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Current Pediatric Reviews, 2024, *20*, 462-471

REVIEW ARTICLE

Erythema Infectiosum: A Narrative Review

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Abstract: ***Background*:** Erythema infectiosum occurs worldwide. School-aged children are most often affected. Since the diagnosis is mainly clinical, physicians should be well-versed in the clinical manifestations of erythema infectiosum to avoid misdiagnosis, unnecessary investigations, and mismanagement of the disease.

***Objectives*:** The purpose of this article is to familiarize physicians with the wide spectrum of clinical manifestations and complications of erythema infectiosum associated with parvovirus B19 infection.

Methods: A search was conducted in July 2022 in PubMed Clinical Queries using the key terms "Erythema infectiosum" OR "Fifth disease" OR "Slapped cheek disease" OR "Parvovirus B19". The search strategy included all clinical trials, observational studies, and reviews published within the past 10 years. Only papers published in the English literature were included in this review. The information retrieved from the above search was used in the compilation of the present article.

Results: Erythema infectiosum is a common exanthematous illness of childhood caused by parvovirus B19. Parvovirus B19 spreads mainly by respiratory tract secretions and, to a lesser extent, the saliva of infected individuals. Children between 4 and 10 years of age are most often affected. The incubation period is usually 4 to 14 days. Prodromal symptoms are usually mild and consist of low-grade fever, headache, malaise, and myalgia. The rash typically evolves in 3 stages. The initial stage is an erythematous rash on the cheeks, with a characteristic "slapped cheek" appearance. In the second stage, the rash spreads concurrently or quickly to the trunk, extremities, and buttocks as diffuse macular erythema. The rash tends to be more intense on extensor surfaces. The palms and soles are typically spared. Central clearing of the rash results in a characteristic lacy or reticulated appearance. The rash usually resolves spontaneously within three weeks without sequelae. The third stage is characterized by evanescence and recrudescence. In adults, the rash is less pronounced than that in children and is often atypical. Only approximately 20% of affected adults have an erythematous rash on the face. In adults, the rash is more frequently found on the legs, followed by the trunk, and arms. A reticulated or lacy erythema is noted in 80% of cases which helps to distinguish erythema infectiosum from other exanthems. Pruritus is noted in approximately 50% of cases. The diagnosis is mainly clinical. The many manifestations of parvovirus B19 infection can pose a diagnostic challenge even to the best diagnostician. Complications include arthritis, arthralgia, and transient aplastic crisis. In most cases, treatment is symptomatic and supportive. When parvovirus B19 infection occurs in pregnant women, hydrops fetalis becomes a real concern.

Conclusion: Erythema infectiosum, the most common clinical manifestation of parvovirus B19 infection, is characterized by a "slapped cheek" appearance on the face and lacy exanthem on the trunk and extremities. Parvovirus B19 infection is associated with a wide spectrum of clinical manifestations. Physicians should be aware of potential complications and conditions associated with parvovirus B19 infection, especially in individuals who are immunocompromised, chronically anemic, or pregnant.

Keywords: Aplastic crisis, arthritis, erythema infectiosum, fifth disease, parvovirus B19, "slapped cheek" appearance.

ARTICLE HISTORY

Received: September 08, 2022
Revised: February 27, 2023
Accepted: February 28, 2023

DOI:
10.2174/1573396320666230428104619

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1875-6336/24 $65.00+.00

1. INTRODUCTION

Erythema infectiosum, also known as the fifth disease or slapped cheek syndrome, is a benign self-limited exanthematous illness that occurs mostly in school-aged children [1]. The condition was the fifth common childhood exanthem to be named (after measles, scarlet fever, rubella, and varicella) [2, 3]. Erythema infectiosum, the most common clinical manifestation of parvovirus B19 infection, is characterized by a "slapped cheek" appearance on the face with relative circumoral pallor and a lacy erythematous exanthem on the trunk and extremities [4]. Prodromal symptoms are usually mild and consist of low-grade fever, coryza, headache, malaise, and myalgia.

A search was conducted in July 2022 in PubMed Clinical Queries using the key terms "Erythema infectiosum" OR "Fifth disease" OR "Slapped cheek disease" OR "Parvovirus B19". The search strategy included all clinical trials, observational studies, and reviews published within the past 10 years. Only papers published in the English literature were included in this review. The information retrieved from the above search was used in the compilation of the present article.

