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INFREQUENCY OF ASYMPTOMATIC MALARIA IN AN ENDEMIC AREA IN AMAZONAS, BRAZIL

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A malaria survey was conducted in an area of high transmission (Costa Marques, Rondonia, Brazil) to determine the prevalence of asymptomatic parasitemia and its clinical significance. Most of the people surveyed were immigrants who had lived in the endemic area < 5 years. The people had easy access to free diagnostic and treatment services at the Malaria Clinic in the town of Costa Marques. The prevalence of plasmodial parasitemia in 344 people was 22%. There were 36 individuals with asymptomatic infections among the 77 parasitemic patients. During the two days following the initial examination, 19 of the 36 individuals: with asymptomatic infections developed malaria. Among the 17 patients who remained asymptomatic for > 2 days, 4 had only gametocytes, 1 had taken inadequate anti-malarial treatment, 3 were under treatment and 2 moved. Six asymptomatic patients denied the use of anti-malarial drugs and they developed malaria 3-6 days after the initial parasitological diagnosis. The final patient remained asymptomatic during the 7 day observation period. He had a history of > 40 malaria attacks and denied the use of antimalarial treatment. With the exception of the latter all of the other asymptomatic patients, were either in the incubation period or had been treated. It is concluded that asymptomatic malaria is rare in the Costa Marques area and that it is necessary to treat all individuals with plasmodial parasitemia.

Key words: Malaria. Asymptomatic malaria. *Plasmodium falciparum. Plasmodium vivax.* Brazil.

Surveys in malaria endemic areas reveal plasmodial parasitemia in variable percentages of the people. Many times these patients are asymptomatic and their parasitemia may indicate a state of equilibrium between the parasite and the host[1458]. These patients often refuse anti-malarial treatment because they don't feel sick, especially when the prescribed drugs must be taken over many days and produce side reactions. This occurred on several occasions during our longitudinal stydy of endemic malaria in the area of Costa Marques, Rondonia, Brazil (12º 26'S, 64º 14'W).

The objective of the present study was to determine the prevalence of malaria infection in the Costa Marques area, and to define the clinical significance of parasitemia in individuals with asymptomatic infections.

MATERIALS AND METHODS

In Costa Marques, malaria is caused by *Plasmodium falciparum* and *Plasmodium vivax*. During a 25 day period in December, 1986, we conducted a house to house survey of residents along road BR429 (from Costa Marques to Presidente Médici) between kilometers 3 and 62. Each person submitted finger prick blood to prepare thick and thin films for routine parasite examination. The films were transported to the Malaria Clinic in the town of Costa Marques, stained with Giemsa and examined under oil immersion at 1000X. One hundred fields were examined to detect the presence of plasmodia. To estimate the density of plasmodia per mm^3 of blood the 'parasite: leucocyte ratio' was multiplied by 5,000. This is the normal number of leucocytes per mm^3 of blood in Costa Marques (M. Urdaneta: personal communication, 1988). The 'plasmodia: leucocyte ratio' was determined from the blood films by counting the number of parasites per 500 leucocytes or, alternatively, the number of leucocytes per 1,000 parasites, whichever came first[9].

We returned to the study population along BR429 within 1-2 days after the initial examination to provide anti-malarial drugs to the parasitemic patients and to inquire about symptoms, the number of prior malarial attacks, medications in use and compliance. People who developed symptoms before our follow-up visits had acess to free diagnosis and treatment at the Malaria Clinic. Individuals with asymptomatic infections were followed for 7 days.

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RESULTS

During the survey we collected 344 samples of blood. Microscopic examination revealed that 77 (22%) were positive: 14 with *P. vivax* and 63 with *P. falciparum*. Clinical examination revealed that 41 patients had symptoms when the parasite diagnosis was established.

We returned to the study area along the road 1 to 2 days after the initial visit to contact the 36 asymptomatic patients. Two of them had moved, 19 had developed symptoms, and 15 remained asymptomatic. Of the latter, 3 were infected with *P. vivax* and 12 with *P. falciparum*. The patients with *P. vivax* had 50, 233 and 420 trophozoites per mm^3. Among the 12 with *P. falciparum* there were 4 with only gametocytes and 8 with only trophozoites. The highest trophozoite density in the asymptomatic group infected with *P. falciparum* was 41,160 parasites per mm^3 (Table 1). There was no relationship between the intensity of parasitemia and the presence of symptoms (Table 2).

