Republic of Iraq
Ministry of Higher Education
And scientific Research
Diyala University
College of medicine

# The contribution of Parvovirus B 19 infection in polyarthritis among children

BY
Taha saher mahmood

Supervised by

Dr. Abdulrazak Shafiq Hasan

2021 diyala 1442

## Abstract

Parvovirus B19 (PVB19V) infection is widespread and associated with a heterogeneous clinical spectrum, ranging from asymptomatic to potentially life-threatening aplastic crisis in chronic haemolyticanaemia, hydrops fetal is, neurologic diseases and polyarthritis. We now report 5 studies in different time and country with different way that children with Joint complaints associated with recent HPV B19 Infection. These children had either erythema Infectiosum or serologic evidence of recent infection. The duration of Joint symptoms was less than 4 months in most cases. in some children infection with HPV B49 may be associated with the development of chronic arthritis . In this study, an attempt was made to investigate the frequency of B19V infection and the association between patients' characteristics and B19V infection in children with JIA. The rate to which our country may be susceptible to infection with this virus associated with polyarthritis is approximately high.

## Introduction

**Parvovirus B19 (B19V)** is a DNA virus of the family Parvoviridae which is classified as a member of the genus Erythrovirus due to its tropism for erythroid precursors (1). Parvovirus B19 was the only member of the large *Parvoviridae* family to be unequivocally associated with human disease until the discovery of human bocavirus in 2005 (2). The virus was first discovered by Cossart and her colleagues in the sera of healthy blood donors in 1975 by electron microscopy while evaluating tests for hepatitis B (3). This new virus, detected in serum number 19 in plate B, has since been known as parvovirus B19. Transmitted through respiratory secretions, hand to mouth contact, blood

transfusion and trans-placental transfer (4). *B19V* has been linked as a cause of hydrops fetalis, intrauterine fetal death, aplastic crisis, spontaneous abortion, acute symmetric polyarthropathy and erythema infectiosum (Fifth disease) (5). Joint symptoms occur in approximately 80% of adults with erythema infectiosum. The incidence of joint symptoms in children with erythema infectiosum has been approximately 8%. However, HPV BI9 infection can occur without classic symptoms and signs of erythema infectiosum, and the true incidence of arthritis in those infected with the virus is unknown (6). On the other hand, the arthritis in children is often asymmetric and pauciarticular, and often involves knee joints and mimics oligoarticular Juvenile Idiopathic Arthritis (JIA). The association between B19V infection and chronic arthritis has been previously investigated; however, the nature of this association is still a matter of debate (7).

## Epidemiology and clinical disease

### Immune-Competent Patients

Infection with parvovirus begins in childhood and continues throughout life. By young adulthood, up to 40% to 60% have been infected, and in old age, ~90% are antibody-positive. Transmission occurs year-round, but may peak late winter to early summer. Every 3 to 4 years, epidemics of increased activity occur. Although acute infections can manifest as erythema infectiosum, infection is asymptomatic in up to 50% of children (8). A prodromal nonspecific illness consisting of fever, chills, headache, malaise, and myalgias, coinciding with B19 viremia, can occur, followed by a typical “slapped cheek” facial rash and a lacy, reticular erythematous rash on the trunk and extremities coincident with the immune response. The typical erythema infectiosum rash often waxes and wanes over a period of days. In adults, the typical EI rash is much less common rather

arthralgias predominate, particularly in women. Symmetric painful, swollen joints, especially wrists, knees, and hands, can last for weeks to months and be confused with Lyme disease or rheumatoid arthritis (8).

