Zoonotic schistosomiasis in Africa: the need for a One Health approach for research and control

Professor Joanne P. Webster
Schistosomiasis
A Neglected Tropical Disease

Blood-borne fluke

Indirectly transmitted involving a mammalian definitive and a molluscan intermediate host.

>240 million infected humans
Changing environments for schistosomes
Control and ‘Elimination’ of Schistosomiasis

2013: World Health Organization (WHO) Strategic Plan:

<table>
<thead>
<tr>
<th>Vision</th>
<th>A world free of schistosomiasis</th>
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<tbody>
<tr>
<td>Goals</td>
<td>To control morbidity due to schistosomiasis by 2020</td>
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<td>To eliminate schistosomiasis as a public health problem by 2025</td>
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<td>To interrupt transmission of schistosomiasis in endemic member states, and in selected African countries by 2025</td>
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“We have committed to continuing our efforts in Africa, in cooperation with WHO, until schistosomiasis is eliminated.”

2016: Donation jump from 25 million to 250 million PZQ tablets a year.
Lessons learned: 
*S. japonicum* in Asia ongoing transmission via animal reservoirs

*Within China*, despite major control efforts >50 years: PZQ, health education, molluscididing, environmental modification, behavioural change etc

*S. japonicum* remains *endemic in seven* (out of 12) provinces and *re-emerging* in some areas.

‘*S. japonicum* is *zoonotic* — transmission between animals and humans.’

Lessons to be learned: 
*S. mansoni* & *S. haematobium* in Africa

’S. haematobium a uniquely human schistosome”


Schistosomiasis in West Africa

Urogenital schistosomiasis prevalence in Niger

- Baseline
- Follow-up year 1
- Follow-up year 2
- Follow-up year 3
- Follow-up year 4
- Follow-up year 5
- Follow-up year 6
- Follow-up year 7

Kokourou Tabalak Sites

2006 2016

0% to 100% of the children and adults are infected with viable zoonotic hybrid schistosomes

Urogenital schistosomiasis prevalence in Senegal

- Children 2017
- Adults 2017

Richard Toll Barkedji Sites

68%

60% to 100% of the children and adults are infected with viable zoonotic hybrid schistosomes
Schistosome pairings: the conventional wisdom = **within-species** monogamy
A plethora of human and livestock schistosome combinations

<table>
<thead>
<tr>
<th>Schistosome Combination</th>
<th>COX1 mtDNA Fragment</th>
<th>ITS rRNA Fragment</th>
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<tr>
<td><em>S. haematobium</em></td>
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<tr>
<td><em>S. bovis x S. haematobium</em></td>
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<td><em>S. bovis</em></td>
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“species”!.....

Novel mathematical hybrid models illustrate role of livestock for ongoing human transmission

Clinical and Economic studies: High ‘costs’ for both human and animal schistosomiasis


So Research to Policy ???: should we treat both human and animal schistosomiasis in Africa?

Animal reservoirs: for and against evolution of PZQ-resistance

Ethonographic studies: Current use and Misuse of PZQ for animal schistosomiasis

This one for animals costs 7500 CFA. The (human form) praziquantel cost 100 CFA the unit. The box of benzimidazole costs 8000 CFA and the box of praziquantel costs 6000 CFA

Focus Group Farmer, Linguere region.

For "yarguitel" it is medicine is not the same (from the market or from the vets). The one who comes from France (Translation Europe) is more efficient.

Focus Group Farmer, Linguere region.

The price, the quality because there are fraudulent drugs that sometimes come from The Gambia. The directions for use of the medication are also important.

Interview Linguere Region, Veterinary Technician.

The problem is that there was no medication proper to animals, so, generally, we would use praziquantel for people to treat animals and in that case, we did not know the dosage, which can cause resistance.

Interview Linguere Region, Veterinary Technician.
Drug Access and Efficacy Evaluation for Livestock Schistosomiasis

**Brutel**

Praziquantel + Levamisole (tapeworm dosage)

Human Policy assists Livestock Policy
Lessons to be learned

Schistosoma spp. in Africa can also be zoonotic
= ongoing transmission
A demand for human and animal treatment

Leger, E., Garba, A., Hamindou, A.A., Webster, B.L., Pennance, T.,& Webster, J.P. (2016). Emerging Infectious Diseases
Research: Elucidation of the biology and impact of this both ancient and emerging infectious disease.

Influence and Implement: Policy & Practice – National & International

Ultimately help improve human and animal health
Thank you

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ZELS

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SCI

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NERC

RISEAL Niger

MEDICAL RESEARCH COUNCIL