Active trachoma, face washing (F) and environmental improvement (E) in a high-risk population in Oman

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التراخوما النشيطة، غسل الوجه وتحسين الظروف البيئية في مجتمع مرتفع الاختطار في سلطنة عُمان

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الخلاصة: ترمي سلطنة عُمان إلى استئصال شأفة التراخوما المسببة للعمى نهائياً بحلول العام 2010. وكجزء من دراسة لاستعراض سُبُل ترصُّد التراخوما التي تتبعها الهيئات الصحية، تم تقييم الجوانب المتعلقة بنظافة الوجه وتحسين الظروف البيئية ضمن استراتيجية SAFE لمكافحة التراخوما ، في مجتمع مرتفع الاختطار، وذلك في «ولاية نزوى». وعلى ذلك، تم تقييم حالة أفراد خمسين عائلة يوجد بين كل منها شخص واحد على الأقل عولج من التراخوما النشيطة خلال الأشهر الستة الماضية، للكشف عن أي إصابة بالتراخوما النشيطة وكذلك لتقصي مدى توافر الماء والمرافق الإصحاحية لديهم. وتم إجراء فحص سريري للأطفال دون الخامسة عشرة في هذه الأُسَر وعددهم 229، فكان معدل التراخوما النشيطة بينهم 3.5٪. وتبيَّن أن 97.8٪ منهم كانت وجوههم نظيفة وأن 70٪ من منازل هذه الأُسَر مزودة بمياه داخل أنابيب أو توفر لهم بواسطة سيارات صهريج. وكانت حالة نظافة الوجه وتحسن الظروف البيئية مرتفعة بصفة عامة.

ABSTRACT Oman aims to eliminate blinding trachoma by 2010. As a part of a study to review the health institution approach of trachoma surveillance, “F” (facial cleanliness) and “E” (environmental improvement) components of the SAFE trachoma control strategy were assessed in a high-risk population in Nizwa ***wilayat***. Thus 50 households with 1 member treated for active trachoma in the last 6 months were evaluated for active trachoma and for water and sanitation facilities. In all, 229 children under 15 years of age were clinically examined; the rate of active trachoma was 3.5% in the children. Clean face was found in 97.8% of the children and 70% of houses had piped water or water supplied by tankers. The status of “F” and “E” in the study area was generally high.

Trachome actif, nettoyage du visage (N) et changement de l’environnement (C) dans une population à haut risque à Oman

RÉSUMÉ Oman entend éliminer le trachome cécitant d’ici 2010. Dans le cadre d’une étude destinée à examiner l’approche de la surveillance du trachome appliquée par les établissements de santé, les composantes « N » (nettoyage du visage) et « C » (changement de l’environnement) de la stratégie de lutte contre le trachome dite stratégie CHANCE ont été évaluées dans une population à haut risque de la ***Wilaya*** de Nizwa. Une évaluation du trachome actif ainsi que de l’eau et des installations d’assainissement a donc été réalisée dans cinquante foyers comptant un membre ayant été traité pour un trachome actif au cours des six derniers mois. En tout, 229 enfants de moins de 15 ans ont subi un examen clinique ; le taux de trachome actif était de 3,5 % chez les enfants. Une bonne hygiène faciale a été observée chez 97,8 % des enfants et 70 % des maisons avaient l’eau courante ou de l’eau fournie par des camions-citernes. La situation des composantes « N » et « C » dans la zone étudiée était généralement bonne.

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Introduction

Trachoma is a communicable eye disease affecting 146 million people worldwide, mainly in developing countries [*1*]. It is one of the leading infectious causes of blindness [*2*]. To control trachoma, the World Health Organization recommends adopting the SAFE trachoma control strategy in national health programmes [*3*]. "S" indicates surgery for lid complications and "A" indicates antibiotics for active trachoma treatment. Both are widely used strategies and adequate information on the outcome of these strategies is available [*4*]. However, less is known about the contribution of "F" indicating face washing and "E" indicating environmental improvement in the overall impact of the SAFE strategy. Reliable community-based information on these issues is needed so that control of many water- and fly-related diseases can be integrated [*5*].

Oman was a trachoma-endemic country in the past. Rapid socioeconomic improvement and implementation of SAFE trachoma control strategies have resulted in the decline of active trachoma from 70%–80% in the late 1970s [*6*] to 2.2% in 1997 [*7*]. Oman aims to eliminate blinding trachoma by 2010 [*8*]. To achieve this, trachoma control initiatives should be further strengthened with special emphasis on the high trachoma-endemic areas.

