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Correlates of Hepatomegaly and Splenomegaly among Healthy School Children in a Malaria - endemic Village

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Summary

Adeyemo AA, Olumese PE, Amodu OK, Gbadegesin RA. Correlates of Hepatomegaly and Splenomegaly among Healthy School Children in a Malaria-endemic Village. *Nigerian Journal of Paediatrics* **1999; 26: 1.** A study of 145 apparently healthy primary school children in Erunmu, a village in south-west Nigeria, has revealed the prevalence of asymptomatic malaria parasitaemia to be 80 percent during the peak malaria transmission season. A prevalence of 15.2 percent hepatomegaly was the most common finding, followed by splenomegaly in 11.7 percent and hepatosplenomegaly in 6.2 percent of the subjects. The occurrence of hepatomegaly was significantly ($P < 0.001$) associated with young age. There was however, no such association with splenomegaly. Children with no organ enlargement had the lowest malaria parasite densities, while hepatosplenomegaly was associated with the highest parasite densities. The haemoglobin type did not show any association with organ enlargement. It is concluded that hepatic enlargement should be used as a malariometric index particularly in young children along with spleen rate that is currently being employed in defining the endemicity of malaria.

Introduction

THE liver and spleen are important organs of the human reticuloendothelial system which are involved in the body's immune response to infectious agents. Therefore, these organs are enlarged in many infectious diseases and may be palpated in the sick patient during clinical examination. Both hepatomegaly and splenomegaly are often described as clinical signs in acute malaria.[1,2] However, their use as clinical signs of malaria often ignores the background hepatomegaly and splenomegaly rates in otherwise healthy children in the community. The liver may normally be palpable down to 2cm below the costal margin in healthy children in their first two years of life, and older children may have splenomegaly as a consequence of repeated malaria infections. Thus, this repeated malarial infection forms the basis of the use of the spleen rate as a malariometric index in communities.[3,4] The aim of the present study was to investigate the prevalence and correlation of hepatomegaly and/or splenomegaly among healthy school children in a malaria endemic community in the south-west Nigeria with a holoendemic pattern of malaria transmission.

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Subjects and Methods

The subjects were children attending a primary school in Erunmu, a village located about 20km from Ibadan. The study was undertaken in July 1996, a peak period for malaria transmission in the area. All children recruited were afebrile and had no history of fever in the preceding 48 hours. Each subject was examined clinically by one of the investigators (AAA), and any hepatomegaly or splenomegaly found was measured (in cms), using a tape measure.

A thick blood film was made and examined for malaria parasite after *Giemsa* staining. At least 100 oil immersion fields were examined before describing a slide as negative. Positive slides had parasite densities determined by counting parasites against 200 leucocytes and then converting to actual counts using an assumed leucocytes count of 8000uL.[2] Capillary blood was spotted on filter paper and used for the determination of haemoglobin genotype by elec-

trophoresis using cellulose acetate strips at alkaline pH.[5] Data obtained were entered into a Case Record Form and subsequently analyzed, using the Epi Info statistical package. Chi-square test (x^2) was used to compare categoric variables and the Student's t-test for continuous variables. Analysis of variance and Fisher's exact test were done as necessary. The associated probability of a statistical test was considered significant if <0.05.

Results

A total of 145 children, aged between three and 16 years, (mean (SD) of 9.3 (3.1) years) and consisting of 75 (51.7 percent) boys and 70 (48.3 percent) girls were recruited into the study. One hundred and sixteen (80 percent) of the children had positive parasitaemia on peripheral blood film examination with a prevalence of asymptomatic parasitaemia among the children being 80 percent (95 percent CI 72.6 percent, 86.2 percent). Parasite densities in the subjects ranged from 29 - 6113 per uL with a geometric mean of 298 per uL and a mean parasite density index (PDI) of 3.1. The distribution of the haemoglobin genotype was AA in 127 (87.6 percent), AS in 16 (11.0 percent), SC in one (0.7 percent) and SS in one (0.7 percent). On abdominal examination, 97 (66.9 percent) of the children had no enlarged liver or spleen, while 22 (15.2 percent) had hepatomegaly alone and 17 (11.7 percent) had splenomegaly alone, and the remaining nine (6.2 percent) had hepato-splenomegaly. Liver sizes ranged from one to 3cm (median 2cm), while spleen sizes ranged from one to 5cm (median 2cm). There was no tenderness of either organ. Children who had hepatic enlargement (with or without an associated splenomegaly) had a median age much lower than those with splenomegaly alone. However, those with splenomegaly alone were of a similar age to those without any of the organs palpable (median age 10 years). This association between hepatomegaly and young age was demonstrated when the patients were divided into age groups ≤5 years, 6-10 years and >10 years. Hepatomegaly was found in 66.7 percent of those aged ≤5 years, 25.4 percent in those 6-10 years but none in subjects over 10 years ($x^2 = 32.20$, $p<0.001$). There was however, no such association with splenomegaly alone ($x^2 = 0.74$, $p=0.690$).

