ROTAVIRUS-ASSOCIATED DIARRHOEAL DISEASE IN LIBYAN INFANTS UP TO ONE YEAR OF AGE

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SUMMARY: The incidence of rotavirus-associated diarrhea in 390 cases of hospital-based Libyan neonates (age: ≤ 28 days) and infants (age: < 28 days to 1 year) with symptoms of diarrhea and vomiting was studied over a period of 12 consecutive months. Rotaviral antigen in the fecal specimens was detected by enzyme linked immunosorbent assay technique using Enzygnost reagents of Behringwerke, West Germany. Fecal specimens were assigned as 'positive' or 'negative' for rotaviral antigen as per criteria of the assay kit. The overall rotaviral incidence (% ± standard error) was 16.9% ± 1.8 (66/390) with 8.1% ± 2.2 (11/135) and 21.5% ± 2.5 (55/255) occurring in neonates and infants respectively (Neonates vs Infants: χ^2=11.31, p< 0.001). The monthly incidence showed seasonal variations with higher percentages occurring during February (25%, 6/24), May (23,5%, 8/34), June (21%, 8/38), September (26.6%, 12/45), and December (20%, 6/30). The significance of these findings are discussed and compared with reports from other countries.

Key words: Diarrhea, rotavirus, gastroenteritis.

INTRODUCTION

Acute diarrhoeal diseases constitute a major public health problem throughout much of the world today. Diarrhea is found consistently among the leading causes of morbidity and mortality in children under 5 years of age in developing countries (12). Viruses have been implicated as a cause for diarrhoeal disease since 1973 (2). Among them, rotavirus appears to be the most common viral agent responsible for acute non-bacterial diarrhoea in infants and young children in both developed and developing countries (10, 11). The incidence of rotavirus diarrhoea may vary considerably from year to year even in the same location. There are reports that, it's incidence is more common in winter in temperate climates and in rainy season in tropics and subtropics (6, 12). However, this phenomenon of seasonality is not clear-cut as there are reports of lack of seasonality in some tropical countries (12). Rotavirus diarrhea occurs in all age groups but is most severe in infants and young children (12). Although the frequency of virus-associated diarrhoeal diseases in children from Benghazi, Libya has been published locally, these studies were based on small samples of Libyan children over a short period of time (3, 4). We have followed the incidence of rotavirus diarrhea round the year (September 1987 to August 1988) in symptomatic neonates (age: ≤28 days) and infants (age: ≤1 year) from Jamahiriya Hospital (Neonatal Ward) and El-Fatah Children Hospital, Benghazi, Libya.

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PATIENTS AND METHODS

Three hundred and ninety six Libyan neonates and infants (Neonates: 135 cases, age: ≤28 days, sex: 68 males and 67 females; Infants: 255 cases, age: >28 days to ≤12 months, sex:130 males and 125 females) were selected at random from cases admitted to the hospitals with symptoms of severe diarrhea and vomiting and were studied for possible rotaviral excretion in fecal specimens. One hundred and twenty fecal specimens from healthy infants (Neonates: 56 cases, age: ≤28 days, sex: 30 males and 26 females; Infants: 64 cases, age: >28 days to ≤12 months, sex: 34 males and 30 females) admitted to the hospitals for minor surgical and other medical reasons were also included in the study as normal controls. Fecal, specimens were collected in sterile containers on the day of admission, extracted with buffer on the same day and the supernatants

were kept frozen at -40°C for up to 48 hours until tested for rotavirus.

Rotaviral antigen was detected by the enzyme linked immunosorbent assay (ELISA) technique using the enzygnost reagents of Behringwerke, West Germany. Faeces were assigned as 'Rotavirus-ELISA positive' or 'Rotavirus-ELISA negative' as per criteria of the assay kit. The sensitivity and specificity of this assay kit is expected to be at least equivalent to that of electron microscopy as evaluated on human fecal specimens by the manufacturer.

The percentages of 'Rotavirus-ELISA positive' cases and the standard error (SE) of percentages were calculated by standard statistical procedures and the actual proportions were compared statistically by Chi-square (χ^2) test (7).

