Ten Years After Mass Treatment with Two Doses of Azithromycin for Trachoma Elimination in Rombo District – Kilimanjaro: Is Trachoma Still Eliminated? A Case Study of Kahe Mpya Sub-Village

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Abstract:

Purpose: This study aimed at evaluating the long term impact of mass distribution of azithromycin in a community which had high prevalence of trachoma and documenting the current prevalence of trachoma. Material and Methods: All residents of Kahe Mpya were given chance to participate in this study, in turn 575 residents participated. The conjunctiva of each consenting resident was examined for clinical signs of trachoma using WHO trachoma grading scheme. Results: The overall prevalence of active trachoma was 4.7% versus 8.1% found 10 years back after the second dose of azithromycin and 3.4% during the elimination period in 2005. In children < 10 years of age the prevalence of active trachoma was 3.3% versus 16.3% found after the second dose of azithromycin and 2.6% during elimination. Children < 10 years of age carry the majority (70%) of the active disease. TS, TT and CO were 109(19%) cases, 7(1.2%) cases and 2(0.3%) cases respectively, and almost all of these cases were in the age group older than 30 years. Conclusion: The prevalence of trachoma fell dramatically during the interventions period and continued to be low ten years after mass azithromycin distribution. Trachoma is still eliminated in this community. Complications of trachoma (TT and TS) still continue to develop.

Keywords: Trachoma; Mass distribution of azithromycin; Ten years prevalence; Kahe Mpya.

Introduction

Trachoma (Ancient Greek: "rough eye") is an infectious eye disease, and the world’s leading cause of preventable blindness. It is caused by bacteria called Chlamydia trachomatis (CT)-serotypes A, B, Ba and C – which spreads through contact with eye discharge from the infected person and through transmission by eye-seeking flies. The infection starts in young children and heals after a couple of months. However, after years of repeated infection, the inside of the eyelid may be scarred so severely that the eyelid turns inward and the lashes rub on the eyeball, scarring the cornea. If untreated, this condition leads to the formation of irreversible corneal opacities and blindness (Mabey, Forsey, & Treharne, 1987; Wright, Turner, & Taylor, 2008).

World Health Organisation defines trachoma elimination in a specific area when the prevalence of active trachoma (TF/TI) is less than 5% among children less than ten years and/or prevalence of trachomatous trichiasis (TT) is less than one case per 1000 population (Solomon, et al., 2008).
Mass distribution of azithromycin with high coverage have shown to cause a dramatic fall in active disease and even further if implementation of other SAFE components is also done (Solomon, et al., 2004). Despite drop in active trachoma infection, cicatricial trachoma (TS, TT and CO) continue to develop even some years after the active trachoma has been cleared (Burton, et al., 2005).

Elimination of trachoma was achieved in Kahe Mpya some years back, it is important to determine the current prevalence of ocular trachoma and its complications; this may be a useful tool for long term assessment of elimination programmes and planning. Lack of long term data on prevalence of trachoma after mass distribution of azithromycin has rendered efficiency of surveillance programmes which leads to unnecessary intervention resulting to wastage of resources and unnecessary distribution of antibiotics.

Thus, this study sought to document the prevalence of trachoma ten years after mass distribution of azithromycin offered more insight for the control and finally elimination of trachoma in areas which still struggles to eliminate trachoma, Tanzania being among them. Results of this study will contribute to the development of surveillance guidelines of trachoma after elimination has been achieved.

Material and Methods

This prospective cross sectional study was conducted in a well-characterised Tanzanian community of Kahe Mpya sub-village in Useri division within Rombo District, Kilimanjaro region, in the North-East of Tanzania. Kahe Mpya has an estimated 250 households, with an estimated population of ~950 (based on 2012 National Census). A collaboration between KCMC, Huruma Hospital and LSHTM has been established, trachoma research has been conducted in this community since 2000, and elimination of infection was documented in 2005 (Burton, et al., 2005).

Following community meetings to explain the purpose and possible benefits of the research, both eyes of each consenting resident were examined using a 2.5x magnifying binocular loupe under direct sun light/torchlight to provide illumination. Trachoma was graded using the simplified grading system of the World Health Organization. Grades of trachoma for each consenting resident were recorded on grading sheets and the results of the worst eye were reported. All participants who were found to have active disease defined as the presence of TF and / or TI were offered two tubes of 1% tetracycline, with instructions to apply the ointment twice daily for 6 weeks. Those found with trachomatous trichiasis (TT) defined as at least one lash touching the globe, where referred to Rombo district hospital where Trichiasis surgery can be done.

