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# Hemophagocytosis with Plasmodium Falciparum in Bone Marrow: A rare case report

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**Abstract**

Hemophagocytic syndrome (HPS) has been associated with infections, hematological malignancies and autoimmune conditions. Malaria is rarely reported to cause HPS. We report a case of a 28-year-old female with fever, anaemia, generalized weakness and splenomegaly, high serum ferritin. Peripheral blood smear revealed pancytopenia along with gametocytes of plasmodium falciparum. Bone Marrow aspiration smears also revealed presence of falciparum gametocytes, pigment laden macrophages and macrophages exhibiting hemophagocytosis were also observed. This case report emphasizes the need for consideration of diagnosis of hemophagocytosis in plasmodium positive smear so as to provide timely diagnosis and prompt treatment to improve the clinical outcome.

**Keywords:** Hemophagocytosis, Plasmodium, Gametocytes, Pancytopenia.

**Introduction:** The term hemophagocytosis describes the pathologic finding of activated macrophages, engulfing host blood cells and their precursors.[1] This can be seen in bone marrow aspirates/biopsies and in biopsies of lymph nodes, spleen, liver, skin. Hemophagocytic lymphohistiocytosis (HLH) is clinical syndrome characterized by a hyperinflammatory condition caused by increased levels of circulating inflammatory cytokines due to a highly stimulated but ineffective immune process, and it is uniformly manifested by an abnormal proliferation of histiocytes throughout the reticuloendothelial system with the engulfment of hematopoietic cells (hemophagocytosis).[2-4] Hemophagocytic syndrome is a rare but life-threatening disease caused by an uncontrolled immune response, resulting in a hyperinflammatory disease. The main clinical and biological features are prolonged high fever, hepatosplenomegaly, and cytopenias with histiocytic infiltration in bone marrow and other tissues. It was first described in 1939 by Scott and Robb-Smith[5] hemophagocytic syndromes related to various disorders such as infections and rheumatic diseases were described.[6-8] High level of suspicion, knowledge of clinical features and accepted diagnostic criteria allow early diagnosis and prompt initiation of treatment.

Here we report a rare case of hemophagocytosis secondary to plasmodium falciparum

**Case Report:** A 28 years old female admitted to the hospital with chief complaints of fever, headache and generalized weakness. Patient delivered baby six weeks back and had lactational amenorrhea. Patient was apparently asymptomatic seven days back when she

started experiencing fever. Fever was insidious, progressive, high grade associated with chills, headache, backpain, generalized weakness and vomiting containing. Fever was not associated with rash or burning micturition. There was no significant family history. On admission patient was calm, conscious, well oriented to time, place and person. General examination revealed that patient was febrile, pale and recorded blood pressure was 100/60 mmHg. Pulse Rate was 78/min. Respiratory Rate was 14/min. There was no lymphadenopathy. However, on Abdominal examination mild splenomegaly was noted. Rest of physical examination was normal. Her laboratory findings on day one of admission revealed pancytopenia (Haemoglobin: 3.7 gm/dl, WBC count: 3500/cumm, Red Blood Count: $1.29x10^6$/microL, Platelet count: 90,000/cumm) and Haematocrit (HCT) was 10.7%. Subsequently, two units of whole blood were transfused to the patient to improve cell count. All biochemical investigations were with in normal limit. While her Ferritin was 518.2 ng/ml, more than the normal range. The Serum $HB_SAg$, Hepatitis C virus (HCV) antibody and Human immunodeficiency virus (HIV) antibody were all negative. Direct coomb test and Indirect coomb test were also negative. Peripheral blood smear examination revealed pancytopenia along with presence of plasmodium falciparum gametocytes [figure 1]. Platelets were normal in morphology. Reticulocyte count was 2%. In view of pancytopenia, generalized weakness and splenomegaly, Bone Marrow aspiration done from right posterior-superior iliac spine. Bone marrow smears also revealed presence of gametocytes of plasmodium falciparum [figure 2], haemophagocytosis and pigment engulfed macrophages [figure 3,4,5]. Erythropoiesis was micro-normoblastic. Myeloid cells, megakaryocytes, plasma cells, lymphocytes and any other findings were with in normal limit.

