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Case Report

Malaria: a masquerader of cytopenias in leukemia

Madhulika Mohan[1], Priyathersini Nagarajan[2]*, Prathibha Karunanidhi[3], Sivaranjini Sudagar[1], Latha M. Sneha[1]

[1]Department of Pediatrics, [2]Department of Pathology, [3]Department of Pediatric Hematooncology, Sri Ramachandra Institute of Higher Education and Research, Chennai, Tamil Nadu, India

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***Correspondence:**
Dr. Priyathersini Nagarajan,
E-mail: nagarajan.priyathersini@gmail.com

ABSTRACT

In developing countries where the prevalence of malaria and cancer are high it can be expected to occur together. 6-year-old male child, a known case of B cell acute lymphoblastic leukemia, on maintenance phase of chemotherapy presented to us with fever. His initial investigations showed no identifiable focus or significant abnormalities. He continued to have high grade fever spikes in spite of stepping up antibiotics. A week after admission he was found to have cytopenias and mild splenomegaly. Peripheral smear and bone marrow aspiration study showed enlarged RBCs infested by *Plasmodium vivax*. We report this case to make the clinicians aware that malaria can be cause of fever in patients on cancer treatment.

Keywords: Fever, Cancer, Parasite

INTRODUCTION

Malaria in children with hematological neoplasms has been reported.[1] In developing countries where the prevalence of malaria and cancer are high it can be expected to occur together.[2] Prompt diagnosis and treatment of malaria in a child with leukemia is life-saving. We report a child with acute lymphoblastic leukemia whose course is complicated by malarial infection.

CASE REPORT

A 6-year-old male child, a known case of B cell acute lymphoblastic leukemia, on maintenance phase of chemotherapy presented to us with fever. His complete blood counts counts were Hb 10.8 g/dl, total counts 2860/m^{3}polymorphs-46%, lymphocytes 54%, platelets 1.56/m^3. There was no identifiable focus or significant abnormalities noted at admissions. He was instituted on parenteral antibiotics as per febrile neutropenia protocol with piperacillin tazobactam and amikacin. Peripheral smear showed normocytic normochromic anemia with neutropenia and thrombocytopenia. Blood culture was sterile. He continued to have high fever spikes and so antibiotics were upgraded to meropenem and teicoplanin. Further work up showed chest X-ray was normal, WIDAL-negative, dengue serology-negative for both IgM and IgG, IgM for Scrub typhus was negative and repeat blood culture was also negative. He continued to have high grade fever spikes in spite of stepping up antibiotics. His counts also were in dropping trend. His hemoglobin was 7.6 gm/dl, RBC count 2.9 million/cumm, total WBC count 2260/cumm and platelet count 25000/cumm. A week after admission he was found to have splenomegaly. Peripheral smear study and bone marrow aspiration were done. His peripheral smear examination showed pancytopenia with enlarged RBCS infested by trophozoites and schizonts of *Plasmodium vivax* (Figure 1 A and B). Bone marrow aspirate also revealed normocellular marrow with trilineage hematopoiesis with many RBCs infested by malarial parasite, *Plasmodium vivax* (Figure 2 A and B).

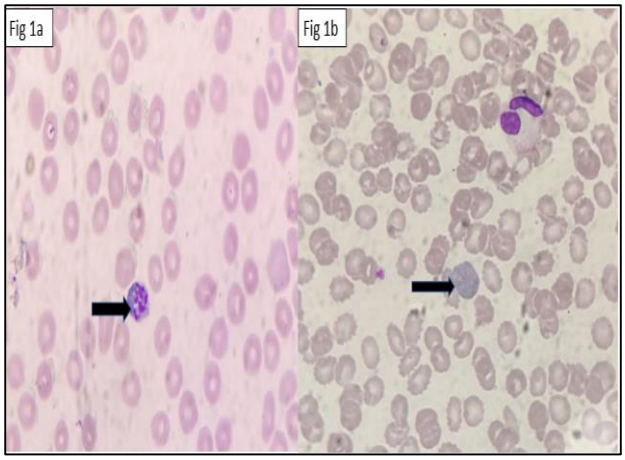

Figure 1 (A and B): Leishmans stain, 1000x: trophozoites and schizonts of *Plasmodium vivax* in the peripheral smear.

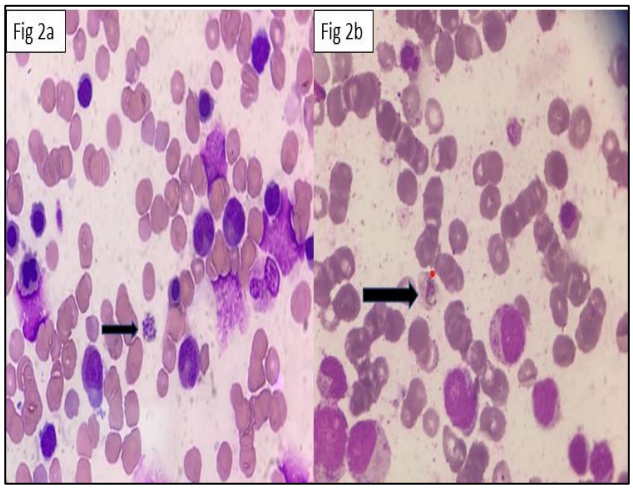

Figure 2 (A and B): May Grunwald Giemsa stain, 1000x: Trophozoites and schizonts of *Plasmodium vivax* in the bone marrow aspirate.

