

Control of intestinal helminths in Indigenous communities



James S McCarthy

Queensland Institute of Medical Research
University of Queensland
Herston Rd, Herston
QLD 4029
Tel (W) 61 +7 3845 3796
(M) 041 442 4659
Fax: 61 +7 3362 0104
Email J.McCarthy@uq.edu.au

Parasite infections, like most other infectious diseases disproportionately affect people living in poverty. Thus, it is no surprise that the prevalence of intestinal helminth infections has remained higher in Indigenous communities in Australia, compared to that observed in more affluent groups in the population.

Most attention has focused on hookworm^{1,2}, because of its well-recognised association with iron-deficiency anaemia and on strongyloidiasis, because of its propensity to cause long-standing infection and its ability to result in life-threatening hyperinfection if immune surveillance wanes³. A related cofactor is the relationship between poor housing conditions, crowding and the effect of increased soil moisture, either through nonfunctioning waste water disposal or location in a tropical area with high rainfall. These conditions result in a favourable environment for the survival of the environmental life cycle phase of soil-transmitted nematode parasites.

In the case of hookworm, mass drug administration (MDA) to primary school children of a single dose of the broad spectrum anthelmintic albendazole on an annual or biannual basis in endemic communities in Northern Australia has proven to be a highly effective public health strategy, resulting in a reduction of the prevalence of both heavy hookworm infection² and clinically significant anaemia⁴. However, such MDA programs have a number of disadvantages:

- Single dose albendazole is ineffective for the treatment of *Trichuris trichuria* (whipworm) and *Strongyloides stercoralis* infection.
- Such programs are unlikely to result in complete elimination of hookworm from endemic communities. This is because the drug administered in this dose is approximately only 90% curative and such programs are unlikely to reach all infected individuals. Hookworm infection can last several years in

untreated individuals who do not receive anthelmintic drug treatment.

- Long-term, partially effective anthelmintic treatment may select for drug resistance as was observed in one Kimberley community when pyrantel therapy selected for drug resistance⁵.

For strongyloidiasis, the situation is even more complicated and many unanswered questions remain. MDA ivermectin has some appeal and has been widely deployed in sub-Saharan Africa in programs to eliminate River Blindness, caused by the filarial parasite *Onchocerca volvulus*. It is likely to have significant activity against *S. stercoralis* when administered in single dose and is more effective than albendazole for this infection. Further, it would likely have an additional significant beneficial activity against scabies. However, most treatment recommendations entail the administration of two doses separated by at least a week. Moreover, there is insufficient safety data to sanction the use of ivermectin MDA in children under 5 years of age and potentially pregnant women. Incorporating pregnancy tests into MDA programs is likely to entail difficult logistical and ethical challenges. The exclusion of children under 5 years of age from ivermectin MDA programs would likely result in the persistence of a reservoir of infection. Further, faecal contamination of the environment is more likely to be caused by children in this age group.



Adult feeding hookworm, visible at 7 o'clock. Bleeding small intestinal mucosa in the background. Photo courtesy of Dr James Daverson, Princess Alexandra Hospital, Brisbane.

Stool testing in Indigenous communities where intestinal helminth infections may be more prevalent is sporadic and driven by clinical requirements. Thus, the epidemiology of intestinal parasite infections more readily diagnosed by parasitologic means (*T. trichuria*, hookworm *Hymenolepis nana* and intestinal protozoa) is not well understood. For strongyloidiasis, serology is a more sensitive diagnostic technique, but not widely deployed due to concerns about cost-effectiveness and specificity^{6,7}. A number of clinically important research questions remain unanswered with respect to soil-transmitted nematode infections. These include:

- What is the current epidemiologic situation, particularly with respect to the distribution of the two hookworm species *Ancylostoma duodenale* and *Necator Americanus*?
- What is the underlying reason for the pattern of infection? For example, why is ascariasis so rare, while trichuriasis is so common? What is the explanation for the geographic distribution of *A. duodenale* and *N. Americanus*?

It has been argued that parasitic disease in northern Australia could and should be controlled more effectively⁸. While the determinants of parasitic disease in northern Indigenous communities are complex, addressing underlying factors include poverty, lack of health knowledge, poor environmental infrastructure and housing, remoteness from health services, family mobility across health regions and haphazard, opportunistic anthelmintic treatment will be essential if sustained control is to be achieved. Experience suggests that the successful implementation of public health programs, including parasite control programs, requires close liaison with the community, the setting of clear goals and a commitment to improve environmental infrastructure and local health education, as well as regular targeted, population-based chemotherapy over a sustained period. At present, regional and state parasite control programs lack a consistent approach across primary and secondary sectors and across state borders and in some regions are ignored or left largely to enthusiasts.

Like other health interventions in Indigenous communities, the involvement of Aboriginal health organisations is essential in activities aimed at improving the control of intestinal helminths and facilitates rational debate on this sometimes emotive issue. While it could be argued that a vertically funded program aimed at controlling parasite infections is not a sensible approach, incorporation of parasite control programs into preventative health activities is a cost-effective means of delivering such programs. The use of standard surveillance techniques, reporting and targets would enable monitoring of progress;

While the cost of the drugs is not the major barrier to the implementation of such programs, the positive publicity gained by two pharmaceutical companies from their leadership in donating ivermectin and albendazole to the World Health Organization-sponsored filariasis program could have some local lessons.

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James McCarthy is Professor of Medicine at the University of Queensland. He is a Senior Consultant Infectious Diseases Physician at the Royal Brisbane and Women's Hospital and Head of the Division of Infectious Diseases at the Queensland Institute for Medical Research. He has a long-standing interest in anthelmintic chemotherapy and on anthelmintic drug resistance.

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