NOTES

Clinical Features of Acute Infantile Gastroenteritis Associated with Human Rotavirus Subgroups I and II

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During a prospective 3-year study, clinical and epidemiological features of rotavirus gastroenteritis in black infants were investigated. Fever and temperatures exceeding 39°C were more frequent in children shedding subgroup II rotaviruses, whereas vomiting was more pronounced in children with subgroup I infection. Diarrhea, dehydration, duration of illness, and the need for admission to a hospital ward were similar in both groups.

Rotavirus is recognized as an important etiological agent associated with acute infantile gastroenteritis throughout the world. The most commonly occurring human rotaviruses have been classified into two subgroups based on antigenic differences which are detectable by various immunological assays (8, 19). The development of monoclonal antibodies against these subgroup-specific proteins has allowed the identification and characterization of the rotavirus subgroups from clinical material (5, 10, 14). Rotavirus infection causes a spectrum of disease in infants and young children that varies from mild diarrhea to severe and sometimes fatal dehydration (7). Vomiting has been reported to be a prominent symptom of rotavirus infection (2); dehydration has been linked more strongly to rotavirus infection than to bacterial illness, and it is this severe dehydration which is potentially fatal (9). There is an urgent need for a rotavirus vaccine, especially in the developing communities where the morbidity and mortality resulting from rotavirus infection is still significant. Vaccine trials have been undertaken with both a live attenuated rhesus rotavirus strain (3, 11) and an attenuated bovine strain (6, 16). It is now of great importance to gain knowledge about the epidemiology of the prevalent strains in different countries where immunoprophylaxis might be considered. This study was conducted to obtain information on the epidemiology and clinical characteristics of infection with the two rotavirus subgroup types circulating among black infants and young children in South Africa.

Rectal swabs and stool specimens were collected between March 1983 and March 1986 from 1,316 infants and young children admitted to the gastroenteritis unit at Ga-Rankuwa Hospital. The patient ages ranged from 4 days to 54 months, with a mean age of 9.5 months; 55% (719 of 1,315; 1 unknown) of the patients were male. The stool specimens were analyzed for the presence of rotavirus by the Rotazyme II enzyme-linked immunosorbent assay (Abbott Laboratories, Chicago, Ill.). Clinical data on infection were obtained for each child from a history given by the parents and from the bed chart which is completed by the attending nursing staff at the hospital. The clinical data obtained included (i) the temperature of the child on admission, (ii) the dehydra-

TABLE 1. Occurrence of subgroup I and II rotaviruses

Type of rotavirus infection	No. of patients	Age range	Mean age (mo)
Subgroup I	42	1–21 mo	7.8
Subgroup II	253	3 wk–36 mo	8.9
Neither	44	2–36 mo	8.8

tion status of the child as assessed by the attending physician, (iii) the presence of vomiting for more than 1 day, (iv) the number of days of diarrheal illness, and (v) whether the child was discharged or transferred to a short-stay ward at the hospital (taken as an indication of the severity of the illness). Not all clinical data for every child was available. All the rotavirus-positive specimens were analyzed for subgroup specificity by enzyme-linked immunosorbent assay using monoclonal antibodies, as described elsewhere (1, 5, 12).

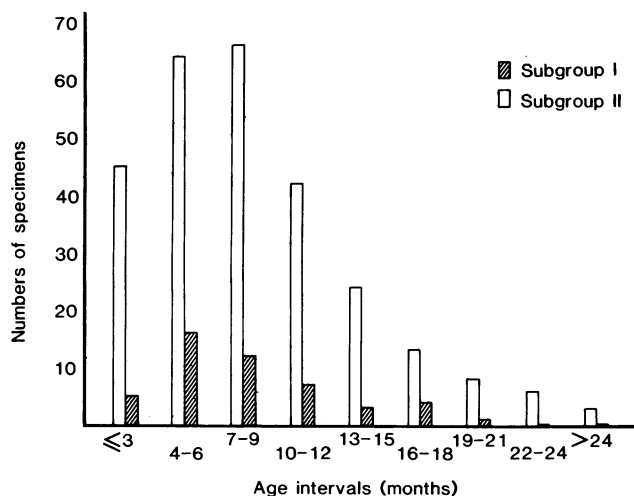In total, 339 stool specimens (25.8%) were shown to

FIG. 1. Age distribution of rotavirus subgroups.
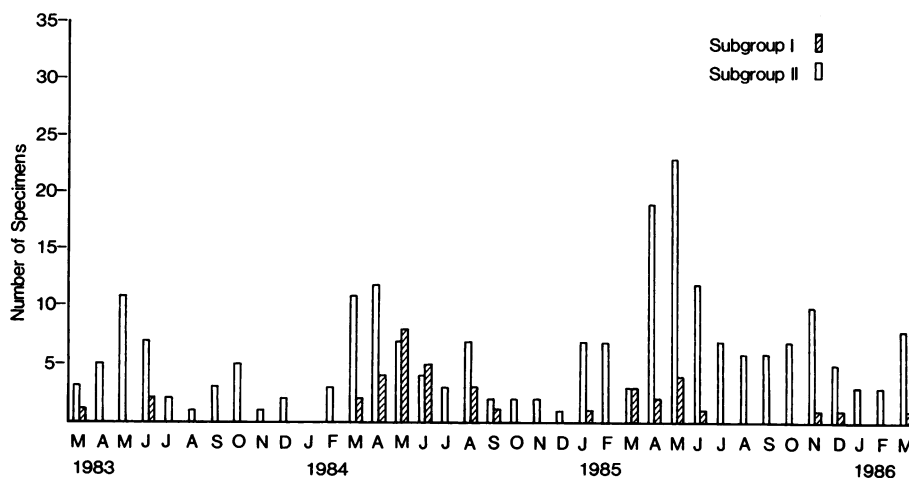
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FIG. 2. Temporal distribution of rotavirus subgroups.

