

## Short Commentary

# Hookworms Infection and The Gynecological and Obstetric Effects on Girls and Women: A Short Note

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Hookworms is the vulgar name of the nematode worms, *Ancylostoma duodenale* and *Necator americanus*, which live in the intestine, jejunum, of the human, causing ancylostomiasis and necatoriasis, respectively. Both specie are also known as old and new world hookworms, respectively, and the infections are included in the soil-transmitted helminth infections. According to WHO [1]: (i) more than 1.5 billion people, or 24% of the world's population, are infected with soil-transmitted helminth infections worldwide; (ii) infections are widely distributed in tropical and subtropical areas, with the greatest number occurring in Sub-Saharan Africa, the Americas, China and East Asia; (iii) over 267 million preschool-age children and over 568 million school-age children live in areas where these parasites are intensively transmitted, and are in need of treatment and preventive interventions.

As to transmission, the eggs, in the two species, are passed out in the faeces and are usually at the four-celled stage of development. When the eggs reach moist soil the larvae develop and hatch out in approximately one day. Larvae feed in the soil, moult twice then reach the infective third stage in a few days (usually five days, but depending on environmental conditions). The third stage larvae, also known as filariform larvae, do not feed, and can live in the soil for a few weeks. When any part of the human body (e.g. an unprotected foot, buttock, hands) contact soil where filariform larvae of the parasite (infective stage) exist, they penetrate the human skin, and penetrate into blood vessels and are carried to the lungs where they break into the alveolar spaces. There is also, according to [2], the possibility of the filariform larvae being ingested by humans. The larvae grow and mature, pass up the respiratory tree and are swallowed, finally developing to adults in the intestine – jejunum. In *N. americanus* the anterior ends of an adult has cutting plates in the mouth, and in *A. duodenale* there are teeth, for biting off pieces of mucosa. These bites cause some histological changes in the mucosa, and abandoned feeding sites may continue to bleed for some time after the worm has moved elsewhere, because of the secretion of anticoagulant by the parasite. They change attachment site often. Then, as general results of the parasitism for hookworms in humans, we found: (i) a local dermatitis a few days after penetration of the larvae, known as ground itch, after repeated

infections and this may be severe with blisters and papular eruptions; (ii) two to four weeks after infection, pneumonitis develops, caused by migrating larvae in the lungs, and associated with a Loeffler's syndrome [3]; (iii) in heavier infections there are likely to be epigastric pains; (iv) hookworms being blood feeders, the most serious consequence is an iron deficiency anemia, in heavy infections; (v) in endemic areas, high worm loads are sometimes associated with severe anemia with ensuing cardiac symptoms and oedema.

These results of the parasitism for hookworms in humans show that it may cause devastating morbidity with severe consequences in general and in the female reproductive health. Here our objective is to alert medical practitioners of gynaecology and obstetrics for effects of hookworms on girls and women of reproductive age.

Considering the mode of transmission of the hookworms, we must recognize the fact that the high risk of infection occurs in regions where the human population is in contact with the soil during domestic work, and agricultural activities that in several African countries are specially attributed to girls and women, and where there is a lack of a water canalization system, and basic sanitation. In this context, hookworms can be accepted as parasites of major significance and as a primary cause or important contributing factor to human disease or in pregnancy. Considering the pregnancy, the anemia contributes towards maternal morbidity and increased risk for mortality associated with conditions such as postpartum hemorrhage [4]. Maternal anemia has also led to anemia of the fetus and subsequently to anemia in the infant. Long term childhood adverse effects include impaired brain development [5].

On the other hand, in a general context, the anemia can be caused by parasitic diseases, especially malaria, hookworm infections and schistosomiasis, diseases that can coexist in an individual [6]. This coexistence, certainly aggravates significantly the health of the individual.

According [1], the WHO recommend for treatment of people against intestinal worms – albendazol (400mg) and mebendazol (500mg) – which are effective, inexpensive and easy to administer by non-medical personnel (e.g. teachers). They have been through extensive safety testing and have been used in millions of people with

few and minor side-effects. Both, Albendazol and Mebendazol, are donated to national ministries of health through WHO in all endemic countries for the treatment the all children of school age. The global target is to eliminate morbidity due to soil-transmitted helminthiasis in children by 2020. This is be obtained by regularly treating at least 75% of the children in endemic areas (an estimated 836 million in 2016). Over 267 million preschool age children and over 568 million school-age school children live in areas were these parasites are intensively transmitted, and are in need of treatment and prevention interventions. WHO recommends periodic medicinal treatment (deworming without previous individual diagnosis) to all at-risk people living in endemic areas. Treatment should be given once a year when the baseline prevalence of soil-transmitted helminth infection in the communities is over 20%, and twice a year when the prevalence is over 50%. This intervention reduces morbidity by reducing the worm burden in addition.

Considering prevention, according to WHO [7] preventive chemotherapy (deworming) in children should be delivered together with promotion of health and hygiene, to reduce transmission by encouraging health behaviours, such as hand washing, use of footwear and proper disposal of feces. Preventive chemotherapy is an important part of a comprehensive package to eliminate morbidity due to soil-transmitted helminths in at-risk population. However, long term solutions to soil transmitted helminth infections will need to address many factors, including improvements in water, sanitation and hygiene.

In [8] we have a good article on “Helminthiasis a neglected cause for reproductive ill-health and stigma”, which we recommend. The authors cite in their conclusion: “the most effective way to reduce the prevalence and spread of helminthiasis is through well-coordinated prevention and control programs. Interventions that focus on early diagnosis and treatment can reduce the prevalence and the infection rates of these infections considerably and consequently improve the community’s health status”. We are in agreement with these authors, because human health may be protected and pregnant and lactating girls and women may be give special attention.

Final conclusion: 1- we think that it was here demonstrated the importance of the helminthiasis, namely hookworm infections, as an underlying cause of gynecological and obstetrics disorders: 2 - we hope that with the attention that is being given to children concerning the treatment of the hookworm infection, the future girls and woman can be free of the hookworm infections and consequently, of its tragic gynecological and obstetrics effects.

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