Nizwa *wilayat* is located in Dhakhiliya region of Oman. The climate is usually hot and dry throughout the year with occasional rain once or twice a year. Nizwa *wilayat* has a population of 61 000 Omanis, of whom 27 500 are children under 15 years of age [*9*].

Since 1983, Nizwa has been a high trachoma-endemic area and both antibiotic treatment and lid surgery campaigns have been periodically undertaken and reviewed by the Ministry of Health and the World Health Organization [*6*]. One diagnostic centre and one regional hospital provide secondary eye care to patients of the Nizwa *wilayat* and 7 other *wilayat* of the region. These units are staffed by 6 opthalmologists and 3 refractionists who use modern diagnostic and management tools. Thus facilities for addressing 'A' and 'S' components of trachoma control are adequate. However, improvements in the socioeconomic situation, although visible, have not been assessed using indicators such as better water sanitation facilities and changes in community attitude to safe ocular hygiene practices.

Hence, as a part of a study to review the health institution approach of trachoma surveillance, the assessment of "F" and "E" components of the trachoma initiative was undertaken in Nizwa. This was a community-based health assessment study. We present here a part of this study to describe the situation of active trachoma in children < 15 years, their "F" face washing status and "E" environmental improvement status of the houses in the study area. Based on the outcomes, reorganization of trachoma control strategies is proposed.

Methods

Between June and August 2002, active trachoma cases were detected and treated in the ophthalmic units. The houses of all 50 active trachoma cases diagnosed during this period and the resident members in these houses were the study population. All the households were visited by a field investigator from October to November 2002, and water and sanitation facilities were assessed as well as facial cleanliness practices.

The house visits were scheduled in the afternoons so that most of the family members could participate in the study. The family members were not told about the assessment of "F" and "E" component prior to the visit.

Two regional supervisors with at least 10 years experience of trachoma screening activities were the field investigators. Half of the houses were randomly selected and visited by one supervisor and the rest were visited by the other supervisor. One female nurse assisted the investigators while examining female members of the households. A meeting was held with field staff to discuss the procedures to ensure uniform and standard methodology and data collection. The procedures were tested in 5 houses in a village outside the study area. During the pilot, the skills to assess trachoma and environmental status of both the field investigators were compared with that of an ophthalmologist and with each other. They were found to be uniform and satisfactory.

Children < 15 years of age residing in these houses were examined for active trachoma. Ophthalmic loupe and torchlight were used for eye examination. To cover those members of the family who were absent (who were mainly schoolchildren), the same team examined them in school. Personal details of family members and trachoma status [trachomatous follicular (TF) and trachomatous intense (TI) in children, trachomatous scarring (TS) in all ages and trachomatous trichiasis (TT) in 35-year-olds and over] were noted on a standard pre-tested form. Children with active trachoma were treated with supervised oral azithromycin. All other house members were also given prophylactic azithromycin treatment.

The head of the household accompanied the field investigator when staff inspected different parts of the house to note the water and sanitation situation. A closed-ended questionnaire was used to note observations about the different components such as quantity and quality of water, type, availability and cleanliness of latrine, cleanliness of kitchen and house, method of garbage disposal, presence of faecal material in and around house, number of flies in a defined area of the kitchen and around the latrine, and the presence of pets and domesticated animals and the location and condition of animal pens.

The field staff imparted health education on water, sanitation and trachoma during the house visit.

Trachoma grading recommended by the World Health Organization was used in our study [*10*]. A clean face for a child was defined as absence of nasal discharge and dirt on the face, and absence of flies on the face. Water supply was considered adequate if water was available for 24 hours within the compound and was of a quality the family members considered fit for face washing. Animal keeping practice was considered safe and hygienic if there was no animal pen within 10 metres of where family members were residing. Sanitation in a house was considered good if a closed latrine was available for a family within the compound, human or animal faecal material was absent in and around house and the fly density was low (< 5 flies/square metre) in the compound and kitchen or on a child's face. Garbage disposal habits focused mainly on the disposal of leftover food.

Data management system

The data collection forms of each house as well as each person were entered using Microsoft Excel spread sheet. A unique identification code was given to the house and each family member and the files were subsequently merged. Univariate data analysis

was performed. The frequencies and percentage proportions were presented with the statistical validation using 95% confidence intervals (CI).