contain rotavirus, and subgroup II rotaviruses were by far predominant, as can be seen in Table 1. Both rotavirus subtypes predominantly infected children younger than 18 months of age (Fig. 1), and there was an equal distribution of rotavirus subgroup types I and II between the sexes. Rotavirus is predominantly a winter disease, and each year there was a peak of rotavirus infection during the autumn and early winter. The distributions of rotavirus subgroup I and II infections showed the same climatic pattern, with the winter peak in activity (Fig. 2).

Clinically, rotavirus infection among these black infants has been shown to be significantly associated with the presence of vomiting and with a shorter duration of illness than was observed with bacterium-associated illness (13). The clinical features of infection with either subgroup I or II rotaviruses are shown in Table 2. Diarrhea, dehydration, and duration of illness occurred at similar rates in both sets of children. However, the presence of vomiting was significantly more likely in individuals with a subgroup I rotavirus infection ($P < 0.05$), whereas fever with a temperature of more than 39°C was more likely to occur in infants excreting a subgroup II rotavirus ($P < 0.05$). Of the patients infected with rotavirus, 16% (47 of 295) were admitted to a short-stay ward at the hospital, although there was no statistical difference in admission rates between the rotavirus subtypes.

Few studies have been undertaken to examine the differences in clinical manifestations of infection with subgroup I and II rotaviruses. White et al. (17) found no differences in the clinical presentations associated with the two rotavirus subgroups. However, other studies have shown that subgroup II infections were more severe than those caused by subgroup I viruses. Yolken et al. (18) reported that diarrhea

and clinical dehydration were more strongly associated with subgroup II rotaviruses. Uhnoo and Svensson (15) showed that fever and temperatures exceeding 39°C were significantly more common in children who shed subgroup I rotaviruses, whereas diarrhea and vomiting were more pronounced in children shedding subgroup II viruses.

In this study, fever with temperatures above 39°C was found to be more strongly associated with subgroup II rotaviruses. This is in contrast to the results of Uhnoo and Svensson (15), who tested 168 stool specimens obtained from children in Uppsala, Sweden. The reason for the difference between the Swedish results and those reported here is not known. However, it is of interest that in contrast to this study in which 95% (321 of 339) of the rotavirus infections were found in children less than 18 months old, in the Swedish study one-fourth of the subgroup I infections and one-third of the subgroup II rotavirus infections occurred in children over 24 months old and up to 15 years of age. Also, just 37% of the Swedish children were less than 1 year old, whereas 76% of our patients were under 1 year old. It is possible that the clinical manifestations of infection are slightly varied in different age groups of children. Although diarrhea was present in both sets of children, with no association between the different subgroups, the presence of vomiting was more pronounced in subgroup I rotavirus infections, again in contrast to the results found in the Swedish study (15). This difference might be the result of differences in defining vomiting as a symptom; this study examined the presence of vomiting lasting more than 1 day, whereas Uhnoo and Svensson reported that more than five vomiting episodes per day was more common in children shedding subgroup II rotaviruses.

In conclusion, it is clearly apparent that infection with a

TABLE 2. Clinical features of patients infected with subgroup I and II rotaviruses[a]

| Rotavirus subgroup | No. of patients | No. (%) of patients | | | | | | | | | | | |
| | | % Dehydration | | | Vomiting | | Fever (°C) | | Days ill | | | Transfer to wards | |
		<5	5–10	>10	Yes	No	37.7–38.9	>39	<4	5–7	>7	Yes	No
I	42	27 (71)	8 (21)	3 (8)	41 (98)[b]	1 (2)	34 (83)	7 (17)[b]	34 (81)	6 (14)	2 (5)	9 (21)	33 (79)
II	253	143 (61)	70 (30)	21 (9)	187 (87)[b]	27 (13)	151 (63)	89 (37)[b]	198 (81)	40 (16)	6 (3)	38 (15)	215 (85)

[a] Not all data for all children were available.
[b] Statistically significant at $P < 0.05$.

particular subtype of rotavirus is not consistently associated with specific clinical symptoms and may be of little value in terms of vaccine consideration. Recent studies have indicated that the serotype analysis of rotavirus strains will be an essential part of the eventual evaluation of vaccine efficacy. Preliminary data from vaccine studies conducted in various areas of the world indicate that monovalent serotype 3 vaccines were efficient in inducing significant resistance to severe rotaviral diarrhea only in areas where the prevalent serotype of rotavirus was the same as that of the vaccine strain but were not particularly successful in areas where the prevailing serotype was different (4, 16). The different clinical characteristics associated with subgroup I and II rotavirus infections stress the importance of expanding our knowledge about the epidemiologies and pathogenicities of the subgroups. This knowledge should contribute to the effective development and administration of an efficient rotavirus vaccine.

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