Acute Schistosomiasis Outbreak: Clinical Features and Economic Impact

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Background. Acute schistosomiasis (AS) is a systemic hypersensitivity reaction that has been recognized mostly in nonimmune travelers. Although the condition is self-limited, it can be severe. We describe an outbreak of AS in a group of travelers returning from Tanzania and estimate the disease burden.

Methods. After we identified the index case, we initiated an epidemiological investigation of the entire group. Diagnosis was established on the basis of symptoms, serologic data, and ova detection. Relevant clinical information was documented with use of a structured questionnaire, and the patient’s economic burden was recorded. Health-related quality of life was assessed during the illness and 3 months later.

Results. Of 34 group members, 27 had a single exposure to a fresh water pond, 22 (81%) of whom were infected. AS developed in 19 (86%) of the 22 infected travelers. Cough (78% of patients), fever (68%), and fatigue (58%) were the most common symptoms, with mean durations (± standard deviation) of 22 ± 11, 11 ± 7, and 37 ± 16 days, respectively. The total number of medical encounters was 258 (mean no. of encounters per patient, 37), and 152 work and school days were missed (mean, 8 days per patient). During the acute phase of illness, there was a significant decline in health-related quality of life that returned to expected norms after 3 months.

Conclusions. A single, short exposure of travelers to an infected pond led to a high infection rate. The illness had a significant impact on the patients’ daily functions, and patients extensively used medical resources. Education to avoid exposure to fresh water remains the most effective method of schistosomiasis prevention.

Schistosomiasis is an intravascular parasitic infection caused by trematodes (flukes). The World Health Organization estimates that schistosomiasis affects >200 million people living in countries where it is endemic [1]. Acute schistosomiasis (AS), or “Katayama syndrome,” is a transient hypersensitivity reaction associated with tissue migration of the larva [2]. Symptoms typically appear 2–12 weeks after exposure and may last for weeks. Manifestations of AS are rarely seen in residents of areas of endemicity but are common in nonimmune travelers. The syndrome is characterized by fever, cough, rash, gastrointestinal complaints, and a range of other symptoms. Contrary to traditional belief, AS may be a clinical manifestation of infection with any Schistosoma species [3].

Outbreaks of AS have been described in adventure travel groups [4–14]. High attack rates (39%–100%) were reported in travelers to sub-Saharan Africa who had been exposed to freshwater lakes. Most of these outbreak descriptions are characterized by prolonged exposure to fresh water, lasting days or more, such as in rafting trips or lengthy lakeside stays [10, 15].

AS is a transient, self-limited syndrome, but little quantitative data exist regarding symptom duration, interference in personal function, and the economic burden of outbreaks among travelers. In this report, we describe 22 cases of AS in a group of travelers participating in a luxury safari trip to Tanzania. The group had a single exposure to a freshwater pond, and most members of the group developed AS. Early detection of the index case combined with rapid investigation of the entire group enabled us to observe this group prospectively.

METHODS

Upon identification of the index case, we initiated an outbreak investigation. A list of the group members...
was obtained from the tour organizer, and all tour participants were contacted by telephone. To identify symptomatic cases, all exposed travelers were interviewed soon after recognition of the outbreak and periodically afterward. Patients were observed prospectively for 12 months. Follow-up focused on the detection of symptoms or signs of chronic schistosomiasis previously described in travelers, including genitourinary symptoms (e.g., hematuria or dysuria), gastrointestinal symptoms (e.g., abdominal pain or diarrhea), constitutional symptoms (e.g., fatigue or weight loss), and CNS involvement [3]. The study was approved by our hospital’s internal review board.

**Case definition.** Schistosoma infection was defined as exposure to the suspected pond plus ≥1 of the following criteria: positive serologic test result, presence of ova in stool or urine specimens, and/or symptoms compatible with AS combined with eosinophilia (in patients for whom serologic tests were not performed). Symptoms defining infection in this group were fever, cough, urticarial rash, and angioedema. Nonspecific symptoms (e.g., fatigue, gastrointestinal complaints, and headache) were reported as well. In hospitalized patients, malaria smears, malaria antigen tests, and blood cultures were performed to rule out other causes of travel-related febrile illness.