Results

All the 50 houses were visited and assessed. Of the 510 residents in these houses, 236 children (121 male and 115 female) were under 15 years of age. Seven of them were absent (3 male and 4 female) and could not be examined. Of the remaining 229, 68 (29.7%) were preschoolers, 107 (46.7%) were primary-school students and 38 (16.6%) were preparatory students. Ten children were studying in private schools and 2 were mentally challenged and were not attending school. The information on education of 4 children was missing.

The active trachoma rate was 3.5% (95% CI: 1.1 to 5.9), all were cases of TF. The active trachoma rate was 5.4% (95% CI: 1.2 to 9.6) in females and 1.6% in males (95%CI: –0.6 to 4.0). It was less common in children under 5 years. The sample size does not rule out the element of chance in the observed rates of active trachoma in different subgroups (Table 1). Infective conjunctivitis was found in 8 (3.6%) out of 225 children examined for this condition.

Table 2 gives information of the water and sanitation situation and facilities. Of 226 children, 221 (97.8%) had clean faces while 5 children (2.2%) had dirty faces. Information on 3 children was missing (Table 2). The type of water supply in the house is given in Table 2. Almost half of the houses had piped water supply and about a quarter each had water supplied by tanker or from a well. Availability of water for face washing was considered adequate in the study area. Of the 50 houses, 48 had private, personal and functional latrines. In 9 houses (18.0%) the investigators observed the presence of solid waste in and

Table 1 **Active trachoma in children by demographic characteristics**

Variable	No. examined	Active trachoma No.	%	95% CI
Sex				
Male	118	2	1.7	–0.6 to 4.0
Female	111	6	5.4	1.2 to 9.6
Age group (years)				
< 5	60	0	0.0	–
5 to 9	81	3	3.7	–0.4 to 7.8
10 to 14	88	5	5.7	0.8 to 10.5
School stage				
Preschool	68	0	0.0	–
Primary school	107	5	4.7	0.7 to 8.7
Preparatory school	38	3	7.9	–0.7 to 16.5
Other	12	0	0.0	–
Missing	4	–	–	–
Total	229	8	3.5	1.1 to 5.9

CI = confidence interval.

Table 2 **Water and sanitation situation in houses of the study area**

Indicators of "F" and "E"	No.	%
Facial cleanliness (n = 226 children < 15 years)		
Clean	221	97.8
Not clean	5	2.2
Water source of the house (n = 50 houses)		
Pipeline	24	48.0
Tanker	11	22.0
Falaj (underground water/ irrigation system)	1	2.0
Well	14	28.0
Sanitation in and around the house (***n*** = 50 houses)		
Functional latrine		
Present	48	96
Absent	2	4
Animal pen		
10 metres away from house	44	88
No animal pen or animal in the house	6	12
Fly density (1 missing)		
< 5 flies/m^2	39	80
> 5 flies/m^2	10	20
Solid waste in and around house		
Present	41	82
Absent	9	18
Garbage disposal in house		
Satisfactory	44	88
Not satisfactory	6	12
Garbage disposal in street		
Satisfactory	45	90
Not satisfactory	5	10

around house. On inquiry, it was reported that small children do not use latrine facilities and delay in disposal of waste resulted in this observation. In all 44 houses had an animal pen but it was more than 10 metres away from the kitchen area. The animals were properly fenced and were not found in the house except in 3 houses. As regards fly density, in 39 (78%) houses, flies were not found in the kitchen and in 10 (20%) houses the fly density was less than 5 flies per square metre area in the kitchen. Information was missing for 1 house. In 6 (12%) houses garbage was found in the house and in 5 (10%) houses garbage was found dispersed on the streets around the houses.

The water and sanitation situation in houses with at least 1 child with active trachoma was compared to houses without a child with active trachoma (Table 3). No significant differences in sanitation facilities were observed between these 2 groups.

Discussion

Oman is aiming to eliminate blinding trachoma by 2010. One of the criteria to certify a country as having achieved this goal is to remove any pockets of active trachoma with a rate of more than 5%. Information on the "F" and "E" situation in the high risk group of our study is crucial for the prevention of blindness programme so that any needed reorganization can be made in order to achieve this goal.

