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Non-malarial fever among pregnant women in Medani Hospital, Sudan: diagnostic uncertainty and overtreatment with quinine

Elhassan M Elhassan¹, Abd Elrahium D Haggaz¹, Mamoun M Magzoub², Ishag Adam^{3*}

¹University of Geizera, Medani, Sudan

²University of Kassala, Sudan

³Faculty of Medicine, University of Khartoum, Khartoum, Sudan

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ABSTRACT

Objective: To investigate the accuracy of malaria diagnosis among pregnant women admitted in Medani Maternity Hospital, Central Sudan during June–October 2009 and to investigate the antimalarials prescribed in this setting. **Methods:** Socio-demographic characteristics and obstetrics history were gathered using pre-tested questionnaires. The finger prick blood samples were collected from pregnant women who admitted as malaria case after an initial microscopic test done by general microscopists for malaria diagnosis. The antimalarial treatment prescribed by treating doctor was inquired for. **Results:** Only 21 (8.6%) out of 243 pregnant women admitted as malaria case after an initial microscopic test done by general microscopists for malaria were found to have blood film positive. There was no significant difference in the specificity of the microscopy accuracy between those who have been investigated in the private and governmental sector, 15/193 (8.2%) vs. 6/60(10%), ($P>0.05$). Quinine infusion was the prescribed drug in this setting. **Conclusions:** There is a very poor specificity of malaria microscopy in pregnant women admitted to Madani Maternity Hospital. Quinine was the drug received. Malaria control programme should interfere urgently to change this situation.

1. Introduction

It has been estimated that 90% of the global malaria burden occurs in Sub-Saharan Africa, where during pregnancy 40% women are exposed to malaria infections[1]. Malaria during pregnancy poses a substantial risk to the mother, her fetus and the neonate[2]. Malaria during pregnancy is a major health problem in Sudan[3, 4], where it has been reported to be associated with maternal anaemia, stillbirth and as the main cause of maternal mortality[5–7].

In the tropics, practitioners are preoccupied by malaria diagnosis[8], not only in feverish patients but also for many undiagnosed systemic disorders. Such malpractice is not limited to treatment of falsely positive malaria, but presumptive treatment is also frequently practiced[9, 10]. Microscopy is the gold standard technique in malaria diagnosis; it is a valuable technique when performed correctly, but it is unreliable and wasteful when poorly executed. In addition, the technique has its own inherent limitations. The low accuracy of malaria diagnosis is widely

recognized in malaria endemic countries[10]. The first step in improving diagnostic tests for parasite-based diagnosis of malaria is of paramount importance. Misdiagnosis of malaria is costly and results in considerable morbidity and mortality, because it contributes to both a delay in treatment of the correct diagnosis and to increasing antimalarial drug pressure and thus resistance, thereby speeding up the obsolescence of affordable drugs[11]. Other studies from Africa have demonstrated that the diagnostic accuracy of microscopy may not have acceptable level[12,13]. Low specificity of microscopy was reported in Sudan—the largest African country— especially among females of reproductive age[14]. There was no published data concerning the accuracy of malaria diagnosis and treatment prescription among pregnant women. Thus with these aims the current study was conducted in Medani Hospital, Sudan.

2. Material and methods

The current study was conducted in Medani Maternity Hospital, Central Sudan during June–October 2009. The area is characterized by unstable malaria transmission and *Plasmodium falciparum* (*P. falciparum*) is the sole

*Corresponding author: Ishag Adam, Faculty of Medicine, University of Khartoum, Khartoum, Sudan P. O. Box 102.
Tel: +249912168988
Fax: +249183771211
E-mail: ishagadam@hotmail.com

species in the area^[15]. In this study, we aimed to estimate the accuracy of malaria diagnosis among pregnant women admitted to receive antimalarials treatment following malaria blood film laboratory diagnosis which was carried-out by the general microscopists in both governmental and private sector. General microscopists are not specialize in malaria diagnosis compared with the expert malaria microscopist. After signing an informed consent, socio-demographic characteristics and obstetrics history was gathered using pre-tested questionnaires. The finger prick blood samples were collected from patients who admitted as malaria case after an initial microscopic test done by general microscopists for malaria diagnosis and before treatment. All samples were reexamined blindly for parasite detection by expert malaria microscopist so as to confirm or reject the initial result. The study received ethical clearance from the ethical committee of the Faculty of Medicine, University of Khartoum, Sudan.

