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PRESUMPTIVE RAPID DIAGNOSIS OF PARVOVIRUS INFECTION IN PATIENTS WITH *ERYTHEMA INFECTIOSUM*-LIKE ILLNESS

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RIALA 6/724

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ABSTRACT: In September 1987 an outbreak of exanthematous illness ressembling erythma infectiosum occurred at an elementary school of São Paulo city. Attempts to isolate virus from the nasofaryngeal secretion and urine and serum samples collected from the ill children in acute phase of illness resulted negative. Nevertheless, parvovirus-like particles of about 24 nm in diameter were observed by negative staining electron microscopy in concentraded urine of seven out of eight ill patients and in nasopharyngeal secretion of one out of four patients. No similar viral particle was observed in concentred urine samples collected on the same occasion from their classmates without evident signs of illness. This is a proposal of an alternative test for a rapid and sensitive presumptive diagnosis of human parvovirus infection.

DESCRIPTORS: *Erythema infectiosum*. Parvovirus infection. Presumptive diagnosis.

INTRODUCTION

It is generaly accepted that human parvovirus B 19, discovered by Cosart *et al.* in 1975[10], is the cause of erytema infectiosum [4, 16, 19]. It also became apparent that the infection by this virus may be associated with arthralgia, aplastic crisis, spontaneous abortion and intra-uterine fetal death[3, 5, 6, 7, 20, 22]. Asymptomatic infection has been reported in household members[10, 19]. Antibody to human parvovirus is most often acquired within the age of 5 and 10 yers and about 60% of blood donor poplation are seropositive[2, 7].

Parvovirus B 19 seems to be widespread throughout the world. Seroprevalence studies indicated that 25-40% of adults in Europe and in the United States, as well as in Australia, Africa and Brazil had antibodies to this virus[9, 11, 15]. Fifth disease outbreak have been reported from England. Japan, Finland and Canada and most of the cases occurred in late winter and early spring[4,12,15,19]. In Brazil, the evidence of B 19 virus infection in cases of erythema infectiosum was firstly obtained in Belem by the IgM antibody assay [13].

The inability to grow parvovirus B19 in sufficient quantity to produce antigen for diagnostic

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assays has precluded the widespread availability of tests for this virus, and sera from humains remain the sole source of this antigen. The specific immunoglobulin M (IgM) antibody assay is the most utilized way to detect B19 infection. The IgM is usually present 7 days after the onset of illness and persists for 2-3 months[1, 9, 10, 16]. The virus replicates in bone marrow explant culturet rich in cells of the erythroid series which is nor aplicable to the routine detection of B19 virus in clinical samples [17, 24]. Virus antigen has been detected by counterimmunoelectrophoresis, radioimmunossay or enzyme immunoassay[10]. Viral DNA has been detected by dot-blot hybridisation and more recently by the use of polymerase chain reaction assay (PCR)[8, 14, 23]. The presence of parvovirus particles may be detected in sera and respiratory secretion by electron microscopy and viral DNA was also found in the urine of this patients.[3, 7]

In September 1987, an outbreak of exanthematous febril illness clinically and epidemiologically suggestive of erythema infectiosum occurred at an elementary school of Municipal Area of São Paulo City in the Sanitary District of Butantã. About 50 children of both sex attending the school within the age of 7 to 9 years were affected by the illness. The clinical symptoms were maculo-papular exanthem in the face and lacy reticular aspect in the torax and superior members. The fever was low around 37.5°C or absent in some children. Among the chidren , four had only slapped cheek and four had erythema in both face and limbs.

With aim to investigate the etiologic agent if ill patients were inoculated into tubes of Hep2, BHK-21, MCR-5, Vero and MDCK cell cultures. The virus isolation attemps in these cell cultures resulted negative.

