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LONGITUDINAL STUDY OF ACUTE RESPIRATORY DISEASES IN RIO DE JANEIRO: OCCURRENCE OF RESPIRATORY VIRUSES DURING FOUR CONSECUTIVE YEARS.

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SUMMARY

The occurrence of different viruses in nasopharyngeal secretions from children less than 5 years old with acute respiratory infections (ARI) was investigated over a period of 4 years (1982-1985) in Rio de Janeiro. Of the viruses known to be associated with ARI, all but influenza C and parainfluenza types 1, 2 and 4 were found. Viruses were found more frequently in children attending emergency or pediatric wards than in outpatients. This was clearly related to the high incidence of respiratory syncytial virus (RSV) in the more severe cases of ARI. RSV positive specimens appeared mainly during the fall, over four consecutive years, showing a clear seasonal ocurrence of this virus. Emergency wards provide the best source of data for RSV surveillance, showing sharp increase in the number of positive cases coinciding with increased incidence of ARI cases. Adenovirus were the second most frequent viruses isolated and among these serotypes 1, 2 and 7 were predominant. Influenza virus and parainfluenza virus type 3 were next in frequency. Influenza A virus were isolated with equal frequency in outpatient departments, emergency and pediatric wards. Influenza B was more frequent among outpatients.

Parainfluenza type 3 caused outbreaks in the shanty town population annually during the late winter or spring and were isolated mainly from outpatients. Herpesvirus, enterovirus and rhinovirus were found less frequently. Other viruses than RSV and parainfluenza type 3 did not show a clear seasonal incidence.

KEY WORDS: Respiratory syncytial virus; Adenovirus; Influenza virus; Parainfluenza virus; Enterovirus; Epidemiology.

INTRODUCTION

For the past decades there has been an increased awareness of the importance of acute respiratory infections (ARI) in the children living in the developing countries where morbidity and mortality due to this disease group is very high[13]. It is now recognized that through a major scientific effort, together with political support, means could be found for the effective control of ARI. A long-term study of acute respiratory infection (ARI) in children was started in 1980 in Rio de Janeiro to investigate the importance of the problem and the causative viruses. The first two years of study of a well defined shanty town community, confirmed the importance of viruses in the etiology of ARI in children of that community[21] and provided some evidence that influenza and respiratory syncytial virus (RSV) had a marked seasonal variation. In that preliminary study, standard procedures for the isolation and identification of viruses by tissue culture were employed. The results giving an isolation rate of about 20% were comparable with those of studies in other parts of the world.

It was recognized that the addition of other procedures, such as immunofluorescence directly on cells in nasopharyngeal secretion, would in-

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crease the detection rate particularly of the more labile viruses.

It was also apparent that further studies should be done on children from a much wider population, and that greater emphasis should be placed on children with lower respiratory tract infections, if the seasonal incidence of respiratory viruses was to be confirmed. To achieve this objective emergency and pediatric wards in hospitals in widely separated parts of Rio de Janeiro were selected for study so that nasopharyngeal secretions could be obtained from children with evidence of lower respiratory tract infection. The present paper describes the seasonal incidence of laboratory confirmed cases of respiratory viruses infections in children at different levels of health care over a period of 4 years.

MATERIALS AND METHODS

City description

In the 1980 census[8], the population of Brazil was estimated to be 121.113.084. Of these 9.5% lived in the State of Rio de Janeiro, which is the State with the highest population density of this country (260 inhabitants/Km^2). The State's population is almost all 93% concentrated in the urban areas. The greater metropolitan area has 9.2 million inhabitants and of these 5.2 million lived within the cities limits. In the metropolitan areas children under the age of five constituted 10.6% of the population. Rio de Janeiro has a subtropical climate, with an average maximum and minimum temperature of 26.5° C and 20.5° C, respectively. The temperature range is from 12° C to 36° C with an average relative humidity of 81, and aproximately 12 cm of rain per year (the wet months are December and January and to a lesser extent the months of June through August). The city's income source are commerce and tourism as well as some governamental and industrial activities. Major sources of air pollution are transport and petrochemical plants. The metropolitan area is divided into two zones, namely the city (Município do Rio de Janeiro) and the suburbs (Baixada Fluminense). The city itself is divided in two parts (Zona Norte and Zona Sul) by a mountain chain. The Zona Norte can be also divided into two parts, one considered rural (west) and the other part (east) having a high population density. The study sites were mainly located in the east of the city. The suburbs are located on a large plain and have several cities such as Nova Iguaçu (pop. 1.101.627), Duque de Caxias (pop. 580.893), São João de Meriti (pop. 402.335).