2.1. Microscopy

The finger prick blood smears were prepared and stained with Giemsa. Parasite density was estimated by counting the number of asexual parasites per 200 white blood cells and calculating parasites per μ L, assuming a white blood cell count of 8 000 cells per μ L. A smear was judged to be negative if no parasites were seen after review of 100 high powered fields. Final microscopy results were based on a rigorous quality control system which included a second microscopist rereading all blood smears and any discrepancies between the first and second readings resolved by a third microscopist

2.2. Statistics

Data were entered in computer using SPSS (version 13.0) for windows and double checked before analyses. Percentage and mean (SD) were calculated. Proportions were compared using student χ^2 test. $P < 0.05$ was considered significance.

3. Results

During the study period 243 pregnant women were admitted to receive quinine in Medani Maternity Hospital following a positive blood film from general microscopists. The vast majority, 183 (75.3%) were admitted from the private sector and rest 60(24.7%) from the governmental sector. Seventy-one (29.2%) of these women were primigravidae. The admitted characteristics of these women were shown in table 1.

Only 21 (8.6%) out of 243 pregnant women admitted as malaria case after an initial microscopic test done by general microscopist were found to have blood film positive after assessment by expert microscopist. There was no significant difference in the specificity of the microscopy accuracy between those who have been investigated in the private and governmental sector, 15/193 (8.2%) vs. 6/60(10%) ($P > 0.05$). The geometric mean parasite count for those who had positive blood film was 268.7 μ /L.

Table 1

Basic characteristics of the pregnant women 243 admitted to Medani Maternity Hospital, Sudan.

Variables	Mean \pm SD
Age (years)	26.9 \pm 5.8
Gravidity	3.3 \pm 2.1
Gestational age (weeks)	19.9 \pm 9.3
Weight (kg)	58.4 \pm 8.1
Temperature ()	38.2 \pm 1.2
Haemoglobin mg/dL	9.8 \pm 1.3

4. Discussion

The current study revealed 94.6% of all hospitalized pregnant women with outside (governmental and private sector) positive blood film for malaria did not have evidence of malaria by light microscopy when reexamined by expertise one. This was a poor specificity of microscopy in this setting. Previously, around 30% of the specificity of microscopy was reported in Central Sudan^[14,16]. In contrast, recent results from Kenya reported an overall sensitivity of 69% and specificity of 62% when comparing initial microscopy readings to expert microscopy readings^[12]. A national laboratory survey in Ghana demonstrated that most laboratory staff lacked professional qualifications and there were marked regional differences in essential resources for malaria diagnosis^[17]. Although microscopy is considered to be the gold standard for malaria diagnosis, malaria rapid diagnostic tests (RDTs) have great potential to fill the need for diagnosis especially in remote areas where good microscopy can not be maintained. RDTs offer the possibility for accurate and accessible detection of malaria parasites, and have an important role in limiting malaria over-diagnosis and over-treatment^[9], particularly where accurate microscopy is not accessible. They do not require any electricity or special equipment. It has been demonstrated in the field that simplified, brief training can result in good retention of skills and minimal inter-user variability^[18, 19]. Interestingly, in a recent study from Tanzania, Reyburn and others reported that availability and use of malaria RDTs did not reduce overtreatment of malaria^[20].

Our study shows that, although most hospitalized pregnant women with acute febrile illnesses in Medani Hospital, Sudan do not have malaria, they continue to receive quinine therapy. We believe that overemphasis on malaria in the national guidelines, the attitudes of treating doctors, and lack of good quality diagnostic tests for malaria are the main reasons for this practice. Quinine was the prescribed antimalarial in this hospital. However, following wide spread malaria parasite resistance to antimalarials, an increasing number of countries in sub-Saharan Africa, including Sudan are changing to artemisinins combination therapy as first or second line treatment for malaria^[21]. In 2002, a WHO expert committee concluded that artemisinins could be used during the second or third trimesters if no suitable alternative was available^[22]. Artemisinins were used effectively and safely in pregnant Sudanese women^[23, 24]. Furthermore, quinine failure was reported among non-pregnant and pregnant population in Sudan^[25, 26]. Yet, quinine infusion was used in this setting, simply because oral preparations of

antimalarials may have poor compliance/adherence among Sudanese patients and the injectable forms of antimalarial are usually preferred^[27]. Obviously controlling /reducing overtreatment is of high priority, not only did this reduce the risk of adverse consequences associated with unnecessary antimalarial therapy but allowed clinicians to focus on the true causes of fever, which were generally mild and self-limiting.

There was a very poor specificity of malaria microscopy in pregnant women admitted to Madani Maternity Hospital. Quinine was the drug received. Malaria control programme should interfere urgently to change this situation. Results must be raised to have an acceptable level of accuracy in order for health care providers to have the confidence to use these results to make decisions about antimalarial therapy. The national malaria control programme and in the state carried out a series of training and supervision activities, but the situation is still far from satisfactory and is further jeopardized by poor control over the growing private sector. It is worth investing more in improved diagnosis of malaria in this setting.

Conflict of interest statement

We declare that we have no conflict of interest.

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