

## THE PREVALENCE OF ANTIBODY TO HUMAN PARVOVIRUS B19 IN RIO DE JANEIRO, BRAZIL

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### SUMMARY

During 1985 and 1986 serum samples were collected from the Rio de Janeiro population and examined for the presence of IgG antibody to human parvovirus B19. No difference in prevalence was found between males and females. Antibody prevalence rose from 35% in children less than five years old to almost 80% in children aged eleven to fifteen years. The antibody prevalence in individuals over 50 years old was over 90%.

**KEY WORDS:** Human parvovirus B19 anti-B19 IgG prevalence.

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### INTRODUCTION

Research throughout the world has shown the association of the human parvovirus B19 infection with human disease such as erythema infectiosum (fifth disease), aplastic crisis in chronic haemolytic anaemia, arthritis and intrauterine death. The increasing importance of parvovirus in human disease has recently been reviewed by several authors<sup>3,20,23</sup>.

Parvovirus B19 infection has recently been described in the Brazilian population<sup>14,18</sup> and B19 virus has been found in the serum of a blood donor from Cabo Frio, R.J.<sup>12</sup>. We now report the prevalence of antibodies against B19 in different age groups of people living in Rio de Janeiro city.

### MATERIALS AND METHODS

#### Sera

Sera collected from the general population

attending the out-patient department of the Santa Casa de Misericórdia do Rio de Janeiro as part of the Influenza Surveillance Program conducted by Fiocruz since 1980 were kindly provided by Dr. G. M. Deane. We selected at random 552 sera (263 from males and 289 from females) from those collected mainly during the year of 1985. Some of the samples from children less than five years old were obtained during 1986.

#### Assays for antibody to human parvovirus B19

##### i) Counter-immunoelectrophoresis (CIE)

This assay was carried out as previously described<sup>7</sup> using the "P" serum<sup>10</sup> as positive antibody control and serum 186/84 from a B19 positive Japanese blood donor<sup>17</sup> as antigen. Both reagents were used undiluted and after the electrophoresis the gel was left overnight at room temperature before recording final results.

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**ii) IgG capture radioimmunoassay (RIA)**

We used a method previously described<sup>8</sup> having as antigen the partially purified BrII virus obtained from a B19 positive British blood donor<sup>17</sup> and monoclonal VRL/B19/11<sup>8</sup> as the anti-B19 antibody. Sera were recorded as positive when the result is one or greater than one arbitrary units (a.u.). One arbitrary unit is the value found for a 1/100 dilution of a strongly positive control sera pool.

**RESULTS**

Overall, 407 (73.7%) of the 552 samples tested contained IgG antibody against parvovirus B19 by RIA (Table 1). Of the positives, 120 (29.4%) were weakly positive (1 to 3.3 au). The remaining positive sera were equally divided between intermediate (3.4 to 10 au) and strong (greater than 10 au) reactions. Of the 552 sera tested 19 (3.4%) had value of 1 au which was confirmed on more than one occasion. The prevalence of antibody by RIA was 196/263 (74.5%) in males and 211/289 (73%) in females. The distribution of weak, intermediate and strong positive results in males and females is shown in Table 1.

The prevalence of IgG positive sera increased with age up to the 11-15 years old age group (Figure 1). Prevalence was lower in the 16-30 years old age group but increased to more than 95% in the oldest age groups. The distribution of strong, intermediate and weak positive sera was quite similar for all the age groups studied (Figure 1) and the shape of the curve would have been the same whether the cut-off value to define positive sera was greater than 1, greater than 3.3 or greater than 10 au.

A hundred sera from persons aged between 20 to 30 years were also examined by CIE and we found a good correlation between strong positivity by RIA and positivity by CIE (Table 1). Of the 19 sera positive by CIE, 17 (89%) had more than 10 au by RIA, and two had 3.8 au and 1.9 au respectively. Of the 33 sera negative by CIE and positive by RIA only five (15.1%) had more than 10 au.

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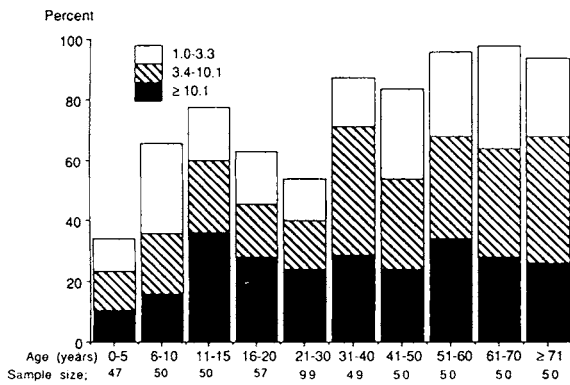
TABLE I

Anti B19 prevalence in males and females

RIA	Total	Males	Females
No. of sera	522	263	289
Anti B19 + (IgG)	407 (73.7) <sup>a</sup>	196 (74.5)	211 (73.0)
Strong + (> 10 au)	137 (33.6) <sup>b</sup>	60 (30.6)	77 (36.4)
Intermediate + (3.4 to 10 au)	150 (36.8)	77 (39.2)	73 (34.5)
Weak + (1 to 3.3 au)	120 (29.4)	59 (30.1)	61 (28.9)
CIE	Total	Males	Females
No. of sera	100	50	50
Anti B19 +	19 (19)	8 (16)	11 (22)

a – percentage of the total of sera tested.

b – percentage of the positive sera.