In healthy individuals with a normal red-cell lifespan of 120 days, the drop in hematocrit associated with parvovirus B19 infection of erythroid-precursor cells is modest and not clinically significant. However, in anemic individuals, especially those with a high reticulocyte count to compensate for chronic hemolysis, such as sickle-cell anemia or hereditary spherocytosis, parvovirus B19 infection leads to a dramatic fall in hematocrit and an acute "transient aplastic crisis" requiring red-cell transfusion. These individuals have a red-cell lifespan as short as 15 to 20 days, and present with severe anemia early in the course of infection, often before IgM antibodies are detectable. Once IgG antibodies develop, the virus is neutralized, reticulocytosis reappears, and the hematocrit returns to baseline. Transient declines in white blood cell or platelet counts may also be seen, but are rarely clinically significant (9).

When infection occurs during pregnancy, maternal viremia can lead to transplacental transmission of virus. Infections early in pregnancy can lead to spontaneous abortions. Fetal infection leads to interruption of erythropoiesis and fetal anemia; in a minority of cases, parvovirus-associated myocarditis and severe anemia can lead to heart failure, fetal hydrops, and/or fetal demise.

Other rashes can occur, in a generalized or localized distribution. These include petechial rashes, Henoch-Schonlein purpura, papular-purpuric gloves and socks syndrome, Gianotti-Crosti syndrome, desquamation, erythema multiform, and erythema nodosum (10-11).

Human leukocyte antigen (HLA) and cytokine gene polymorphisms have been linked to chronic arthritis and chronic fatigue syndrome following acute B19

infection, and it is possible that inherited variations in antigen presentation and cytokine response are responsible for symptoms (12).

**Morbidity and mortality**

### End-organ involvement

Destruction of erythroid precursors in the bone marrow is the hallmark of B19. As in normal hosts, pancytopenia, neutropenia, or thrombocytopenia can occasionally be seen and rare cases of hemophagocytosis, myocarditis, hepatitis, or central nervous system disease have been reported.

## Classification

According to the severity of the course, depending on the severity of intoxication, mild, moderate and severe degrees of the disease are distinguished. In terms of duration, there are acute (up to 1 month), subacute (up to 3 months) and chronic, recurrent or continuous (over 3 months) variants of the course. There are the following forms of the pathological process (13):

**Congenital infection**: It is formed as a result of the transmission of the virus by the transplacental route. The risk of fetal infection is 30%. The most dangerous period is from 10 to 28 weeks of gestation. Fetal death, according to various sources, occurs in 3-8% of cases. During the transmission of parvovirus transplacentally, cases of spontaneous abortions, intrauterine fetal death were noted . The main cause of developmental disorders is hypoxia due to a decrease in the oxygen capacity of the blood. Viral myocarditis with rhythm disturbances, heart failure is often observed, and hypoalbuminemia is detected when liver cells are damaged.

**Acquired infection**: It is more often diagnosed in children. Among adult patients, women prevail. In pregnant women, the clinical picture has no

specific features. Acquired parvovirus infection is divided into typical and atypical (arthralgia, hepatitis, asymptomatic) forms.

**Chronic infection**: It develops in patients with primary or acquired immunodeficiency. It occurs due to the inability of the human body to eliminate the virus. Persistent viremia is typical. The pathogen is found in the red bone marrow.

## Diagnostics

Objectively, the presence of specific elements of the rash with the corresponding localization, pallor of the nasolabial triangle, with the development of the arthralgic form - swelling, hyperemia of the affected joints, with hepatitis - jaundice, enlargement of the liver is objectively noted (13-14).

The following clinical and laboratory methods are used to diagnose parvovirus infection (15):

**Clinical blood test**: Mild anemia, thrombocytopenia, neutropenia, accelerated ESR are determined. Aplastic crisis is characterized by severe anemia with a critical decrease in the hemoglobin content, the absence of reticulocytes.

**Identification of infectious markers**: Serological techniques are used. Determine the titers of IgM and IgG. In general, IgM to B19 appears 7 to 10 days after infection, is followed within a few days by IgG, and remains positive for 2 to 4 months. In contrast, immunocompromised hosts may not develop antibodies, or IgM can develop but remain positive for months or years as an indicator of persistent infection, without development of IgG (16). Thus, IgM levels are not a strong indicator of acute parvovirus infection. Usually, an increase in the IgG titer is used over time. PCR diagnostics have been developed.

