



Impact of *Schistosoma haematobium* infection on urinary tract pathology, nutritional status and anaemia in school-aged children in two different endemic areas of the Niger River Basin, Mali

Moussa Sacko^{a,*}, Pascal Magnussen^b, Adama D. Keita^d, Mamadou S. Traoré^{a,c}, Aly Landouré^a, Aïssata Doucouré^a, Henry Madsen^b, Birgitte J. Vennervald^b

^a Institut National de Recherche en Santé Publique (INRSP), B.P. 1771, Bamako, Mali

^b DBL - Centre for Health Research and Development, Faculty of Life Sciences, University of Copenhagen, Thorvaldsensvej 57, DK1871 Frederiksberg C, Denmark

^c Department of Public Health, Faculté de Médecine de Pharmacie et d'Odonto-Stomatologie (FMPOS), Université de Bamako, B.P. 1805, Bamako, Mali

^d Service de Radiologie et d'Imagerie médicale, CHU Hôpital National du Point-G, B.P. 333, Bamako, Mali

ARTICLE INFO

Article history:

Available online 30 December 2010

Keywords:

Schistosoma haematobium

Morbidity

BMI

Anaemia

Schoolchildren

Control

Mali

ABSTRACT

The aim of the present study was to contribute to define urinary schistosomiasis-related morbidity indicators and to understand the relationship between infection intensity and disease burden among school-aged children in different endemic areas of Mali. A cross sectional study was undertaken in two different endemic settings: Koulikoro district, along the river and Selingué dam area in the Niger River Basin in order to compare and describe morbidity related to *Schistosoma haematobium* infection. A total of 667 children aged 7–14 were enrolled in the study. Among these, 333 were from Koulikoro district (175 boys and 158 girls) and 334 from Selingué dam area (169 boys and 165 girls). The overall prevalence of *S. haematobium* in the two areas was 91.5%; Koulikoro (97.0%) and Selingué (85.9%) and this difference was significant after adjusting for age, sex and clustering within villages. Prevalence of heavy infection (≥ 50 eggs per 10 ml of urine), 57.6% in Koulikoro and 43.8% in Selingué, did not differ significantly after adjusting for age, sex and clustering within villages. The transmission of *Schistosoma mansoni* was mainly confined to Selingué dam area (12.5%) and was nearly absent in Koulikoro district (1.1%). Blood in urine was the most frequently reported clinical symptom, more common in Koulikoro (76.8%) than in Selingué (57.6%). In a multivariable logistic regression model adjusting for sex, age group, egg intensity category and clustering within villages, Selingué had higher prevalence of macro-haematuria, urinary tract pathology, upper urinary tract pathology and total pathology than Koulikoro, while micro-haematuria did not differ between the two areas. Morbidity measures increased to some extent with egg intensity category, especially micro-haematuria. The results obtained from this study are of importance for planning intervention as for monitoring and evaluation of control in different endemic settings in Mali.

© 2010 Elsevier B.V. All rights reserved.

1. Introduction

In Mali, schistosomiasis is the second most important parasitic disease after malaria and recognised as an important public health problem. The disease is endemic in many regions of the country (Traoré et al., 2007; Clements et al., 2008) and both urinary and intestinal schistosomiasis due to *Schistosoma haematobium* and *S. mansoni*, respectively are present with *S. haematobium* being the most commonly found. In several studies, *S. haematobium* infection was found to be associated with high morbidity particularly among school-aged children (7–14 years) (Dabo et al., 1995; Vester et al., 1997; Traoré et al., 1998a; Keita et al., 2001). These studies

have shown that *S. haematobium* infections lead to severe urinary tract pathology and renal complications. In addition to pathology, there is evidence that, *S. haematobium* can affect nutritional status (e.g. height and weight) and haemoglobin (Hb) levels negatively by increasing blood loss and decreasing food intake leading to iron-deficiency anaemia (Chandiwana, 1983; Befidi-Mengue et al., 1993; Stephenson, 1993). Studies in Niger and Kenya have shown that children infected with *S. haematobium* were significantly more malnourished than children without infection (Stephenson et al., 1985; Latham et al., 1990; Prual et al., 1992). Infection with *S. haematobium* may also impair child growth as demonstrated in a study in Cameroon among school-aged children where anthropometric indices (height-for-age and weight-for-age) were higher in the uninfected group (Befidi-Mengue et al., 1992). Likewise a study in Zimbabwe revealed significant differences in the anthropometric indices of uninfected and infected children (Chandiwana, 1983).

* Corresponding author. Tel.: +223 2023 9211; fax: +223 2021 4320.
E-mail address: msacko@afribonemali.net (M. Sacko).

In Mali, no published studies are available regarding the relationship between urinary schistosomiasis and nutritional status and anaemia and there are few studies regarding other morbidity indicators than macro- and micro-haematuria (Traoré et al., 1998b; van der Werf and de Vlass, 2004; Koukounari et al., 2006).

Transmission studies have shown that, areas of high *S. haematobium* transmission are the vast irrigation areas Office du Niger, Baguineda, Selingué, the small reservoirs area of Dogon country and along the Niger and Senegal rivers (Vercruyssen et al., 1994; Traoré et al., 2007; Clements et al., 2008, 2009). These studies have shown large differences in prevalence within the same ecological area and intensity of *S. haematobium* infection has been also found to differ significantly between zones or between villages within zones (Coulbaly et al., 2004). However, our knowledge is very limited on the relationship between level of infection and morbidity indicators and how these indicators reflect disease burden in different endemic settings.