**Questionnaires.** Travelers’ data were collected using a structured questionnaire that included sociodemographic details, signs and symptoms of acute disease, and laboratory results. All the travelers were asked specifically about exposure to fresh water—in particular, the number of times that they entered the pond and the amount of time spent in the water. The economical impact was assessed by recording all medical encounters, including laboratory investigations and hospitalizations, and lost working days, school days, and leisure activities.

Health-related quality of life (HRQL) was assessed using the Short Form 12 (SF-12) questionnaire. This is a generic validated HRQL questionnaire that includes 12 items, which can be summarized into a physical component summary score (PCS-12) and a mental component summary score (MCS-12). Norm-based scorings of the general US population are available elsewhere [16]. The SF-12 questionnaire was administered at 2 times: during the acute phase of illness and 3 months later.

**Laboratory methods.** Serologic studies were conducted at the Parasitology Reference Center, Government Central Laboratories (Israel Ministry of Health) in Jerusalem. The serologic test performed at the Israel Ministry of Health is based on soluble egg antigen ELISA (IVD Research), and it is not species specific. Therefore, a convenience sample (n = 8) was sent to the Laboratory of Parasitic Diseases at the Centers for Disease Control and Prevention (CDC; Atlanta GA), where species-specific serologic assays are used (Falcon Assay Screening Test [FAST]–ELISA screening with *Schistosoma mansoni* adult microsomal antigen and species-specific immunoblot tests for *S. mansoni* and *Schistosoma haematobium*, as described elsewhere [15]). Stool (with the merthiolate-iodine-formaldehyde technique) and urine (24-h collection) specimens were tested for the presence of *Schistosoma* ova at the Parasitology Reference Center.

**Statistics.** Fisher’s exact test was used for categorical data, and Student’s *t* test was used for continuous data. Changes in the PCS-12 and MCS-12 scores were assessed with a paired Student’s *t* test. Statistical significance was set at *P* < .05.

**RESULTS**

The index case was a 62-year-old man who presented with a 3-day history of febrile illness, the onset of which occurred 4 weeks after a safari trip to Tanzania. At presentation, physical examination findings were unrevealing. Laboratory investigations disclosed a normal blood cell count and differential, with a WBC count of 7130 cells/mm³ and an eosinophil count of 330 cells/mm³ (4.6%). Malaria diagnostic evaluation yielded negative results, and the patient was discharged from the hospital for follow-up. Four days later, the patient’s fever subsided, but he complained of rash and pruritus. This time, his physical examination revealed an urticarial rash on the trunk, and the blood cell count revealed considerable eosinophilia (eosinophil count, 1030 cells/mm³; 12%) and a total WBC count of 8100 cells/mm³. The combination of fever, urticarial rash, eosinophilia, and a recent visit to an area of endemicity led the treating physician to suspect AS. The patient denied any freshwater lake or river exposure but admitted to swimming in the hotel’s pond (figure 1).

The group consisted of 34 Israeli travelers who visited a tented lodge near Lake Eyasi in Tanzania in April 2007. The travelers spent 1 day in the lodge and had a single short exposure to the pond located at the lodge (figure 1). The hotel’s pond was the only source of fresh water that the group con-

![Figure 1. The Schistosoma-infected pond, an unchlorinated freshwater pond surrounded by vegetation. Several group members recalled seeing snails in the water.](cid://2008:47/1500/000000)
tacted throughout their trip in Tanzania. None of the travelers without exposure to the pond developed symptoms of AS. All 27 exposed travelers reported a single exposure (mean duration of exposure ± SD, 39 ± 35 min) to the pond. Twenty-two persons (81%) were infected.

*Schistosoma* infection was diagnosed on the basis of positive serologic ELISA results for 15 of 22 persons. Serum samples obtained from 8 of these persons were sent to the CDC Parasitology Laboratory for species identification. The *S. mansoni* antibody FAST-ELISA test yielded positive results for all 8 samples, and *S. haematobium* coinfection was noted for 3 samples. One case was diagnosed by the presence of *S. mansoni* ova in a stool sample. The remaining 6 patients received diagnoses on the basis of the combination of typical symptoms and eosinophilia. None of the patients had ova detected in urine specimens. Diagnostic evaluation for malaria and blood culture results were negative for all hospitalized patients.