**Differential diagnosis** is carried out with scarlet fever, measles, and rubella. In some cases, differentiation is required with allergic reactions, Kawasaki disease, and rocky mountain fever. With the predominance of gastrointestinal symptoms, the disease is distinguished from pseudotuberculosis, enterovirus infection. With the development of hepatitis, it is necessary to exclude other possible causes of the pathological condition. The arthralgic form may resemble rheumatoid arthritis, the joint damage associated with Lyme disease (15-17).

## Treatment of parvovirus infection

Drugs for etiotropic treatment have not been developed. Symptomatic therapy is prescribed. In the case of severe fever, antipyretic drugs are used, with severe itching, antihistamines are used. Detoxification therapy is performed. With an aplastic crisis, an urgent transfusion of erythrocyte mass is necessary under the control of data from a general blood test (13-14). Repeated blood transfusions are possible until self-erythropoiesis is restored. Additionally, oxygen therapy is indicated. In chronic parvovirus infection, the use of intravenous immunoglobulin gives good results. Cancellation of drugs or correction of conditions that caused immunodeficiency is required. With the formation of dropsy of the fetus, intrauterine exchange transfusions are possible (15-17).

**Aims of the study:**

The current reviewing study was designed to achieve the following goals

1. Exploration of the contribution of Parvovirus B 19 infection in cases of arthritis.
2. Figure out the effect of certain socio-demographic risk factors increasing the rate of parvovirus B 19 infection in the community.

**Article review that prove the contribution of Parvovirus B19 infection in polyarthritis in children:**

One hundred four children initially seen in the pediatric rheumatology clinic of the Floating Hospital for Infants and Children, Boston, Mass., between February 1991 and April 1992 were screened for antibodies to HPV BI9 because the acute onset of joint symptoms, associated constitutional symptoms, or exposure to viral illness raised the suspicion of recent viral infection (18). **Twenty** of these children had detectable lgM anti-HPV BI9 antibodies and are included in this report. An additional two patients are included who did not have IgM anti-HPV BI9 antibodies but who had clinical findings consistent with erythema infectiosum at the time of onset of their symptoms. These patients were seen in November 1990 and August 1991, respectively. Serum from one of these patients was tested, and IgM anti-HPV BI9 antibodies were not detected. Serum from the other patient was not tested. The presence or absence of IgM and IgG anti-HPV B19 Antibodies was determined by enzyme-linked immunosorbent assay (16 patients) or Western blot (four patients). (Microbiology Reference Laboratory, Cypress, Calif.). The ELISA results were reported as an index, calculated as the ratio of the optical density of the test serum to the optical density of a serum with confirmed positivity (19) .

## The result was:

❖ **Serologic testing for HPV B19:** The IgM anti-HPV B19 antibody titer was significantly elevated in 20 children; 16 had IgM antibody by ELISA, and four patients had IgM antibody by Western blot. Of the 16 patients in whom antibody was detected by ELISA, 14 patients had an IgM index > 1.2 (range 1.52 to > 10). Of these 16 patients, two had equivocal lgM indexes initially (0.90, 1.19); when convalescent serum was tested 2 weeks to 3 months later, these two patients had decreased lgM indexes, and lgG indexes > I0. The two patients who did not fulfill serologic criteria for recent HPV BI9 infection had an illness consistent with erythema infectiosum at the time of onset of joint complaints, and one of them first had serum tested for anti-HPV antibodies 4 months after the onset of symptoms, when IgM antibody may no longer be present. This patient had an IgG index of 7.54, indicating past infection. Timing of serologic testing for HPV BI9. Of the 22 patients, 18 were examined within I0 weeks of the onset of joint symptoms, when IgM antibody titers would be expected to be highest 3. II and therefore readily detectable. The remaining four patients were examined and tested 4 to 12 months after the onset of joint symptoms (patients 6, 8, 9, and 16). The patient tested at 7 months had increased IgM anti-HPV BI9 antibody. This patient had an increase in the severity of his joint complaints 2 months before serologic testing. The patient tested 12 months after the onset of symptoms had a slowly evolving symmetric polyarthrifts, and also had increased IgM anti-HPV B 19 antibody. One patient initially did not have detectable IgM antibody by Western blot 1 week after the onset of his symptoms; additional testing 4 months later revealed IgM and IgG. Seven patients had paired serum samples tested by ELISA. All seven had a decrease in IgM index on the

