The epidemiology and disease burden of rotavirus infection in the Salento peninsula, Italy

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The aim of this study was to delineate the epidemiology of rotavirus gastroenteritis in the Salento peninsula, Italy. The study lasted a year and included the gathering of data on hospitalizations for enteritis caused by rotaviruses in the pediatric wards of seven hospitals in the Province of Lecce. During 2004, 7,938 children were hospitalized; 973 of them had gastroenteric symptoms and 202 were positive for rotavirus. The percentage of admissions to hospital was high in autumn and at the beginning of spring. The highest incidence of the disease was observed in children aged between 1 and 2 years, especially males. The morbidity of diarrhea caused by rotavirus followed a seasonal pattern and a distribution in terms of age group and sex that were in line with what has been seen in other geographical areas.

In conclusion, on the basis of the data gathered in this study, the cases of acute gastroenteritis seem to represent an important cause of hospitalization in the Salento peninsula.

Key words: epidemiological surveillance, rotavirus, viral gastroenteritis.

Intestinal infections still represent one of the main public health problems all over the world. We are dealing therefore with a relevant problem with a substantial impact on families and on health costs. The high number of children who undergo a medical examination or who are admitted to hospital with gastroenteritis highlights the importance of this illness.

Among the agents discovered in the course of surveillance studies undertaken in various parts of the world on the etiology of diarrhea, rotaviruses are the most frequently implicated viruses. These viruses are responsible annually for around 3.3 million deaths in the population below five years of age in developing countries[1,2]. In industrialized countries, the problem is clearly less dramatic, although rotaviral infections still represent an important cause of hospitalization of pediatric-aged children and entail high social costs.

Studies on the impact of rotaviruses in Europe are limited; the rates of incidence recorded in European countries appear highly heterogeneous and the studies currently available do not allow us to determine whether these variations are due to real differences in the epidemiology of these viruses or rather reflect differences in the diagnostic methods[3-6].

The data reported in the literature show a seasonal and geographical pattern, with infections in countries with a temperate climate mainly seen during autumn and winter[7,8]. Furthermore, on the basis of studies carried out on hospitalized patients, it has been demonstrated that the highest frequency of disease is usually observed in children below five years of age[9,10].

On a global level, however, very few data are available regarding laboratory-confirmed cases of gastroenteritis associated with rotaviruses, because pediatricians rarely request a specific

diagnosis, partly due to the high cost of the tests but above all because the etiological diagnosis does not affect the treatment of the gastroenteric illness[11].

There is a need, therefore, to implement national systems for the surveillance of enteritis caused by rotaviruses so as to draw up intervention programs based on sound epidemiological data. The objective of this study was to delineate a new and more precise epidemiological picture of acute illnesses of the gastroenteric tract in the Salento peninsula and, in particular, of those with rotaviral etiology. Specifically, the study evaluated, for the year 2004, the rate of infections caused by rotaviruses that required hospitalization in children below five years of age.

Material and Methods

The study was performed between January and December 2004 and involved the pediatric wards of seven hospitals in the province of Lecce, specifically Casarano, Copertino, Galatina, Gallipoli, Lecce, Scorrano and Tricase (Fig. 1). During the study period, all the records regarding children aged between 0 and 16 years hospitalized to any of the above-mentioned hospitals with gastroenteric symptoms were anonymously collected. Gastroenteritis was defined as the occurrence of vomiting and/or diarrhea. Diarrhea was defined as the passing of two or more liquid or semi-liquid stools or a single watery stool per day by a child. Children with chronic diarrhea and intoxication, etc. were excluded. Identification of the disease as a gastroenteritic episode was made by the pediatrician.

Fig. 1. Distribution of the seven sentinel hospitals in the Salento peninsula.

A report was compiled for each patient with demographic data (age, sex, city of residence) and clinical information: cases with diarrhea, vomiting and/or fever. The diagnosis for rotavirus infection was carried out in the Clinical Virology Laboratories of the hospitals by means of rapid screening tests currently available on the market, such as latex agglutination (ROTAGEN, Biokit; Hospitals of Copertino, Gallipoli, Lecce and Scorrano), immuno-enzymatic (VIDAS Rotavirus, BioMerieux; Hospital of Casarano) and immuno-chromatographic (ROTA-STRIP QUICK-TEST, Amplimedical; Hospitals of Galatina and Tricase) tests.

According to the producers, these tests have a sensitivity and specificity ranging between 95.7-100% and 96.3-100%, respectively.

The monthly data concerning the detection of rotaviruses at each hospital were stratified in accordance to age, gender and symptomatology.

Results

The study population at risk comprised 130,239 children up to the age of 16 years domiciled in the Salento peninsula.

During 2004 in the province of Lecce, 7,938 children were hospitalized; 973 (12.3%) of these had gastroenteric symptoms, constituting 0.75% of the study population at risk.

The number of monthly hospitalizations was more or less constant during the year studied, with a slight drop in autumn. Admissions to hospital for acute gastroenteritis increased during the first few months of the year reaching a peak in April, when they accounted for 17.3% of total hospitalizations.

A positive rapid screening test was obtained in 202 patients, corresponding to 2.5% of total admissions to hospital and 20.8% of hospitalizations for gastroenteritis (Table I).

Concerning total hospitalizations, admissions for rotavirus infection were higher in the first part of the year; the highest admission rate was registered in May (6.4%) and the lowest in October (0.48%).

