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Clinical characteristics and genotypes of rotavirus in adults

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G9P[4]

Immunity from a prior rotavirus infection is incomplete with infections occurring throughout life.[1–3] Data suggest that rotavirus is responsible for 3–18% of adult diarrhea, particularly during the winter–spring.[2,3] We used data from our multi-year retrospective study[2–4] of adults with community-acquired diarrhea from whom rotavirus was identified to describe the clinical characteristics, rotavirus genotypes, and predictors of adverse clinical outcomes.

The methods for this Institutional Review Board approved study have been published.[2–4] Briefly, stool specimens from adults (≥18 years) submitted to Northwestern Memorial Hospital (Chicago, Illinois) for bacterial stool culture (BSC) were collected February–May from 2006 to 2011. Hospital-acquired diarrhea and duplicate specimens were excluded.[2–4] Residual BSCs were analyzed for rotavirus by Rotaclone® and genotyped.[2–4] Demographic information, medical co-morbidities, and outcomes were abstracted. Immunocompromised individuals were defined as previously outlined.[2,3]

The Modified Vesikari Score (MVS), which has been used to quantify the severity of norovirus challenge infections in adults,[5,6] was calculated based upon a retrospective medical record review. We used a 15 point scale that eliminated the dehydration component since the use of intravenous treatment depended upon the location of care (e.g., not used in outpatients, but nearly universally used for ED visits). Subjects for whom clinical data were missing were assigned the lowest score for that category. We compared the MVS and the genotype with outcomes including hospitalization and hospital Length of Stay (LOS) ≥3 days.

Depending on the distribution of the data, Chi-square or Fisher's exact tests were used. Multivariate analyses were conducted using logistic regression or exact logistic regression. Variables significantly associated with outcome in bivariate analyses ($p < 0.10$) were included in the multivariate models and only those variables that remained significant independent predictors of outcomes were retained in the final model. Some categorical variables were reclassified as dichotomous when most categorical classifications occurred with few or zero frequency counts. For continuous variables, medians were compared using the Wilcoxon rank-sum test. All analyses were performed using SAS 9.3 (SAS Institute, Cary, NC).

Between 2006 and 2011, 125 of 4516 (2.8%) adults with a BSC available had rotavirus identified. Of these, 119 had demographic data available (95%) (Table 1). Immunocompromising conditions were present in 30%.

Among the 103 (82%) isolates that could be at least partially genotyped, the predominant genotypes included 40 (39%) G2P[4], 23 (22%) G1P[8], 15 (15%) G3P[8], and 10 (10%) G12P[6]. The marked variability in the predominant circulating type that had been observed in 2006–2010[3] continued in 2011 with G2P[4] predominating (identified in 16 of 25 BSCs, 64%).[4] Among subjects with genotyping data, G2P[4] accounted for 36% (26/72) of adults <60 years and 45% (14/31) in those ≥60 years ($p = 0.39$). An emerging genotype, G9P[4], was identified in 3/8 (37.5%) with international travel (Mexico in 2, India in 1) but in none without ($p = 0.0002$). Subjects with G3P[8] tended to have a higher median MVS (MVS = 9) than subjects without G3P[8] (MVS = 6) ($p = 0.05$). This increased MVS in those with G3P[8], however, did not result in increased risk of hospitalization or LOS. Outcomes did not differ for the most common genotypes.

Risk factors for adverse outcomes are presented in Tables 1 and 2. In multivariate models, age and increased temperature predicted hospitalization, while steroid use predicted LOS ≥3 days among hospitalized patients (Table 2).

Table 1 Characteristics of adults from whom rotavirus was detected in residual bacterial stool culture specimens.