2. CAUSATIVE AGENT

Erythema infectiosum is caused by human parvovirus B19 - a virus that belongs to the *Erythroparvovirus* genus in the *Parvoviridae* family [5]. While parvoviruses can infect a variety of animal species, parvovirus B19 does not infect other animals but only humans. In fact, parvovirus B19 is the only member of the *Parvoviridae* family known to cause disease in humans [2, 6]. The name "parvo" is derived from the Latin word *parvum*, which means small. The designation B19 refers to the laboratory number that was used to identify the first positive isolate: the 19th cell in plate B of a panel of sera [2, 7, 8]. Parvovirus B19 was first discovered by Cossart *et al*. in 1975 [7]. In 1983, Anderson *et al*. discovered that parvovirus B19 was the causative agent of erythema infectiosum [9].

Parvovirus B19 is a small (26 nm) nonenveloped, icosahedral, single-stranded deoxyribonucleic acid antibody (DNA) virus that is composed of approximately 5600 nucleotides [3, 10]. The capsid structure and the absence of an envelope are responsible for the resistance of the virus to heat, cold, and detergents [11]. The viral genome encodes three nonstructural proteins and two capsid proteins [2, 12]. The three nonstructural proteins include a large nonstructural protein NS1 (671aa, 78kDa) and two smaller nonstructural proteins (7.5 kDa and 11 kDa) [12]. The two capsid proteins include a minor structural protein VPI which constitutes 5% of the capsid and a major structural protein VP2 which constitutes 95% of the capsid [11, 12]. NS1 and the two smaller nonstructural proteins are involved in the regulation of viral promoter and replication functions [12]. The nonstructural proteins are toxic and induce apoptosis in the host cells [12]. The two capsid proteins, VP1 and VP2, are encoded by overlapping reading frames, and self-assembled to form viral particles *in vitro* [6]. Parvovirus B19 is relatively solvent and heat-resistant [7].

3. PATHOPHYSIOLOGY

Acquisition of parvovirus occurs mainly through the respiratory route. After acquisition, the virus binds to cell receptors in the respiratory tract of the host. The virus then translocates its genome to the nucleus of the cell with resulting DNA replication, RNA transcription, protein translation, and assembly of the virus capsid [1]. Lysis of the infected cell leads to the release of mature virions, followed by a brisk viremia [1]. This coincides with the appearance of prodromal symptoms such as fever, headache, and malaise. IgG antibodies appear approximately seven days after the appearance of IgM antibodies, and this coincides with the appearance of the clinical features of erythema infectiosum, such as the characteristic facial rash and arthralgia [1].

Presumably, direct invasion of epidermal cells by parvovirus B19 contributes to the development of the rash as parvovirus B19 DNA and capsid proteins can be detected in epidermal cells of patients with erythema infectiosum [13]. Parvovirus B19 can cause acute arthritis as evidenced by the detection of parvovirus B19 DNA in the joint fluid of affected patients [12, 14]. Arthritis may be caused either by a direct viral infection of the synovial tissue or through systemic viremia with seeding of the virus in the joint space [12]. Some authors suggest that clinical features of erythema infectiosum may result from the deposition of immune complexes in the skin and joints of patients with erythema infectiosum [5, 15].

Parvovirus B19 has a tropism for late erythroid progenitor cells in the bone marrow and replicates in these erythroid progenitor cells [16]. The virus is toxic to these erythroid progenitor cells leading to their destruction and inhibition of erythropoiesis with resultant erythroid aplasia which is usually transient [12, 17, 18]. Apparently, parvovirus B19 has no adverse effect on the myeloid cell line. Erythrocyte P blood group antigen, also known as globoside, found in high concentrations on the cell surface of erythrocytes and their precursors, is a receptor for parvovirus B19 [19]. These receptors for parvovirus B19 are also found on endothelial cells, placental trophoblast cells, and cardiomyocytes [20]. Individuals who lack the blood group P antigen are immune to parvovirus B19 infection [19].

Although parvovirus B19 is usually transmitted *via* the respiratory route, transmission *via* percutaneous exposure to parvovirus B19-infected blood or blood products and vertical transmission of the virus from a mother to a fetus can also occur [21-27].

