-	0.3% (6)
Total of Samples	244	277	484	217	178	146	339	217	2102

NT = non-typed.

DISCUSSION

The peak in RV infections occurred in September, that marks the beginning of the rainy season. It can be suggested that climatic variation could promote a range of impacts upon the occurrence of RV infection in Brazilian population. The overall percentage of RVA detected among children in Brazil is much higher (~30%) than found in adults. The significant reduction in the frequency of RVA detection in children with gastroenteritis observed in Brazil after the RVA vaccine introduction was not followed by adult inhabitants. A low percentage of RVA infection was observed in 2009. According to the National Meteorology Institute records, during the year of 2009, Brazil experienced an atypical raining winter season with higher average rainfall record due to the El Niño phenomenon, therefore, this climatic condition could be involved in the low detection frequency observed. Throughout the study period, G2P[4] was the most frequent strain in adults (64.5%), providing further evidence that its predominance reflect the epidemic cycle of RVA strains instead the supposed selective advantage created by the monovalent G1P[8] vaccination program. On the other hand, it also can be suggested that adult infections may serve as a reservoir to maintain RVA strains in childhood gastroenteritis. In conclusion, this study adds further evidence that RV is a minor cause of acute adult gastroenteritis in Brazil, and suggested that adults are susceptible to the same types of RVA at the same season of the year as children. This study highlights the need for continuing surveillance in both pediatric and mature populations, to monitor the suitability of vaccines and to correlate vaccine efficacy with continuing virus evolution, and adult infections may serve as another source of RVA genomic diversity.