He was started on antimalarial chloroquine phosphate. His fever settled dramatically and counts improved after antimalarial therapy. He was well and on follow up was continuing the maintenance phase of chemotherapy.

DISCUSSION

The prevalence of malaria and cancer are high in developing countries. When they occur together can contribute to higher mortality and morbidity. Both can confuse the diagnosis when co exists. Nirmala et al reported a high prevalence of chloroquine resistance among the clinical cases of falciparum malaria in their study of 50 cases of hematologic malignancies with 31 patients microscopically diagnosed as having *P. falciparum* infection.[1] However, Bansal et al in their study investigated one hundred episodes of FN involving 82 children for evidence for malaria by standard microscopy, quantitative buffy coat, and antigen detection. Malaria was not found in any case by any of the three methods.[2]

Taylor et al retrospectively studied the outcome of malaria infection in pediatric oncology patients in Senegal, West Africa over a 10-year period. Of the 51 episodes there was no association with severe anemia, leucopenia, neutropenia, or lymphopenia. Despite the high incidence of myelosuppression in pediatric oncology patients, they found no evidence of increased fatality of malaria episodes in cancer children.[3]
Venkateshwari et al reported a child with pancytopenia who was found to have malarial infection but later persistence of pancytopenia despite the clearance of parasitemia, with the suspicion of an underlying malignancy, bone marrow aspiration done demonstrated acute lymphoblastic leukemia.[4] Malaria due to blood transfusion has been reported malignancies and bone marrow transplant setting. Ladeb et al has reported a 27-year-old man with severe aplastic anemia underwent bone marrow transplantation from his HLA identical brother on day 26 post BMT. They found that their patient was transfused by a red cell unit harvested in a voluntary donor native of a malaria endemic country. PCR for *P. falciparum* performed in that donor was positive.[5]

Rapoport et al reported three cases of malaria complicating the Hodgkin`s lymphoma, non-Hodgkin`s lymphoma, and acute lymphoblastic leukemia, all the three cases showed neutropenia.[6]
Ellis et al did a critical review of 1753 articles for a period of 20 years and evaluated eighty-nine eligible articles to explore link between malaria and malignancies. Excluding for Burkitt lymphoma, the relationship between cancer and malaria they did not find any association.[7]

Kulkarni et al in a case is a illustrated how a sharp peak in the WBC histogram and a monoblast flag could confuse a diagnosis of malaria and mimic a leukaemia blast. So careful attention should be given when both co exists or when malaria occurs in leukaemia.[8]

CONCLUSION

We report this case to make the clinicians aware that although rare, Malaria could be considered in any child with cancer when they present with fever and cytopenias, especially in a region with high endemicity for malaria. But empirical treatment with antimalarial is not recommended.

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REFERENCES

1. Nirmala, Kumar A, Kapoor AK, Lal B, Dutta GP, Swaroop A. Plasmodium falciparum: drug-resistant

malaria complicating leukemias and lymphomas in children. Exp Parasitol. 1999;93(1):33-7.
2. Bansal D, Gautam P, Dubey ML, Marwaha RK. Presumptive treatment for malaria is not justified in children receiving cancer chemotherapy. Pediatr Blood Cancer. 2010;55(6):1108-10.
3. Taylor CA, Moreira C, Murray MJ. A retrospective study of malaria in pediatric oncology patients in Senegal. J Pediatr Hematol Oncol. 2011;33(5):325-9.
4. Ramesh V, Venkata NMM, Sankar J. Mixed Malarial Infection with Pancytopenia in a Child with Acute Lymphoblastic Leukemia: An Unusual Presentation. Indian J Med Paediatr Oncol. 2017;38(1):92.
5. Ladeb S, Ben Abdejlil N, Fakhfakh N, Lakhal A, Belloumi D, Ben Hamed L et al. Plasmodium falciparum infection transmitted by transfusion: A cause of hemophagocytic syndrome after bone marrow tranplantation in a non-endemic country. Transpl Infect Dis. 2018;20(3):e12887.
6. Rapoport BL, Uys A. Malaria parasitemia associated with febrile neutropenia in African patients undergoing chemotherapy for haematological malignancies: A report of three patients. Chemotherapy. 2008;54:117-9.
7. Ellis T, Eze E, Raimi-Abraham BT. Malaria and Cancer: a critical review on the established associations and new perspectives. Infect Agent Cancer. 2021;16(1):33.
8. Kulkarni JD, Singh R, Pramod PS. Not all blast flags in hematology analysers are leukemia-think malaria! Indian J Cancer: 2020;57(4):505-6.

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