**Discussion:** HLH (Hemophagocytic Lymphohistocytosis) is a life-threatening condition characterised by severe hyperinflammation due to uncontrolled proliferation of activated lymphocytes and histiocytes secreting high amounts of cytokines [9-11]. Clinically, both familial and acquired HLH have overlapping symptomatic presentations in the form of fever, organomegaly, variable neurologic symptoms, and rarely rash, lymphadenopathy and diarrhoea. Laboratory findings of HLH include cytopenias, hypertriglyceridemia, hypofibrinogenemia, elevated ferritin, liver dysfunction, low or absent natural killer (NK)-cell activity, or elevated soluble CD25 (interleukin [IL]-2 receptor). Hemophagocytosis in bone marrow/spleen/ lymph nodes which is considered a hallmark of HLH may not be apparent in the bone marrow biopsy early in the disease process [11, 12].

Our patient was free from active viral infections such as HBV, HCV, and HIV. She was treated with drugs containing anti-malarial agents like artisunate Our patient was suffering from falciparum malaria. After treatment with antimalarial drugs her complete blood count showed recovery from the previous pancytopenia.

Our patient presented with fever, splenomegaly and pancytopenia along with presence of gametocytes of Plasmodium falciparum in both peripheral blood smears. Later, bone marrow examination revealed haemophagocytosis, along with falciparum gametocytes and pigment laden macrophages. These facts lead us to believe that her HPS was associated with the falciparum malaria

**Conclusion:** Hemophagocytosis secondary to malaria, although rare, can be potentially fatal condition, if not diagnosed early and treated appropriately.

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**Legend Figures**

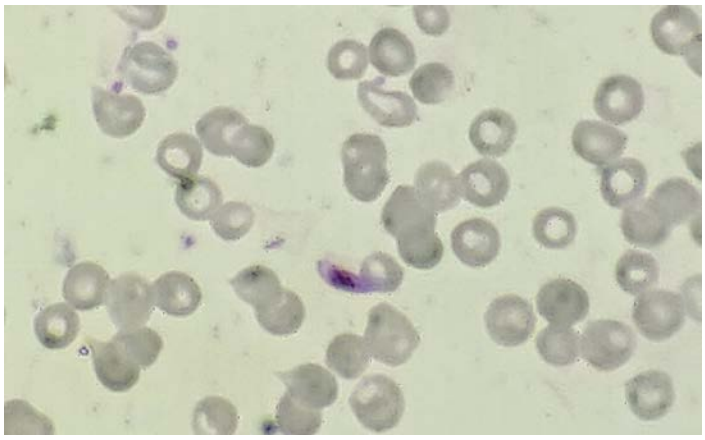

Figure 1: Peripheral blood smear examination revealed presence of plasmodium falciparum gametocytes [LS 1000X]

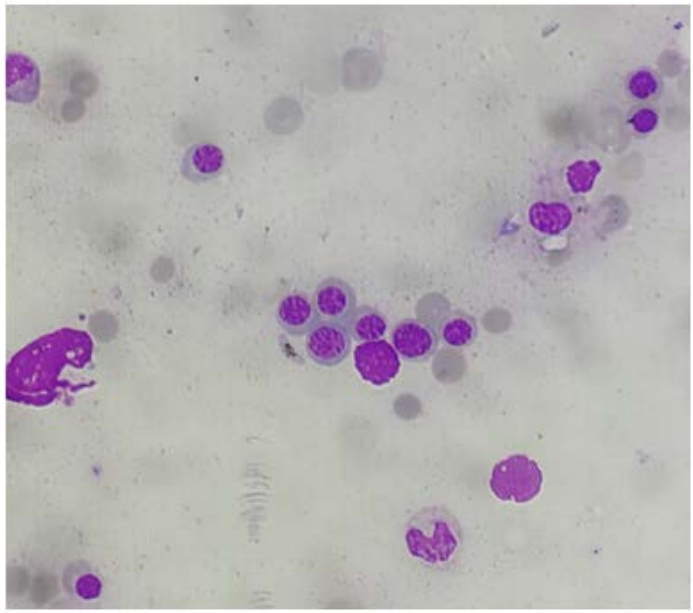

Figure 2: Bone marrow smear showing gametocytes of plasmodium falciparum [LS 1000X]