Although the presence of malaria parasitaemia did not seem to be related to either the enlarged liver or spleen, there was however, an association between parasite densities and organomegaly. The parasite density increased progressively from among children with no organ enlargement, to those with splenomegaly alone, then hepatomegaly alone while those with hepatosplenomegaly had the highest parasite densities ($p=0.006$). There was a similar association between parasite density index and organ enlargement. Haemoglobin types did not show any association with organ enlargement.

Table I

Correlates of Hepatomegaly and Splenomegaly among 145 healthy School Children

Category	No of Cases	Age (years)	Hb AS No (%)	MP positive No (%)	Parasite density (/uL)	PDI
Hepatosplenomegaly	9	5.5(3-9)	2(22.2)	7(77.9)	820(116-6113)	4.43
Hepatomegaly only	22	6(4-10)	4(18.2)	19(86.4)	507(44-4533)	3.95
Splenomegaly only	17	10(6-14)	2(11.8)	13(76.5)	398(31-1551)	3.54
Neither	97	10(4-16)	8(8.2)	77(79.4)	227(29-5114)	2.73
P value		[a]<0.001	[b]0.381	[b]0.864	[c]0.006	[c]0.004

Age is given as median (range); parasite density is given as geometric mean (range)
HbAS = haemoglobin AS; MP = malaria parasite positive; PDI = Parasite density index
[a]Kruskal -Wallis one way analysis of variance;[b]Chi-squared test; [c]Analysis of variance.

Discussion

The high asymptomatic parasitaemic rate of 80 percent in this study is comparable to 74.1 percent reported by Sowunmi[6] among rural primary school children in 1996 but much higher than the 27 percent reported in 1995 among another group of children also from a rural school.[7] This difference is very likely to be due to the dissimilarity in the age group of children studied.

Although the splenic rate has always been used as an established malariometric index, the same had not applied to hepatomegaly. Various studies have however, shown definite changes in the hepatic size in relation to clinical attacks of malaria in childhood.[8]

The finding of hepatic enlargement more frequently than splenic enlargement is thus not surprising in this series. The younger asymptomatic children had mainly hepatomegaly while the older ones had splenomegaly. Therefore, hepatomegaly should be considered an additional malariometric index in describing the pattern of malaria in a community. Support for this opinion comes from Sowunmi[8] who studied hepatomegaly in acute uncomplicated malaria in childhood and found that hepatomegaly was more common than splenomegaly and was significantly more frequent in younger children. This observation in acute malaria does not seem to be different from what we found in asymptomatic malaria parasitaemia.

The parasite density also tended to be higher in children with hepatosplenomegaly, followed by those with hepatomegaly alone, than those with splenomegaly alone with the least densities in those with no organ enlargement. This suggest that the higher parasite densities are more likely to be associated with hepatosplenomegaly than with enlargement of either organ alone. The possibility of this being a factor of increased stimulation of the reticuloendothelial system by a higher parasite load thus leading to enlargement of both organs will need to be investigated. Furthermore, the development of attacks of clinical malaria and partial immunity in relationship to malaria parasites densities during asymptomatic periods need elucidation.

The present study has revealed that hepatomegaly and splenomegaly are common among healthy children of school age; the presence of these two clinical signs is related to age and to malaria density. It is important that this prevalence in apparently healthy children, be used as a background against which to evaluate their occurrence in disease states.

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