The 5 noninfected travelers exposed to the infected pond were asymptomatic, and their serologic test results were negative. There were no statistically significant differences between the infected and noninfected, exposed travelers with regard to mean age and sex (table 1). Ages ranged from 6 to 69 years. The mean duration of exposure (± SD) was shorter by ∼30 min in the noninfected, exposed group (44 ± 35 vs. 12 ± 11 min; *P* = .06). The duration of exposure ranged from 5 to 150 min. Shortly after exposure, cercarial dermatitis (i.e., “swimmer’s itch”) was reported by 3 (13.6%) of the 22 infected patients.

Most infected travelers (19 [86%] of 22) developed symptoms compatible with AS. There were no statistically significant differences in sex, age, or duration of exposure between symptomatic and asymptomatic infected travelers.

Among patients with AS, cough (78% of persons), fever (68%), and fatigue (58%) were the most prevalent symptoms (figure 2). Time to onset of different symptoms varied significantly. Urticarial rash and fever appeared earlier (time to onset, 3–6 weeks after exposure), whereas cough and gastrointestinal symptoms appeared later (time to onset, 3–13 weeks after exposure). Angioedema and headache were reported in 2 cases each (mean time of onset for both was 26 days after exposure). The duration of symptoms also varied significantly. Fatigue had the longest duration (mean duration, >6 weeks), whereas cough and diarrhea generally lasted for >3 weeks. Other symptoms had shorter durations (figure 2).

Laboratory findings in the infected travelers were significant for eosinophilia in 72% of patients (table 2). In most patients, eosinophilia was present during the symptomatic period, and eosinophil counts normalized gradually after administration of praziquantel treatment. Three patients had persistently high eosinophil counts despite receipt of praziquantel treatment (which was administered 90 days after exposure), and the counts approached normal values only 1 year after initial infection in 2 of the 3 patients.

The number of medical encounters, number of work and school days missed, and leisure activities lost due to AS are summarized in table 3. Most of the medical encounters were physician visits. Four patients were hospitalized (mean duration of hospitalization ± SD, 7.25 ± 2.6 days). Symptomatic, working adults lost a mean (± SD) of 7.8 ± 6.3 work days. More than 300 leisure activities, mostly sports activities, were “lost.”

All infected patients were treated with praziquantel, and 8 (42%) of the 19 symptomatic, infected patients also received a course of steroid treatment. None of the infected travelers experienced late complications of schistosomiasis at the 12 month follow-up.

During the acute phase of illness, the HRQL was significantly lower than the norm-based scores for the general US population, particularly on the PCS-12. However, HRQL scores increased significantly, returning to levels greater than US norms 3 months later (figure 3).

**DISCUSSION**

We demonstrated that AS may present as a severe, debilitating syndrome with a significant decline in HRQL during the acute phase. In this large outbreak, rapid epidemiologic investigation enabled screening, identification, and treatment of all infected patients. The point exposure of the group and the prospective nature of the investigation allowed us to accurately describe the timing, prevalence, and duration of symptoms. In addition, the morbidity and economic impact caused

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**Table 1. Demographic characteristics of *Schistosoma*-exposed travelers.**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>All exposed travelers</th>
<th>Exposed, infected travelers</th>
<th>Exposed, noninfected travelers</th>
<th><em>P</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. (% of travelers)</td>
<td>27</td>
<td>22 (81)</td>
<td>5 (19)</td>
<td></td>
</tr>
<tr>
<td>Age, mean years ± SD</td>
<td>30.8 ± 20.3</td>
<td>30.8 ± 20.5</td>
<td>30.8 ± 21.9</td>
<td>NS</td>
</tr>
<tr>
<td>Proportion (% of male travelers)</td>
<td>13/27 (48)</td>
<td>12/22 (54)</td>
<td>1/5 (20)</td>
<td>.32  (NS)</td>
</tr>
<tr>
<td>Duration of exposure, mean min ± SD</td>
<td>39.0 ± 34.8</td>
<td>44.1 ± 35.9</td>
<td>12.2 ± 11.2</td>
<td>.06</td>
</tr>
</tbody>
</table>

**NOTE.** NS, not statistically significant.
by the acute illness were quantitatively evaluated using validated questionnaires.