4. EPIDEMIOLOGY

Erythema infectiosum occurs worldwide, especially in temperate climates. Children between the ages of 4 and 10 years are most often affected [28, 29]. The disease can also occur in adults (including pregnant women), although this is much less common [28, 30]. The sex ratio is approximately equal [31]. Acquisition of the virus is often during childhood and continues at lower rates throughout adulthood [5, 32]. The prevalence of IgG antibodies against parvovirus B19 ranges from 2 to 15% in children under 5 years, 15 to 60% in

those aged 6 to 19 years, 30 to 60% in young adults, and 90% of elderly individuals [8, 16, 33, 34].

Most cases of erythema infectiosum occur sporadically [33]. Community outbreaks usually occur in the late winter and early spring [11, 23, 26, 33]. Mini outbreaks of erythema infectiosum occur approximately every 3 to 4 years [1, 8]. Parvovirus B19 spreads predominantly by respiratory droplets and, to a lesser extent, the saliva of infected individuals [3, 26]. The transmission rate among susceptible school contacts and family members is approximately 20% and 50%, respectively [21, 23, 26, 35]. Transmission of the virus usually occurs during the week before the onset of the rash [26]. Individuals with erythema infectiosum are most contagious during the phase of active viral replication and viral shedding and are no longer contagious after the onset of rash [16, 33, 36].

5. HISTOPATHOLOGY

Histologically, a biopsy of the skin lesion shows edema in the epidermis and a nonspecific lymphocytic perivascular infiltrate [13].

6. CLINICAL MANIFESTATIONS

The incubation period is usually 4 to 14 days but can be as long as 21 days [36, 37]. Prodromal symptoms occur in 15 to 30% of cases [33]. The prodromal symptoms are usually mild and consist mainly of low-grade fever, headache, malaise, and myalgia [8, 28, 36, 38]. A symptom-free period of 7 to 10 days usually follows the prodrome and precedes the exanthema [33]. Because symptoms are so mild and temporally separated from the onset of the rash, the prodrome is often not recalled.

The rash typically evolves in three stages, but the three stages are not always distinguishable [23, 31, 39]. The initial stage is an erythematous rash on the cheeks, sparing the central face, giving rise to a characteristic “slapped cheek” or “facial flush” appearance (Fig. **1**) [1, 4, 23, 40]. Relative circumoral pallor is usually present. In some patients, a “slapped cheek” appearance may be the only clinical manifestation of erythema infectiosum [28]. The facial rash usually fades in four to five days [28, 40]. Enanthems are characteristically absent. In the second stage, the facial rash spreads concurrently or quickly to the trunk, extremities, and buttocks as a diffuse macular erythema (Fig. **2**) or as a maculopapular rash (Fig. **3**) [6, 28, 38]. The rash tends to be more intense on the extensor surfaces of the extremities. The palms and soles are typically spared [40]. Central clearing of the rash results in the characteristic reticulated or lacelike pattern (Fig. **2**) [4]. The rash may worsen with exposure to sunlight or heat [1, 28]. Pruritus is noted in up to 15% of children with erythema infectiosum [6, 31]. The rash usually resolves spontaneously within three weeks without desquamation or sequalae [6, 23]. The third stage is characterized by evanescence and recrudescence (Leung *et al*. 2006). Triggers for recrudescence include fever, exercise, sunlight, overheating, hot baths, irritation, and emotional stress [6]. The third stage usually lasts for a few weeks, but recurrences may be noted for months [6]. The infection ultimately resolves spontaneously, leaving the child usually with life-long immunity [23].

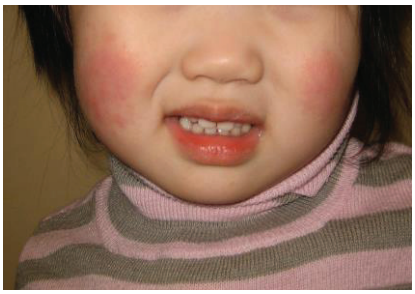

Fig. (1). Classic slapped-cheek appearance in a child with erythema infectiosum. Confluent erythema of bilateral cheeks with sparing of nasal bridge and perioral areas. (*A higher resolution / colour version of this figure is available in the electronic copy of the article*).