The Zona Norte and suburbs are linked to the city by railways and a main highway (Avenida Brasil). Other cities such as Niterói (pop. 408.519) and São Gonçalo (pop.680.844) are connected by ferry boat or long bridge. Many people live in one of the cities and commute regulary to the others, Rio de Janeiro city being the focal point of professional activity and population concentration. Although the poor people live mainly in the great metropolitan areas, the city of Rio de Janeiro itself has many shanty towns on the mountain side which are crowed with low-socio economic families.

Study Design

We defined our target population as children under the age of five belonging to the lower socioeconomic group of the city. Nasopharyngeal secretions (NPS) were collected from those with acute respiratory infections (ARI) within seven days of onset, attending different levels of health care service such as outpatients department, emergency and pediatric wards. Complete descriptions of the population under study and of the health services that have participated in the project can be found in our previous papers[20,21]. Specimens collected from over five years old people were also included. These older people are mainly persons such as relatives and hospital, health unit and laboratory staff with ARI symptoms and in close contact with patients. All the specimens were transported to the laboratory at 4° C (wet ice) within two hours of collection. In the laboratory, one aliquot of about 0,5 ml of NPS was put into virus transport medium (VTM) for isolation procedures as described previously[17,18]. The remainder of the NPS was for immunofluorescence as described by P.S. GARDNER and J. MCQUILLIN[5]. RSV, parainfluenza type 3 and influenza A specific anti-sera raised in calves and anti-bovine and anti-rabbit immunoglobulins conjugated to fluorescein were obtained from Wellcome Laboratory.

Parainfluenza type 2 and influenza B specific anti-sera (rabbit) were obtained from the Central Public Health Laboratory (UK), parainfluenza type 1 and adenovirus specific anti-sera (rabbit) were

kindly supplied by Dr. M. Grandien, National Bacteriology Institute, Stockholm.

Patients

Clinical specimens were collected in different locations and over different time periods as shown in figure 1. The population based study covered a two years period starting in January 1982 and ending in April 1984, and 252 clinical specimens were taken during medical consultations at the primary health care unit. From other patients attending this unit an additional 568 specimens were collected from January 1982 through April 1984 and from January to December 1985.

The second semester of 1984 was omitted because of a shortage of human resources. The outpatients department of the Hospital Universitário (HU) UFRJ sent 75 specimens from August 1982 to October 1984. The emergency wards study started in March 1982 at the Hospital Salgado Filho (HSF), Hospital Geral de Bonsucesso (HGB) and Urgências Pediátricas (URPE) continued to March 1985, October 1984 and January 1985, respectively. From April 1983 the Hospital do Andaraí (HA) was also introduced until April 1985. A total of 663 samples were obtained: 247 from the HSF, 179 from the HGB, 147 from the HA and 90 from URPE. The inpatients study yielded 551 samples from 4 hospitals. Policlínica de Botafogo (PB) and Hospital Salles Netto (HSN) were enrolled into the study from March 1982. The HSN was removed from the study in October 1983 as this hospital serves mainly as a reference hospital for diarrhoeal diseases and there was a shortage of personal. The Hospital do Andaraí (HA) was included in January 1985 to compensate for the elimination of the HSN. PB was eliminated from the study in April 1984 as result of a major change in health policy that diminished drastically the number of hospitalizations at this unit. Table I shows the number of specimens (1651), that fitted the criteria of three health care levels over the period 1982 through 1984. In the first two years about half of the specimens were from the primary health care unit of the School of Public Health. The changed in 1984 when specimens were almost exclusively from the hospital studies. The study was directed mainly towards lower respiratory tract infections (LRTI). The specimens from the population based study at the primary health care unit provided most to the upper respiratory tract infections (URTI).

Almost half (49%) of the patients were under the age of one, and of these 2/3 were in the first six months of life. The remainder of the specimens were mainly from children between 1 and 2 years of age, while children between 3 and 5 years produced only 13 percent of the specimens. The predominance of specimens from males is clear and the ratio of total male to female was 1.19 to 1.00. The duration of disease before the specimens were taken shows that 74% of the specimens were collected when the disease was within the first four days of disease onset. This is important in regard to virus detection.

