



FOLLOW-UP OF TREATED SCHOOL AND PRE-SCHOOL CHILDREN FOR SCHISTOSOMIASIS AT  
KAMLEEN LOCALITY, GEZIRA STATE, SUDAN

Kardaman, M<sup>1</sup>., Swar, M<sup>2</sup>., Homeida, M<sup>3</sup>., Abdelhafeiz, M<sup>4</sup>., Elhussein, D<sup>5</sup>., Noma, M<sup>6</sup>., Babeker, A<sup>7</sup>.,  
Sidahmad, S<sup>8</sup>., Elrade, W<sup>9</sup> and Amin, M<sup>10</sup>

<sup>1</sup>Dean Faculty of Medicine, University of Medical Sciences and Technology Sudan

<sup>2</sup>Dean School of Medicine, Ahfad University for Women

<sup>3</sup>Faculty of Medicine, University of Medical Sciences and Technology Sudan

<sup>4</sup>lecturer Ahfad University for Women

<sup>5</sup>School of Health Sciences Ahfad University for Women

<sup>6</sup>Faculty of Medicine, University of Medical Sciences and Technology Sudan

<sup>7</sup>School of Health Sciences, Ahfad University for Women

<sup>8</sup>Health Sciences, Ahfad University for Women

<sup>9</sup>Research and Grants Unit

<sup>10</sup>Director Research and Grant Unit, Ahfad University for Women

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ABSTRACT

In 2009, a study investigated safety, efficacy and acceptability of praziquantel for the treatment of *S. haematobium* and *S. mansoni* infections among pre-school children in Hilat Daoud, Gezira State, Sudan. The study also investigated the burden of schistosomiasis and other health problems in this age group. The present follow up study was planned to investigate the overall health status of the children of Hilat Daoud. All the examined pre-school children (3-5 years old) were negative and there was no blood in all urine samples. The overall prevalence in the study area was 7.6 %. Anaemia and jaundice were not seen in these children; however, reducible umbilical hernia was detected in 11 children and hepatosplenomegaly in one child who was then referred to hospital for further evaluation. The health status of the children of Hilat Daoud has improved as a result of mass chemotherapy campaigns and awareness raising, however, access to safe drinking water, adequate sanitation, primary schools, health services and piped water supply remain the major problems of Hilat Daoud and other migrant communities. Ministries of health and Ministries of social welfare in all states in Sudan should make efforts to influence relevant policies targeting migrant agricultural workers and their families to promote the expansion of sanitation and clean water supply coverage and they should be included in all prevention and treatment campaigns.

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INTRODUCTION

Two main species, *Schistosoma mansoni* (causing intestinal schistosomiasis) and *S. haematobium* (causing urogenital schistosomiasis) are endemic in Africa and account for about 85.0% of the global burden of the disease (Savioli, 1997, Chitsulo, 2000, Hotez, 2009). In most African countries, the two species overlap, resulting in mixed infections (WHO, 2002). Continuous exposure to contaminated water causes repeated infections during childhood but severe-chronic disease appears later in life. Other more subtle, effects of the infection in school children include short-term memory loss, slower reaction time, lower scores in some tests of cognitive ability, and poor growth (Partnership for Child Development).

The cost of large-scale school health programmes which deliver anthelmintic to children in Ghana and Tanzania. (1999) Acta Tropica. 73(2):183-204. Anaemia and other nutritional deficiencies have also been linked with the infection. The history of schistosomiasis in the Sudan was reviewed by several workers (Amin and Satti, 1973; Jordan, 2000, Amin and Hwiada, 2016). Within the whole of the Sudan there has been over the last ten years a serious increase in endemicity and prevalence of both *Schistosoma mansoni* and *S. haematobium* infections as a result of progressive expansion in water resource projects, population movements and limited control measures; (Amin and Elhussein, 2009). There is emerging evidence that the burden of schistosomiasis is high in pre-school children and the World Health Organization