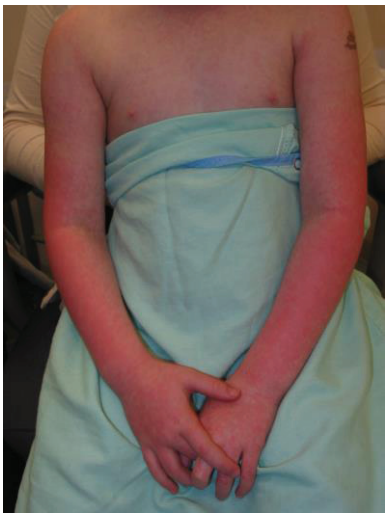

Fig. (2). Diffuse macular erythema on the forearms and reticular erythema on the arms and upper chest in a child with erythema infectiosum. (*A higher resolution / colour version of this figure is available in the electronic copy of the article*).

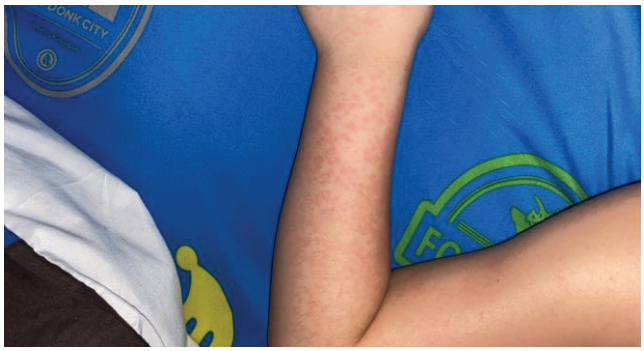

Fig. (3). Maculopapular rash on the forearm in a child with erythema infectiosum. (*A higher resolution / colour version of this figure is available in the electronic copy of the article*).

In adults, the rash is less pronounced than in children and is often atypical. Approximately 20% of affected adults have an erythematous rash on the face [41]. The rash is more frequently found on the legs, followed by the trunk, and arms

[41]. Pruritus is noted in approximately 50% of cases [41]. The exanthema may be in a gloves-and-sock pattern, peri flexural pattern, and palpable purpura [41]. A reticulated or lacy erythema is noted in 80% of cases which helps to distinguish erythema infectiosum from other rashes [41].

7. DIAGNOSIS

The diagnosis is based on the typical clinical presentation of a "slapped cheek" appearance, with absent or mild prodromal symptoms, followed by a symmetrical, reticulated rash that waxes and wanes. Virologic confirmation and laboratory tests are rarely necessary.

8. LABORATORY INVESTIGATIONS

When virologic confirmation is required (*e.g.*, a pregnant woman who has a history of exposure to parvovirus B19 or with clinical features of parvovirus B19 infection), determination of serum anti-parvovirus B19 IgM antibody is the preferred diagnostic test in an immunocompetent host [16, 33]. Methods to determine serum anti-parvovirus B19 IgM antibody include enzyme-linked immunosorbent assay (ELISA) and radioimmunoassay (RIA). Serum parvovirus B19 IgM antibody is detectable within 7 to 10 days following parvovirus B19 infection and is generally present for two to four months [8, 21, 23]. Serologic testing for anti-B19 IgM is the best test for recent or acute parvovirus B19 infection on a single serum sample. However, the presence of antinuclear antibody (ANA), rheumatoid factor (RF), and Epstein-Barr virus IgM can result in a false positive anti-B19 IgM result [36]. Serum parvovirus B19 IgG antibody starts to rise approximately two weeks following parvovirus B19 infection and may persist for life [28]. The presence of serum parvovirus B19 IgG antibody indicates previous infection and immunity, although seroconversion from a parvovirus B19 IgG-negative to an IgG-positive state suggests recent infection [42]. In an immunocompromised patient, serologic diagnosis is unreliable. In this setting, the demonstration of parvovirus B19 DNA titer by polymerase chain reaction (PCR) assay is the optimal diagnostic method [23, 43].

A complete blood count (CBC) may be considered if anemia or a hematologic abnormality is suspected. C-reactive protein (CRP) or erythrocyte sedimentation rate (ESR), serum complements, ANA, RF, anti-DNA, and anti-citrullinated peptide/protein antibody (ACPA) should be considered in the workup of a patient with arthritis [23].