All information from grading sheets were double entered and stored in a password-protected Microsoft Access database. Data analysis was carried out using R and R Studio version 2.12.2.

This study was approved by the National Institute for Medical Research (NIMR-Tanzania). Written informed consents were obtained from all subjects or their parents.

Results

Studies have been done in Kahe Mpya since 2000 when a baseline survey was done. Due to prevalence of active trachoma in Kahe Mpya of 20.4% for all age groups, interventions according to the SAFE strategy were initiated. This included harvesting of rain water and encouraging resident to build and use latrines. Health education was given and Azithromycin 20mg/kg (Maximum 1000kg) was offered to all residents of Kahe Mpya. Treatment covered 80% of the population. Thereafter surveys were carried out at 2, 6, 12, 18 and 24 months respectively (Gaynor, et al., 2003).

The study aimed at including all residents of Kahe-Mpya sub-village irrespective of age or gender. A total of 575 residents of Kahe-Mpya consented to participate in this study with 236 (41%) male participants. Mean age was 22 years (SD 21.8, range 2months – 87 years) (table 1). All residents were given an equal chance to
participate. Residents who did not give informed written consent to be part of the study were free not to take part without affecting their medical care.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Number (%)</th>
</tr>
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<tbody>
<tr>
<td>No. of persons examined</td>
<td>575</td>
</tr>
<tr>
<td>Age [mean (±SD)] (years)</td>
<td>22 (±21.8)</td>
</tr>
<tr>
<td>Males (%)</td>
<td>236 (41%)</td>
</tr>
<tr>
<td>No. of children aged &lt; 10 years</td>
<td>246</td>
</tr>
<tr>
<td>Age [mean (±SD)] (years)</td>
<td>6 (±19.2)</td>
</tr>
<tr>
<td>Males (%)</td>
<td>138 (56.1%)</td>
</tr>
<tr>
<td>No. of adults aged ≥10 years</td>
<td>329</td>
</tr>
<tr>
<td>Age [mean (±SD)] (years)</td>
<td>22 (±25.9)</td>
</tr>
<tr>
<td>Males (%)</td>
<td>98 (30%)</td>
</tr>
</tbody>
</table>

Overall prevalence of active trachoma was decreased significantly with time but it was necessary to repeat mass distribution of azithromycin at 24 months (2002) when the overall prevalence of active trachoma was still 8.1%. Further impact surveys were carried out five years after the baseline survey and three years after the second azithromycin distribution. The overall prevalence of active trachoma continued to decrease to 3.2% when elimination was declared.

This study, ten years after second dose of mass azithromycin distribution found an overall prevalence of active trachoma of 4.7% (27 people) representing a 1.5% increase of overall prevalence of trachoma since the last survey (three years after the second azithromycin distribution).

The highest prevalence of active disease occurred in children between 1 – 4 years old in each of the previous studies (Gaynor, et al., 2003). This study showed the same finding (figure 1).

Trachoma was declared to be eliminated in Kahe-Mpya after the impact surveys carried out in 2005 (three years after the second azithromycin dose) which found the prevalence of active trachoma in children less than ten years of age to be 2.6%.

The 3.3% prevalence of active trachoma found in this study represents 0.7% increase in active trachoma infection in this age group as shown in figure 2. This is still low and trachoma is still eliminated in this community.
Overall prevalence of trachoma scarring (TS) was 18.9% (109 subjects), for trachomatous trichiasis 1.2% (7 subjects) and for corneal opacity 0.35% (2 subjects). Almost all cases of TS are found in the age group above 10 years old (93.5% of all TS). None of the TT and CO cases were found in the age group less than 10 years. All the TF were in the age group under 10 years of age (figure 3).

