

Acanthamoeba Keratitis: Is Water Exposure a True Risk Factor?

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Abstract:

Water exposure has been commonly cited in the literature as a significant risk factor for the development of Acanthamoeba keratitis. We tested the hypothesis that the incidence of tap and contaminated water exposure in Acanthamoeba keratitis patients is no higher than in the normal contact lens population. All patients diagnosed with Acanthamoeba keratitis at our institution over a 4 year period were reviewed retrospectively: 64 % (7 patients) reported a history of

water exposure. In comparison, 100% of a control population of 100 healthy contact lens wearers surveyed by self-report reported comparable water exposure, and 87% reported multiple sources of water exposure. The finding that the incidence of water exposure is actually lower in patients with *Acanthamoeba* keratitis than in the general contact lens population suggests that water exposure may be less important, and other factors more important in the development of this disease.

Introduction:

Acanthamoeba keratitis is a potentially blinding corneal infection which, unfortunately, is frequently misdiagnosed. Although therapy has evolved rapidly, prognosis remains guarded, even when the correct diagnosis is made early.¹⁻⁴

Because of the severity and intractability of *Acanthamoeba* keratitis, prevention of this disease is of paramount importance. The literature suggests that contact lens use and water exposure are two of the most important risk factors for the development of the disease.⁵⁻⁹ Cases of *Acanthamoeba* keratitis in contact lens wearers have been reported after exposure to water from hot tubs, lakes, homemade saline, and even tap water (which often contains *Acanthamoeba*).¹¹⁻¹³

It was our clinical impression, however, that such water exposure is common, perhaps even universal, in healthy contact lens wearers. We tested the hypothesis that water exposure is no more common in patients with *Acanthamoeba* keratitis than in a normal contact lens population.

Key Words:

Acanthamoeba keratitis, contact lens, water exposure, risk factors, host factors.

Subjects:

Two groups were selected for comparison: a patient population and a control population.

The patient population consisted of all patients diagnosed with *Acanthamoeba* keratitis at Massachusetts Eye & Ear Infirmary from 1990 - 1994. Eleven patients (13 eyes) were identified retrospectively. Diagnosis of *Acanthamoeba* keratitis was made by calcofluor white stain (7 patients), culture of contact lenses, cases, and solutions on agar plates with *E. coli* overlay (2 patients), and corneal biopsy (2 patients). All patients were carefully questioned by the treating ophthalmologist about antecedent water exposure and contact lens wear and hygiene.

The control population consisted of 100 healthy contact lens wearers presenting to a contact lens clinic for a routine exam, who were surveyed by self-report. Each patient completed a thorough questionnaire regarding their type of lenses, length and frequency of wear, method of cleaning, and exposure to water sources, including rinsing lenses with tap water, and rinsing eyes, showering, bathing, or swimming while wearing lenses (Table 1).

Results:**Population Characteristics:**

In the patient population there were 7 women and 4 men. Mean patient age was 31.5 years (range: 14 - 56 years) with a mean follow-up of 15.3 months (range: 7 - 37 months). 64% percent of patients (7 of 11) had a history of contact lens wear (soft contacts, 5 cases; rigid gas permeable (RGP), 1 case; hard, 1 case).

In the control population there were 68 women and 32 men. Mean age was 36.1 years (range: 15 - 81 years). 85% of women wore soft contact lenses (5% extended wear soft contact lenses (EWSCL)) and 15% used RGP or hard lenses.

64% of the men wore soft lenses (1% EWSCL) and 36% wore RGP or hard lenses.

Incidence of Water Exposure in the "Patient" vs. the "Control" Populations:

64% of all patients with Acanthamoeba keratitis (7 of 11 patients) admitted to a recent history of water exposure (contaminated water (lake, pond, or hot tub water), 3 cases; home saline, 1 case; tap water, 3 cases).

In comparison, 100% of healthy contact lens controls reported a comparable history of water exposure. 87 % of controls reported multiple (2 - 6) sources of water exposure.

Discussion:

Contact lens use and water exposure have been frequently cited in the literature as important risk factors for the development of Acanthamoeba keratitis. All types of contact lenses have been implicated,¹⁴⁻¹⁸ as has exposure to home saline and tap water, as well as pond and lake water.¹⁹⁻²⁴

Sixty-four percent of our patients with Acanthamoeba keratitis reported a history of recent water exposure; in comparison, 100% of our control population of healthy contact lens wearers reported similar water exposure. This result has two implications: 1) a history of water exposure, while clinically striking, is insufficient for the development of Acanthamoeba keratitis, and may be less important than assumed, and 2) other unidentified factors (e.g., differential resistance, other environmental cofactors) are necessary for the development of this disease. The importance of other factors is illustrated by this basic fact: millions of patients wear contact lenses every day, and presumed millions are exposed daily to various water sources containing the ubiquitous Acanthamoeba, yet only a few

hundred patients have been reported to have developed *Acanthamoeba* keratitis. We suggest that a search for these unidentified factors by researchers may prove valuable in the improved prevention, diagnosis, and therapy of *Acanthamoeba* keratitis and other related diseases.

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Table 1.

Excerpt from Self-Report Questionnaire of Water Exposure in "Control" Population

Name(optional): _____ Age: __ Sex: __ Date: _____

Place an "X" on the line next to your answers:

Have you **ever** done these things, **even once**? (check **each** that applies):

- a) I rinsed my lenses with tap water before putting them in ____
- b) I rinsed my eye with water when my lenses were in ____
- c) I took a shower or bath with my lenses in ____
- d) I swam (snorkeled, scuba dived) with my lenses in ____
- e) I was in a hot tub with my lenses in ____
- f) My eye got splashed with water with my lenses in ____