second sample. The change in IgG index from the first to second serum was variable.

❖ **Clinical manifestations:** Sixteen patients are female and six male. Age range is 2 to 19 years and median age is 7.5 years. Only three patients had known HPV BI9 exposure shortly before the onset of symptoms. Eleven of the patients had constitutional symptoms, defined as fever, anorexia, malaise, or fatigue. Only seven had a history of rash (four patients) or had rash at the time of examination (three ptients). Four patients had erythematous patches on the cheeks and extremities. One patient had a history of a peteehial rash on his lower extremities that lasted only 24 hours. One patient had erythematous papules on the face and one leg, and one patient had a remote history of urticaria.

❖ **Joint symptoms**. Arthritis occurred in 20 patients; two patients had arthralgias only. Two patterns of arthritis or arthralgia were evident. In 10 patients, arthritis or arthralgia was polyarticular, affecting >__5 joints; in 12 patients the pattern was pauciarticular, affecting four or fewer joints. Two patients had monoarticular arthritis. Ofthe 12 patients with a pauciarticular pattern, two had a migratory component to their complaints and one had hip arthralgias only. Large joints were affected more often than small joints (Figure). The knee was the most common joint affected (82%). The duration of joint symptoms was generally brief, with complete resolution within 6 weeks in ll children and within 4 months in three additional children. Eight children continue to have persistent joint symptoms (six arthritis, two arthralgia) 2 to 13 months after onset of their complaints. Those with symptoms 2 months (two patients), 2 1/2 months, 5 months, 11 months, and 13 months in duration have arthritis and fulfill criteria for the diagnosis of juvenile rheumatoid arthritis. (20)

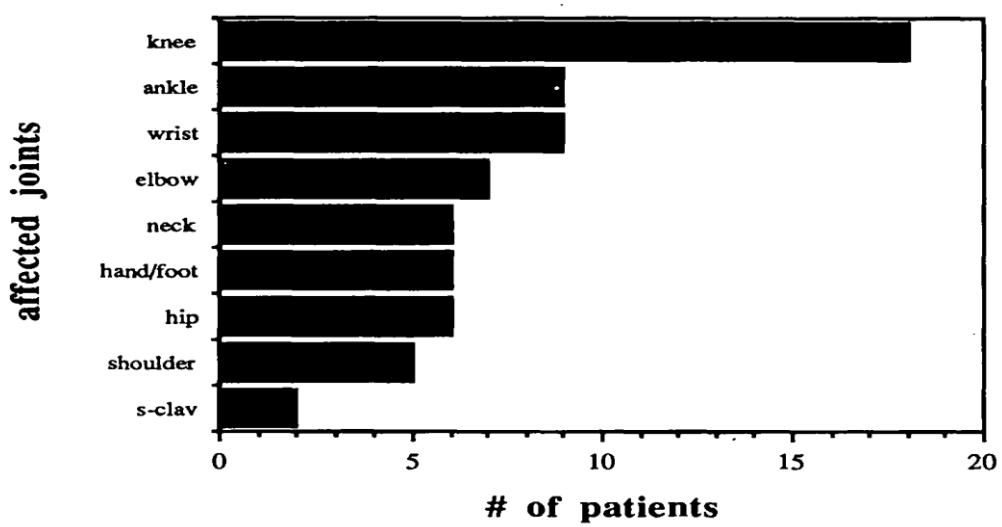


**Figure.** Distribution of affected joints in children with HPV B19–associated joint complaints. *Hand/foot*, Small joints of the hands and feet; *S-clav*, sternoclavicular joint.

