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Quantitative Buffy Coat Analysis-An Effective Tool for Diagnosing Blood Parasites

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ABSTRACT

Quantitative buffy coat (QBC) analysis, which is based on principle of centrifugal stratification of blood components, is a well-known and a very sensitive technique which can be used for the detection of malarial parasites in peripheral blood. In our experience, this technique is also highly specific for doing speciation of malarial parasite in Indian set up. In addition, this technique was also found to be a sensitive and specific tool for diagnosing filariasis. Lastly, the cellular pattern of buffy coat in QBC, together with other non-specific findings, has many times aided in making correct diagnoses in difficult cases of visceral Leishmaniasis.

Keywords: Quantitative buffy coat, Malarial parasite, Filariasis, Visceral leishmaniasis

Sir,

The timely diagnosis of infections can help in preventing patients' morbidities, unnecessary prescriptions, costs of hospital stays/visits and those of further diagnoses. Malaria, Filariasis and Leishmaniasis are important parasitic causes of Pyrexia of Unknown Origin (PUO) in India [1].

Quantitative Buffy Coat analysis (QBC)- which is based on principle of centrifugal stratification of blood components, was initially used for detection of blood parameters. It is also a very sensitive technique which can be used for the detection of malarial parasites, as the parasitized erythrocytes get concentrated in a layer which can be visualized by fluorescence microscopy [2-4]. In our experience, QBC is also quite specific for speciation of malarial parasites, as *Plasmodium falciparum* and *Plasmodium vivax*, the two most important causes of malaria in India can be differentiated by doing this test. In our laboratory, 36 cases of malaria were diagnosed by doing QBC analysis (18 of vivax malaria, 17 of falciparum malaria and one mixed infection caused by *P. falciparum* and *P. vivax*); whereas, only 22 cases could be identified by using light microscopy. Most of the antigen detection-rapid diagnostic test (RDT) kits available in India also differentiate only falciparum malaria from non-falciparum malaria. Moreover, a mixed infection caused by *P. falciparum* and *P. vivax* cannot be differentiated from an isolated *P. falciparum* infection by using an RDT kit [3].

Filariasis is diagnosed by doing light microscopy of wet mounts and by using Giemsa stained thick smears of peripheral blood [2]. However, these tests are requested only based on a clinical suspicion of lymphoedema/eosinophilia. We diagnosed filariasis as a cause of fever in samples which were received for detection of malarial parasites (wherein, routinely, wet mount examination of blood was not done). Eleven cases of filariasis were diagnosed with help of QBC analysis; 2 of which were associated with other parasitic infections, namely - Leishmaniasis and falciparum malaria. In 8 out of 11 cases of such "incidentally" detected filariasis - the parasitic count was high, no other cause of fever could be identified and patients showed clinical improvements after taking specific treatment. QBC very sensitively picks up microfilariae present in peripheral blood. Speciation and parasitic counts can be done in almost all the cases.

Visceral Leishmaniasis (VL) is usually diagnosed, based on examination of Geimsa stained smears of bone marrow/splenic aspirates and/or by detecting antibodies for rK-39 antigen. But the former has a low sensitivity and the latter remains positive for a long time after treatment and so there is a theoretical possibility of a cross reactivity [2]. From our experience, we can say that peripheral blood of patients with VL shows a characteristic pattern which results from pancytopaenia with relative lymphocytosis. Among 42 cases of VL which were diagnosed in our laboratory, QBC was done on anti-coagulated blood collected from nine patients. All QBCs showed "VL pattern", which included- a packed RBC zone of less than 5 mm, a markedly decreased zone of platelets, a relatively increased zone of agranulocytes and an almost absent zone of granulocytes. The cases of VL with partial treatment/treatment failure are difficult to diagnose; in such cases, diagnosis of VL as a cause of PUO is made based on some non-specific parameters such as reversal of Albumin: Globulin ratio, positive aldehyde test, travel to endemic areas, etc. The presence of "VL pattern" in such cases indicates active leishmaniasis as being a cause of fever.

To conclude, powerful diagnostic techniques like QBC can serve as helpful tools which can be used in the parasitological work up of PUO. However, the high costs and requirement of skilled and experienced microscopists are the limiting factors which hinder its widespread utilization.

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