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Research Paper

COMPARATIVE EVALUATION OF PAN-MALARIA ANTIGEN CARD TEST AND BLOOD SMEAR FOR DIAGNOSING MALARIA

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The present study was done to compare a rapid malaria test, Malariscan, for the diagnosis of malaria against the peripheral blood smear examination. Blood samples from 1000 patients suspected of having malaria were obtained. The peripheral blood smears were stained with Leishman's stain and all the blood samples were subjected to card test according to manufacturers' instructions. A total of 150 samples were positive by blood smear examination while 142 were positive by pan-malaria antigen card test. The assay had sensitivity of 94.6% and specificity, positive predictive value and negative predictive value were 99.7%, 98.6% and 99.0% respectively. The pan-malaria antigen card test can be used as single or in combination with conventional blood smear examination for detection of malarial parasite and for early diagnosis of malaria.

Keywords: Malaria, Peripheral blood film, Rapid test

INTRODUCTION

Malaria is a serious, sometimes fatal, parasitic disease posing a major public health problem in India. It is estimated that there are approximately 0.32 million cases with about 335 deaths every year in our country (Park, 2009). There is a difficulty to clinically diagnose malaria but the treatment has to be started immediately in order to avoid complications. Conventional peripheral blood smear examination for demonstration of

malarial parasites remains the gold standard for diagnosing malaria. However, this technique is time consuming and requires skilled personal. Several newer diagnostic techniques have been designed to replace the conventional microscopic methods. Therefore, the present study was done to compare the peripheral blood smear examination with pan-malaria antigen card test which detects the presence of lactate dehydrogenase (pLDH) of the *Plasmodium* spp.

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MATERIALS AND METHODS

The present study was conducted in the Emergency Department of Microbiology from January 2009 to November 2009. One thousand samples were collected from clinically suspected cases of malaria after their verbal consent. Thick and thin smears were prepared and stained with Leishman's stain and examined for malarial parasites by light microscopy. All the samples were subjected to pan-malaria antigen card test (Maleriscan, Inbios, Bhat Bio-tech India Pvt Ltd.) according to manufacturer's instructions. The pan-malaria card test is a immunochromatographic test for the qualitative detection of pLDH of all the four *Plasmodium* spp. (*P. falciparum*, *P. vivax*, *P. malariae*, *P. ovale*) in human whole blood. The results were read in 5-20 minutes. Interpretation of the results was done as:

Negative: When only one red line (control line) appears in the result area.

Positive: When two red lines (control and pan lines) appear in the result area.

RESULTS AND DISCUSSION

A total of 1000 samples were tested for malarial parasites. Out of these, 587 were males and 413 were females. The blood film result indicated that 150 (15.0%) cases were infected with malaria and 850 (85.0%) were negative. Of these 144 (96.0%) were positive for *P. vivax* and 6 (4.0%) were *P. falciparum*. Pan-malaria antigen card test could detect 142 (14.2%) positive cases of malaria and 858 (85.8%) were negative.

The blood smear examination could detect eight positive cases of *P. vivax* which were not detected by the card test. However, two cases were positive by card test and negative by blood

smear examination. The sensitivity of card test was 94.6% and specificity, positive predictive value (PPV), negative predictive value (NPV) were 99.7%, 98.6% and 99.0% respectively.

Malaria presents a diagnostic challenge and early detection is a prerequisite for effective management of the disease. Apart from clinical and microscopic examination, many rapid diagnostic tests have been developed. Most frequently, they deploy a dipstick or test strip bearing monoclonal antibodies directed against the target parasite antigen.

In the present study, we evaluated the use of pan-malaria antigen card test for diagnosis of malaria. Here we observed that two cases of malaria were positive by card test and negative by blood smear examination. Maleriscan is a pan-malaria antigen card test which cannot differentiate between the four species, so the above two cases might be of *P. falciparum* as it is known that *P. falciparum* can remain hidden in the capillaries of internal organs and is not found in the peripheral blood.

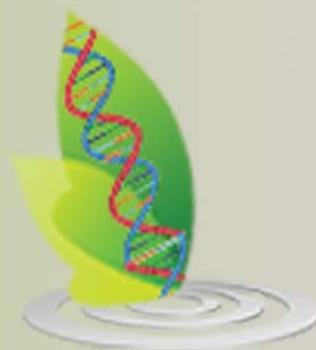
Maleriscan, which is based on the detection of pLDH of *Plasmodium* spp. had a sensitivity of 94.6% while a lower sensitivity of 75% has been reported from Pondicherry (Parija *et al.*, 2009) by using other kit-based procedure (Malrigen) based on similar principle, whereas the specificity (100%) and PPV (100%) were in accordance with our study (99.7% and 98.6% respectively). The specificity and PPV of pLDH assay can be due to the fact that pLDH antigenemia closely mirrors parasitemia (Hopkins *et al.*, 2007). Our study showed a NPV of 99% which is in accordance with a study from Kampala (Hopkins *et al.*, 2007) and this offered a good reliability in ruling out malaria as a cause of fever.

CONCLUSION

To conclude, our evaluation shows that pan-malaria antigen card test is a simple, reliable and rapid test for the diagnosis of malaria with some limitations like high cost, inability of quantification of parasite and differentiation between the *Plasmodium* species. Even then, the test can be a promising alternative to microscopy in remote and rural areas of our country where the facility for microscopic examination do not exist and can be used as supplement to microscopy in tertiary care centres.

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