❖ **Laboratory results**: Hematocrit values were ~_0.35 (35%) in 12 patients, but no patient had a hematocrit <0.31 (31%). Leukocyte counts were normal (4.5 to 10.0 • 109/L [4500 to 10,000/mm3]) in 16 patients; no patient had a leukocyte count >15.0 • 109/L (15,000/ mm3). Likewise, the erythrocyte sedimentation rate was usually normal. Antinuclear antibodies were detected in 7 of 21 patients. Three sera had ANA titers of 1:40 in a speckled pattern, one had an ANA titer of 1:320 speckled, and one had an ANA titer of 1:640 in a mixed speckled and diffuse pattern. In the other two sera, diffuse pattern ANA in titers of 1:40 and 1:160 were detected. One patient had a mild elevation of serum aminotransferase values (<3 times normal); values returned to normal as his symptoms (fever, malaise, rash, arthralgias) resolved. Rheumatoid factor was absent in all 10 patients tested. Total hemolytic complement (CHs0) was found to be decreased in three of six patients tested. Radiography or ultrasonography was performed in 10 patients, and results were abnormal in eight. Joint effusions were seen in five patients, and synovial thickening was detected by ultrasonography in one patient. An

additional two patients' radiographs revealed soft tissue swelling with osteopenia.Each of these patients with abnormal radiographs had arthritis by examination.

**Simo Nikkari, Reijo Luukkainen, and other his researcher they did different study about parvovirus B19 and polyarthritis** (21).

They took Samples from 62 patients initially diagnosed with RA were studied by PCR for the presence of B 19 virus and for serological evidence of recent B 19 infection. The final diagnosis was made according to the American College of Rheumatology criteria (22).

Forty patients were examined in the Turku University Central Hospital, 15 in Satalinna Hospital (situated also in south west

Finland) and seven in Jyvaskyla Central Hospital in central Finland.

**The result was Results** (21)**:**

- **PCR**

The sensitivity of the assay was about 70 molecules per assay when purified PCR product was used as template (figure). With the known B 19 positive serum sample used as positive control, B 19 DNA was detectable by Southern hybridisation of the PCR product up to a serum dilution of 1:109. Addition of human DNA equivalent 50000 synovial fluid granulocytes per assay did not affect sensitivity of the PCR. No B 19 DNA was detectable from the patients with different forms of arthritis, including 65 patients with early RA. Conversely, B 19 DNA could be amplified from 6/21 serum samples taken from patients with serologically proven acute B 19 infection as well as in cases of hydrops fetalis and transient erythroblastopenia. Prolonged B19 viraemia in a child with aplastic crisis was detectable by our assay. Human beta-globin

gene was amplified from all the synovial granulocyte samples, indicating that significant inhibitory agents were not present and that DNA isolation had been properly carried out.

