Epidemiological and clinical characteristics of human parvovirus B19 infections during 2006-2009 in Northern Greece

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Abstract

Background. Parvovirus B19 infects children and adults, often causing erythema infectiosum, polyarthriti, but also aplastic crisis in patients with chronic haemolytic anaemia, rash, fever and fetal hydrops or fetal death. This study aims at the detection of acute parvovirus B19 infections during 2006-2009 in northern Greece on epidemiological and clinical aspect.

Material and methods. Specimens were obtained from 63 patients, who addressed to hospitals, suspected for acute parvovirus B19 infection (17 in 2006, 29 in 2007, 10 in 2008 and 7 in 2009). Thirty (47.6%) were children (one day - 15 years old) and 33 (52.4%) were adults (16-65 years old). The infection was shown by PCR in whole blood and/or pleural fluid and supported by detection of specific IgM antibodies in the patients’ blood serum, which was performed by ELISA.

Results. Twenty (31.7%) out of the 63 specimens were found to be positive: 3/17 (17.6 %) in 2006, 16/29 (55.2 %) in 2007, none in 2008 and 1/7 (14.3%) in 2009, p=0.0002. Positive children were found 10/30 (33.3%) and positive adults 10/33 (30.3%). Specific IgM antibodies were detected in all 20 positive patients. Children developed hematological disorders, mainly types of anemia (6 cases), hydrothorax/ascites (2 cases), arthritis (1 case), and liver transplant rejection (1 case). Adults were presented with pregnancy complications (2 cases), arthralgia/arthritis (4 cases), febrile syndromes (3 cases) and atypical rash (1 case).

Conclusions. In conclusion, an annual variation in the circulation of parvovirus B19 was noticed, presenting an increase of acute infections in northern Greece during 2007. Regarding serious cases, although children and adults seemed equally affected, differences in clinical manifestations were observed between them, with hematological dysfunctions predominant in childhood. Hippokratia 2011; 15 (2): 157-160

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The parvoviruses are small (18-25 nm) viruses with single-stranded DNA genome and are classified in two subfamilies: Parvovirinae (vertebrates infection) and Densovirinae (insects infection). The Parvovirinae subfamily contains three genera: Parvovirus (autonomous replication), Dependovirus (helper-virus supported replication) and Erythrovirus (autonomous replication in erythroid progenitor cells). Humans are mostly infected by parvovirus B19.

The most common clinical manifestation in children, especially those aged 4-11 years, is erythema infectiosum causing a “slapped-cheeks” facial rash, extended later on the trunk and limbs and accompanied, in few cases, by fever, headache, coryza, nausea and diarrhoea. Joint involvement, transient haemolytic anaemia and encephalitis may also occur. However half of all infections in children are asymptomatic. In adults parvovirus B19 causes polyarthropathy more commonly rather than rash, characterized by symmetrical arthralgia. Almost all patients appear with sudden onset, some may present acute anaemia but those with underlying haemolytic disorders may develop transient aplastic crisis. Foetal infection may lead to heavy foetal anaemia causing hydrops foetalis or foetal death, although cases of a non-fatal outcome leaving, however, severe chronic anaemia to some have been reported.

Laboratory control for parvovirus infection contributes when necessary not only to the differential diagnosis of various clinical pictures in children and adults, but also to the differential diagnosis and manipulation of pregnancy or post-partum incidents.

To our knowledge there has not been conducted a molecular approach - based study regarding acute parvovirus B19 infection in Greece so far. This study is the first on national level to investigate the epidemiological and clinical characteristics of parvovirus B19 infection in cases needing advanced health care.

Materials and methods

Sixty three patients suspected for parvovirus B19 infection, were examined; 17 of them during 2006, 29 dur-
Parvovirus B19 clinical syndromes in children and adults in patients examined during 2006-2009

Four out of the ten infected adults were pregnant women. In two of them, pregnancy was complicated by the parvovirus B19 infection; one resulting in foetal death, and another in foetal hydrops, as mentioned above. The virus caused no complication to the other two pregnant women, who were however treated/admitted because of arthritis in one case and atypical rash in the other.

