Special Article

Challenges in prevention and control of schistosomiasis in the Sudan

Mutamad A.Amin* and Durria Mansour Elhussin*

Background

The World Health Organization (WHO) estimated that 200 million people are infected with schistosomiasis and 600 million are at risk of infection in more than 76 countries[1]. Recently the at risk population has been updated to 779 million. Many of those with schistosomiasis are in sub-Saharan Africa[2]. In 1984 WHO adopted a strategy to control schistosomiasis morbidity. Chemotherapy was the main operational component of this strategy focusing on school age children and other high risk groups[3]. In 1993, the WHO recommended that in areas of high prevalence morbidity control remains the strategy of choice and if resources permit, strategies for transmission control can also be envisaged in all areas[4]. When morbidity control became the preferred strategy, schistosomiasis control programmes have increasingly been integrated into primary health care settings and schools[5,6,7].

The history of scistosomiasis in the Sudan was reviewed by several workers[8, 9] 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. More than seven million people are expected to be infected in the Sudan as projected by the Director of the National Schistosomiasis Control Programme, 2009 personal communication.

Interest in prevention and control of schistosomiasis in the Sudan had been intensified by the establishment of the Gezira Irrigation Scheme in 1925 and the successful treatment of schistosomiasis by antimony tartarate as a result of the work of Christopherson in Khartoum hospital in 1918. The health authorities were well aware of the consequences of bilharzias in the Gezira irrigation Scheme – failure to prevent would be disastrous and probably irreversible[10]. Measures adopted included screening of workers and compulsory treatment of infected people[10]. After trials copper sulphate and mechanical barriers were introduced as snail control measures[11, 12]. However, because of insensitivity of the direct smear method of stool diagnosis and the inefficiency of the antimony drug and increased population movements, prevalence of schistosomiasis increased steadily and by the 1970s

Biomedical Research Laboratory
Ahfad University for Women
Correspondence: Prof Mutamad A.Amin
E. mail: mutamadamin@hotmail.com

Keywords: Gezira, Bilharzia, antimony.

Prevalence rates of up to 70% were reported in school children[13]. In late 1967 a Bilharzia Department was established at Ministry of Health, National Public Health Laboratories. During the period from 1967 to 1970 studies were initiated to evaluate the use of copper sulphate and mechanical barriers in the control of schistosomiasis[14, 15].

In 1970 the London Khartoum Bilharzia Project (Agreement between London School of Hygiene and Tropical Medicine, Faculty of Medicine University of Khartoum and the National Council for Research in collaboration with the Ministry of Health) was established.

The long term objective of the project was to recommend evidence-based schistsomiasis control procedures for the Gezira Scheme. The outcomes of the project were documented in several publications[16—22] The findings of these studies formed the basis of the schistosomiasis control strategies within the comprehensive integrated plan of the Blue Nile Health Project (BNHP) which was established in 1979 to control malaria, schistosomiasis and diarrhoeal diseases in

Gezira\Managil and Rahad Schemes. The BNHP was a joint venture between the Sudan Government represented by the Ministry of Health and the World Health Organization. The goals of the project were to maintain the prevalence of Malaria at\or below 2%, reduce schistosomiasis from the 1979 figure of well over 50% to 10% and to reduce mortality due to diarrhoeal diseases. The BNHP (1979—1990) was a great success story in the history of control of water associated diseases[23,24]. This success could not be sustained due to lack of funding and shortages in public health infrastructure and the mission was unaccomplished after termination of funding in Rahad and Gezira\ Manigle zones[25].

The following elements challenge the prevention and control of schistosomiasis.

1. Lack of Recognition.

One of the main challenges facing the prevention and control of schistosomiasis in the Sudan has been the lack of recognition given to the schistosomiasis problem, the lack of awareness and political will. While control successes were achieved in some areas of Sudan, they could not be sustained due to lack of funding.

Schistosomiasis is not regarded as a public heath priority by policy makers and health authorities in most endemic countries and as such receives little or none financial support. WHO assigned thirteen diseases including schistosomiasis as Neglected Tropical Diseases (NTDs). Schistosomiasis is neglected simply because it is more difficult to include chronic disability and illness into the agenda of ministries of health, especially in presence of more important diseases such as HIV/AIDS, TB and Malaria.

2-The need for a national control plan

To convince decision makers a sound cost-effective national plan with a clear strategy and objectives should be produced. The basis of the plan can be envisaged as follows:

• Epidemiology / public health importance

Apart from the Gezira Scheme, there is lack of information regarding epidemiology of schistosomiasis in all other states of the Sudan An adequate appraisal of the epidemiology of the disease, (transmission, morbidity, disease burden socio –economic aspects etc) is necessary in order to develop a sound control strategy. (Informal consultation on schistosomiasis. WHO, Geneva, 1998). In 1993, the World Bank Development Report (Investing in Health) introduced a system of disability adjusted life years lost (DALYs) as a measure of disease burden.