9. DIFFERENTIAL DIAGNOSIS

Differential diagnostic considerations of the rash of erythema infectiosum include scarlet fever, erysipelas of the face, rubella/German measles, rubeola/measles, roseola infantum, hand-foot-and-mouth disease, infectious mononucleosis, tinea faciei, keratosis pilaris rubra faciei, sunburn, phytophotodermatitis, juvenile dermatomyositis, discoid lupus erythematosus, linear Blaschkoid lupus erythematosus, tumid lupus erythematosus, rosacea, fixed drug eruption, and contact dermatitis (Table **1**) [44-63]. Rash and arthritis in an older child or adult should prompt consideration of serum sickness, systemic juvenile idiopathic arthritis (also known as systemic juvenile rheumatoid arthritis or Still disease), and systemic lupus erythematosus (Table **1**) [47, 64-68]. The distinctive features of each condition usually allow for a straightforward differentiation from erythema infectiosum.

10. COMPLICATIONS

Arthritis and arthralgia can occur as a complication of erythema infectiosum or as the sole clinical manifestation of parvovirus B19 infection [69, 70]. Approximately 75% of patients with joint symptoms due to parvovirus B19 infection have or will develop a rash. Less than 20% of these patients have the typical slapped cheek appearance of the rash seen in erythema infectiosum [16, 36, 71]. Patients are no longer contagious when they have joint symptoms. Although common in adults and older adolescents, arthropathy occurs in only 8 to 10% of children with erythema infectiosum [23, 33, 72, 73]. Arthropathy is more common in females than males [72-74]. Symmetrical poly arthropathy is common in adults and can affect any joints [8, 75]. The most commonly affected joints are the metacarpophalangeal and interphalangeal joints, followed by the knee, wrist, and ankle joints [6, 16, 33]. Joint pain usually worsens over the day. Joint stiffness is not uncommon [28]. The arthropathy may be immunologically mediated given that its onset coincides with the appearance of circulating antibodies [6]. Arthropathy is self-limited and usually resolves in a few weeks [3, 11, 69]. Typically, the arthropathy associated with parvovirus B19 infection does not cause destruction of the affected joints [76].

Transient aplastic crisis, another potential complication, results from an arrest of erythropoiesis and destruction of reticulocytes induced by parvovirus B19 [28]. The aplastic crisis usually lasts for 7 to 14 days [36]. Transient reticulocytopenia usually has little impact on an otherwise healthy child. Transient aplastic crises occur more often in patients with impaired red cell production such as iron deficiency; ongoing blood loss; or chronic hemolytic anemia, such as sickle cell disease (most common), hereditary spherocytosis, thalassemia, glucose-6-phosphate dehydrogenase (G6PD) deficiency, pyruvate kinase deficiency, or autoimmune hemolytic anemia [5, 23, 26, 43, 69, 77]. The hemoglobin will return to normal once IgG antibodies develop with the neutralization of the virus and the reappearance of reticulocytosis [8]. In immunocompetent individuals, a transient aplastic crisis usually occurs only once in the individual's lifetime, possibly because of the development of protective immunity [3, 26]. Other less commonly reported hematologic complications include transient neutropenia and transient thrombocytopenic purpura [6]. Thrombocytopenic purpura may be secondary to NS1 toxicity to megakaryocytes, bone marrow suppression, and antiplatelet antibodies [8]. Persistent parvovirus B19 infection may develop in immunocompromised patients with resultant severe reticulocytopenic anemia from pure red cell aplasia [8, 78, 79]. Immunodeficient patients are also at risk for bone marrow suppression which can manifest as agranulocytosis, neutropenia, pancytopenia, and thrombocytopenia [8].

Table 1. Differential diagnosis of erythema infectiosum.