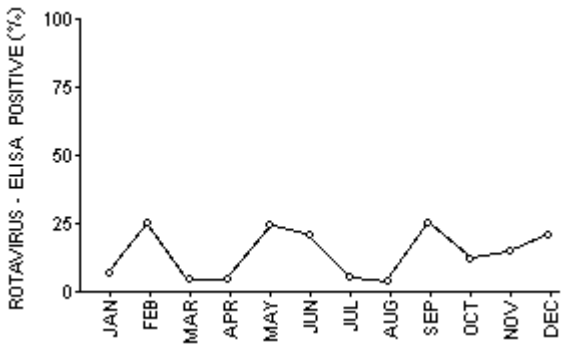
RESULTS

The incidence of rotavirus ELISA-positive cases according to age and their statistical analyses are stated in Table 1. The overall yearly incidence (%±SE) was 16.9 % ± 1.8, with 8.1% ± 2.2 and 21.5% ± 2.5 occurring in neonates and older infants respectively. The monthly percentage occurrence of rotavirus ELISA-positive cases which showed seasonal variation (Figure 1) were as follows: January-4.1% (1/24), February-25% (6/24), March-2.7% (1/37), April-2.8% (1/36), May-23.5% (8/34), June-21% (8/38), July-6.2% (2/32), August-2.9% (1/34), September-26.6% (12/45), October-12.5% (4/32), November-1.33% (4/30), December-20% (6/30). The other viral, parasitic or bacterial agents which can also cause diarrheal diseases were not looked at in the present study.

DISCUSSION

The peak incidence of rotaviral infection occurs early in life including the neonatal period, and its importance has recently been recognized. The incidence of 16.9% ± 1.8 observed in our study is comparable with reports from Jamaica (15% ± 2.5; χ^2=0.292; p >0.5) but lower than that found in central African Republic (27% ± 3.1; χ^2=8.14, p<0.005) (11, 12). This incidence of 16.9% ± 1.8 is nevertheless lower than the findings of 40% ± 3.5 (χ^2=36.81, p<0.001) and 22.5% ± 2.9 (χ^2=2.49, p >0.1) reported earlier from Benghazi locally which may be due to small number of specimens, the short period of time covered and the age groups included in the previous studies (3, 4).

Figure 1: The monthyl occurrence of rotavirus associated diarrheal disease in 396 Libyan neonates and infants up to one year of age.



Regarding the neonates the incidence of 8.1% ± 2.2 observed in our study is similar to the report from Nigeria (5% ± 1.8; χ^2=1.38, p >0.1) (9). On the other hand rotavirus infection as high as 21.5% ± 4.5 in newborns (age: ≤7 days) has been reported from Pondicherry, India (12). In most of the countries, the peak occurrence of rotavirus infection is observed in older infants up to 11 months of age (12). In our present study, the occurrence of rotavirus-ELISA positive cases was also higher in older infants (21.5% ±±2.5) than in neonates (8.1% ± 2.2) (χ^2=11.31, p<0.001).

It is interesting to note that our results showed seasonal variations with high percentages of rotavirus ELISA-positive cases occurring in the months of February, May, June, September and December. This was taken as evidence of the epidemiology observed with different climatic conditions (12). The reasons for these uneven seasonal incidence of rotavirus infection are yet unknown. It is known that the occurrence of rotaviral diarrhea may vary considerably from year to year even in the same location (12). There are reports which indicate that rates of rotavirus diarrhea are considerably lower in community-

Table 1: The incidence of rotavirus-ELISA positive cases in symptomatic Libyan neonates and infants up to one year of age.

Subjects	Rotavirus-ELISA positive/Total (Percentage ± SE)
A. Neonates and Infants (up to one year of age):	66/390 (16.9 % ± 1.8)
B. Neonates (Age: ≤28 days):	11/135 (8.1% ± 2.2)
C. Infants (Age: >28 days to 1 year):	55/255 (21.5% ± 2.5)
D. Normal controls (Age: ≤1 year):	2/120 (1.6% ± 1.1)

χ^2 = 32.244, df = 2, p< 0.001, SE: Standard error

based settings compared to hospital based studies and rotavirus cases tend to be over-represented among hospitalized patients. Various epidemiological factors affecting the incidence of rotavirus diarrhea in our patients are not known. A parallel study similar to that conducted in middle east (1) and other countries (12) is required in Libya to identify the risk factors and the serotypes which influence the occurrence and severity of rotaviral diarrhea (5, 8).

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