Discussion

The present study aimed at the epidemiological and clinical characteristics of parvovirus B19 serious infections in northern Greece during 2006-2009. Despite the rather short studied period and the fact that a study based on hospital patients does not safely reflect the community conditions, an annual variation in the circulation of parvovirus B19 was indicated. Three (17.6%) patients out of 17 were diagnosed in 2006 having parvovirus B19 acute infection by PCR and by the presence of specific IgM antibodies, 16 (55.2%) out of 29 in 2007, none out of 10 in 2008 and one (14.3%) out of seven in 2009. The statistically significant difference (p=0.0002) among them proves that there was an increase of acute infections in northern Greece in 2007 preceded and followed by years of very few or no infections. As it is also reported for other temperate countries as well as in a former study of this same laboratory, epidemics are found to occur at intervals of a few years. An important difference in the annual incidence of infection was also observed in Magee-Women Hospital, University of Pittsburgh Medical Center, where 14 cases of infection during pregnancy occurred in 1998, no cases in 1999 and 2000, and 11 cases in 2001. The result of our study opposes the older esti-
In temperate countries, infection with parvovirus B19 is more common among children and presents a lower rate in adults. In northern Greece from 2006 to 2009 both adults and children receiving hospital care, seemed equally infected. There were 10/33 adults infected by parvovirus B19 and 10/30 infected children (p=0.796). There is no statistical difference in the two age groups in contrast to previous studies referring to general population and reporting that children are of higher risk of being infected than adults. Thus it might be resumed that children may be more susceptible to the infection itself, as to numerous infectious agents, however the severity of clinical manifestations does not differ according to age.

Adults and children presented with different clinical manifestations. By studying parvovirus B19 infection from its clinical aspect we concluded that arthritis/arthralgia and febrile syndromes were the most common presentations in adults; four out of the nine adults infected were presented with arthritis/arthralgia, three with febrile syndromes, while two with pregnancy complications and one with atypical rash. In B.J. Cohen’s study in 1995, arthritis was also more frequently seen in adults, especially women, than in children. Moreover I. Colmegna et al. report that joint complains occur more often in adults and that they are usually presented as a symmetric polyarthritis affecting the small joints of the hands, wrists and knees. In our study adults with arthritis did not manifest a rash, confirming the fact that this is a common presentation of parvovirus B19 infection in adults.

Febrile syndromes were, as mentioned above, as common as arthritis. Besides, most cases of infection with parvovirus B19 in healthy adults are either asymptomatic or characterized by mild, non-specific, cold-like syndromes. Although parvovirus B19 may cause acute cessation of the red blood cells production, there was no case of adult anaemia, caused by parvovirus B19, in this study. Non-immunocompromised patients remain mostly asymptomatic. Transient aplastic crisis and chronic anaemia are developed in patients with illnesses that shorten red blood cells’ life, such as sickle cell anaemia, thalassemia and in immunodeficient patients respectively. None of the adult patients examined in this study had a background of immunodeficiency or haemophagocytosis.

Four of the nine (44.4%) infected by parvovirus B19 adults were pregnant women. Reports about the percentage of pregnant women that develop symptoms attributable to parvovirus B19 infection vary in different parts of the world. The infection caused pregnancy complications to two of the four infected pregnant women of this study. The other two, one appearing only with arthritis and the other with an atypical rash during the infection, finally delivered healthy infants. Pregnant women with asymptomatic infection are at greater risk to develop pregnancy complications - such as hydrops fetalis and foetal death - especially if the infection occurs in the first and second trimester. There was one case of foetal death reported to us and one of foetal hydrops. The risk of foetal loss due to parvo B19 infection in international bibliography varies up to 16%, while a recent study in the U.S.A. reports that 12% of the infected foetuses develop hydrops.

There are reports in Italy and Belgium of parvovirus B19 detection in gastric and intestinal mucosa and association of the infection with a severe inflammatory bowel disease. Nevertheless none of our patients developed such symptoms.

Children presented mainly haematological dysfunctions, as there were six (four neonates and two infants) out of ten children with anaemia. Most of the children that appeared with symptoms in this study were maternally infected, as assumed by their age together with the fact that anaemia was their prevailing clinical manifestation. Infection with parvovirus B19 during pregnancy may result in the reduction of the red blood cell production and the development of severe congenital anaemia.

Two out of ten infected by parvovirus B19 children, both neonates, presented with hydrothorax and ascites, which are presentations of hydrops that infection via the placenta may also cause.

One out of the ten infected children suffered from arthralgia. We may notice, once more, that arthritis can be observed in children but not as a common symptom of infection as in adults.

Transplant recipients are at high risk of developing symptomatic parvovirus B19 infection due to their immunodeficiency. It has been estimated by J.B. Park et al that 84 out of 143 kidney-transplant recipients (58.7%) showed at least one PCR positive. Our one case of child liver-transplant recipient infected by parvovirus B19 resulted in the rejection of the transplant. There is probably a connection between this fact and the role of B19 viral non-structural protein, NS1, which, according to a study of Brian D. Poole et al, induces apoptosis of liver cells.

Since infectious diseases are at present the best explained pathologic conditions, it is important for the international scientific community to be aware of the expansion and presentation of the infectious agents in a region, in a country or in neighbouring ones. The attraction of the attention of clinicians to as many infectious agents as possible is basic for a good monitoring of the correspondent diseases and finally for a sufficient control and prevention of any target-agent selected.

References