Condition	Characteristics
Scarlet fever	Fever; scarlatiniform rash better felt than seen; rash has the texture of sandpaper or gooseflesh; strawberry tongue; beefy red pharynx; palatal petechiae; enlarged and inflamed tonsils; tender anterior cervical lymph nodes
Erysipelas of the face	Fever; abrupt onset of sharply demarcated facial erythema with non-pitting edema; typically unilateral; hot to touch; does not progress to a generalized eruption; cervical lymphadenopathy often present
Rubella/German measles	Low-grade fever; retroauricular, suboccipital, and posterior cervical lymphadenopathy; pinpoint erythematous, maculopapules classically begin on the face and spread caudally to the trunk and extremities
Rubeola/measles	High fever; coryza; cough; conjunctivitis; Koplik spots; morbilliform, erythematous "brick-red" exanthem three to four days after onset of fever; fever peaks with the appearance of the exanthem; exanthem classically begin on the face and becomes more confluent as it spreads downwards to the trunk and extremities; cervical lymphadenopathy
Roseola infantum	High fever for 3 to 4 days followed by the abrupt appearance of rash at defervescence
Hand-foot-and-mouth disease	Painful oral enanthem; asymptomatic exanthem on the palms and soles
Infectious mononucleosis	Fever; fatigue; inflamed pharynx; tonsillar enlargement with or without thick tonsillar exudates; palatine petechiae; widely scattered, erythematous, and maculopapular or morbilliform rash; generalized lymphadenopathy; splenomegaly
Tinea faciei	Erythematous, scaly patch or plaque with a well-defined border on the face; clearing of the center of the lesion gives rise to the classic annular appearance; lesion tends to be unilateral or asymmetric
Keratosis pilaris rubra faciei	Well-demarcated erythema on the cheeks; small follicular keratotic papules within the areas of erythema giving the affected skin a rough texture
Sunburn	Confluent, erythematous patches in the sun-exposed area following sun exposure; pain and/or pruritus may be present
Phytophotodermatitis	Bizarre configurations of erythema with a sharply demarcated border; confined to the area that has come in contact with the photosensitizing compounds (*e.g.*, furocoumarins) in various plants and consequent sun exposure; burning sensation and pain are prominent; vesicles and bullae may develop after 24 hours and peak at 72 hours
Juvenile dermatomyositis	Heliotrope rash; erythematous photosensitive rash on the face, neck and shoulders; Gottron papules; Gottron sign; symmetrical proximal muscle weakness
Discoid lupus erythematosus	Well-demarcated, erythematous, hyperkeratotic, indurated, coin-shaped plaques covered by partially adherent, scales in sun-exposed areas; female predominance
Linear Blaschkoid lupus erythematosus	Unilateral lesion predominately on the face; early age of onset; no gender predilection; low incidence of photosensitivity; lack of systemic manifestation
Tumid lupus erythematosus	Erythematous plaques and nodules in the sun-exposed area; scale typically absent; rare in children; no sex predilection; no internal organ involvement
Rosacea	Flushing, nontransient erythema, telangiectasia, and inflammatory papulopustules affecting the central facial area; onset usually between 30 and 50 years of age
Fixed drug eruption	History of medication use, well-demarcated, round to oval, erythematous or violaceous macules/plaques, absent systemic symptoms; usually resolves within two weeks after the offending medication has been discontinued; recurs in the same location with repeat exposure to the medication
Contact dermatitis	Well-demarcated, erythematous lesion localized to the area of contact; immediate skin reaction with burning, stinging, or discomfort if caused by an irritant; delayed response associated with pruritus caused by an allergen
Serum sickness	Fever; pruritic rash generally lasts a few days to two weeks after the causative agent is stopped; polyarthralgias or polyarthritis
Systemic juvenile idiopathic arthritis	Intermittent fever; asymptomatic evanescent, macular, salmon-pink rash exaggerated by heat; arthralgias/arthritis; lymphadenopathy; hepatomegaly; splenomegaly; no sex predominance
Systemic lupus erythematosus	Fever; fatigue; weight loss; violaceous erythema on the malar area ("butterfly" rash); arthritis/arthralgias; painless oral and/or nasal ulcers; Raynaud phenomenon; multiple systemic involvement; female predominance

11. CONDITIONS ASSOCIATED WITH PARVOVIRUS B19 INFECTION

The many manifestations of parvovirus B19 infection can pose a diagnostic challenge even to the best diagnostician. Conditions that have been reported in association with parvovirus B19 infection include polyarthropathy syndrome (arthritis or arthropathy in adults in the absence of other manifestations of erythema infectiosum), unilateral laterothoracic exanthem, juvenile spring eruption, erythema multiforme, erythema nodosum, fibromyalgia, hemophagocytic lymphohistiocytosis, Henoch-Schönlein purpura, Diamond-Blackfan syndrome, vasculitis, aseptic meningitis, encephalitis, uveitis, neuropathies, carpal tunnel syndrome, Guillain-Barré syndrome, acute cerebellar ataxia, myocarditis, hepatitis, hypocomplementemic post-infectious glomerulonephritis, chronic fatigue syndrome, Gianotti-Crosti syndrome, Kawasaki disease, symmetrical drug-related intertriginous and flexural exanthema (SDRIFE), and papular-purpuric gloves-and-socks syndrome (PPGSS) [3, 4, 8, 33, 50, 80-102]. For many of the above conditions, a causal role of parvovirus B19 has not been definitively established [36, 103-106].