(WHO) is considering a recommendation that will include pre-school children and infants in population treatment programs. However, there is paucity of safety and efficacy data on praziquantel in pre-school children aged <5 years. In order to contribute evidence to inform treatment policies, this study was sponsored by WHO to assess safety, efficacy and acceptability of praziquantel among pre-school children in schistosomiasis endemic area along the Gezira Irrigation Scheme in Sudan. Three villages namely, Hilat Daoud, Branco and Hamad Allah were selected. *S. haematobium* was the predominant species in Hilat Daoud and Branco whilst Hamad Allah was mainly endemic for *S. mansoni*. The study concluded that praziquantel was safe, effective and acceptable among children aged <6 years and should be included in population treatment programs (Amin *et al*, 2012). The purpose of the present study was to assess the health impact in pre and school children of migrant agriculture workers following praziquantel treatments and health education programmes.

Habiba village had three primary schools one for girls, one for boys and a mixed one for girls and boys. It has primary health care centre operated by a medical doctor and a medical assistant to provide curative and preventive services. The modest laboratory of the health centre was run by a laboratory technician. Water supply from a deep bore well and electricity were available only in the nearby Habiba village.

**Target subjects**

Pre-school children from Tahlil Kindergarten school (3-5 years old), school-aged children from Hilat Daoud and primary school children aged 6 to 14 years in Habiba schools were enrolled in the study.

**Selection of the participants**

All pre-school children attending Tahlil Pre-school were included in the study [n=35].