❖ **SEROLOGY**

Four patients of 135 initially diagnosed with early RA had serological evidence of recent B19 infection. Three of these patients seem to be true B 19 arthropathies and one fulfils ACR criteria for RA. The serological diagnosis of patient number 1 is based on a positive anti-B19 IgM antibody level, which together with the low anti-B19 IgG suggests a possibility of subclinical infection after the beginning of arthritic symptoms. Patient number 2 is clinically a typical B19 arthropathy patient. The joint manifestations were preceded by symptoms of upper respiratory tract infection in concordance with acute B 19 infection. The serological diagnosis is based on slow development of anti-B 19 IgG antibodies during several months, a phenomenon we have not encountered before in the diagnosis of acute B 19 infection in otherwise healthy individuals. The anti-B 1 9 IgM antibodies detected in patient 3 are consistent with a recent infection within two months. Unfortunately, paired sera were not available from this patient, nor from patient number 1. In patient number 4 a slight rise in anti-B 19 IgG antibodies between the first two serum samples is observed, but on the basis of the clinical picture, B 19 arthropathy seems unlikely. In the control groups two possible cases of recent B 19 infection were found. Patient number 5 was initially diagnosed as having selflimiting reactive arthritis, the triggering agent being uncertain. The IgM and IgG antibody responses against B 19 are consistent with recent infection; the patient most probably had B 19 arthropathy. In addition, anti-B 19 IgM antibodies were observed in one healthy blood donor (patient 6), from which no clinical information is available (21).

**To evaluate the prevalence of recent parvovirus B19 infection in a cohort of children presenting with acute arthropathy and to determine the prevalence of a subsequent diagnosis of juvenile rheumatoid arthritis the F OG˘ UZ,C AKDENIZ,E ÜNÜVAR and other researcher the did this research in *Istanbul Medical Faculty* *(23)* .**

In this prospective study, parvovirus B19 IgM antibody was investigated in 75 patients who were referred to our clinic with acute joint complaints and also in 75 healthy controls. One patient in each group was excluded due to neuroblastoma and acute lymphoblastic leukemia. The characteristics of parvovirus B19 IgM positive patients who were accepted as parvovirus B19 arthropathy were further evaluated. All the patients were followed up for at least 6 weeks and the patients with chronic progression of joint complaints were followed for at least 6 months to determine their progress. The cases of juvenile rheumatoid arthritis in this chronic group were identified.

**The result was:**

Parvovirus B19 IgM was detected in 16 of 74 patients (21.6%) with acute arthropathy compared with 3 of 74 (4.1%) in the healthy control group ($\chi 2$= 8.67; *P*= 0.003). The parvovirus B19 positive patients with arthropathy were more likely to become chronic (*P* = 3.7 × 10–7) and to be diagnosed as juvenile rheumatoid arthritis (*P*= 0.03) than the parvovirus B19 IgM negative group with arthropathy. Additional joint destruction developed in one case who was parvovirus B19 IgM positive in whom juvenile rheumatoid arthritis was diagnosed during follow up (23).

**To determine the prevalence of human parvovirus B19 infection in patients with juvenile idiopathic arthritis (JIA) by detection of specific IgM, IgG, and viral DNA the BENITO GONZALEZ, CARMEN LARRAزAGA and other his researcher the did this research in *Faculty of Medicine,University of Chile* *(24).***

Serum samples of 50 patients with diagnosis of juvenile idiopathic arthritis and 39 healthy controls were analyzed by ELISA to detect IgG and IgM anti-B19-specific antibodies. The parvovirus B19 genome was detected by nested polymerase chain reaction (PCR). The average age of the patients was 9.6 years (2–14 yrs); 30 were female (60%) and 20 male (40%). The definitive diagnoses of these patients corresponded to 19 systemic forms (38%), 11 to the oligoarticular variety (22%) and 20 to the polyarticular (40%). The average age of the control group was 7.8 years (2–16 yrs); the distribution by sex was 25 females (64%) and 14 males (36%).

**The *results was:*** IgM against parvovirus B19 was detected in 20% of the cases (10 patients) and B19 DNA genome by PCR in 48% (24 patients); in 10% of the cases (5 patients), both markers were detected. IgG was found in 32% (16 patients). In the control group neither IgM nor the viral genome was detected. However, 43.5% of the controls (17/39) had IgG against parvovirus B19, indicating past infection by the virus *(24)*.