Table I. Detection of Rotaviruses in Children Admitted to the Pediatric Wards of Hospitals in the Province of Lecce

Hospital	Number of hospitalizations	Gastroenteritis n (%)	Rotavirus-positive n (%)
Casarano	990	141 (14.2)	38 (3.8)
Copertino	1883	157 (8.3)	37 (2.0)
Galatina	724	182 (25.1)	63 (8.7)
Gallipoli	1083	118 (10.9)	16 (1.5)
Lecce	1432	155 (10.8)	14 (1.0)
Scorrano	1052	136 (12.9)	14 (1.3)
Tricase	774	84 (10.9)	20 (2.6)
Total	7938	973 (12.3)	202 (2.5)

The rate of positive rapid screening tests among symptomatic patients followed a similar pattern in the course of the period under study, ranging from 41.1% in May to 5.6% in October (Fig. 2).

Concerning the age of patients, the highest morbidity was observed in children below five years of age (92.1%). The rate of enteritis sustained by rotaviruses ranged from 11.9% in newborns (0-1 year) to 53.5% in children aged between 1 and 2 years, and fell to 26.7% in children aged between 3 and 5 years. Furthermore, diarrhea caused by rotaviruses was more frequent in males (54.5%) (Table II).

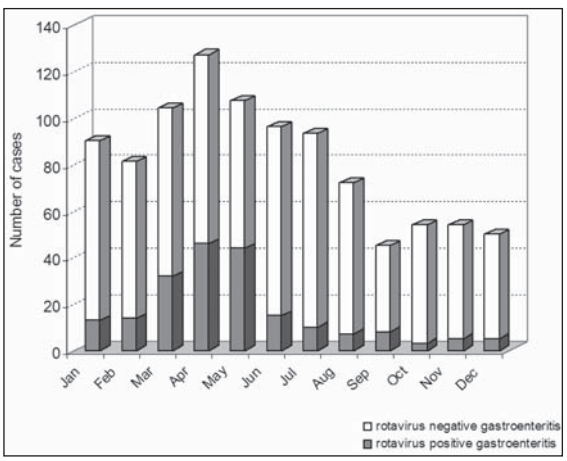

Fig. 2. Pattern over time of gastroenteritis in children admitted to the seven sentinel hospitals in the Salento peninsula.

From the clinical point of view, diarrhea was present in all cases, while vomiting was observed in 87.7% of patients. The simultaneous appearance of diarrhea and vomiting and of diarrhea, vomiting and fever was registered in 13.4% and in 74.3% of cases, respectively. Finally, a coinfection, sustained especially by adenoviruses or salmonella spp, was observed in 8.4% of hospitalized patients with rotaviral enteritis (Table III).

Discussion

The infections caused by rotavirus in the Salento peninsula, as in Italy in general, are not subject to specific surveillance, due to the absence of an integrated system for monitoring acute illnesses of the gastroenteric tract; the epidemiology and the impact of these infections are thus little known.

Our research provides data on enteritis caused by rotavirus in children admitted to hospital for acute diarrhea in the Salento peninsula,

Table II. Characteristics of the 202 Children Admitted to Hospital and Prevalence of Gastroenteritis in Children <16 Years

AGE (months)	Children admitted to hospital n	Rotavirus-positive n (%)
0-12	96	24 (11.9)
13-35	354	108 (53.5)
36-60	239	54 (26.7)
>60	284	16 (7.9)
SEX		
Male	531	110 (54.5)
Female	442	92 (45.5)
Total	973	202 (100)

Table III. Symptoms of Patients Hospitalized for Gastroenteritis in the Salento Peninsula

Symptoms	Rotavirus-positive n (%)	Rotavirus-negative n (%)
Diarrhea	12 (5.9)	20 (2.6)
Diarrhea and vomiting	27 (13.4)	153 (19.9)
Diarrhea and fever	13 (6.4)	50 (6.5)
Vomiting	0	8 (1)
Vomiting and fever	0	4 (0.5)
Diarrhea, vomiting and fever	150 (74.3)	536 (69.5)
Total	202 (100)	771 (100)
Concomitant diagnoses	17 (8.4)	2 (0.5)

thus contributing to the understanding of the epidemiological framework of this disease in Italy. In general, rotaviruses were detected in 20.8% of children admitted to hospital for enteritis in the pediatric wards of hospitals in the province of Lecce. Data obtained are in line with the results observed in Spain (24%)[12], Finland (26%)[13] and England (29%)[14].

The rate of the cases of enteritis caused by rotaviruses in the Salento peninsula, as in other countries with a temperate climate, was greater during winter and the beginning of spring, thus confirming the existence of a seasonal pattern as reported in the literature[15].

Concerning age, other authors indicate that the prevalence of diarrhea caused by rotaviruses remains high from 4 to 36 months, with a peak between 12 and 23 months, after which it declines. In our study, the highest morbidity was found in children aged between 1 and 2 years. In addition, as has been observed in other countries, hospitalization was slightly more frequent in males[3,11,16,17].

Enteritis caused by rotaviruses varies widely in its clinical aspects: from asymptomatic or very light forms of the disease to serious forms with severe dehydration. The disease is heralded by a slight fever and vomiting, followed by watery diarrhea, with little mucus. The fever and vomiting ease off during the second day of illness, but the diarrhea lasts for 5-7 days, although it tends to clear up spontaneously. Our research on children admitted to hospital showed the presence of all major symptoms (diarrhea, vomiting and fever) in 74.3% of cases; this situation is probably due to the fact that less serious infections are treated at home, without consulting a pediatrician and above all without admission to hospital.

Data obtained in this study demonstrate that cases of acute gastroenteritis represent an important cause of hospitalization in the Salento peninsula and that a significant portion of these are caused by rotaviruses. Therefore, considering the social and health costs of gastroenteric illnesses and the lack of epidemiological and etiological information in this regard, a broad program of surveillance of these infections is imperative in order to plan adequate measures of control and prevention.

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