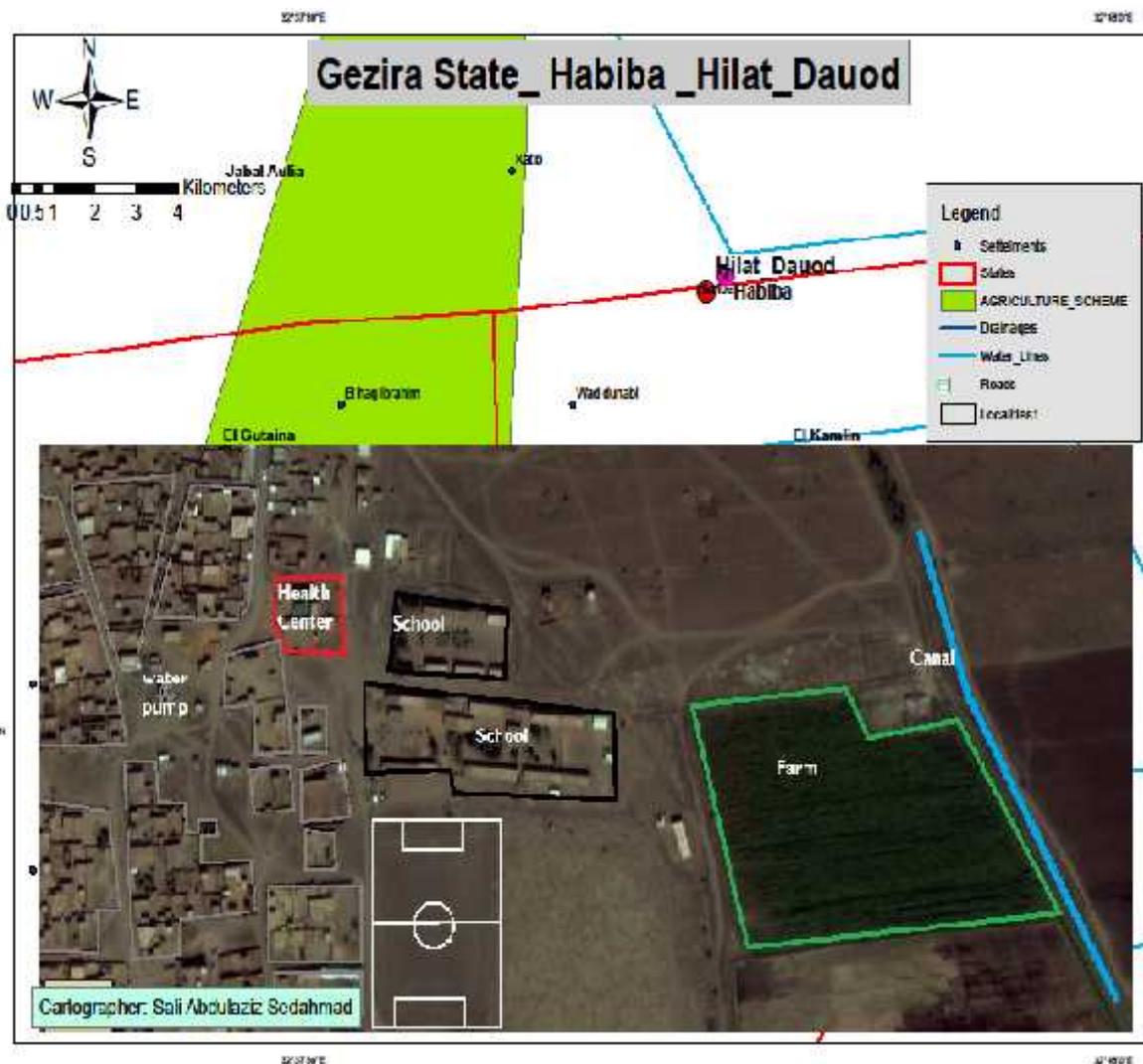


Figure 1 Map Study Area

Study Area. (Fig.1 Map)

**MATERIAL AND METHODS**

The 2009 study was mainly conducted in Hilat Daoud inhabited by immigrant Tama tribe from West Darfur, Sudan. Those migrants were a pool of agricultural labours for the land owners at the nearby village of Habiba located in Kamleen locality of Gezira State, Sudan.

Sheikh Daoud arranged for examination of the school children (6-14) years at the youth club in Hilat Daoud. All the children who came on the day (n=104) were examined.

**Urine examination**

The method described by (Ageel and Amin, 1997) was used for examination of urine for *S. haematobium* eggs.

**Clinical examination**

All the children underwent clinical examination before treatment was given. Praziquantel tablets (Distocide, Batch No. DISTT4010) made in Korea, provided by the WHO was used for treating the infected children following WHO Manual of Preventive Chemotherapy (2006).

**Snail survey**

Water courses surrounding Hilat Daoud and Habiba were surveyed during January, 2017. The snails were collected by 3 trained men working for 20 minutes at each site, using the snail scoop method described by (Amin,1972).

Ethical clearance for the study was obtained from Ahfad University for Women in Sudan.

**Table 1** Prevalence of *Schistosoma haematobium* among pre-school and school aged children at Hilat Daoud and Habiba.

Category	Male	Female	Total	Prevalence
<b>1.1 Hilat Daoud</b>				
<b>School-aged children</b>				11.5%
NO. Examined	79	25	104	
NO positive	12	0	12	
<b>1.2 Tahlel Pre-school children</b>				
NO. Examined	26	9	35	
NO positive	0	0	0	0%
<b>2.Habiba boy school</b>				
NO. Examined	94	0	94	
NO positive	9	0	9	9.5%
<b>3.Habiba Rufida girl school</b>				
NO. Examined	0	53	53	
NO positive	0	1	1	1.8%
<b>Total number examined</b>	199	87	286	
<b>Total number positive</b>	21	1	22	7.6%

**RESULTS**

**Results of Laboratory Examination and Prevalence of Schistosomiasis**

Table 1 summarized results of the study. All the examined male and female pre-school children (3-5 years old) of Tahlel were negative and there was no blood in all urine samples. The prevalence of *S. haematobium* among male school-aged children in Hilat Daoud was 11.5% and 0% in females. In Habiba boy school the prevalence was 9.5% and 1.8% in Rufida girl's school. The overall prevalence in the study area was 7.6 %.