	Overall	Hospitalization			Hospital LOS ≥3 days		
		Yes	No	*p*-value	Yes	No	*p*-value
	n = 125 (%)	*n* = 65 (%)	*N* = 60 (%)		*n* = 32 (%)	*n* = 33 (%)	
Median age in years (IQR)	47 (32–64)	57 (40–71)	36.5 (29–51)	<0.001	63.5 (42.5–76)	53 (40–68)	0.32
% Female	65 (52%)	34 (52%)	31 (52%)	0.94	16 (50%)	18 (55%)	0.72
Race/ethnicity				0.008			0.40
African American	27 (22%)	20 (31%)	7 (12%)		7 (22%)	13 (39%)	
Asian	7 (6%)	2 (3%)	5 (8%)		1 (3%)	1 (3%)	
Hispanic	9 (7%)	7 (11%)	2 (3%)		5 (16%)	2 (6%)	
White	75 (60%)	35 (54%)	40 (67%)		18 (56%)	17 (52%)	
Unknown	7 (6%)	1 (2%)	6 (10%)		1 (3%)	0 (0%)	
Immunosuppression[a]							
Any	37 (30%)	25 (38%)	12 (22%)	0.06	17 (53%)	8 (24%)	0.02
HIV	11 (9%)	7 (11%)	4 (7%)	0.53	2 (6%)	5 (15%)	0.42
SCT/SOT	11 (9%)	5 (8%)	6 (11%)	0.52	4 (13%)	1 (3%)	0.20
Active cancer	14 (11%)	11 (17%)	3 (6%)	0.06	9 (28%)	2 (6%)	0.02
Steroids	10 (8%)	8 (12%)	2 (3%)	0.09	8 (25%)	0 (0%)	0.002
Other chronic comorbid conditions[a]							
Hypertension	41 (33%)	32 (49%)	9 (17%)	<0.001	17 (53%)	15 (45%)	0.54
Diabetes	14 (11%)	13 (20%)	1 (2%)	0.002	7 (22%)	6 (18%)	0.71
Kidney disease	8 (6%)	7 (11%)	1 (2%)	0.05	5 (16%)	2 (6%)	0.26
Inflammatory bowel disease	5 (4%)	5 (8%)	0 (0%)	0.04	4 (13%)	1 (3%)	0.20
Clinical findings[a]							
Median number of the maximum episodes of diarrhea per 24 h (IQR)	5 (2–12)	6 (2–10)	5 (2–12)	0.89	5.5 (3–10)	7 (2–12)	0.76
Number of episodes of diarrhea							
1–3 episodes	41 (33%)	24 (37%)	17 (41%)	0.93	11 (34%)	13 (39%)	0.71
4–5 episodes	13 (10%)	8 (12%)	5 (12%)		5 (16%)	3 (9%)	
≥6 episodes	53 (42%)	33 (51%)	20 (48%)		16 (50%)	17 (52%)	
Missing	18 (14%)	0	18		0	0	
Median duration (in days) of diarrhea (IQR)	2 (1–4)	1 (1–3)	3 (2–5)	<0.001	1 (1–3)	2 (1–3)	0.54
Duration of diarrhea							
1–4 days	84 (67%)	56 (86%)	28 (68%)	0.05	27 (84%)	29 (88%)	0.91
5 days	8 (6%)	2 (3%)	6 (15%)		1 (3%)	1 (3%)	
≥6 days	14 (11%)	7 (11%)	7 (17%)		4 (13%)	3 (9%)	
Missing	19 (15%)	0	19		0	0	
Median number of the maximum episodes of vomiting per 24 h (IQR)	1 (1–3)	2 (1–3)	1 (1–3)	0.23	1 (1–3)	1 (0–2)	0.42
Number of episodes of vomiting							
None	43 (34%)	20 (31%)	23 (55%)	0.01	11 (34%)	9 (27%)	0.90
1 episode	36 (29%)	22 (34%)	14 (33%)		11 (34%)	11 (33%)	
2–4 episodes	20 (16%)	18 (28%)	2 (5%)		8 (25%)	10 (30%)	
≥5 episodes	8 (6%)	5 (8%)	3 (7%)		2 (6%)	3 (9%)	
Missing	18 (14%)	0	18		0	0	
Median duration (in days) of vomiting (IQR)	1 (1–2.5)	1 (1–2)	2 (1–4)	0.007	1 (0–1)	1 (0–1)	0.50