RESULTS

During a four years period 2109 specimens from under five years old children were processed for virus diagnosis. An average of 14 NPS were received each week with a maximum of sixty NPS each week during the high ARI period and minimum of 2 NPS during the long holidays: Carnival, Christmas, Easter (Figure 2). The Table II shows the results in the three levels of medical care. The percentage of virus detected varies between 26.8 and 36.8. All the viruses that are responsable for ARI were found, except the parainfluenza virus type 1,2 and 4 and influenza C. Patients attending emergency and pediatrics wards yielded more viruses than outpatients, and this is clearly due to a high RSV occurrence in the former groups. Among the specimens received from outpatients, RSV was detected in 13%. This proportion was high in children from emergency wards (29.5%) or from pediatric wards (23.5%). Figure 2 shows the distribution of RSV positive clinical specimens received for different levels of medical care during four consecutive years. RSV positive specimens were concentrated between the epidemiological week 10 and 36, showing a clear seasonal occurrence of this virus. The peaks of RSV positive cases were sharper in emergency wards than among outpatients or inpatients. A relatively small proportion of specimens (27.3%) was collected from emergency wards and pediatric wards during the periods before the 10th week and after the 36th week. No other viruses showed this seasonality and RSV was the only viral agent which predominated when an increase of ARI cases occurred in pediatric and emergency wards. Figure 3 shows the distribution of RSV positive cases in the city of Rio de Janeiro, during the weeks of high prevalence of the virus. Positive cases were concentrated in the areas with

high population density. Adenovirus was the second more frequent virus isolated, being much more frequent among outpatients (16.6%) than in patients hospitalized in pediatric (11.6%) or emergency wards (10.2%). A total of 85 strains of adenovirus were isolated, all belonging to serotypes 1 to 7. The most frequent were types 2 (29.4%), 1 (22.3%) and 7 (20%). The adenovirus type 7 (27%) and type 2 (22.9%) predominate among the isolates from children in emergency and pediatrics wards.

Adenovirus type 2 (37.5%) and 1 (27.5%) were the most frequent among the children living in the shanty town (outpatients). Figure 4 shows the distribution of parainfluenza virus type 3 in Rio de Janeiro from 1982 to 1985. In the shanty town population this virus appears to have caused oubreaks during the second semester (late winter and spring) of 1982 and 1983. Only two isolations were obtained out of these periods. In specimens from hospitals, parainfluenza type 3 virus occurred during all the year in frequency. Influenza viruses were also more frequent among the outpatients than among the inpatients.

Influenza B viruses were isolated mainly from outpatients department (shanty town population). Few were from children at emergency wards and none from children in pediatric wards. Influenza A viruses were isolated from patients attending the three levels of medical care.

Figure 5 shows the influenza virus occurrence during the four consecutive years in the Rio de Janeiro. No clear seasonality could be noted. Influenza B virus occurred yearly since 1982, in several different months. Influenza A occurred in the late fall and winter (1982 and 1983) and also during the spring (1982, 1984 and 1985) and summer (1985). From a total of 47 influenza viruses isolated 65.9% were type A and the remaining 34.1%, type B. The influenza A viruses were classified as H3N2 (83.8%) and H1N1 (16.2%).

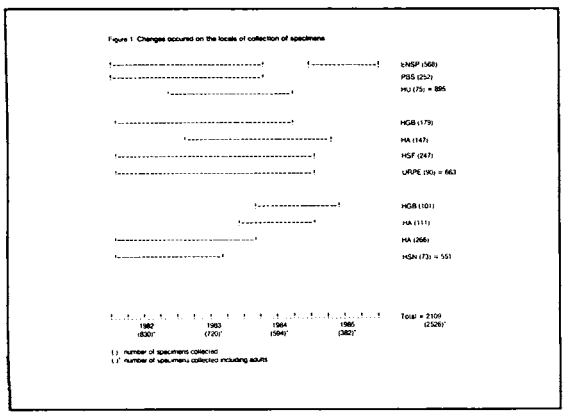
Half of the H1N1 viruses were isolated from children under five years old and 3.9% of the H3N2 viruses were from adults as were also 25% of the influenza B viruses. The influenza A (H3N2) were further characterized as related to the standards A/Bangkok/1/79 (viruses isolated during 1982) and A/Philipines/2/82 (viruses isolated during 1983 to 1985). The influenza A (H1N1) were related to the standards A/England/333/80 (viruses isolated during 1982) and A/Chile/1/83 (viruses isolated during 1985). The influenza B virus isolated from 1983 were related to the standard B/Singapore/222/79 and the others isolated from 1984 to 1985 were related to the standard B/USSR/100/83.

