SCHISTOSOMIASIS OF THE LOWER REPRODUCTIVE TRACT WITHOUT EGG EXCRETION IN URINE

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Abstract. The individual and public health impact of female genital schistosomiasis (FGS) has been studied and FGS as a risk factor for acquiring human immunodeficiency virus is discussed. In a community-based study in Tanzania, 40% of the women of child-bearing age (n = 543) showed excretion of Schistosoma haematobium eggs in the urine (median = 2.2 eggs/10 ml of urine) and 32% (n = 263) had S. haematobium eggs in their cervical tissue. Urinary and genital schistosomiasis coexisted in 62% of the women, but S. haematobium eggs were found in the cervix without detectable egg excretion in the urine in 23%. Only 43% of the FGS cases had hematuria. Since FGS frequently exists in women with scanty or no egg excretion in the urine and because this disease manifestation is a considerable individual and public health hazard in S. haematobium-endemic areas, mass treatment targeted to women of child-bearing age should be considered.

Genital manifestations of infection with Schistosoma haematobium, although long known, have not attracted much attention. Only recently have the individual and public health implications of female genital schistosomiasis (FGS) been reported. An estimated 9–13 million women may be afflicted by this disease entity in Africa alone. This caused the World Health Organization to include FGS into a group of gender-specific diseases that deserve high-priority research. Besides debilitating or life-threatening consequences such as infertility and ectopic pregnancy, FGS seems to be a risk factor for the transmission of human immunodeficiency virus (HIV).1,3

Recently, it was shown that bacterial vaginosis is likely to increase the susceptibility of women to HIV-1 infection in sub-Saharan Africa. Since in FGS the physical barrier function of the epithelium is impaired, women with genital schistosomiasis may also be at a higher risk for HIV infection than women with a normal reproductive tract. Moreover, there is circumstantial evidence that the immunologic microenvironment of the peri-oval granuloma facilitates the local propagation and systemic spread of HIV. If this hypothesis is correct, the control of urinary schistosomiasis, similar to the control of bacterial vaginosis, could reduce transmission of HIV.4

It has been assumed that genital lesions are always accompanied by active urinary schistosomiasis as indicated by the presence of viable eggs in the urine. However, the observation of genital pathology observed in female European travelers with only scanty or no egg output in urine indicates that FGS may also occur in absence of urinary schistosomiasis. To test this hypothesis, we carried out a cross-sectional, community-based study in two villages in Tanzania.

MATERIALS AND METHODS

Study site and population. Kileo and Kivulini are situated about 36 km southeast of Moshi near the main road from Arusha to Dar es Salaam, Tanzania. A traditional irrigation scheme has enabled the villagers to grow rice. Schistosomiasis is endemic in both villages. Women included in the study are mainly Wapare and work as farmers.

All women 15–45 years of age living in these villages (n = 799) were asked to participate in the study. A total of 543 women were examined parasitologically; 49% (n = 263) volunteered for a complete gynecologic examination including colposcopy and biopsy (virgins and pregnant women were excluded). Women infected with S. haematobium were treated with praziquantel (40 mg/kg of body weight). Diagnosed genital infections were treated according to standard procedures.

The study was reviewed and approved by the Research and Ethical Committee of the Kilimanjaro Christian Medical Center. Approval was also provided by the local authorities (Regional Medical Officer, Kilimanjaro Region, Moshi). Study participants were included in the study after informed consent was obtained. All explanations were given in the local languages (Kiswahili and Kipare).

Parasitology. Three urine samples obtained on three consecutive days from each study participant were examined using the filtration trypan-blue staining technique. Urine samples were obtained between 11:00 AM and 1:00 PM.8,9 Before the collection of urine women were given soda to drink (approximately 300 ml) to minimize the day-to-day variation in egg excretion.10 The urine was thoroughly mixed, 50 ml were filtered through a polycarbonate membrane of 14-μm pore size (Nuclepore; Costar, Tübingen, Germany) and the number of eggs was counted. By definition, women excreting S. haematobium eggs on at least one day were considered to have urinary schistosomiasis, whereas study participants not excreting eggs on three consecutive days were classified as not having urinary schistosomiasis.

Genital schistosomiasis was diagnosed bedside by the microscopic examination of wet crushed biopsies of the cervix, a method so far considered to be the gold standard.11 Women with schistosome eggs present in cervical tissue were considered cases of FGS.

Hematuria. Hematuria, a disease marker strongly associated with urinary schistosomiasis, was assessed in a semiquantitative manner by urine reagent strips (Combur-9-Test; Boehringer Mannheim, Mannheim, Germany). Pathologic findings were graded on a scale of 0 to 3 according to the
Statistical analysis. For comparisons between groups, the chi-square and the Mann-Whitney tests were applied where appropriate.

RESULTS

Schistosoma haematobium eggs were detected in the urine of 40% of the women, with the prevalence increasing from 32% after one urine examination to 40% after three examinations. Egg excretion was low: median = 2.2 (95% confidence interval = 0.3–17.8 eggs/10 ml of urine). Genital schistosomiasis was diagnosed in 85 of 263 women (32%). Female genital schistosomiasis coexisted with urinary schistosomiasis in 62%. However, 23% of the women without detectable egg excretion in their urine had FGS (Table 1). Microhematuria was present in 61% of the women with egg excretion in the urine and in 23% of the women without egg excretion in the urine ($P < 0.01$). The high number of positive reactions may be explained by menstruation, the presence of other genital infections, or very light infections of urinary schistosomiasis undetectable by the parasitologic procedure applied. Only 43% of the FGS cases showed hematuria as assessed by urine reagent strips. Thus, the urinary reagent strip results did not correlate with the presence of egg-induced genital lesions.

DISCUSSION

Since prevailing control strategies for urinary schistosomiasis rely on a single examination of 5–10 ml of urine, whereas we filtered three urine samples of 50 ml each, the percentage of women with FGS who will not be diagnosed and therefore excluded from treatment should be considerably higher than the 23% calculated in this study. In fact, based on a single urine examination, 31% of the FGS cases would have been misclassified as noninfected. Even more important, according to current guidelines, the decision to treat or not to treat individuals in S. haematobium-infected areas is usually based on a single reagent strip reading for hematuria. If this policy was followed, 57% of the FGS cases would have been overlooked and not treated.

In view of our findings that FGS frequently exists in females with scanty or no egg excretion in the urine, and consequently without hematuria, and that FGS probably facilitates infection with and the propagation of HIV, current policies of chemotherapeutic control of schistosomiasis should be reconsidered. Treatment targeted towards women of child-bearing age should be taken into consideration.

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