This outbreak occurred after a single, short exposure to a freshwater pond (mean duration, 40 min) in a group of safari travelers in Tanzania. The majority of previous outbreak descriptions among travelers occurred in groups with multiple exposures to infected water sources, such as exposures during rafting or prolonged periods near lakes [5, 6, 10, 12, 15]. In the expatriate population in Malawi, it was shown that the absolute risk of acquiring schistosomiasis at Cape Maclear increased from 52%–74% among persons with an estimated 1-day duration of exposure to 78%–90% among those with a 10-day duration of exposure [15]. In this outbreak, a single brief exposure to the infected pond led to a high infection rate of 81%.

There are only a few descriptions of AS outbreaks after a single exposure [8, 13, 14, 17]. In these reports, the infection rates ranged from 63% to 100%. Visser et al. [7] reported an outbreak of schistosomiasis after a single exposure in 28 travelers returning from the Dogon area of Mali; in this group, a 97% infection rate was found among exposed travelers, but only 52% of persons developed symptoms or signs of AS. The previously described high infection rates are comparable to the rate described in our group.

Our data support the idea that the shorter duration of exposure to the infected water led to a decrease in the risk of infection. The difference in exposure time between groups was nearly statistically significant (probably as a result of the small sample size). Age and sex were not significantly associated with risk of infection.

The percentage of symptomatic patients among infected travelers in our group was 86%. Symptoms did not vary on the basis of duration of exposure; thus, we hypothesize that the severity of the disease is related to individual immune response after infection and not to the parasite load. This hypothesis is further supported by the fact that, in previous reports of AS, even with prolonged exposures (probably leading to a higher load of cercarial penetration and infection), the proportion of symptomatic patients among infected travelers remained in the range of 57%–83% [5, 6, 10].

AS is a syndrome characterized by fever, cough, fatigue, gastrointestinal complaints, urticarial rash, angioedema, headache,
Table 2. Laboratory findings for 22 *Schistosoma*-infected patients.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No. or proportion (%) of travelers with characteristic</th>
<th>Mean ± SD during acute phase of illness</th>
<th>Time to normalization, days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eosinophil count&lt;sup&gt;a&lt;/sup&gt;</td>
<td>16/22 (72)</td>
<td>3016 ± 2416</td>
<td>125 ± 34</td>
</tr>
<tr>
<td>500–1000 cells/mm³</td>
<td>3/16 (19)</td>
<td>763 ± 162</td>
<td>...</td>
</tr>
<tr>
<td>&gt;1000 cells/mm³</td>
<td>13/16 (81)</td>
<td>3535 ± 2394</td>
<td>...</td>
</tr>
</tbody>
</table>
| Low platelet count<sup>b</sup> 
2 × 10¹² platelets/mm³ | 2/22 (9)                                               | 53,000 ± 58,000                        | 3 ± 2                       |
| Elevated AST level<sup>c</sup> IU/L                 | 7/20 (35)                                              | 61 ± 17.4                              | 18 ± 18                     |
| Elevated ALT level<sup>d</sup> IU/L                 | 10/22 (45)                                             | 86 ± 40.1                              | 34 ± 25                     |
| Elevated total bilirubin level<sup>e</sup> mg/dL    | 3/18 (17)                                              | 1.4 ± 0.1                              | 44 ± 20                     |
| Elevated γ-glutamyl transpeptidase level<sup>f</sup> IU/L | 3/8 (37)                                               | 325 ± 460                             | 65<sup>g</sup>              |
| Presence of Charcot-Leiden crystals in stool specimen | 2/11 (18)                                              | ...                                    | NA                          |
| RBCs present on urine dipstick                       | 3/19 (16)                                              | ...                                    | 32 ± 3                      |
| WBCs present on urine dipstick                       | 2/19 (11)                                              | ...                                    | 27 ± 2                      |

**NOTE.** ALT, alanine aminotransferase; AST, aspartate aminotransferase; NA, data not available.

<sup>a</sup> Normal value, <500 cells/mm³.

<sup>b</sup> Normal range, 140–440 × 10¹² platelets/mm³.

<sup>c</sup> Normal range, 11–47 IU/L.

<sup>d</sup> Normal range, 7–53 IU/L.

<sup>e</sup> Normal range, 0.3–1.1 mg/dL.

<sup>f</sup> Normal range, 11–50 IU/L.