Discussion

It has been well documented that a single mass distribution of oral azithromycin to trachoma endemic community can significantly lower the prevalence of active trachoma infection. This has been demonstrated in group-randomized trials in Egypt, Tanzania and Gambia (Lakew, et al., 2009; Stare, et al., 2011). Although in this community two doses were given for the control of trachoma but even the single dose had tremendous impact on the active prevalence of active trachoma. This study is adding to the proof that mass distribution of azithromycin when covering the large percentage of the population has a lasting impact on lowering the active trachoma infection (Solomon, et al., 2008; West, et al., 2005). West et al, in their study done in Dodoma Tanzania they concluded that “mass treatment of the population is still the best approach for hyperendemic communities, provided high coverage is achieved” (Emerson, & Ngondi, 2009). Despite the fact that they monitored their sample size for only 2 months, but even this study of ten years after azithromycin distribution has shown this to be true. One needs to be careful in generalizing
these results since the environments and location of Kahe Mpya are not the same as other areas. The fact that the previous interventions included community works such as improvement in sanitation, water provisions and health education can also be a contributory factor for this low prevalence observed. As it has been argued that mass antibiotics distribution alone does not eliminate trachoma (Ngondi, et al., 2009; Gambhir, et al., 2010).

Previous studies also showed that the community burden of infection was disproportionately borne by children under the age of 10 years. This study also found the same, 3.3% (19 cases of active trachoma under age 10 years out of 27 cases in all ages) of all active infection is borne in children age less than 10 years. Active disease in this age group has significant impact in trachoma control and specifically for the provision of mass azithromycin distribution. Active trachoma is basically a disease of childhood with peak infection rates being seen among children aged less than ten years. In this study 70% of active trachoma was in children below ten years of age. The prevalence begins to decline by adolescent though some adults, especially women who are the care-givers of young children, continue to have repeated episodes of active disease.13,14

Previous impact studies done in Kahe Mpya showed the prevalence of active trachoma in children less than 10 years old accounted for at least 90 percent of the total burden of active trachoma infection (Gaynor, et al., 2003). This study found out ten years after the second dose of azithromycin was given to Kahe Mpya village, the overall prevalence of active trachoma infection is still at low level of 4.4% as shown in figure 1. When subpopulation prevalence of trachoma was done in children below ten years of age as per WHO definition of trachoma elimination, the prevalence of trachoma in this age group was 3.3% as shown in figure 2. Although there is slightly increase of active trachoma in children below ten years from the elimination prevalence which was 2.6% but it still suffices the definition of WHO elimination of trachoma and therefore trachoma is still eliminated ten years after mass azithromycin distribution. This observation contrasts starkly with the predicted pattern of rapid community reinfection used in a model of the effect of mass treatment (Lietman, et al., 1999; Hu, et al., 2013).

This study found the prevalence of trachoma scarring (TS) of 18.9% (109 cases). This is low compared to what other studies have found out. Explanation for this observation tally with natural history of trachoma and may be due to delayed – type hypersensitivity reaction to chlamydial antigens and the role of repeated infection which modify the general responsiveness of the conjunctiva to other pathogens (Taylor, 2009; Ferreira, Bernardes, & Bonfioli, 2010). Cases of TT found in this study are in line with other studies which have found Trichiasis to continue to develop for many years after trachoma infection has been controlled (Muñoz, et al., 1999; Bowman, et al., 2001).

Corneal opacity which is the ultimate outcome of untreated trichiasis will eventually lead to blindness. This study found a low prevalence of corneal opacity compared to other studies which have been done in other areas. This can reflect the availability of surgical services for management of trichiasis (Mabey, Solomon, & Foster, 2003; Mariotti, Pascolini, & Rose-Nussbaumer, 2009).

Despite good findings this study had several limitations: First, in previous studies conjunctiva swabs were taken and comparison to clinical findings as per WHO grading was done. This study didn’t involve conjunctival swabbing. Second, failure to track individual person for the progression of trachoma status and changes, this would have provided the real time progression of trachoma. Third, the failure to integrate other SAFE components as part of this evaluation could also provide a chance for bias as other SAFE components could have been contributing to this low prevalence of Trachoma observed. Fourth, low turn up of the participants which was attributed by fear of eye damage as they have been examined several times previously, so some residents were not willing to participate in this current study. However, the researcher was committed to educate respondents on the matters ensuring their
Confidentiality of information to be collected. By doing so most people participated in the study while aware of the whole aim of the research.

Conclusion
This study showed ten years post azithromycin distribution still scarring, trichiasis and consequently corneal opacity develops in this population of Kahe Mpya albeit at low rate. In this regard it is recommended that trachoma programmes will need to maintain structures to detect and treat incident cases of trichiasis for trachoma control strategies.

Acknowledgement
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Conflict of Interest
None to declare.

References