**Figure 1** – Prevalence of antibody to human parvovirus B19 in different age-groups measured by RIA. Percentages of strong (10.1 a.u.) intermediate (3.4 – 10.1 a.u.) and weak (1.0 – 3.3 a.u.) positive sera in each group are shown.

10 au. The distribution of anti-B19 results by CIE in males and females is shown in Table 1.

## DISCUSSION

Infection by the human parvovirus B19 is as widespread in Rio de Janeiro city as has been described in other countries, including Japan<sup>19</sup>, USA<sup>2,15</sup>, West Germany<sup>21,22</sup> and England<sup>9,10,13</sup>. The age-specific distribution of B19 IgG antibody parallels the age-specific attack rates of erythema infectiosum, which is mainly an illness of school-age children. In different countries the prevalence of B19 IgG antibody ranges from 2% to 24% in children less than five years old, to 15% to 51% in children between five and 18 years old. In adults, between 30% to 60% have been found positive for B19 IgG<sup>2,9,10,13,15,19,21,22</sup>. The differences found in these studies may be due to differences in the sensitivity of the tests used: CIE<sup>10,13,19</sup>, EIA<sup>2,15,21,22</sup> or RIA<sup>9</sup>. Age profiles in the population tested and regional differences in infection rates may also affect the antibody prevalence. An important point to consider is the year when the serum samples were collected because the incidence of B19 infection varies according to a 6 year epidemic cycle<sup>6</sup>. For example, the antibody prevalence found among children living in North-London in 1982/1983 was lower than among children throughout England and Wales whose serum samples were collected in

TABLE 2

Correlation between anti B19 antibodies found by counter immunoelectrophoresis (CIE) and radioimmunoassay (RIA)

CIE	RIA		Total
	Positive	Negative	
Positive	19	0	19
Negative	33	48	81
Total	52	48	100

1985/1986 after a B19 outbreak<sup>4,9</sup>. It is also important to note that sample sizes vary between studies.

For all these reasons we chose as a reference the British serological study<sup>9</sup> both because the antigen and the technique used for it were the same as for this present study and because sera were selected from the same years. The main differences between the two studies were the size of the sample, which was three times larger in the British study (1722) than in this Brazilian study (552); and the distribution of the population analysed, which in the British study was spread over eight cities including 300 sera from North London and in the Brazilian study was concentrated in one very crowded city, Rio de Janeiro. In both the British and Brazilian populations there was a gradual increase in antibody prevalence by age but with a decrease in the 21 to 40 years age group in Britain and in the 16 to 30 year age group in Rio de Janeiro. This pattern was also found in the Japanese population with a decrease in the 20-29 year old group<sup>19</sup> and in the German population in the 31 to 50 years age groups<sup>21,22</sup>. We do not know the reason for it. All populations showed a gradual increase in antibody prevalence in older age groups. The antibody prevalence among the Brazilian sera was slightly higher than among the British sera in all the age groups. This may not be significant as the Brazilian sample sizes were small, in which case the British study may be closer to the true prevalence. Alternati-

vely Brazilian sera collected in a very crowded city like Rio de Janeiro may show a high antibody prevalence because of a more free circulation of virus there than in the more dispersed population of England and Wales.

A study of the German population<sup>22</sup> showed that the anti-B19 prevalence was higher in females (47.5%) than in males (32.5%). The same has been found for the American population where the antibody prevalence was 51% for females and 38% for males<sup>15</sup>. In the Brazilian study no difference was found between females and males but the distribution of strong, intermediate and weak positives (Table 1) showed more females with strong antibody reactions. In outbreaks of EI either no differences in clinical attack rates in male or female children<sup>4,11</sup> or adults<sup>24</sup> have been observed, or the attack rate has been higher in females<sup>1,16</sup>.

Results obtained using CIE showed that 33 (63%) of 52 RIA positive sera (Table 1) would have been negative if this study had been done with the less sensitive technique, as has previously been reported<sup>8</sup>.

In both Brazilian and British populations we noted a high number of weak positive sera (between 1.0 to 3.3 au) and we do not know whether or not these people are immune to B19 infection. Studies in human volunteers showed that individuals with lower antibody levels are only partially protected against experimental infection with high titre virus<sup>9</sup>. These levels of antibody may, however, confer immunity to natural infection where the challenge dose is likely to be lower.

We have found a high prevalence of anti-B19 IgG in the Rio de Janeiro population similar to that of other countries where the infection has been studied. This supports the view that B19 virus, which is increasingly being recognised as a significant human pathogen, has a worldwide distribution.

## RESUMO

### Prevalência de anticorpos para o parvovirus humano B19 na população do Rio de Janeiro, Brasil.

Amostras de soros coletadas da população do Rio de Janeiro durante os anos de 1985/1986 foram examinadas para a presença de anticorpos da classe IgG contra o parvovirus humano B19.

Nenhuma diferença foi encontrada com relação ao sexo. A prevalência de anticorpos aumenta a partir de 35% em crianças menores que 5 anos de idade até 80% nos indivíduos na faixa etária entre 11 e 15 anos. A prevalência de anticorpos seguiu aumentando até mais de 90% entre os indivíduos acima de 50 anos de idade.

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