

ORIGINAL ARTICLE

## Giardiasis as a threat to backpackers in the United States: a survey of state health departments

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Forty-eight of the 50 state health departments in the United States responded to a questionnaire about giardiasis in their jurisdictions. The agencies had reports of 34348 cases during 1991 and studied 80 outbreaks in the same period. Nineteen of these outbreaks were attributed to consumption of contaminated drinking water; only two outbreaks were reported among individuals identified as campers or backpackers. Only two departments considered water-associated giardiasis to be a problem for backpackers in their jurisdiction, and neither had any data to support this concern. The surveillance data of health departments indicate that giardiasis is a common communicable disease in the United States. They do not, however, provide any evidence that wilderness water is an important cause of the disease in this country.

*Key words:* giardiasis, enteric infections, water-borne disease

### Introduction

There has been increasing concern with the acquisition of water-borne disease by backpackers in the United States. Over the past two decades, most of this concern has focused on giardiasis [1].

Although occasional peer-reviewed reports have drawn attention to this risk [2,3], it is widely discussed in lay publications. The evolution of ideas about this disorder among backpackers is typified by two statements in separate editions of guide books to the New York Adirondacks. The 1962 edition of the Adirondack Mountain Club's high peak region trail guide [4] commented that "all water in the streams from the mountain sides may be used for drinking." Twenty-three years later, however, hikers were warned in another edition of the same publication [5] that ". . . some Adirondack water sources have become contaminated with a parasite known as *Giardia lamblia*. . . . Boil all water for 2–3 minutes, administer an iodine-based chemical purifier . . . or use a commercial filter designed specifically for Giardiasis prevention."

In parallel with this increased concern, there has been a corresponding commercial emphasis on the use of mechanical or chemical water disinfection systems. The use of such devices or chemicals is advocated in most educational publications geared toward backpackers [6,7].

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The contamination of surface water by *Giardia lamblia* and associated outbreaks of diarrheal disease have been well described [8,9]. Virtually all such reports, however, have dealt with community water supplies, from which affected individuals were continuously drinking over prolonged periods of time. Reports of outbreaks of giardiasis among backpackers, in contrast, have been very rare [2,10]. Thus, it is not at all clear why considerable attention is being directed at this disease as a risk for hikers in the United States.

Water sampling for *Giardia* cysts is a cumbersome, labor-intensive process rarely employed in the wilderness. Given the innumerable potential sources of drinking water available to hikers in the back country, such a sampling approach would seem to be an unlikely way of studying this problem anyway. Thus, epidemiologic approaches, targeting individuals with diagnosed disease either retrospectively or prospectively, are much more likely to establish the actual extent of this threat. We decided to use the existing network of state health departments as sources for current data on giardiasis in backpackers in the United States.

### Methods

The health departments of all 50 states were surveyed by mail and follow-up phone call. All were asked if giardiasis was a reportable illness in their jurisdiction and the number of cases reported in 1991, the last year for which complete data would have been available. The departments were next asked the number of outbreaks of giardiasis studied by their staff in the past year. Of these outbreaks, the number determined to be associated with consumption of contaminated water was requested. The departments were also asked about outbreaks of the disease they had investigated during 1991 that involved backpackers. Finally, they were asked an open-ended question seeking any information suggesting giardiasis had been a problem for backpackers within their jurisdictions over the past several years.

### Results

Forty-eight states (96%) responded to the survey and provided usable data. Forty-two of these 48 health departments (88%) consider giardiasis a reportable illness, although a few rely on local health departments to investigate potential outbreaks. During 1991, the last full year before the survey, a total of 34348 cases were reported to these agencies.

During the same interval, 19 health departments reported studying outbreaks of enteric illness which were ascribed to giardiasis. Of 80 such outbreaks studied, 19 were determined to be associated with the consumption of contaminated drinking water. Only two outbreaks (one each in Alaska and Washington) were reported to have occurred in individuals known to the health departments as backpackers or campers.