We treated the 19 symptomatic patients and the 4 asymptomatic patients with falciparum gametocytes. Among the 11 remaining patients, 4 admitted to taking anti-malarial medication (Table 3). Two children aged 8 and 11 years with parasite densities of 491 and 316, respectively, were taking folk medications and preferred to continue this treatment. Blood examination two days later showed that their parasite densities dropped to 40 and 0 trophozoites, respectively, and they were not visited again. One patient with an initial density of 1,469 trophozoites was taking medication prescribed elsewhere. She had subsequent parasite densities of 750 and 50 trophozoites and was not followed further. The final patient had an initial density of 50 vivax trophozoites. He had been treated incompletely 15 days earlier and was given new medication.

Table 1 – *Age, sex, years in residence, density of asexual parasites on initial examination, and day of initial symptoms in malaria patients.*

Age (years)	Sex	Years in residence	Parasites/mm3 *falciparum*	Parasites/mm3 *vivax*	Day of symptoms
33	M	4	0	92	1-2
57	M	7	0	668	1-2
8	F	7	9	0	1-2
34	M	<1	30	0	1-2
7	F	3	78	0	1-2
6	F	6	99	0	1-2
37	M	<1	289	0	1-2
22	F	<1	336	0	1-2
0.5	F	<1	367	0	1-2
25	F	7	837	0	1-2
9	M	3	1,198	0	1-2
40	F	3	1,650	0	1-2
39	M	<1	3,325	0	1-2
9	F	4	4,530	0	1-2
15	M	12	6,045	0	1-2
9	F	3	8,327	0	1-2
8	M	<1	8,385	0	1-2
5	M	<1	19,942	0	1-2
7	F	3	41,160	0	1-2
12	F	2	0	233	3
9	F	4	505	0	3
9	M	8	20	0	5
4	F	4	250	0	5
9	M	9	659	0	5
8	M	<1	0	420	6
6	F	<1	0	50	>7
53	M	5	49	0	>7
11	F	2	316	0	>7
8	M	2	491	0	>7
6	M	6	1,469	0	>7

Table 2 – *Relationship between parasite density and the presence of symptoms at first examination in 53 patients.*

Parasites/mm 3	Nº Patients *P. falciparum*		*P. vivax*	
	Symptoms	No symptoms	Symptoms	No symptoms
<99	4	7	0	1
100 – 999	8	9	0	3
1,000 – 4,999	3	5	0	0
5,000 – 14,999	4	3	1	0
15,000 – 19,999	1	1	0	0
20,000 – 41,999	0	1	0	0
42,000 – 80,000	2	0	0	0
TOTAL	22	26	1	4

Table 3 – *Age, density of asexual stages and first day of symptoms in 11 patients with plasmodial parasitemia.*

	Parasites/mm3/Day								
Age	0	1	2	3	4	5	6	7	Remarks
				P. falciparum					
9	659					1706 (S)			
9	505		1950	(S)					
9	20					20 (S)			
4	250					(S)			
8	491		40						Folk treatment
11	316		0						Folk treatment
6	1469			750	50				In treatment
53	49					10		0	Chloroquine prophylaxis?
				P. vivax					
6	50								Incomplete treatment
12	233			193 (S)					
8	420						57 (S)		

(S) = day of initial symptoms.

The remaining seven asymptomatic patients were not taking medication (Table 3). Six of these patients became symptomatic between 3-6 days after the initial blood examination. In 2 of the 6 additional blood examinations made before the onset of symptoms revealed small increases in the density of asexual stage parasites to a maximum of 1,950. In the third patient, a subsequent count remained unchanged (20 *P. falciparum).* The fourth patient did not have a follow-up blood examination. The fifth and sixth patients had a decrease in the initial density of vivax trophozoites 233 to 193 and 420 to 57.

The remaining patient was a 53 year old man who had densities of falciparum trophozoites of 49, 10 and 0 on days 0, 5, and 7, respectively, and he remained asymptomatic throughout the study. He claimed to have had 40 episodes of malaria in the past, but had not experienced malaria during the previous three years. He attributed this fact to the use of chloroquine for 1 1/2 years in the past. However, six months later this man reported to the Malaria Clinic with acute malaria and we suspect that he was taking prophylactic medicine during the present study. With the exception of this man, all of the patients were treated for malaria.

