



A survey of malaria and some arboviral infections among suspected febrile patients visiting a health centre in Simawa, Ogun State, Nigeria



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Summary Most febrile patients are often misdiagnosed with malaria due to similar symptoms, such as fever shared by malaria and certain arboviral infections. This study surveyed the incidence of malaria, chikungunya and dengue infections among a number of suspected febrile patients visiting Simawa Health Centre, Ogun State, Nigeria.

Venous blood samples were obtained from 60 febrile patients (age 3–70 years) visiting the centre between April and May 2014. The rapid diagnostic test (RDT) was used to detect the presence of chikungunya (CHK) antibodies (IgM), dengue (DEN) virus and antibodies (NS1, IgM and IgG) and malaria parasites (*Plasmodium falciparum* and *Plasmodium vivax*). Malarial confirmatory tests were by microscopy and nested polymerase chain reaction (PCR) using the polymorphic region of Glutamate-Rich Protein (GLURP) gene. The complexity of *P. falciparum* infection in the community also determined by the use of nested PCR. These three mosquito-borne infections were observed in 63% (38) of the patients. The prevalence of CHK, DEN and malarial infections singularly were 11%, 0% and 63%, respectively, whereas malaria with either CHK or DEN infections were 24% (9) and 3% (1), respectively. No subjects were positive for CHK and DEN co-infection. Malarial microscopic confirmation was in 94% (32) of the malaria RDT-positive samples, 50% (17) were successfully analysed by nested PCR and the mean multiplicity of infection was 1.6 (1–3 clones). One patient sample harboured both *P. falciparum* and *P. vivax*. The study reports the presence of some arboviral infections having similar symptoms with malaria at Simawa, Ogun State. The proper diagnosis of infectious diseases is important for controlling them. © 2015 King Saud Bin Abdulaziz University for Health Sciences. Published by Elsevier Limited. All rights reserved.

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Introduction

Mosquitoes are carriers of various pathogens that cause disease in humans. These diseases include malaria, yellow fever (YF), dengue fever, chikungunya, and some filarial diseases [1]. It is estimated that over two billion people worldwide live in regions where these diseases are rampant [2].

Malaria parasites are transmitted by female *Anopheles* mosquitoes, whereas DEN and CHK viruses are transmitted by female *Aedes* mosquitoes [3]. Co-infection among the three diseases is possible in geographical locations where the respective vectors co-exist [4]. As the species of mosquitoes responsible for transmission of these infections are present in Nigeria [5], co-infection is expected to occur.

Malaria, DEN and CHK share common symptoms such as sudden high fever, headache and joint pain among others. In most Sub-Saharan countries including Nigeria, malaria is commonly attributed to all febrile illnesses [6]. Due to this similarity and lack of specificity of symptoms, misdiagnosis is often common among clinicians. Misdiagnosis is more probable when these infections occur simultaneously [7].

Plasmodium falciparum is the most common species of malarial infection and is more prevalent in Sub-Saharan Africa than in many other regions of the world [8]. *Plasmodium vivax* is estimated to cause 20% of malaria infections and is commonly found in tropical areas outside of Africa [9]. The absence of the Duffy binding protein, which is required for invasion of the human host by *P. vivax* in individuals from West and Central Africa, is responsible for the low prevalence in these regions. However, cases of *P. vivax* infections are now being reported daily in areas where the parasite has never been described before [10].

The aim of this study was to determine the incidence and types of malaria parasites (*P. falciparum* and *P. vivax*), the prevalence of co-infection by malaria parasites with dengue virus and chikungunya virus, the prevalence of present, past dengue and chikungunya infections among suspected febrile patients visiting Simawa Health Centre, Ogun State Nigeria. The relationship between age and sex to these three mosquito-borne diseases was also determined.

Materials and methods

Study site

The study was conducted among in-patients and out-patients visiting the Simawa Health Centre

(3°29'E, 6°45'N). Simawa is a rural community and one of the 15 wards in Sagamu Local Government area, Ogun State, Nigeria. Two types of health services exist in this community: modern healthcare services (Primary Health Centre) and the traditional health services (use of herbs), which are more commonly patronised than the former. Simawa Primary Health Centre is one of the 3 health centres in Sagamu local government area of Ogun State, Nigeria. Simple curative services in these health centres include antimalarial treatment. The Sagamu local government area has a total population of 255,885 [11]. There is one doctor per 2992 people [12] with only 3% of these doctors in the Primary Health Centres [13].

Patients selection

Patients presenting to the health centre with some signs and symptoms compatible with the diagnosis of malaria, dengue and chikungunya (fever which can be recent or in evidence during the previous 2–4 days or/and other symptoms of febrile diseases such as chills, headache, joint, muscle and body pains), normal anatomical conditions allowing for venous blood via peripheral arm veins and only those who gave their consent were enrolled into the study (consent from adult patients directly, consent from parents/guardians of children below 9 years of age and assents from children between 9 and 17 years of age). Attitudes (customs and traditions) of certain Nigerians, especially in rural areas, have been reported to affect participation in research involving the collection of blood samples [14]. The 60 patients who gave their consent out of the suspected patients were enrolled in the study from April to May 2014. Exclusion criteria included patients with good health status and with chronic diseases.

The study protocol was approved by the Ogun state Ministry of Health, Nigeria.

Sample collection

Whole blood samples were obtained from the patients (April to May 2014) by venipuncture and transferred into plain bottles. Whole blood (3–5 drops) was used for the RDT malaria parasite detection, approximately 20 μ l of which was spotted onto 3MM Whatman filter paper for malarial molecular analysis and to prepare thin and thick blood films for malaria parasite species identification and quantification. The remainder of the whole blood sample from each patient was centrifuged and the sera were used for dengue and chikungunya rapid diagnostic tests.

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