HOOKWORM

INTRODUCTION

Hookworm is an intestinal parasite most commonly found in tropical and subtropical climates worldwide, particularly in Africa and Latin America. Hookworm is one of three members of a family of parasites known as the soil-transmitted helminths (STHs) and affects more than 576 million people across the globe. Left untreated, hookworm causes internal blood loss leading to iron-deficiency anemia and protein malnutrition, particularly in pregnant women and children. Chronic hookworm infection in children contributes to physical and intellectual impairment, learning difficulties and poor school performance. Hookworm is a serious global concern contributing to an estimated 40 percent reduction in future wage earnings in affected areas.

Hookworm transmission is a complex, repetitive cycle. Hookworm larvae are found in human feces and transmitted to humans from contaminated soil through the skin, usually due to walking barefoot, or by accidentally ingesting contaminated soil. Once inside the body, larvae are carried through the bloodstream to the lungs and mouth where they are swallowed, digested and passed to the small intestine. The larvae mature into half-inch-long worms which attach themselves to the intestinal wall and feed on human blood. Adult worms mate and hatch thousands of eggs, which are passed into the feces of the human host. If the feces come into contact with soil under the right conditions, the eggs hatch into larvae and are re-transmitted to humans, beginning the cycle again.

There are two common species of hookworm, Ancylostoma duodenale and Necator americanus. Hookworm transmission requires the development of eggs into larvae in soil, and the infection cannot be spread through personal contact.

DISEASE OVERVIEW

Risks

- Warm, tropical or sub-tropical environments
- Areas with poor or improper sanitation management
- Pregnant women and women of childbearing age
- School-age children
- Farmers and others in contact with contaminated soil

Symptoms

- Itching or rash where contaminated soil has touched the skin
- Abdominal pain
- Diarrhea
- Weight loss and/or loss of appetite
- Extreme fatigue and weakness
- Intestinal blood loss leading to anemia and/or malnutrition

Transmission

Hookworm larvae enter the body through the skin, find their way to the small intestine and mature into adult worms by attaching themselves to the intestinal wall and feeding on human blood. As the worms feed, they cause severe internal bleeding leading to abdominal pain and diarrhea, anemia and eventual malnutrition.

Treatment

- Education on sanitation and hygiene, specifically regarding the proper use of latrines and shoe-wearing
- Anti-helminthic drugs albendazole (Albenza) or mebendazole (Vermox) on an annual basis
  - 50 million tablets of mebendazole donated per year by Johnson & Johnson
  - Albendazole available from GlaxoSmithKline for US 2¢ per pill
- The Human Hookworm Vaccine Initiative (HHVI) is working to develop a vaccine to prevent hookworm infection and eliminate reliance on current drug therapies
  - Development is currently in a Phase I clinical trial

DISEASE BURDEN

Prevalence

- 576 million people worldwide, including 44 million pregnant women
- Tropical or sub-tropical environments in poverty-stricken areas of Africa, Latin America, Southeast Asia and China
- World's leading cause of anemia and protein malnutrition, particularly in pregnant women and children

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Disease Impact

- Pregnant women with hookworm are at high risk for low birth-weight babies and poor milk production, and their infants have higher rates of malnutrition and mortality
- Pregnant women who develop anemia are three and a half times more likely to die in childbirth
- Children with hookworm have shown a 23 percent drop in school attendance
- "Deworming" (treating hookworm) has been shown to be the most cost-effective mechanism to improve school attendance

EFFORTS AT CONTROL

The most effective prevention method for controlling chronic hookworm infection includes both proper sanitation management efforts and educational campaigns aimed at the use of latrines. In addition, two drugs are available to treat active hookworm infection, Albendazole and Mebendazole. In 2001, the World Health Organization adopted a resolution aimed at the deworming of 75 percent of all at-risk school-age children by 2010, the largest public health program ever attempted to date. A hookworm vaccine is also in development and is currently in a Phase II clinical trial by Sabin's HHVI.

FACTS AT A GLANCE

- Nearly one-tenth of the world's population infected
- World's leading cause of anemia and protein malnutrition, particularly in pregnant women and children
- Children with chronic infections are at increased risk for physical and mental impairments which can lead to learning disabilities and poor school performance

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