<sup>g</sup> Follow-up data were available for only 1 patient. The γ-glutamyl transpeptidase level normalized within 65 days.

arthralgia, and myalgia, particularly neck pain. Cough was the most common symptom in our patients. Older reports of AS seem to underestimate the frequency of this symptom, with cough rates of 32%–33% [5, 7], compared with higher rates of cough of 72%–86% in recent reports about outbreaks [11, 13]. Our previous experience and our experience in this outbreak indicate that patients presenting with respiratory complaints should be evaluated for AS, even if fever is not present [3, 18–20]. Moreover, almost one-third of our patients had no fever. The previous name of the syndrome, “Katayama fever,” seems to be a misnomer and might mislead physicians into thinking that a lack of fever rules out AS.

In this group of patients, AS caused prolonged symptoms. Both cough and fatigue were notable for their long duration and interference with the normal function of patients. The prolonged nature of cough in AS was reported previously by Grandiere-Perez et al. [13], who reported an outbreak of AS involving a group of travelers to Mali. In their study, 86% of the patients complained of cough, which lasted 7–210 days (mean duration, 61 days).

Chronic schistosomiasis is known to carry a significant economic burden in countries where it is endemic [21–24]. To the best of our knowledge, there have not been any estimates of the economic burden of AS. Many practitioners perceive AS to be a short, self-limited disease. We have shown that the symptomatic burden is often significant, leading to considerable morbidity and disability, with weeks of lost leisure activities.

Furthermore, we have shown that AS outbreaks result in a significant economic impact, consisting of lost work days and medical expenses for hospitalization, laboratory tests, and physician time. In our group, entire families were affected, resulting in parents missing work and children missing school. Similar findings were previously reported in a report of an outbreak of AS that involved 8 travelers who had been exposed in the Dogon region in Mali; in this group, all patients were unable to work for at least 2 weeks [14].

The validated SF-12 questionnaire is an objective quantitative tool for the measurement of changes in HRQL, and this is, to our knowledge, the first report of an HRQL evaluation in AS. In a recent publication, HRQL was assessed using the SF-12 for patients with hypereosinophilic syndrome, a severe, chronic, and sometimes fatal disease [25]. The PCS-12 scores were higher for patients with hypereosinophilic syndrome than for our patients. However, unlike patients with hypereosinophilic syndrome, AS patients’ HRQL returned to the expected baseline level after recovery from the acute phase of illness.

An additional problem with AS is therapeutic: the optimal treatment regimen has not yet been established. Praziquantel is the drug of choice for treatment of schistosomiasis, but it has only partial activity against schistosomulae during the acute phase of illness. It is clear that treating patients with praziquantel during the acute phase of illness without repeating treatment 12 weeks after exposure may result in chronic schistosomiasis [3, 13]. Furthermore, praziquantel treatment during
this phase may actually exacerbate symptoms [3, 13]. AS is considered to be a hypersensitivity reaction, and corticosteroid treatment may be useful. In our cohort, 8 (42%) of the 19 symptomatic, infected patients required treatment with corticosteroids during the acute phase of illness. However, the timing, dose, duration of steroid treatment, and the need to combine it with praziquantel have not been subjected to a systematic evaluation.

In our group of patients with AS, the course of eosinophilia was not uniform. Although, in most patients, high eosinophil counts returned to the normal range after receipt of praziquantel treatment, some patients had elevated eosinophil counts that persisted for >12 months after exposure, despite receipt of adequate treatment.

Several plausible causes of the persistent eosinophilia in patients with AS should be considered.

1. Persistent Schistosoma infection that occurs despite receipt of adequate therapy (i.e., therapeutic failure). Praziquantel resistance was previously reported in travelers and in the local population; most cases were attributed to receipt of inadequate doses or to early administration [26–28]. Because our patients were treated with high-dose praziquantel given >12 weeks after infection, the persistence of nonresponder schistosomulae was highly unlikely.

2. Helminthic coinfections are common in areas where Schistosoma infection is endemic [29]; however, they are seldom found in travelers and are mostly seen in long-term expatriates [30, 31]. Multiple stool samples that were investigated for ova and parasites failed to demonstrate helminthic coinfection in our patients.

