

Prevalence of malaria among children in Wadi Hajar – Hadhramout, Yemen

Abdulhakeern Lardhi*, Saleh Al-Jumaily**, Ahmed M. Al-Haddad***, Jalil I. Al-Ezzi*, and Babiker Harouun***

* Dept. of Pediatric, College of Medicine and Health Science, Hadhramout Univ. for Science and Technology.

**Dept. of Pediatric, College of Medicine, Mosul University

***Dept. of Microbiology, College of Medicine and Health Science, Hadhramout Univ. for Science and Technology.

Abstract

Malaria remains one of the most serious public health problems in many parts of the world, it is the major public health problem in Yemen. A cross-sectional study. The study was conducted in Al_Mukilla child and Maternity Health hospital, all children presented from Wadi Hajar, Hadhramout Yemen since January 2005 to June 2006 were included in the study, after filling the examination Questioner including Temperature and spleen check up, Thick and thin blood film were done to check for malaria and Hb was estimated. Results: During the study period 163 children were malaria positive for Plasmodium falciparum. More than 40% of investigated children had Slide positive rate (SPR), SPR is differed significantly by age group and was highest (67.5%) in less than 5 year-olds and 10% of them was aged below one month of age, and their mothers had malaria. However, there was no significant difference in SPR between males and females. This is the first epidemiological study done in this endemic area of malaria; we found that it is endemic by Plasmodium falciparum species. The presenting manifestations include male predominance mostly below 5 years of age. With fever, anaemia and hepatosplenomegaly.

Key Word: malaria, *Plasmodium falciparum*, children, Hadhramout, Yemen

Introduction

Malaria is an acute and chronic protozoan illness characterized by paroxysms of fever. Chills, sweats, fatigue, anemia and splenomegaly, important criteria that suggest *P. falciparum* malaria include symptoms occurring < 1 month of exposure, intense parasitemia (>2%), ring forms with double Chromatin dots, and individual erythrocytes infected with more than one parasite, the diagnosis of malaria is established by identification of organisms on Giemsa-stained smears of peripheral blood by thick and thin blood film.

Malaria acquired in area suspected chloroquine -Resistant plasmodium falciparum should be treated with drugs other than chloroquine. Intravenous quinidine or quinine should be administered when a patient cannot retain

oral fluids and medication because of vomiting or peripheral asexual parasitemia that exceeds 5%. Pararteral therapy should be continued until oral medication can be tolerated or until the parasitemia < 1%, usually within 48 hrs, and oral medications can be tolerated. Quinine sulfate is then administered for a total of 3-7 days of combined quinidine/quinine therapy, plus Fansidar in one dose in the last day of therapy (1).

Malaria remains one of the most serious public health problems in many parts of the world. Over 40% of the population are at risk, and it is endemic in 91 countries, mostly developing (2). The annual global burden of malaria is estimated at 1.1 million deaths, mostly due to *Plasmodium falciparum* infections in children in sub-Saharan Africa, 300-500 million cases, and 44 million

disabilities adjusted life years (3). Infection caused by *P. falciparum* is associated with the greatest morbidity and mortality. The clinical severity of *P. falciparum* malaria is highly dependent on the malaria-specific immune status of the infected individual (4).

Malaria has always been a major public health problem in Yemen. (2). 60% of the total population live in malarious areas and there are several hundred deaths every year (5,6), there is no published international study done to explore the Geographical distribution of malaria all around Yemen. It has the typical afrotropical pattern in which the predominant species is *P. falciparum* (7, 8).

Malaria is a devastating infection that annually affects > 300 million people worldwide, resulting in >3000 pediatric deaths per day. In fact, malaria is the leading cause of mortality among children <5 years of age in Africa and is the cause of 20% of all-cause mortality in this age group (9,10,11,12).

It has been estimated that severe malarial anaemia causes between 190 000 and 974 000 deaths each year among children < 5 years (13).

In chronically infected children, anaemia and hypersplenism are common. Splenic rupture is a serious complication in children with hypersplenism. *P. malariae* and *P. ovale* generally cause fever but not in a toxic appearance. In some individuals, *P. malariae* may coexist as a commensal organism, causing infection but no clinical disease (4).

While the epidemiology of malaria among the people has been studied in other areas of Yemen (14), no data is available about the prevalence of malaria among children in Wadi Hajar in Hadhramout-Yemen, which is a big valley having about 50 villages where around 100,000 pupils living, in a poor primitive life with bad hygiene and hot humid climate full of mosquitoes.

