Effect of *Schistosoma Haematobium* Infection on *Plasmodium Falciparum* Malaria Burden in Lambaréné, Gabon

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BACKGROUND

Malaria remains the main cause of mortality in children living in sub-Saharan Africa where Plasmodium spp. usually share the same spatial distribution with other parasites such as helminths and often co-infect the same host. There are studies suggesting the interaction between both infections and conclusions are conflicting. Data on the influence of *S. haematobium (Sh)* on *P. falciparum* (*Pf*) parasite remains scarce. Additional studies are needed to assess the epidemiology of helminths and Plasmodium spp. coinfection and its consequence in affected population. In this study, our objectives were to assess the effect of *Sh* on asymptomatic *Pf* parasite carriage in an area where helminths and malaria are highly endemic.

METHODS

The study was cross sectional and was conducted in school children aged from 6 to 16 years old. Detection of *Pf* parasites was done by TBS using Lambaréné method (Kremsner et al, 1988; Planche et al, 2000). The presence of *Sh* eggs was assess by urine filtration in three urine samples collected every morning during three consecutive days. Chi square test and generalized linear model have been used to compare the risk to be infected by *Pf* parasite.

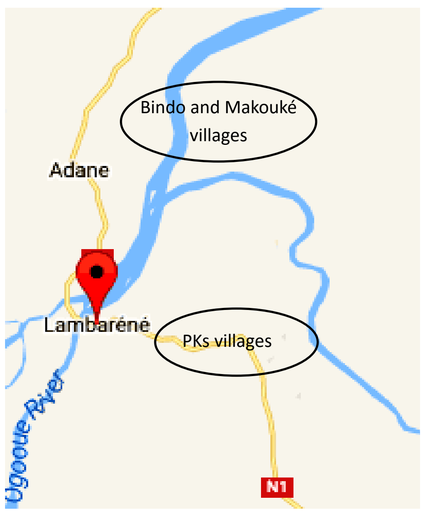

Figure1: Study sites

Table1: Risk factors associated with asymptomatic *P. falciparum* infection

	Crude analysis			Adjusted analysis		
	OR	95%CI(OR)	P-value	aOR	95%CI(aOR)	P-value
***S.haematobium* status**			0.002			0.06
Negative	1			1		
Positive	1.77	[1.23-2.53]		1.47	[0.98-2.18]	
Locality			<0.001			0.02
BM	1			1		
PK	1.86	[1.32-2.64]		1.61	[1.09-2.37]	
Sex			0.14			0.38
Female	1			1		
Male	1.30	[0.92-1.84]		1.18	[0.82-1.72]	
Age	1.05	[0.99-1.11]	0.09	0.95	[0.89-1.01]	0.08
T. trichiura			0.06			0.09
Negative	1			1		
Positive	1.51	[0.98-2.28]		1.50	[0.94-2.38]	
A. lumbricoide			0.93			0.72
Negative	1			1		
Positive	1.02	[0.64-1.59]		0.91	[0.55-1.49]	
Hookworm			0.72			0.76
Negative	1			1		
Positive	1.14	[0.54-2.25]		0.88	[0.39-1.88]	

Table 2: Risk fators associated with asymptomatic P. *falciparum* infection stratified for *T. trichiura* and Hookworm infetion

	Crude analysis [+]			Adjusted analysis*		
	OR	95%CI(OR)	P-value	aOR	95%CI(aOR)	P-value
***T. trichiura* and hookworm negative**						
***S. haematobium* status**			0.27			0.84
Negative	1			1		
Positive	1.29	[0.83-2.01]		1.05	[0.65-1.67]	
***T. trichiura* and hookworm positive**						
***S. haematobium* status**			0.002			<0.001
Negative	1			1		
Positive	3.06	[1.48-6.44]		3.92	[1.75.-9.19]	

[+]Breslow-Day test, p-value=0.046
*Adjusted to age, sex, locality and A. lumbricoides infection

RESULTS

1-Study site and population

The study was conducted in two localities from Lambaréné (figure 1). A total of 739 school aged children have been included. 420 (57%) were living in Bindo-Makouké villages and 351 (47%) were female.

2-Prevalence of asymptomatic *P. falciparum* infection and *S. haematobium* infection

2.1-Overall prevalence for:

Asymptomatic *P. falciparum* infection : **23%** [19.6-25.6]
S. haematobium infection : **36%** [33.1-39.7]

2.2-Prevalence of *Sh-Pf* co-infection : 9%

2.3-Prevalence per locality, PK villages vs Makouké-Bindo villages for:

S. haematobium: **45%** [39.6-50.6] *vs* **19%** [15.2-22.8], *P-value*<0.001
P. falciparum : **29%** [23.8-33.8] *vs* **18%** [14.4-21.8], *P-value*<0.001

3-Characteristics of study groups

The two study groups in regard of Schistosomaisis status were comparable for sex, age and STH infection. Contrariwise, the prevalence of asymptomatic *Pf* infection was statisticaly higher in individuals infected by *Sh* by comparison with to those free of schistosomiasis.

4–Effect of *S. haematobium* infection on asymptomatic *P. falciparum* parasite carriage risk

A univariate analysis, we found a significant association between S*h* status, locality and *Pf* parasite and a trend of association for Trichirus infection. Children infected by schistosomiais have a 1.77 odds to carry *Pf* parasite compared to the non-infected children (See table1).

At multivariate analysis, we found that both hookworm and *Trichuris trichiura* infections modifiy the risk to be infected by *Pf* parasite when positive for *Sh*. We therefore stratify our analysis on these infections and our results reveal that, adjusted to the other factors, in children free of Trichirus and hookworm infection there is no effet of *Sh* on *P. falciparum* parasite carriage while in infected children by trichirus or/and hookworm, the risk to be infected by *Pf* parasite is high (aOR=3.92, P-value<0.001) (See table 2).

CONCLUSION

In our study population, *S. haematobium* infection doesn't increase the risk of *P. falciparum* parasite carriage. However, co-infection of *S. haematobium* with Hookworm and/or *Trichirus trichiura* worms increases the risk of being asymptomatic infected with *P. falciparum* parasite.