The rate of vertical transmission of parvovirus B19 during pregnancy is estimated to be approximately 33% [107]. Maternal infection with parvovirus B19 with or without erythema infectiosum during pregnancy is associated with spontaneous abortion, intrauterine growth retardation, fetal anemia, high output cardiac failure, intrauterine fetal demise, and nonimmune hydrops fetalis [21, 23, 69, 108-114]. The risk of fetal anemia and nonimmune hydrops fetalis is greater when maternal infection with parvovirus B19 occurs during the first 20 weeks of gestation [107, 115]. The overall risk of fetal loss is 2 to 6%, with the highest risk during the first 20 weeks of gestation [1, 6, 28, 114]. Fetal loss during the third trimester is very low [116]. In spite of case reports suggesting that infection with parvovirus B19 during pregnancy might be teratogenic [117-122], epidemiologic studies do not support this assertion [16, 123, 124]. Altogether, most infants born to mothers with parvovirus B19 infection are full-term and asymptomatic and do not have an adverse outcome [1, 125]. Congenital parvovirus infection is no less uncommon than other congenital infections [126, 127].

12. PROGNOSIS

Generally, the disease is mild, and the prognosis is excellent. Most individuals with erythema infectiosum recover without sequelae. After recovery, immunity to the disease protects the individual from parvovirus B19 infection in the future [1].

13. MANAGEMENT

There is no specific antiviral drug available for the treatment of erythema infectiosum [10]. Treatment is mainly symptomatic. Oral antipyretics/analgesics such as acetaminophen or ibuprofen should be considered for fever and joint pain. As the rash develops after the viremia has cleared and the virus can no longer be transmitted, there is no need to isolate affected children or restrict attendance at school or childcare facilities. In the majority of cases, reassurance of the benign and self-limiting nature of the disease is the only intervention necessary [128]. Patients with an aplastic crisis may require blood transfusion or transfusion of blood products [10].

CONCLUSION

Erythema infectiosum, the most common manifestation of parvovirus B19 infection, is characterized by a "slapped cheek" appearance and lacy exanthem. Generally, the disease is benign and self-limited and occurs mostly in children. Persons with erythema infectiosum often feel well and do not require treatment. Physicians, however, should be aware of potential complications such as arthritis and aplastic crisis as well as conditions associated with parvovirus B19 infection, especially in individuals who are immunocompromised, chronically anemic, or pregnant.

AUTHORS' CONTRIBUTIONS

Professor Alexander K.C. Leung is the principal author. Dr. Joseph M. Lam, Dr. Benjamin Barankin, Dr. Kin Fon Leong and Professor Kam Lun Hon are coauthors. All the authors contributed to drafting and revising the manuscript and approved the final version submitted for publication.

LIST OF ABBREVIATIONS

ACPA	=	Anti-citrullinated Peptide/Protein Antibody
ANA	=	Antinuclear Antibody
CBC	=	Complete Blood Count
CRP	=	C-Reactive Protein
DNA	=	Deoxyribonucleic Acid Antibody
ELISA	=	Enzyme-Linked Immunosorbent Assay
ESR	=	Erythrocyte Sedimentation Rate
G6PD	=	Glucose-6-phosphate Dehydrogenase
PCR	=	Polymerase Chain Reaction
PPGSS	=	Papular-Purpuric Gloves-and-Socks Syndrome
RF	=	Rheumatoid Factor
RIA	=	Radioimmunoassay
SDRIFE	=	Symmetrical Drug-related Intertriginous and Flexural Exanthema

CONSENT FOR PUBLICATION

Not applicable.

FUNDING

None.

CONFLICT OF INTEREST

Professor Alexander K.C. Leung is a section editor of Current Pediatric Reviews.

ACKNOWLEDGEMENTS

Declared none.

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