EDITORIAL

RAPID SEROLOGICAL DIAGNOSIS OF MALARIA: NEED TO INTRODUCE INNOVATIVE TECHNIQUES IN DEVELOPING COUNTRIES

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Malaria kills 1-2 million people annually including one million children and infects 300-500 million people worldwide. The disease is present in over 100 countries, threatening 40% of the world population[1]. Malaria is one of the leading causes of morbidity and mortality and is the single largest killer in children aged under five in Africa[2]. It is caused by four species of the Plasmodium (P.) protozoa of which P. falciparum is responsible for most deaths. Reliable diagnosis of malaria requires laboratory confirmation of the presence of malarial parasite in the blood of a febrile child[3]. Traditional methods based on the examination of Giemsa-stained thick and thin blood smears under a microscope, are inappropriate for many areas because there are insufficient microscopes and / or trained microscopists to read and interprete the slides.

Recently, rapid detection methods have been developed for situations where microscopy may not be available. They are based on the detection of antigen released from parasitized red cells. Malaria antigens currently targeted by rapid diagnostic (RDT) are histidine rich proteins II (HRP-II), plasmodium lactate dehydrogenase (pLDH) and plasmodium aldolase[4]. The HRP-II is a water soluble protein produced by asexual stage and young gametocytes of P. falciparum. It is expressed on the RBC membrane and because of its abundance in P. falciparum, it was the first antigen to be used to develop a rapid diagnostic test.

Plasmodium lactate dehydrogenase (pLDH) is an enzyme found in the glycolytic pathway of the malaria parasite and is produced by asexual and sexual stages of the parasite. Different isomers of pLDH for each of the four plasmodia exist and their detection constitutes a second approach to RDT development. Several other enzymes of the malarial parasites involving the glycolytic pathway such as aldolase have also been suggested as a target antigen for RDT for species other than P. falciparum. These new immunochromatographic (ICT) antigen tests are capable of detecting >100 parasites/ul and of giving rapid results in 15 to 20 minutes[5]. They are available commercially in a kit form with all the necessary reagents and the procedure does not require extensive training or equipment to perform or to interpret results[5]. Immunochromatography relies on the migration of liquid across the surface of a nitrocellulose membrane. The tests are based on the capture of parasitic antigen from the peripheral blood using monoclonal antibodies prepared against a malaria antigen target and conjugated to either a liposome containing selenium dye or gold particles in a mobile phase[7,8]. A second or third capture monoclonal antibody applied to a strip of nitrocellulose acts as the immobile phase. The migration of the antigen-antibody complex in the mobile phase along the strip enables the labeled antigen to be captured by the monoclonal antibody of the immobile phase, thus producing a visible colored line[9-11].

The traditional and tedious microscopic examination of blood film carefully by an experienced and trained microscopist of a well prepared and well stained blood films still remains the gold standard for detecting and identifying the malarial parasite, but has undergone very little improvement since its development in the early 1900s[12]. It has the additional advantages of differentiation between falciparum, vivax, ovale and malarie, circulating stages trophozoite, gametocyte, and schizont and determination of level of parasatemia In experienced hands, it can detect 50 parasites/ul (0.001%)[13,14]. It is relatively inexpensive, more sensitive and also gives us other information like platelet and leukocyte estimation and the presence of abnormal and immature cells.

The rapid diagnostic tests are simple to use, easy to interpret, produce results in less than 20 minutes, and are as sensitive to microscopy and do not require skilled personnel to perform the tests. They can be used as a supplement in doubtful cases[15]. Studies carried out, locally and internationally, show that results of RDT are comparable to conventional microscopy. A study done in Germany showed a sensitivity of 92.5% and specificity of 98.3% for ICT[16].

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Traditional blood film microscopy for malarial parasite is the gold standard in the presence of experienced microscopist but rapid diagnostic tests can be used as a supplement in doubtful cases. These tests provide an alternative especially in rural areas of developing countries, where microscopy is not available, staff is inexperienced in far flung areas and urgent diagnosis is needed at night, weekend and holidays even in urban areas when available staff is relatively inexperienced.

With the present burden of disease, it is imperative that these rapid and innovative diagnostic tests should be introduced in this scenario and made freely and widely available.

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