**The causal role of Parvovirus B19 (B19V) in Juvenile Idiopathic Arthritis (JIA) is still a matter of debate. In this study, an attempt was made to investigate the frequency of B19V infection and the association between patients' characteristics and B19V infection in children with juvenile idiopathic arthritis. This study done In *Shahid Beheshti University of Medical Sciences, Tehran, Iran* *(25).***

Synovial fluid samples were obtained from 27 children (13 boys, 14 girls, aged 3-16 years) with JIA and were analyzed by polymerase chain reaction to detect B19V DNA. Age, sex, number of involved joints, time elapsed between beginning of symptoms and arthrocentesis, serum Erythrocyte Sedimentation Rate (ESR) and C-Reactive Protein (CRP) were compared between JIA patients with and without B19V.

**The Results was :** Six patients (22.2%) were B19V+. There was no significant association between presence of B19V DNA in synovial fluid and number of joints involved, duration of disease, treatment with Disease- Modifying Anti rheumatic Drugs (DMARD) or glucocorticoid therapy and mean ESR and CRP levels. However, there was a slightly significant relationship between sex and age and detection of B19V DNA in the synovial fluid of JIA patients *(25)*.

**In the next two study explain the rate of of Parvovirus B19 Infection among Children with Clinically Suspected Erythema Infectiosumin and thalassemia Diyala Province, Iraq (26-27). Which can help us to know the extent of this virus spread in Diyala and how much infection with this virus can lead to possible polyarthritis.**

**1.** The present study was conducted to explore the rate of human PVB19 infection rate among children with fever and skin rash and to figure out the role of attribute factors (26). The present cross-sectional study was conducted between December 2019 and June 2020 in Diyala province, Iraq. Data and samples were collected from different teaching hospitals and healthcare centers. Sixty apparently healthy children were enrolled as control group and200 patients clinically presented with skin rash and fever. The age group was (1-14) years. A special questionnaire form was pre-constructed for this study including: Sociodemographic factors, clinical manifestation and history

of underlining conditions. Blood samples were aseptically drawn from all studied groups. Part of the blood was used for the determination of complete blood count (CBC). The remaining was placed in plane tubes, left at room temperature for 30 minutes. Thereafter, serum samples were separated, labeled and stored at −20°C till use. ELISA technique was used for determination of anti-PVB19 IgM and IgG in serum (DIA-PRO, Italy). Human privacy was respected by obtaining verbal consent from their patents. Statistical analysis was done by SPSS version 25 and P values less than 0.05 were considered significant.

**The results was:** The anti-PVB19 IgG positivity rate in children with EI patients was 198(95.0%) which is significantly higher compared to that of control (P= 0.0001). The anti-PVB19 IgM positivity rate among children with EI was 907(45.0%), versus 2(3.3%) among healthy control. thus the difference was significantly higher (P= 0.0001). Furthermore, the mean ± SD of the anti-PVB19 IgG as well as anti-PVB19 IgM titers in children with EI were significantly higher than that of children in control (P= 0.0001 and P= 0.0001) respectively. Moreover, the anti-PVB19 IgG and anti-PVB19 IgM titers were insignificantly associated with age, sex, and residence of EI patients. Regarding the blood indices, the PCV (%), WBC (x103), and MCV (fL),MCH (pg/cell).MCHC (gm/dl) and the PLT (x103) were significantly higher in children with EI compared to their counterparts of control.

**2.** The present study was conducted to explore the rate of human PVB19 infection rate among children with thalassemia and to figure out the role of attribute factors (27).

Sixty apparently healthy children were enrolled as control group and135 patients with laboratory confirmed thalassemia were included. The age range

of children included was 1-14 years. Blood samples were aseptically drawn from all studied groups. Part of the blood was used for the determination of complete blood count (CBC). The remaining was placed in plane tubes, left at room temperature for 30 minutes. Thereafter,serum samples were separated,, labeled and stored at −20°C till use. ELISA technique was used for determination of anti PVB19 IgM and IgG in serum (DIA-PRO, Italy). Human privacy was respected by obtaining verbal consent from their patents. Statistical analysis was done by SPSS version 25 and P values less than 0.05 were considered significant.