DISCUSSION

To determine the frequency of persistent parasitemia without symptoms of malaria in the residents of Costa Marques we followed 30 asymptomatic people with asexual stage plasmodia. Nineteen developed symptoms 1-2 days after the parasitic diagnosis was made. Of the 11 remaining asymptomatics, the parasitemia was secondary in four of them because they were under treatment. In 6 of the asymptomatics the initial diagnosis was made during the incubation period because symptoms appeared within the next six days. There was only one patient, the 53 year old man, with parasitemia not associated with an acute episode of malaria.

The low frequency of asymptomatic carriers in Costa Marques contrasts sharply with data from other countries[13]. For example, in some hyperendemic areas of Africa, asymptomatic parasitemia is frequently found in children and especially in adults[4678]. In these areas the prevalence of malaria, the density of parasites, and the frequency of symptomatic carriers are high in children and diminish progressively with age. In the Costa Marques area, we encountered what Chagas and Chagas noted over 50 years ago that "... there cannot be persistent parasitemia without symptomatic manifestations"[2].

Although there is high malaria transmission along road BR429, there are factors that delay the acquisition of immunity to clinical disease in the local people. Among them are the short time of residence in the endemic area and access to free diagnosis and treatment. These factors reduce host-parasite contact and delay the acquisition of immunity to clinical disease.

In the Costa Marques area, the presence of asexual stage plasmodial parasitemia in non-treated individuals implies the necessity for treatment. If this is not prescribed, malaria symptoms are likely to appear within a week.

RESUMO

Em uma área de alta transmissão de malária (Costa Marques, Rondônia) foi feito um estudo para determinar a prevalência de parasitemia assintomática e seu significado clínico. A maioria dos habitantes estudados era imigrante que vivia na região há menos de 5 anos. Em Costa Marques há facilidades para o diagnóstico e pronto tratamento da malária. Em 344 pessoas examinadas havia 77 (22%) com parasitemia para hematozoários. Entre estes, 36 não tinham sintomatologia de malária. Após dois dias, 19 dos 36 desenvolveram sintomatologia. Dos 17 que continuavam assintomáticos, 4 tinham somente gametócitos no esfregaço de sangue

examinado, 1 tinha recebido tratamento antimalárico inadequado, 3 estavam em tratamento e 2 se mudaram da área. Entre o 3.º e 6.º dia 6 apresentaram sintomatologia. Um paciente continuou assintomático no 7.º dia, quando terminou a observação. Ele contava já ter tido mais de 40 ataques de malária. Exceto ele, todos os outros assintomáticos ou estavam no período de incubação ou em tratamento. Conclui-se que a malária assintomática é rara em Costa Marques e que é necessário tratar todos os indivíduos com parasitemia.

Palavras-chaves: *Malária. Malária assintomática.* Plasmodium falciparum. Plasmodium vivax. *Brasil.*

REFERENCES

1. Bruce-Chwatt LJ. A longitudinal survey of natural malaria infection in a group of West African adults. Part I and II. West African Medical Journal 12:1-52, 1963.
2. Chagas C, Chagas E. Manual de Doenças Tropicais e Infectuosas. Volume I. Livraria Editora Freitas Bastos. Rio de Janeiro, 1935.
3. Cobran KMcL. Malaria in the partially immune adult Nigerian. The Journal of Tropical Medicine and Hygiene 60:233-237, 1960.
4. Garnham PCC, Wilson DB, Swellengrebel NH. A review of hyperendemic malaria. Tropical Disease Bulletin. 47:677-698, 1950.
5. Greenwood BM. Asymptomatic malaria infections – Do they matter?. Parasitology Today 3:206-214, 1987.
6. McGregor IA. The significance of parasitic infections in terms of clinical diseases: A personal view. Parasitology 94(Suppl.): 159-178, 1987.
7. Organización Mundial de la Salud. Quimioterapia del Paludismo. Séries Monográficas. 27. Ginebra, 1982.
8. Schwetz J, Peel M. Congenital malaria and placental infections amongst negroes of Central Africa. Transactions of the Royal Society of Tropical Medicine and Hygiene. 28:167-174, 1934.
9. World Health Organization. Advances in Malaria Chemotherapy. Technical Report Series 711. Geneva, 1984.