**Table 2** Age Group Distribution of the study participants (n=61)

Age group	Males	Females
<5 years	2 (3%)	0
5-10 years	27 (44.3%)	12 (19.7%)
>10-15 years	16 (26.2%)	3(4.9%)
>15 years	1 (1.5%)	0
Total	46 (75.4%)	15(24.6)



**Figure 2a** Follicular hyper keratosis



**Figure 2b** Conjunctival xerosis

**Clinical Examination**

The 61 children were clinically examined by a paediatrician, 75.4% (n=46) were males and 24.6% (n=15) were females. Age group distribution revealed that 63.9% of children were in the age group 5-10 years (Table 2). The clinical examination revealed the absence of anaemia and jaundice in all the children. However, reducible umbilical hernia was detected in 11 children and hepatosplenomegaly in one child who was then referred to a hospital for further investigation. Two males presented with Vitamin A deficiency (Fig. 2a, b).

**Table 3** Anthropometric Measurements

Measurements	Male	Female
Short stature	5	1
Under weight	3	1
Stunted growth	8	4



**Figure 3** Macroscopic Haematuria

Anthropometric measurements revealed that 5 males and one female had short stature (height below the third percentile) three males and one female were under weight (weight below the third percentile). Stunted growth (weight and height below the third percentile) was recorded in 8 males and 4 females (Table 3). In the earlier study, (Amin *et al*; 2012) 103 (74.6%) children had abnormal urine colour, mainly blood in urine (haematuria) (Fig. 3). Abdominal pain was also prevalent among these children (n=78; 56.5%). Only three children (2.2%) reported general fatigue. General physical examinations and anthropometric measurements revealed that 11 patients (8.0%) had stunted growth (Height-for-age <3rd percentile); 9 patients (6.5%) were underweight according to Welcome classification of malnutrition. One case of hepatosplenomegaly was detected, referred to the district hospital for further evaluation and management. Children with umbilical hernias were also referred. The children with vitamin A deficiency were given therapeutic doses of vitamin A. Children with other minor infections were treated with the appropriate medication.

### Results of Snail survey

No snails were found in all water courses except in one small irrigation channel near Hilat Daoud. Snails that found were: 11uninfected *Bulinus truncatus*, the intermediate host of *S. haematobium* and 25 *Bulinus foreskalli*, does not transmit schistosomiasis.



**Figure 4** Sheikh Daoud and Professor Amin organizing community-based treatment campaign for scistosomiasis, 2009 /consent obtained from Sheikh Daoud

### DISCUSSION

The estimated population of Gezira State in millions was 3.85 in 2010 and 4.10 in 2012 (Annual Health Statistical Report of Federal Ministry of Health, 2012), of which about 700,000 people were migrants primarily from Darfur and Kordula States, Sudan and neighboring countries. These migrants formed a permanent pool of agricultural labour. Due to their low socioeconomic status, the immigrants played an important role in the transmission of schistosomiasis and other helminthic infections (Amin and Hwiada, 2016; Fenwick; 1982; Bella; 1980; Amin and Satti1973). Sheikh Mohamed Abdulla Daoud was the founder of the village (Hilat Daoud) in 1972 when he settled with three families beside Habiba village (Fig 4). The population of Hilat Daoud is now over 3000. The health status of the children of Hilat Daoud is much better with regards to schistosomiasis as a result of treatment campaigns (Amin *et al*,2012, Malik *et al*,2016), health promotion by the health centre and the female teacher in Kindergarten school. Furthermore, the educated youth established a club to organize television shows and posters about schistosomiasis transmission and control. Access to safe drinking water, adequate sanitation, primary schools, health services and piped water supply remain the major problem of Hilat Daoud and the widely distributed migrants in irrigation schemes. Ministries of Health and Ministries of Social welfare in Sudan States should make efforts to influence relevant policies targeting migrants agricultural workers and their families to promote the expansion of sanitation and clean water supply coverage. They should be included and consider as full partners in all prevention and treatment campaigns. The disappearance of the intermediate host snails from the canals in the study area was most probably due to the season when the snail survey was carried out and other environmental and biological factors (Babiker *et al*, 1985).

### CONCLUSION

The study showed that the treatment campaigns and the community participation lead by the head of the village had impact on prevalence and morbidity of schistosomiasis among

the migrant community of Hilat Daoud. Seasonal study on snail fluctuation is required to determine the transmission pattern of schistosomiasis in order to plan control measures.

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### Ethical Clearance

It was obtained from Ahfad University for Women.

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