The population we examined was more at risk for active trachoma compared to the general population since in each household 1 family member had active trachoma for which he/she had been treated in last 6 months. However, even in this vulnerable group, the active trachoma rate was less than 5%. The clinical grading of active trachoma is easy to follow and by using experienced health staff, the chances of misclassification were minimized in our study. Therefore, active trachoma does not seem to be a significant public health problem in the study area. However, studies

Table 3 **Active trachoma in children according to water and sanitation situation ("F" and "E")**

Variable	Active trachoma		Chi-squared[a] (*P*-value)
	Absent No.	Present No.	
Clean face (*n *= 226)			
Present	202	19	0.22 (0.64)
Absent	5	0	
Water source			
Easy access (pipeline/tanker)	21	12	1.7 (0.2)
Far from house (***falaj*** and well)	7	9	
Sanitation facilities			
Excellent	22	3	15.01 (< 0.0001)
Less satisfactory	8	16	

[a]***Mantel–Haenszel method of chi-squared calculation.***

conducted in different seasons and using larger samples could further confirm this observation.

The active trachoma rate in children under15 years in Oman was reported to be 1.3% in 1996 [*7*]. In the same study, it was 2.6% in the Dhakhiliya region. Our study was in one *wilayat* of the same region and we found a much higher rate (3.5%) compared with this study. This could be due to the inclusion of a high-risk group in our study. Sharing the same environment, having similar hygiene habits and cross infection during the latent period could be the reason for the active trachoma cases found in these households.

The annual school screening activity in Nizwa *wilayat* targeting first primary-school students during 2001–2002 revealed an active trachoma prevalence of 1.1% [*9*]. Our study also suggests a low rate of active trachoma in primary-school students. Higher rates observed in children attending preparatory school suggest the need for periodic review of active trachoma in this age group. The absence of infection in preschoolers in this high-risk population needs further investigation.

In view of the low prevalence in the study area, clinical finding of active trachoma should be complemented by laboratory tests as proposed by other studies [*11*].

A high proportion of the children in the study area had clean faces. The arrival of guests may have prompted the mother to make their children presentable and thus may have resulted in an over-estimation of the clean face rate due to social desirability bias. However, some of the children were screened in school and their facial cleanliness status was similar to those present in the house. This indicates the probable marginal effect of this bias on the study results.

The availability of water and the status of environmental sanitation was also better than that reported in other high trachoma-endemic areas of developing countries [*12,13*]. Low rates of communicable eye diseases such infective conjunctivitis in our sample confirms the low transmission po-

tential in these houses. Nevertheless, in spite of all efforts, social desirability bias might have influenced the study results causing an over-estimation of positive sanitation situation.

Active trachoma in children was inversely associated with the good sanitation and water facilities in the houses (Table 3). However, since our study was descriptive and the prevalence of active trachoma was less than 5%, the association between active trachoma and good water and sanitation should be viewed with caution.

The ongoing screening of schoolchildren and prevention of transmission by prophylactic treatment of the family members using a supervised azithromycin regimen could have reduced active trachoma. However, improved sanitation and water facilities could sustain these achievements. The multiple benefits of further strengthening the "F" and "E" strategy in other areas, such as diarrhoea control and reduction in other health problems like contagious skin diseases, should be considered when additional resources are allocated to improve water and sanitation components even in areas with low incidence of trachoma. The Integrated Management of Childhood Illnesses (IMCI) in trachoma-endemic areas should include trachoma control as one component as a cost-effective and sustainable initiative for many health problems in children. The monitoring of such a strategy could also be within IMCI rather than as part of the programme management of trachoma control.

The environmental situation in houses with and without active trachoma cases among children was not significantly different. The low prevalence rate of active trachoma and the epidemiological transition being experienced by the population of the study area could be responsible for this observation.

The national trachoma control initiative should undertake a similar exercise to evaluate the status of "F" and "E" components in other areas of the country and accordingly review the implementation policies.

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Alliance for Global Elimination of Trachoma by 2020

The World Health Organization leads an international alliance of interested parties to work for the global elimination of trachoma, the Alliance for Global Elimination of Trachoma by 2020 (GET 2020). The Alliance supports and collaborates with WHO in carrying out essential activities such as epidemiological assessment, including rapid assessment and mapping, project implementation, coordination, and monitoring, disease surveillance, project evaluation and resource mobilization. It is open to all parties – governments, international organizations and nongovernmental organizations – that are willing and ready to contribute to international efforts. These efforts are based on the WHO-developed strategy – a combination of interventions known by the acronym "SAFE" which stands for Surgery for trichiasis (inturned eyelashes), Antibiotics, Facial cleanliness and Environmental improvement. WHO and its partners are supporting implementation of the SAFE strategy in the endemic countries that decided to eliminate trachoma as a result of political engagement and technical capability. Further information about WHO's work to eliminate trachoma can be found at: http://www.who.int/pbd/blindness/trachoma/en/index.html