The herpesvirus isolated from children under five years old were classified as herpes simplex type 1 and were seven times more frequent among outpatient. The enteroviruses were the fourth group in frequency among all the children, being the fifth only for the outpatients. The twenty-seven enteroviruses isolated included poliovirus type 1 (30%), type 2 (7%) and Coxsackievirus B5, Echovirus type 1, 2, 19 and 31 (22.2%). Thirty-seven percent of the enterovirus were not identified using the Melnick pool, probably because they represent a mixture of viruses. Rhinoviruses were found in a lower proportion at the three levels of medical care. Five additional rhinoviruses strains were also isolated from the laboratory staff during the period of study. Other viruses occasionally found and recorded in Table II as miscelaneous were mumps (2), measles (3) and citomegalovirus (1). Table III shows the distribution by year of the specimens collected from children under five years old during 1982, 1983 and 1984. The total yield of virus varied from 30 to 32 percent. RSV and adenovirus occurrence were quite constant, but influenza and parainfluenza viruses varied year to year. Rhinovirus were not detected during 1982 and 1983. Table IV shows the distribution by age of the specimens collected from children under five years old during 1982, 1983 and 1984. The yield of viruses decrease from the youngest to oldest patients. RSV and adenovirus were prevalent for all ages but influenza was prevalent mainly among older children.

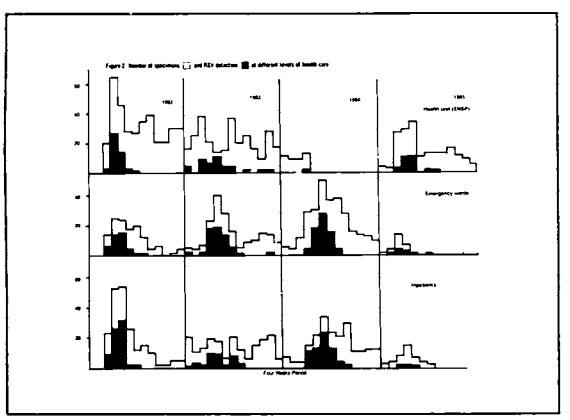
DISCUSSION

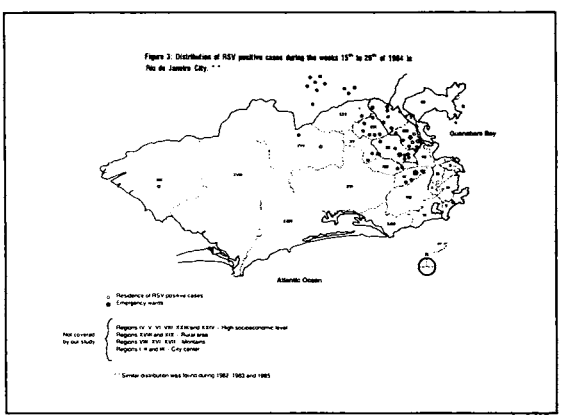
Our main objective was to expand our previous study as it was impossible to know if the shanty town results[21] were representative of the city as a whole. We decided to investigate more severe ARI cases and to expand the etiological investigations. This study has limitations due to the difficulties of obtaining continous data and specimens without the support of the health authorities. Other factors beyond our control such as strikes in the health sector and changes in health policies had

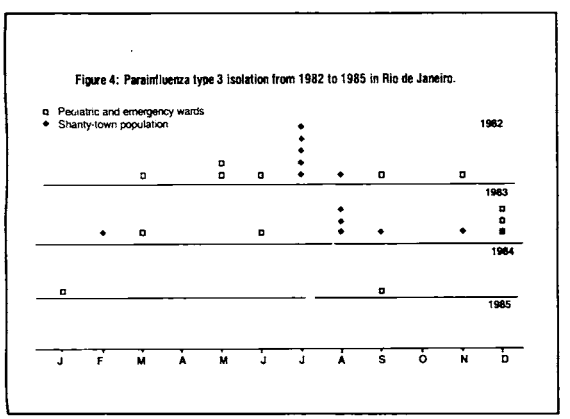
an important impact on the development of the original project. However we belive that important information have been obtained from this investigation. The primary health care level is the best location for the study of benign and moderate cases of ARI and it provides a large variety of viral agents. The pediatric wards in hospital are good sources of specimens from moderate and severe ARI but due to the over flow of patients to private pratices many patients become unacessible to investigation during ARI epidemic peaks. The emergency wards gave the best indications of seasonal variation of moderate and severe ARI and of the viral agents associated with LRTI in early childhood. It was even very difficult to collect clinical specimens at this level of medical care out of the severe ARI peak incidence (April to June) when emergency wards are plenty of children showing bronchiolitis, bronchitis and pneumonia.



