Diagnostic screening of malaria infestation through WBC Scattergram

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Introduction

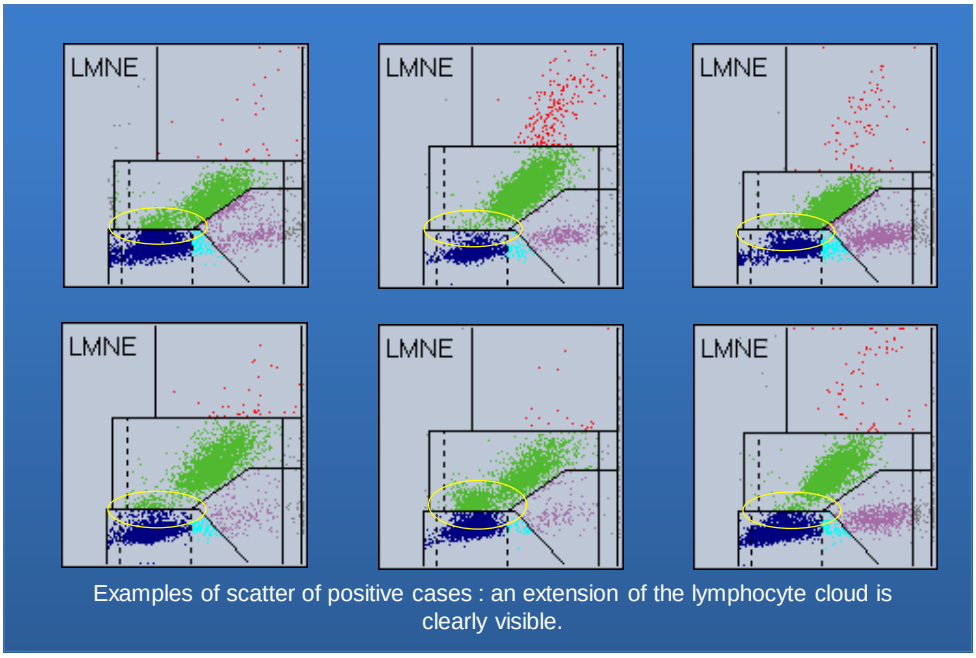
In tropical countries infective causes such as malaria & dengue are common findings. Our study was conducted to assess whether any abnormal pattern is observed in five-part WBC scattergrams, which can help to develop an alarm for malaria screening.

Materials and methods

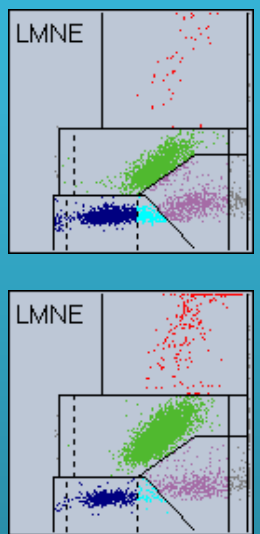
Patients with pyrexia of unknown origin (PUO) were investigated for presence of malarial parasites for 6 months. Results were segregated based on malarial parasite positivity (MPP) detected on peripheral smear examination with Field's staining method. Results were further segregated based on the sub-species (*P. vivax* or *P. falciparum)* and also the dominant parasitic forms. Dengue infestation was evaluated by Rapid Diagnostic Test (RDT).
All the results were reviewed for abnormal patterns in WBC scattergram (Horiba Medical LMNE matrix).

Results

Laboratory received total 2405 requests for investigations in PUO of which 190 patients were MPP and 195 Dengue-positive.
On a detailed naked-eye examination of the WBC scattergram, 151 results (79.47%) showed a fairly distinct prominent scatter cloud in between Lymphocytic & Neutrophilic clouds.
Among of the 151 scatter-positive, 150 samples presented *P. vivax* and one *P. falciparum*.
Of 39 scatter-negative cases, 16 were *P. vivax* (41%), 22 *P. falciparum* (56.41%) & one showed combined infestation.
In these MPP cases, simultaneous RDT for Malaria was performed in 19 cases: 15 were *P. vivax* of and showed positive scatter; one *P. vivax* and 3 *P. falciparum* were scatter negative.
This abnormal pattern was distinctly absent in all parasite-negative cases as well as in the 195 Dengue-positive cases.



Examples of scatter of positive cases : an extension of the lymphocyte cloud is clearly visible.



Examples of scatter of negative cases.

Discussion

Tremendous technological advances taking place in last 20 to 25 years have introduced newer techniques of cellular analysis in automated blood cell analyser.
Here we demonstrated that the graphic analysis of the WBC scattergram is able to discriminate between the malaria positive samples and malaria negative, as well as the Dengue positive.
Because of our specific patient recruitment the samples were mainly infected by *P. vivax* and only few samples by *P. falciparum*. Further studies are needed to determine the specificity and sensitivity of this finding in *P. falciparum* MPP.
With a precise data analysis, proper regionalization & applying digital scatter signal sensitivity criteria it may be possible to define a slide review criteria to confirm presence or absence of malarial parasite in the sample.