**The results was:** The anti-PVB19 IgG positivity rate in children with thalassemia patients was (89.6%) which is highly significant compared to that of healthy control (63.3%), (P= 0.0001). Furthermore, the results also showed that the mean ± SD of anti -PVB19IgG titer of children with thalassemia and controls were 1.929 ±1.955 and 1.434 ±1.220 respectively. The anti-PVB19 IgM positivity rate among children with thalassemia was (34.8%), versus (3.3%) among healthy control. with significantly higher difference (P= 0.0001). The mean ± SD of anti-PVB19 IgM titer among children with thalassemia and healthy control were 0.621 ± 0.449 and 0.294 ± 0.267 respectively. The anti-PVB19 IgG titer in children with thalassemia was insignificantly associated with age groups (P=0.804), gender (P= 0.224) bur significantly higher in rural versus urban residence (P= 0.030).The anti-PVB19 IgM titer in children with thalassemia was insignificantly associated with age groups (P=0.665), gender (P= 0.548), and residence (P=0.579).The Mean ± SD of Hb (g/dl), PCV(%), MCV (fL) and HCV (pg/cell) were significantly lower in children with thalassemia compared to healthy control.

## Discussion

In a 1962 epidemic (9), nearly 80% of adults with erythema infectiosum had joint symptoms, but fewer than 8% of those less than 20 years of age had joint symptoms. With the availability of serologic testing for HPV BI9, it became possible to diagnose acute infection in the absence of typical symptoms associated with erythema infectiosum. In this article view, five reports emphasized the association of HPV BI9 with an arthropathy that in some patients can appear similar to rheumatoid arthritis. Most patients had joint symptoms in the absence of rash or prodromal illness. Acute B 19 infections are quite commonly followed by arthropathies. Chronic conditions resembling RA associated with B19 infection have also been reported (28).Parvovirus DNA has been observed in synovial fluid, synovial fluid cells and synovium of patients with B 19 arthropathy (29). In acute B19 infection virus can be detected in high concentrations in serum and for a longer period in circulating polymorphonuclear cells. For these reasons we have studied the serum, synovial fluid and synovial fluid cells from patients with RA and from controls. On the other hand, some studies like this showed that in children (30) and in some adult series 12 the major joints especially the knees have been affected. Polyarticular and symmetrical involvement are seen in adults,(31)while pauciarticular involvement is more common in childhood.(30) In the present study, polyarticular involvement was predominant. Although the monoarthropathy rate is reported to be very low. Although there are controversial data in the literature, the higher rate of B19 IgM positivity in the arthropathy group than in the control group and the higher chronic progression and higher number of JRA diagnoses in the IgM positive cases than in the negative cases suggest that this virus is associated with JRA. The causative role

of B19V in pathogenesis of RA or JIA has been described more accurately by some studies. According to a study by Nocton *et al*, 6 of 22 children with joint complaints related to a recent B19V infection developed chronic arthritis fulfilling the diagnostic criteria for JIA during the following 2 to 13 months (18). In this study showed that there was a significant relationship between sex and age and detection of B19V DNA in the synovial fluid of JIA patients. Weissbrich B *et al* reported no significant differences between RA patient groups with respect to age, disease duration, number of affected joints, and presence of erosive arthritis as well as ESR and CRP values (32). According to a study by Marwa Mansour Hussein **(26-27)** we can say that our country, especially Diyala, their children are at risk of developing polyarthritis due to the presence of this virus in a high rate positivity rate in children with Erythema Infectiosumin patients and in children with thalassemia patients.

## CONCLUSION

It can be concluded that the rate of parvovirus B19 infection among children with arthropathies as well as the polyarticular involvement were high in world community beside the presence of asymptomatic infection.

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