

## Leukemoid Reaction in Malaria

Unnati Padalia<sup>1</sup>, Charu Modi<sup>1</sup> and Rajesh C. Patil<sup>2</sup>

<sup>1</sup>Department of Microbiology,

K.J. Somaiya College of Science and Commerce, Mumbai - 400 077, India.

<sup>2</sup>Department of Microbiology, Bhavan's College, Andheri, Mumbai - 400 058, India.

(Received: 18 September 2008; accepted: 30 November 2008)

**Malarial infection of humans brings about many hematological changes, including anemia and thrombocytopenia. Since lymphocytes are intimately associated with the immune response to malaria, changes in the circulating numbers and phenotype of lymphocytes are reported. Reporting a case of malarial infection, where the peripheral smear showed lymphocytosis as well as atypical lymphocytosis with leukemoid reaction i.e. mimicking a leukemia.**

**Key words:** Malaria, Leukemoid reaction, Atypical lymphocytes.

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The Plasmodium infection, brings about many hematological changes in the human blood. Anemia and thrombocytopenia are well established features of Plasmodium infection. However, leucocytosis associated with presence of atypical lymphoid cell, mimicking an acute lymphoid leukemia is uncommon and hence reporting here such a case.

### MATERIAL AND METHODS

A two year old child was admitted with the complaints of Fever for five days. The fever was not associated with chills, rigors or rash over the body. There was also a yellowish discoloration of sclera for three days. There was a history of breathlessness for two days, which had increased since the morning of admission. There was also history of lethargy.

On examination, the general condition was moderate. The patient's heart rate was 150/minute; Respiratory rate was 48/minute. There was pallor as well as icterus. There was no lymphadenopathy. The blood pressure was 100/56 mm Hg. Patient had features of Rickets. Liver was four centimeter palpable, was non tender, firm, with sharp margins and smooth surface. Spleen was three centimeter palpable and non tender. There was no free fluid in the abdomen.

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\* To whom all correspondence should be addressed.

Lymphocytes are intimately concerned with the immune response to infection. Alterations in the proportions and numbers of lymphocyte subpopulations have been found in *Plasmodium* infection. In the acute phase of this infection, a reversible decrease in the percentage and numbers of T cells occurs accompanied by an increase in the percentage of B cells and null cells<sup>1</sup>. (Fakunle *et al*, 1978)

Exposure to malaria elicits an exaggerated stimulation of polyclonal B lymphocytes, leading to excessive and partially uncontrolled production of IgM as the initiating event. Defective immunoregulatory control of B lymphocytes causes an increase in B lymphocytes and a decrease in T lymphocytes in the peripheral blood. This is accompanied by T cell infiltrations of the hepatic and splenic immune complexes. This leads to anemia, deposition of large immune complexes in Kupffer cells in liver and spleen, reticuloendothelial cell hyperplasia, and hepatosplenomegaly<sup>2</sup>. (Verma *et al*, 2007)

Although an increase in B lymphocytes is reported, reports of leukemoid reaction in malaria are uncommon.

Krumbhaar introduced the term leukemoid reaction in 1926 to describe leukocytic features that could mimic leukemia. Leukemoid reactions associated with various leukocyte types - neutrophils, lymphocytes, monocytes, eosinophils, and basophils have been described<sup>3</sup>. (Mizock *et al*, 1992)

The earliest report of leukemoid reaction occurring in malaria, appeared in 1949, in which, Riley *et al* reported a case of mixed malarial i.e. *Plasmodium vivax* and *Plasmodium falciparum* infection to be associated with leukemoid reaction<sup>4</sup>.

In 1987, Irving *et al* reported case of a four year old patient with *Plasmodium falciparum* malaria. The diagnosis was established by observing many gametocytes in the peripheral blood. The blood picture was that of a leukaemoid reaction with severe anemia, high total leucocyte count and thrombocytosis. Treatment with chloroquine and primaquine, together with packed red cell transfusions, was successful in eliminating both the malaria parasites and the leukaemoid blood picture as was observed in the present case<sup>5</sup>. In 1988, Gandapur *et al* reported a case of malaria and enteric fever presenting as a leukemoid reaction<sup>6</sup>.

The hematological abnormalities that have been reported to invariably accompany infection with malaria include anemia, thrombocytopenia, splenomegaly and mild to moderate atypical lymphocytosis and rarely disseminated intravascular coagulation<sup>7</sup>. (Bashawri *et al*, 2002)

Cunha, in 2004, suggested that in manually interpreted stained malarial smears, the absence of even 1% atypical lymphocytes should cause the physician to question the diagnosis of malaria. He also observed that atypical lymphocytes in the peripheral smear in patients with acute malaria do not relate to *Plasmodium* species or degree of parasitemia<sup>8</sup>.

In the study done by Bashawri *et al*, atypical lymphocytes were seen in 38.7% of the cases with malaria. Lymphocytosis was more common in children affected by malaria, than in adults<sup>7</sup>. (Bashawri *et al*, 2002)

Ahmed *et al*, in 1987 reported that in their study, the percentage of reactive lymphocytes in children was increased to a degree that mimicked a viral infection<sup>9</sup>.

To conclude, when severe leukocytosis as well as significant number of atypical lymphocytes present in the peripheral smear of a case of malaria, the possibility of leukemoid reaction should be considered to avoid over diagnosis of leukemia.

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