The majority of patients brought for medical care were children in the first year of life, reflecting greater concern of parents for the health of young children; there was also a predominance of males over females as reported in other studies[4]. The importance of RSV as the major pathogen related to severe cases of ARI has been amply demonstrated, as the role of other viruses such as influenza, adenovirus and parainfluenza viruses has also been stressed[1,13]. In Brazil many etiological studies involving people of all ages have been done in Rio de Janeiro[6], São Paulo[2,22] and Belém[9] during differents epidemiological periods. Most of these studied ARI outbreaks in closed communities







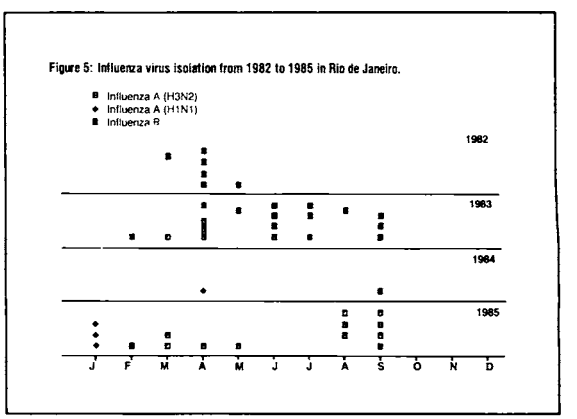


TABLE 1.
Characteristics of the Children investigated for virus etiology by year

Year		1982(%)	1983(%)	1984(%)	Total(%)
Sex	Male	370	318	242	930
	Female	290	252	203	745
	Total	**660**	**570**	**445**	**1675**
	M:F. ratio	1.28:1	1.26:1	1.19:1	1.25:1
Age	0-6 months	221(34)	171(31)	173(41)	565(35)
	7-11 months	100(15)	90(16)	45(11)	235(15)
	1 year	154(24)	128(23)	93(22)	375(23)
	2 years	87(13)	74(13)	57(14)	21813)
	3 years	51(8)	47(9)	29(7)	127(8)
	4 years	29(4)	25(5)	18(4)	72(4)
	5 years	9(1)	12(2)	3(1)	24(1)
	Total	**651**	**547**	**418**	**1616**
Health care level					
	Health post	335(51)	262(46)	15(3)	612(37)
	Emergency wards	168(25)	171(30)	281(66)	620(37)
	Pediatric wards	157(24)	130(23)	132(31)	419(25)
	Total	**660**	**563**	**428**	**1651**
Clinical diagnosis					
	URTI*	60(10)	93(17)	10(2)	163(11)
	LRTI**	509(90)	453(83)	419(98)	1381(89)
	Total	**569**	**546**	**429**	**1544**
Days after the onset of symptoms when samples were taken					
	1 day	118	123	89	330(22)
	2 days	96	77	55	228(15)
	3 days	115	113	63	291(20)
	4 days	95	86	65	246(17)
	5 days	68	62	50	180(12)
	6 days	38	27	38	103(7)
	7 days	47	40	20	107(7)
	Total				**1485**

* = Upper Respiratory tract Infection
** = Lower Respiratory tract Infection

or during short periods of time. The viral etiology was studied by classical methods of virus isolation in cell culture and/or eggs and it is very difficult to compare results obtained in different laboratories using different methods. Our previous paper using viral isolation from oropharyngeal swabs collected from outpatients underestimates the importance of RSV in this population[20]. In the Northern hemisphere outbreaks of illness associated with RSV occur regulary in the winter months, from late autumn to early spring. This seasonal distribution was been described for several countries such as the U.S.A. and Japan[1], Finland[12] and England[16] and Norway[11]. In the Southern hemisphere there appears to be wide variation but studies have often been short-term so a seasonal incidence might not have been apparent. For example in Brazil, RSV has been isolated from children in outbreaks of ARI in Belém[9], São Paulo[2,22] and Porto Alegre[14] but a seasonal distribution was not sharply defined. In the more Southern Countries of America like Uruguai[7] and Argentina (personal communication for Dr. M. Weissenbacher) the peak incidence of RSV has been during the winter months (June, July and August). Similar findings of a winter incidence have been reported from Australia and

TABLE 2.