Country-specific data for the burden for schistosomiasis could support the justification for control.

• Integration with related diseases

A cost- effective approach is to integrate schistosomiasis with the control of other related diseases like malaria and soil-transmitted helminthes. An example of a success story was the Blue Nile health Project, Sudan[25].

• Integration into primary health care settings

The greatest challenge is to extend diagnosis and regular chemotherapy coverage as a public health intervention to reach all individuals at risk of the morbidity caused by schistosomiasis. Vertical campaigns are no longer appropriate .Since the late 1970s, when morbidity control became the preferred strategy, schistosomiasis control programmes have increasingly been integrated into primary health care settings and schools[26,27]

The National Schistosomiasis Control Programme in the Sudan operates from Khartoum. 12 states out of 26 are targeted. Praziquantel, when available, is transferred from Khartoum to the infected subjects only during campaigns organized centrally. The drug is not available at health settings in all targeted states.

• Intersectoral cooperation

Transmission control requires an intersectoral approach and multi-angle control efforts for water supply, sanitation and environmental management.

• Snail surveys and focal snail molluscicide are necessary to interrupt transmission especially in the presence of migration and displacement and irregular supply of drugs.

3- Capacity building needs

Improved capacity is needed at all levels of the health system, particularly the periphery to improve accessibility to drugs and diagnosis as well as snail control, where feasible.

4) Population movements

The impact of population movements on transmission and control of schistosomiasis has been demonstrated in several countries. In Sudan imported and migrant agricultural labourers played a significant role in the spread of schistosomiasis in water resource development schemes and challenges prevention and control of schistosomiasis[28, 29]. Massive population movements to northern states from western Sudan took place during the flooding and famine in 1988 or from the Southern Sudan and Darfur as a result of civil wars. Most of the people settle near irrigation schemes and banks of the White and Blue Niles where transmission occurs. Active transmission was reported recently in the shores of the White Nile and irrigation schemes around Khartoum State.

5-New water resource development projects

The role of water resource development schemes in the spread of schistosomiasis has been discussed by several authors [8,26, 27,30].

Two huge projects are under construction in the Sudan:

The Merowe High Dam, in Northern State, also known as Merowe Multi-Purpose Hydro-Project or Hamadab Dam. Its dimensions make it the largest contemporary project in Africa.

The White Nile Sugar Scheme with an area of about 250 000 acres. Water is now flowing in both projects and displacement, migration and settlement are taking place.

There is a need for health, environmental and social impact assessment in these two newly developing projects. Schistosomiasis has a stake in both environmental impact assessment (EIA) and social impact assessment (SIA).Preventive measures should be introduced to minimize the risks of transmission.

Recommendations

The following recommendations are thought to be relevant to situation in Sudan.

1-support and commitment from top decision makers is highly required for successful and sustainable control of schistosomiasis

2-There is a need for a cost-effective comprehensive integrated national plan with clearly defined objectives and strategies. Specific data for the burden of the disease could support the justification for control.

3- Plans of action at state levels and plans of operation at district levels have to be developed. Vertical campaigns are no longer appropriate. Control activities need to be integrated into primary health care settings and schools

3- There is a need for capacity building at state and district levels (accessibility of drugs, a capacity to diagnose, and a capacity to treat and capacity for snail control.)

4-There is a need for health, environmental and social impact assessment in the newly developing dams and irrigation schemes.

4- A budget item for prevention and control of schistosomiasis and related water associated diseases need to be included in the budget of water resource development projects.

5- Operational research is required to improve intervention strategies, diagnostic techniques and to facilitate human behaviour change and social science and to address many other questions.

References:

1. World Health Organization Report of the informal consultation on schistosomiasis in low transmission areas: control strategies and criteria for elimination 2001;*WHO\CDS\CPE\SIP\2001*

2. Steinmann P. Keiser, J. Bos, R. Tanner et al. Schistosomiasis and water resources development: systematic review, meta-analysis, and estimates of people at risk. *Lancet Infectious Diseases*2006; *6 (*7): 411-425

3. World Health Organization .The control ofSchistosomiasis.Technical Report Series No.728. 1985; Geneva: World Health Organization

4. World Health Organization .The control ofSchistosomiasis.Technical Report Series No.830. 1993; Geneva: World Health Organization