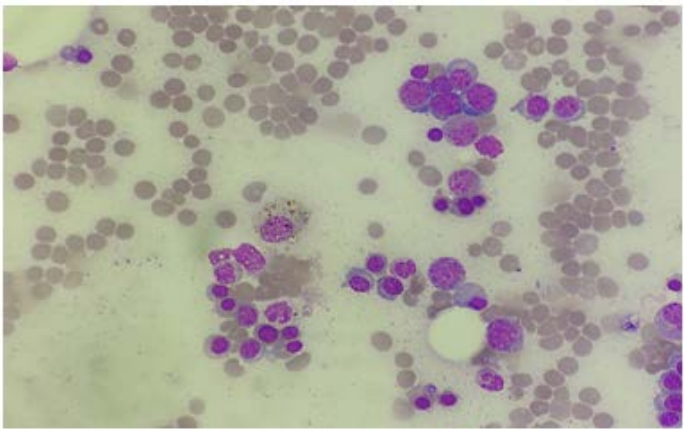

Figure 3: Bone marrow showing presence of pigment engulfed macrophages [LS 1000X]

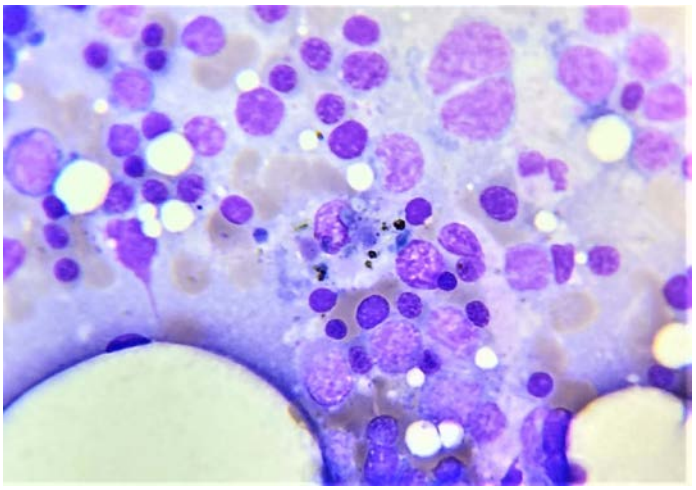

Figure 4: Bone marrow showing presence histiocyte with hemophagocytosis. [LS 1000X]

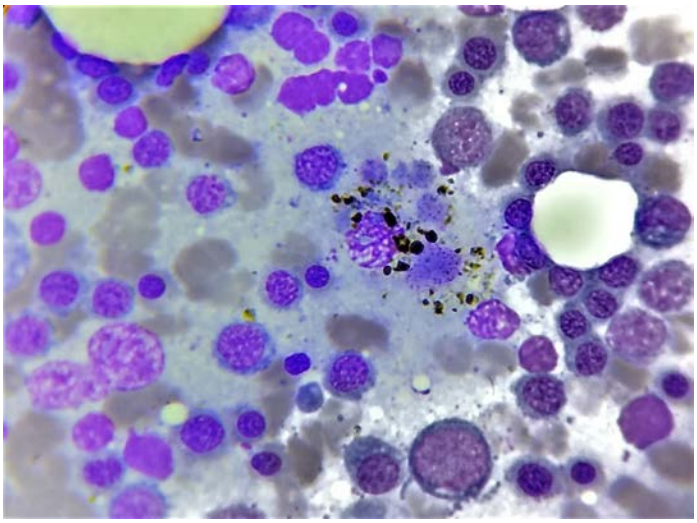

Figure 5: Bone marrow showing presence histiocyte with hemophagocytosis. [LS 1000X]