The aim of the present study was to contribute to the understanding of the relationship between schistosome infection intensity and disease burden with particular emphasis on clinical outcomes, nutritional status and anaemia among school-aged children in different endemic settings and thereby contribute to the improvement of the implementation of the schistosomiasis control programme in Mali.

2. Materials and methods

2.1. Study area

The study was undertaken in two areas of the Niger River Basin (NRB): Koulikoro district along the river and Selingué dam area (Fig. 1). The Niger River, with a total length of about 4700 km, is the longest and largest river in West Africa. The NRB covers 7.5% of the continent and spreads over 10 countries (Guinea, Côte d'Ivoire, Burkina Faso, Algeria, Benin, Mali, Niger, Chad, Cameroon and Nigeria). Twenty-five percent of the basin lies in Mali and takes up 46.7% (578, 850 km²) of total area of the country.

The Niger River is the main water resource in Mali and flows for 1700 km from the south to the north and crosses six out of eight regions including Bamako district. The water flow in the river is partially regulated through dams: the Sélingué dam on the Sankarani River is mainly used for hydroelectric power, but also permits the irrigation of about 60,000 ha under double cropping. Two diversion dams, one at Sotuba in Koulikoro region, and one at Markala in Ségou region, are used to irrigate the area of Baguineda and the Office du Niger, respectively. Several irrigation schemes have been developed, especially related to the construction of the Talo and Djenné dams on the Bani River and the dam at Tossaye on the Niger River.

2.2. Selection of study villages

Six villages (three in Koulikoro and three in Selingué) were selected after an initial parasitological screening performed in 10

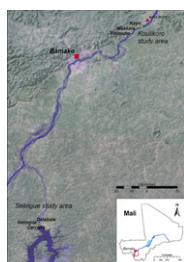


Fig. 1. Map of the study areas in the Niger River Basin showing the six villages surveyed in Koulikoro district and Selingué dam area in Mali.

villages (five in Koulikoro district and five in Selingué dam areas). Inclusion criteria included high risk of exposure (village located less than 1 km from the river or situated around the dam area), a stable population being permanent residents of the village and a low exposure to antischistosomal drugs, i.e. population not having received mass treatment for at least 5 years. In addition, the population had to consent to participate in the study and have a prevalence of infection of *S. haematobium* above 30% and macro-haematuria above 20%. In Koulikoro the last mass treatment has been performed in 1995 and whereas in Selingué it has been in 1986.

2.2.1. Koulikoro district

The district is located along the Niger River about 60 km from the capital Bamako, in the north Soudanian zone and is the economic and administrative headquarter of Koulikoro region. The average annual temperature varies between 26 °C and 35 °C. The mean rainfall for the last 3 years was 775 mm per year (Direction Nationale de la Meteorology). The Niger River is navigable for 1300 km from Koulikoro district to Tombouctou in the north for a period of 4–6 months. The vegetation is woodland and forest. The district is about 60,042 km² with a total population estimated at 168,836 inhabitants (Direction Nationale de la Statistique et de l'Informatique-DNSI, 2001). The population depends on the rivers as the principal water supply for domestic and occupational purposes. The main occupation is agriculture (millet and maize), followed by livestock, cultivation of vegetables, fishing and sand exploitation for commercial purpose. Men are mainly involved in millet and maize production during the rainy season, while women are mainly involved in growing vegetables as well as domestic activities. Intensive water contact activities are particularly noticed after the rainy season in October and could last up to June. This period is associated with high risk of transmission of schistosomiasis.

The three study villages Kayo, Massala and Tlomadio are all located along the Niger River. They are inhabited by different ethnic groups but do not differ in terms of occupational and water contact activities. The baseline demographic survey showed that, in Koulikoro the main ethnic groups were Bambara (75.8%) followed by Peulh (11.3%), Bozo (6.5%), Somono (1.9%) and others (Senoufo Songhai, Malinke, Minianka, Dogon and Bobo) (4.5%). The population has access to both a community health centre and a reference health centre.

2.2.2. Selingué dam area

The Selingué Dam was built 1980 on the Sankarani River, a major tributary of the Niger River. It currently irrigates 2000 ha and produces 44 MW of electricity. Selingué is located in the south savannah area in the south of Mali. The average annual temperature varies between 21 °C and 34 °C. The mean rainfall for the last 3 years was 979 mm per year (Direction Nationale de la Meteorology). The vegetation consists of dense woodland and gallery forest. The area can be considered as a man-made change in the environment and also as a new focus of schistosomiasis as compared to Koulikoro. The three study villages Carriere, Dalabala and Selingué are located in different sites close to the dam (Fig. 1). The area consists of three types of villages: old villages, re-settled villages and newly created villages. The dominant ethnic group is Malinke (48.1%), followed by Bozo (24.9%), Peulh (11.9%), Bambara (10.6%), Somono (4.1%) and other (Soninke, Dogon, Sosso) (0.4%). In Carriere the dominant ethnic group are Bozo, a group known for fishing, while in Selingué and Dalabala the dominant ethnic group are Malinke, mainly involved in agriculture. The Bozo's have moved from other parts of the country, namely Ségou, Koulikoro and Mopti regions after the construction of the dam. The Malinke are considered as the autochthonous people of the area. The main activities in this area are fishing, agriculture (predominantly rice cultivation in the irri-

Download English Version:

<https://daneshyari.com/en/article/6128197>

Download Persian Version:

<https://daneshyari.com/article/6128197>

[Daneshyari.com](https://daneshyari.com)