5. Chandiwana, SK, Taylor, Pand Matanhire D. Community control of schistosomiasisin Zimbabwe. *Central African Journal of Medicine*1991;37: 69-77
6. Traore M. Requirements for sustainable schistosomiasis control. *World Health Forum 1996;16: 184-186*
7. Ageel AM & Amin MA. Integration of Schistosomiasis control activities into the primary health care system in the Gizan region, Saudi Arabia .*Annals of Tropical Medicine and Parasitology* 1997;91:907-915
8. Amin MA and Satti, MH. A general review on Schistosomiasis in the Sudan. *Sudan Medical Journal* 1973; 11: 86-91
9. Jordan P. From Katayama to Dakhla: the beginning of epidemiology and control of Bilharzia. Acta Tropica 2000; 77:9-40
10. Greeny WH. *Annals of Tropical Medicine and Parasitology*. 1952;46:250
11. Sharaf el Din and El Nagar H. Control of snails by CuSO4 in the canals of the Gezira irrigated area of the Sudan. Journal Tropical Medicine and Hygiene 1955;58: 260-263
12. Elnagar H. Control of schistosomiasis in the Gazira, Sudan. Journal Tropical Medicine and Hygiene 1958; 61: 231-235
13. Amin MA and Fenwick A The development of annual regimen for blanket snail control on the Gezira irrigated area of the Sudan. *Annals of Tropical Medicine and Parasitology,* 1977; 71: no. 2, 205-212.
14. Amin MA. The control of Schistosomiasis in the Gezira, Sudan. The use of Copper Sulphate and Mechanical barriers. Sudan Medical Journal 1972; 10: 75-82.
15. Amin MA. Large-scale assessment of the molluscicides Copper Sulphate and N-trityl morpholine (Frescon) on the North Group of the Gezira irrigated Area.*Journal of Tropical Medicine and Hygiene* 1972; 75:169-175.
16. Amin MA. The Schistosomiasis Control Project in the Gezira irrigated area, Sudan.W.H.O./Schisto/1972; 30
17. Amin M A and Fenwick, A., The use of Molluscicides in the Gezira Irrigated area of the Sudan. Proceedings of the Annual Scientific Conference of the East African Medical Research Council, Nairobi, 1973.
18. Amin M A. and Fenwick A. Aerial application of N-trityl aorpholine to irrigated canals in Sudan. *Annals of Tropical Medicine and Parasitology*, 1975; 69: 257-264
19. Amin M A , Fenwick A , Osgerby J M et al . A large scales control trial using the molluscicidal Frescon in the Gezira Irrigation Scheme Sudan. *Bulletin of the World Health Organization*, 1976; 24: 573-585.
20. Fenwick A, Cheesmond, A K and Amin M A. The role of field irrigation canals in the transmission of *Schistosoma mansoni* in the Gezira Scheme, Sudan. *Bulletin of the World Health Organization*, 1981; 59: 777-786.
21. Amin M A , Fenwick A , Teesdale C H et al. The assessment of a large snail control programme over a three-year period in the Gezira irrigated area of the Sudan. *Annals of Tropical Medicine and Parasitology 1982; 76: (4), 415-424.*
22. Kardaman M W, Amin M A, Fenwick A et al. A field trial using Praziquantel (Biltricide) to treat Schistosoma mansoni and schistosoma haematobium infection in Gezira , Sudan. *Annals of Tropical Medicine and Parasutikigtm* 1983; 77: -297-304.
23. El gadal A A. The Blue Nile Health Project: a comprehensive approach to the prevention and control of water associated diseases in irrigated schemes Of the Sudan. *Journal of Tropical Medicine and Hygiene*1985; 88: 47-56
24. Blue Nile Health Project, Ministry of Health Sudan JournalL *of Tropical Medicine* and Hygiene.1985,88:no.21-106
25. Blue Nile Health Project, Sudan. Annual report 1990
26. Lemma A. Schistosomiasis: The social challenge of controlling a man- made disease. Impact of science on society 1973;xx111: 133-138
27. Amin M A. Problems and Effects of Schistosomiasis in irrigation schemes in the Sudan. In: Worthington, F.B. ed. op. cit., 1977; 407-44
28. Bella H, de C Marshall, TF, Omer A H et al. Migrant workers and schistosomiasis in the Gezira, Sudan. *Transaction of the Royal Society of Tropical Medicine* and Hygiene 1980; 74: 36-39
29. Fenwick A, Cheesmond AK, kardaman,M et al Schistosomiasis among labouring communities in the Gezira irrigated area ,Sudan. *Journal of Tropical Medicine and Hygiene 1982; 85:3-11*
30. Bradley D J. The health implications of irrigation schemes and man-made diseases. In Feachem R, Mc Garry, M. and D. ,ed. water, wastes and health in hot climate, *London, John Willey and Sn* 1977;: 18-29.