Based on previous studies that the human parvovirus B19 is the etiologic agent of erythema infectiosum, the clinical specimens were tested for the presence of parvovirus particles. Urine of eight children and nasopharyngeal secretion (NPS) and sera of four children of a total of 12 students with erythema infectiosum, and urine of 15 asymptomatic children were examinted for the presence of parvovirus-like particle by negative staining electron microscopy. The urine samples were previously concentrated 100 to 400 times by Minicon B15 (Amicon Co). Viral particle measuring about 24 mm were detected in the urine of seven il patients. Four urine samples were positive after concentrating 100X, but three specimens needed 400X concentration before the viral particles being detected, and one was negative. Viral particles of similar size and morphology were seen in the NPS of one out of four children studied, but none was found in the sera of these children. Otherwise the attempts to find similar viral particles in sera and urines 15 asymptomatic classmates collected on the same occasion resulted negative.

DISCUSSION

Other viruses are also associated with exanthems as enteroviruses, Herpesvirus Group, adenoviruses, measles virus, rubella virus, although differing of B19 infection in both clinical and epidemiological aspects. The possibility of the illness in the present investigation being caused by rubella virus, measles virus or Herpesvirus Group was discarted because they have envelope in the outer membranes and are larger than the virus found in the present investigation (rubella measures virus, 58 mm, measles virus, 150-400 mm and Herpesvirus Group 160-200 mm). Enteroviruses and adenoiruses are cultivable in the virus isolation system utilized in this study.

It seems that erythema infectiosum is a relatively late event in parvovirus B19 infection. This may explain the fact that no viral B19-like particle was found in sera of these patients and this is in accordance with previous studies[4, 9].

Examination of urine for the presence of microorganism helps in the diagnosis of certain infectious diseases. The success of detection viruses depends upon the amount of virus being excreted in the urine. It is possible that if the virus is excreted in urine in low number, the commonly used procedures may not be sensitive enough to detect it. However, if the urine sample is concentrated prior to being tested, the probability of virus detection may increase considerably[21]. Minicon B-15 (Amicon Co.) has been used for concentration of urine, cerebrospinal fluid or other physiological fluid[18]. It contains membranes with a cut-off of 15,000 molecular weight, being able to retain the smallest viral particles and even proteins.

Due to the unavailability of the specific immune serum to B19 virus a more specific and sensitive tecnique as immune electron microscopy could notbe employed in the present investigation. On the other hand, factors like clinical symptoms, epidemiologic basis, size of the particles found and age of the ill patients suggest that the exanthematous illness which affected these students was caused by parvovirus B19.

Although being an expensive equipament, nowadays most of Institutions of Health engaged in the virological studies in Brazil has at least one electron microscope as a tool for diagnostic purposes. The results obtained demonstrate that the technique used in the present investigation may be applied for the routine presumptive diagnosis of human parvovirus infection. The advantage of this method of diagnosis for B 19 virus infection is the simplicity and rapidity.

RIALA6/724

TAKIMOTO, S., *et. al.* - Diagnóstico presuntivo rápido de infecção por parvorívus em pacientes com eritema infeccioso. *Rev. Inst. Adolfo Lutz*, 52(1/2): 27-30, 1992.

RESUMO: Em setembro de 1987 ocorreu em uma escola primária municipal da cidade de São Paulo, um surto de doença exantemática clinicamente compatível com eritema infeccioso. As tentativas de isolamento de vírus de amostras da nasofaringe, urina e soro de doentes colhidos na fase aguda da doença resultaram negativas. No entanto, partículas virais de cerca de 24 nm de diâmetro semelhantes ao parvovírus foram observadas ao microscópio eletrônico pela coloração negativa em sete das oito amostras e na secreção da nasofaringe de uma das quatro amostras colhidas de doentes. Por outro lado não foi visualizada nenhuma partícula viral semelhante em amostras de urina igualmente concentradas, colhidas na mesma ocasião de 15 colegas de classe que não apresentavam sinais evidentes da doença. A presente investigação apresenta uma alternativa para diagnóstico presuntivo rápido de infecção por parvovírus humano.

DESCRITORES: Eritema infeccioso. Infecção por parvovírus. Diagnóstico presuntivo.

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