Specimens received from under five years old children and viruses detected (period: from January, 1982 to December, 1985).

	Total of specimens	Specimens yielding virus	% of Specimens yielding virus	Viruses Identification (%)							
				RSV	PF3	Ad	Flu	Herpes	Rhino	Entero	Misc
Outpatients	895	240	26.8	119 (49.6)	15 (6.2)	40 (16.7)	36 (15)	9 (3.8)	3 (1.3)	14 (5.8)	4 (1.7)
Emergency wards	663	244	36.8	196 (80.3)	4 (1.6)	25 (10.2)	7 (2.9)	3 (1.2)	3 (1.2)	6 (2.4)	0
Inpatients	551	172	31.2	130 (75.6)	8 (4.6)	20 (11.6)	1 (0.6)	1 (0.6)	3 (1.7)	7 (4.0)	2 (1.2)
Total	2109	656	31.1	445 (67.8)	27 (4.1)	85 (12.9)	44 (6.7)	13 (2.0)	9 (1.4)	27 (4.1)	6 (0.9)

TABLE 3.

Specimens yielding virus by year and viruses identification

Virus	YEAR 1982(%)	1983(%)	1984(%)	Total(%)
Adenovirus	31(13)	25(14)	15(11)	71(13.6)
Influenzavirus	9(4)	20(11)	1(0.7)	30(5.8)
Parainfluenzavirus	12(6)	15(8)	2(1.4)	29(5.6)
R.S. Virus	144(71)	109(60)	108(81)	361(69.4)
Rhinovirus	0(-)	0(-)	4(3)	4(.8)
Coxsackievirus	0(-)	1(0.5)	0(-)	1(.2)
Echovirus	1(0.5)	0(-)	0(-)	1(.2)
Others	6(3)	13(7)	4(3)	23(4.4)
Total Virus positive	203	183	134	520
% of total of Specimens	30.8	32.0	30.1	31.0

South Africa[1]. Neverthless, a long term study carried out in Sidney (Australia) showed that RSV can also peak during the fall[3]. Throughout the whole 4 years period of our study, the main peak incidence of laboratory confirmed cases of RSV infection was in autumn in the months of March, April and May, and the virus was only rarely detected during the rest of the year. This correlates with the mortality data showing a high mortality by LRTI over this same period[15]. Each year RSV began to be detected early in March at the end of the summer holidays. Similar findings have been obtained in Panama[10] and Trinidad[19]. There was no correlation with the rainy season, which is January and February, nor with the coldest months which are June to August. In our study RSV appeared at the same time on children at 3 different levels of health care in all parts of Rio de Janeiro. Children at outpatient clinics, emergency and pediatric wards were all a good source of virus. Children in pediatric wards were least suitable as the turn-over of available beds limited the number of cases

TABLE 4.
Specimens yielding virus by age (1982-1984)

	AGE					
	< 1 year(%)	1 year(%)	2 years(%)	3 years(%)	4 years(%)	5 years(%)
Adenovirus	39(12)	15(16)	11(29)	2(11)	1(9)	1(12)
Influenzavirus	7(2)	9(10)	5(13)	4(22)	1(9)	2(25)
Parainfluenzavirus	15(4)	7(8)	2(5)	1(6)	2(18)	0(-)
R.S. Virus	255(76)	59(64)	13(34)	9(50)	7(64)	5(62)
Rhinovirus	2(1)	0(-)	0(-)	2(11)	0(-)	0(-)
Coxsackievirus	0(-)	0(-)	2(5)	0(-)	0(-)	0(-)
Echovirus	1(-)	0(-)	0(-)	0(-)	0(-)	0(-)
Others	15(4)	2(2)	5(13)	0(-)	0(-)	0(-)
Total	**334**	**92**	**38**	**18**	**11**	**8**
Total of Specimens	**790**	**375**	**218**	**127**	**72**	**24**
% of specimens yielding viruses	**42%**	**24%**	**17%**	**14%**	**15%**	**33%**

available for testing whereas in the emergency wards children remained for only short periods and more specimens became available over critical time. In our previous paper[21] we had a false impression that influenza virus circulated only during winter months. We clearly show now that influenza virus can cause outbreaks during all seasons in Rio de Janeiro when a longer period was studied.

