

Strategies for control of trachoma: observational study with quantitative PCR

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Abstract

Antibiotics are an important part of WHO's strategy to eliminate trachoma as a blinding disease by 2020. At present, who needs to be treated is unclear. We aimed to establish the burden of ocular *Chlamydia trachomatis* in three trachoma-endemic communities in Tanzania and the Gambia with real-time quantitative PCR.

Conjunctival swabs were obtained at examination from 3146 individuals. Swabs were first tested by the qualitative Amplicor PCR, which is known to be highly sensitive. In positive samples, the number of copies of omp1 (a single-copy *C trachomatis* gene) was measured by quantitative PCR.

Children had the highest ocular loads of *C trachomatis*, although the amount of pooling in young age groups was less striking at the site with the lowest trachoma frequency. Individuals with intense inflammatory trachoma had higher loads than did those with other conjunctival signs. At the site with the highest prevalence of trachoma, 48 of 93 (52%) individuals with conjunctival scarring but no sign of active disease were positive for ocular chlamydiae.

Children younger than 10 years old, and those with intense inflammatory trachoma probably represent the major source of ocular *C trachomatis* infection in endemic communities. Success of antibiotic distribution programmes could depend on these groups receiving effective treatment.

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Trachoma is caused by repeated re-infection of the conjunctivae by the bacterium *Chlamydia trachomatis*. It is the second commonest cause of blindness worldwide. Trachoma is usually diagnosed on clinical grounds. Active disease for example, is the presence of TF (five or more follicles in the central part of the conjunctiva of the upper lid) and/or TI (pronounced inflammatory thickening of the conjunctiva of the upper lid that obscures more than half the normal deep tarsal vessels). However, other conjunctival infections sometimes cause these signs, and not everyone who has an ocular *C. trachomatis* infection will have them.

In spite of this, clinical diagnosis of active disease is appropriate for individual patients in the field, because (1) laboratory tests for *C. trachomatis* infection are

expensive and are rarely available in endemic areas; and (2) antibiotic treatment, which is designed to clear ocular *C. trachomatis* infection, has few serious adverse effects (regardless of whether topical tetracycline or oral azithromycin is used), so it does not matter if a few people who don't actually have the infection are given antibiotics.

In this study, we wanted to determine which population subsets are most important as reservoirs of ocular *C. trachomatis*, in order to help inform antibiotic distribution guidelines. For this purpose, clinical signs alone would have been inadequate. We therefore used a new quantitative PCR (Q-PCR) assay (which measures the number of copies of a *C. trachomatis* gene collected in a standardised conjunctival swab), and tested every consenting individual in entire communities in Rombo, Tanzania; Kongwa, Tanzania; and Jareng, The Gambia. At the time that swabs were taken for Q-PCR, the all-ages point prevalences of active disease were 18%, 36% and 8% at these three locations, respectively. About 1000 individuals were seen at each site.

Children under ten years of age had the highest loads of ocular *C. trachomatis*. They therefore probably constitute the major source of organism for transmission to others, and should be the main target group for antibiotic distribution programmes. Individuals with TI had higher loads than those in other clinical categories. However, some people who only had conjunctival scarring (TS) but no active disease, and some adults, also had *C. trachomatis* positive swabs.

What is the take-home message for people working in trachoma control?

Achieving high antibiotic coverage levels in children and people with TI will probably be critical to the success of the 'A' component of SAFE, but other demographic or clinical groups should not be ignored.