The aim of this study is to determine whether malaria is a widespread problem and prevalent among children in Wadi Hajar or not.

Subjects and Methods

The study was carried out in Wadi Hajar in AI-Mukalla district in Hadhramout-Yemen. This study was a clinical cross-sectional study. All children from Wadi Hajar, which were presented to AI-Mukalla Maternity Care Hospital (MCH) during the period from January 2005 to June 2005, were included in this Study.

Each child was exposed to a medical physical examination of the spleen and an examination sheet was prepared for results recording. The examination sheet consists of items concerned with personal information of the family, and part for physical examination results. Clinical examinations were carried out under standardized conditions by a trained personnel.

Blood samples were taken from all children included in the study to determine the malaria infection by means of the microscopical examination of stained thick and thin films. Thin films were fixed with absolute methanol and stained with 3% Giemsa diluted in pH 7.2 buffered water for 30 minutes. Thick films were stained unfixed using Field stain. A qualified laboratory technician studied each sample under oil immersion (100x magnifications) and other technicians were called in when discrepancy in the result occurs.

Temperature and hemoglobin level were measured. Anemia was defined as a hemoglobin level < 11 g/dL (14). The data were analyzed using Statistical Package for the Social Sciences (SPSS) version 10. Percentage means and standard deviations were calculated. The data were analyzed in the descriptive presentation expressed as frequency, percentage, in the forms of table.

Results

During the study period from January 2005 to June 2006, 400 children were investigated. A total of 163 children (40.75 %) fulfilled the criteria for diagnosis of malaria. There were more males than females, giving a sex ratio of 1.4:1. Their age ranged from 1 months to 14 years (Table 1).

Slide positive rate (SPR) differed significantly by age group and was highest in < 5 year-olds (67.5%). *P. falciparum* was observed in all of the cases.

From the age group < 5 years, 11 out of 110 (10%), within one month of age, were malaria positive, their mothers were also malaria positive.

Body temperature, anemia, hepatosplenomegaly, headache, and chills results were tabulated in table 1.

Discussion

This is the first epidemiological survey to investigate malarial morbidity for children in Wadi Hajar in Hadhramout-Yemen. This area has been characterized as endemic area for malaria (14).

The development of resistance to current antimalarials, insecticide resistant mosquitoes, poor health infrastructure coupled with political instability in malaria endemic countries, world climatic changes and population increase are the main reasons for the increasing trend of malaria cases and mortality (14,17).

Slide positive rate (SPR) differed significantly by age group and was highest in < 5 year-olds (67.5%), this is in agreement with a study done in the Sudan by Himeidan *et al.* (18) with similar results bearing in mind that, the area of this study is almost the same geographically as that of the Sudan with similar population behavior.

Investigation of the children with in one month and their mothers showed

that all infected children were from infected mothers, which is in accord with other scientific findings in congenital malaria (20,21).

Variation of body temperature results between 37-39 °C as an indication of malaria is observed. Some children were malaria positive although their body temperature was normal which could be due to non-specific reasons or immunity (22,23). Other climatical diseases are concomitant with malaria that counts for the increased body temperature.

The percentage of anemia (< 11 g/dL) in malaria-infected children, in our study was 71.8%, which is in accord with other finding in Latin America with little variation probably aggravated by low income of the families in this study area (22,23). However, anemia in Latin America was caused by *P. vivax*, which is less parasitic than *P.*

falciparum.

Hepatosplenomegaly due to malaria was reported by Grobusch and Kreamsner (25), who indicated the presence of such conditions in malaria endemic area. Similar results were obtained in our study area with sizes slightly bigger than reported (2-4 cm large). It is also noticed that splenomegaly in the area is available because of poor protein nourishment.

Percentage of headache and chills due to malaria is consistent with findings in Latin America (22,25).

In recommendation, we would suggest that preventive measures against malaria in the study area such as chemoprophylaxis and bed nets should be employed for all people there especially for children.

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Table (1) Results of diagnosis of *Plasmodium falciparum* infection in children at Wadi Hajar.

Variable	Children infected (n = 163)	
	No.	%
Sex		
Male	96	58.9
Female	67	41.1
Age		
< 5	110	67.5
5-9	30	18.4
10-14	23	14.1
Body temperature		
37 °C	6	3.7
37-39 °C	157	96.3
Anemia		
Yes	117	71.8
No	46	28.2
Hepatosplenomegaly		
< 2 cm	124	76
2-4 cm	35	21.5
>4cm	4	2.5
Headache		
	115	70.6
	48	29.4
Chills		
	41	25.2
	122	74.8