3. The natural course of eosinophilia in patients with untreated AS is typified by a spontaneous, slow decrease in the eosinophil count within 2 years after infection [32]. In treated travelers, the mean duration of eosinophilia was demonstrated by Grandiere-Perez et al. [13] to be 113 days (range, 1–190 days). In a study of 31 patients with AS in Brazil, 93% remained eosinophilic during 5 months of follow-up [33]. In this last study, there was no correlation between eosinophil counts and

Table 3. Economic impact of an outbreak of acute schistosomiasis among travelers.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No. (%) of affected travelers</th>
<th>Total no.</th>
<th>Mean no. per person</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medical encounters</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration of hospitalization, days</td>
<td>4 (18)</td>
<td>29</td>
<td>7.25</td>
</tr>
<tr>
<td>No. of travel and tropical medicine clinic visits</td>
<td>22 (100)</td>
<td>53</td>
<td>2.4</td>
</tr>
<tr>
<td>No. of family physician visits</td>
<td>22 (100)</td>
<td>74</td>
<td>3.3</td>
</tr>
<tr>
<td>No. of visits to other specialist physician</td>
<td>5 (23)</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>No. of emergency department visits</td>
<td>9 (41)</td>
<td>15</td>
<td>1.6</td>
</tr>
<tr>
<td>No. of laboratory visits</td>
<td>22 (100)</td>
<td>82</td>
<td>3.7</td>
</tr>
<tr>
<td>Total no. of medical encounters</td>
<td>22 (100)</td>
<td>258</td>
<td>11.7</td>
</tr>
<tr>
<td><strong>No. of missed days of work or school</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missed work days</td>
<td>13 (59)</td>
<td>101</td>
<td>7.8</td>
</tr>
<tr>
<td>Missed work days associated with child’s illness</td>
<td>6 (27)</td>
<td>5.5</td>
<td>0.9</td>
</tr>
<tr>
<td>Missed school days</td>
<td>14 (64)</td>
<td>46</td>
<td>3.3</td>
</tr>
<tr>
<td>Total no. of missed days of work and school</td>
<td>19 (86)</td>
<td>152.5</td>
<td>8</td>
</tr>
<tr>
<td><strong>No. of missed leisure activities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missed sport training sessions</td>
<td>18 (82)</td>
<td>207</td>
<td>11.5</td>
</tr>
<tr>
<td>Missed nonsport leisure activities</td>
<td>19 (86)</td>
<td>87</td>
<td>4.5</td>
</tr>
<tr>
<td>Missed family meetings</td>
<td>21 (95)</td>
<td>35</td>
<td>1.6</td>
</tr>
<tr>
<td>Total no. of leisure activities missed</td>
<td>21 (95)</td>
<td>329</td>
<td>15</td>
</tr>
</tbody>
</table>
levels of specific IgE for *Schistosoma* soluble egg antigen or soluble adult worm antigen preparation. The variability in the rate of decrease in the eosinophil count may be explained by differences in individual cytokine response to *Schistosoma* infection during AS and recovery [34]. In most of our cases, the eosinophil count eventually decreased without receipt of additional treatment. Because the patients’ symptoms did not recur, and because there was no evidence of another helminthic infection, we believe that individual variability of the immune response is the most likely reason for the slow eosinophil clearance.

This issue highlights the difficulties in identifying treatment failure in travelers with AS. Ova detection is the method of diagnosis only in the minority of these patients and cannot be used to detect treatment failure (unlike chronic schistosomiasis). The results of serologic tests, which are the main diagnostic tools for infected travelers, remain positive for prolonged periods—if not indefinitely—even with administration of appropriate treatment. Eosinophil counts may remain elevated for long periods, with no other evidence of infection.

The present study illustrates the problems facing pretravel consultations of travelers to Africa. In many locations, the true epidemiological status regarding both schistosomiasis and other diseases is unknown, and local information may not be reliable. A common misconception among travelers is that luxury trips are associated with lower health risks. Our group regarded the pond as safe for swimming, because it was located in a luxurious lodge and because the tour operators considered bathing there to be safe. Travelers to Africa must be made aware that the risks in tropical and adventure travel are not related to the level of travel. Avoiding bathing in freshwater sources in Africa should be considered a universal rather than a local precautionary measure.

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**Potential conflicts of interest.** All authors: no conflicts.

**References**

16. Ware J. How to score the SF-12 physical and mental health summary scales. 2nd ed. Boston: The Health Institute, New England Medical Center, 1995.