Influenza B was shown to be much more frequent during 1982 to 1985 than during the previous two years, 1980 to 1981[21]. Among the influenza A, the H3N2 variants were more frequent than H1N1 as also in other countries at the same time[25,26,27,28]. Adenovirus types detected in the present study are similar to those obtained by us during 1980-1981 in the shanty town population[21] and those described by others in Rio de Janeiro and in several other countries[24]. Parainfluenza type 3 occurred during the second semester of two consecutive years (1982 and 1983) in the shanty town population, as previously shown for the years 1980 and 1981[21]. We do not have data for 1984 due to gap on the specimens collection from the shanty town population during this year (Figure 1). The seasonal prevalence of parainfluenza type 3 is different from country to country. Outbreaks occur in summer or early autumn in the United Kingdon or during winter in Norway and Denmark[12]. We could not detect parainfluenza virus type 1, 2 and 4 or influenza C but these viruses usualy occur with a low frequency in other studies conducted in developed countries[12]. The enteroviruses were the fourth group in frequency among all the children, being the fifth only for the outpatients. In our previous study, enteroviruses were ten times more frequent than RSV. Among them we could identified 37% as poliovirus which were considered vaccinal strain as they were isolated mainly during antipoliomielytis vaccination campain. Other enteroviruses that could be identified were Coxsackievirus B5 and Echovirus Type 1, 2, 19 and 31. None of these had been isolated during 1980 to 1981 when Coxsackievirus B4 predominated[21]. Among the other viruses found we think that rhinovirus must be more frequent than we could detect as we lack an efficient system for rhinovirus diagnosis. Rhinoviruses were detected mainly during the last two years (1984-1985) of this study reflecting a major disponibility of the diploide cell strain (MRC-5) for diagnostic work. An important consequence of this project was to increase the interest of physicians in etiological studies and in the use of rapid diagnostic techniques as an aid to the management of patients and of wards outbreaks. Considering that infant mortality due to respiratory diseases have a clear season-

ality during the winter months in Southern Brazil[23] or autumn months in Rio de Janeiro[15] that coincides with a larger virus circulation we recommend a good respiratory virus surveillance system to control child mortality in Brazil.

RESUMO

Estudo longitudinal sobre doença repiratória aguda no Rio de Janeiro: Ocorrência de Vírus Respiratório durante quatro anos consecutivos.

Investigamos, durante um período de 4 anos (1982 a 1985), a ocorrência de vírus em secreções de nasofaringe coletadas de crianças com menos de 5 anos de idade apresentando quadro clínico de infecção respiratória aguda (IRA), residentes na cidade do Rio de Janeiro. Foram encontrados todos os vírus conhecidos como associados a IRA, com excessão do vírus influenza C e parainfluenza 1, 2 e 4. Vírus foram isolados mais freqüentemente de crianças internadas em salas de emergência e enfermarias que daquelas atendidas em ambulatório. Este fato está claramente relacionado com a alta inciência do vírus sincicial respiratório (RSV) nos casos mais severos de IRA. Espécimens positivos para RSV aparecem principalmente durante o outono, nos 4 anos consecutivos, indicando uma ocorrência sazonal. As salas de emergências são a melhor fonte de dados para vigilância do RSV, onde um aumento no número de casos positivos corresponde a um aumento no número total de casos de IRA internados. Os adenovírus ocupam o segundo lugar entre os vírus freqüentemente isolados, sendo predominante os sorotipos 1, 2 e 7. Embora em menor número os vírus influenza e parainfluenza tipo 3 também são encontrados. Vírus influenza A foram isolados igualmente em crianças internadas em enfermarias, salas de emergência e nos pacientes atendidos em ambulatórios, enquanto o vírus influenza B é predominante neste último grupo.

O vírus parainfluenza tipo 3 causou surtos anuais na população residente na favela durante o final do inverno ou primavera e foi isolado principalmente das crianças atendidas no ambulatório. Herpesvírus, enterovírus e rinovírus foram encontrados com menor freqüência. Dos vírus isolados somente o RSV e o parainfluenza tipo 3 mostraram uma incidência sazonal bem definida.

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