Only two departments responded positively to the question about whether they were aware of an association between backpacking and giardiasis in their jurisdictions over the past several years. One quoted a report [2] of an outbreak among college students on a trip within their state 20 years ago. The other indicated that although the department had no actual data, their impression was that this could be a problem. The other responses to this question provided further insight into the perceptions of state health departments on this issue. One state, while not ascertaining any cases among backpackers, had recently studied

three outbreaks in public campgrounds. Another reported a high baseline incidence of infection and frequent water-associated outbreaks, although most of the latter were traced to small community water systems.

Although the focus of the questionnaire was water-associated outbreaks, eight respondents specifically commented that day care centers were the major setting for outbreaks in their states.

### Discussion

It appears to be common wisdom among outdoor recreationists in the United States that there is widespread fecal contamination of wilderness waters. This has led to the perception that water-borne enteric infections, with giardiasis as the prototype, are a major threat to users of the back country. This survey suggests that if this consensus is real, it has escaped the attention of professional epidemiologists in health departments throughout the nation.

The potential for water-borne spread of *Giardia lamblia* has long been recognized [11]. Community supplies drawn from surface water which do not employ filtration seem to be the source of most reported outbreaks [11,12]. In most such situations, the outbreaks have been investigated by epidemiologic surveys of residents. Demonstration of cysts in suspect water is technically difficult and has been much less uniform. Attack rates in these outbreaks tend to be low and to correlate with quantity of water consumed.

State health departments have investigated and reported most of these water-associated outbreaks of giardiasis. The 19 outbreaks of giardiasis associated with water in this survey are comparable to the 7 detected in 1989–1990 in a Centers for Disease Control monitoring program [8]. Given this interest and expertise, it seems peculiar that these departments would be generally unaware of what the lay recreational literature considers a major threat.

It could be argued that health departments surveillance might be ill-suited to detect enteric illness in backpackers visiting their jurisdictions. Specifically, disease which is subclinical or misdiagnosed and lax physician reporting could lead to serious underestimates of the extent of the problem. These criticisms, however, beg the question. If the agencies charged with investigating communicable disease in the United States do not have data linking giardiasis to backpacking within their jurisdictions, who does?

Reports in the medical literature of well-studied outbreaks among campers are as rare as health department data. An oft-cited report from nearly 20 years ago [2] describes acquisition of disease by 65% of a group of college students hiking in the Uinta Mountains area of Utah. This report is highly suspect. The attack rate was far beyond that in published reports of water-associated giardiasis. No cysts were identified in suspect water, and there was no association between water consumption rates and the likelihood of disease. The authors discounted food or fecal–oral spread, commenting that the former had never been reported. Although correct at the time of publication, the statement is refuted by several recent reports of spread by food handlers [13–15]. Interestingly, the attack rate among Utah hikers is in the range reported in food-borne outbreaks [14].

A more recent study involved an outbreak among 93 students on a geology field trip in Colorado [16]. The students actually traveled around the state by bus, camping each evening at off-road sites and occasionally consuming water from streams. Although this

was considered by the authors to be a water-associated outbreak, the high attack rate and temporal clustering of initial symptoms are also more consistent with a food-borne illness.

Prospective studies of acquisition of giardiasis by users of the wilderness are logistically difficult to design. An excellent effort at such a study, however, was recently reported by Zell and Sorenson [17]. Although 16% of a cohort they studied developed transient gastrointestinal illness following a visit to an area of high use, *none* developed symptomatic giardiasis.

Thus, neither health department surveillance nor the medical literature support the widely held perception that giardiasis is a significant risk to backpackers in the United States. In some respects, this situation resembles that recently described by Campbell and Smith in reference to shark attacks [18]: an extraordinarily rare event to which the public and the press have seemingly devoted inappropriate attention.

Given the apparent absence of data supporting the risk of this disease in backpackers, there are two reasons for physicians and wilderness educators to rethink their approach to back country water use. The first might be called the "Chicken Little" phenomenon: If we dwell incessantly on what may be a nonproblem, we risk being taken less seriously on other issues. The second is a need to address real concerns. Giardiasis and similar enteric illnesses in developed nations are overwhelmingly spread by direct fecal-oral or food-borne transmission, not by contaminated drinking water. Given the casual approach to personal hygiene that characterizes most backpacking treks, hand washing is likely to be a much more useful preventive strategy than water disinfection! This simple expedient, strictly enforced in health care, child care, and food service settings, is rarely mentioned in wilderness education materials.

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