

ORIGINAL ARTICLE

Prevalence and Risk Factors of Trachoma among Children of Woreilla Woreda, South Wollo Administrative Zone

Eyob Lemma, MD*

ABSTRACT

Background: *Trachoma is still prevalent in large regions of Africa including Ethiopia. Crowded living condition, scarcity of water, poor hygiene and ownership of cattle were incriminated as risk factors by studies in some countries. But the degree to which these factors contribute to the development of trachoma has not been well documented in Ethiopia, especially in rural communities where the problem prevails.*

Methods: *A cross-sectional study was conducted in Woreilla Woreda, South Wollo administrative zone to determine the prevalence and factors associated with trachoma among children of age 5 to 15 years. A sample of 560 children in the age group of 5 to 7 years of age were examined for the presence of trachoma. The World Health Organisation's (WHO) simplified classification scheme for assessing trachoma in community based surveys was used for the purpose. Prior to the examination an interview was conducted with the mother or caretaker of each child using a structured questionnaire.*

Results: *The prevalence of trachoma was found to be 40.9%. A total of 161(28.8%) children were found to have active trachoma (TF and/or TI). On multiple logistic regression older age group, not going to school, face washing habit less than once a day and failure to seek eye care service were found to be associated with the presence of trachoma in this study population. Other factors, which were independently and positively associated with the presence of trachoma, include poor household and environmental conditions (animals living in the same room with people, cooking in the living room, absence of proper waste disposal).*

Conclusion: *An attempt at decreasing trachoma in the face of scarcity of resources, focusing on improving hygienic conditions both in the household and its surroundings and changing people's behavior towards washing their face more frequently is recommended.*

Key words: Trachoma. Risk Factors. Prevention. Face Washing.

INTRODUCTION

Trachoma is a term derived from a Greek root meaning rough, referring to the appearance of the upper tarsal conjunctiva. It is a specific form of keratoconjunctivitis

that is communicable and usually of chronic evolution. Its causative agent, *Chlamydia trachomatis*, is spread by direct contact, dirt and flies. The distraction over the eyes ranges from conjunctivitis often

*Department of Community Health, Faculty of Medicine, Addis Ababa University, P.O. Box 101597, Addis Ababa

follicular to most disabling forms of entropion and trichiasis formation, corneal infiltration, corneal scarring, complete corneal opacity and blindness. Identification of cases is relatively easy. Furthermore, the World Health Organization (WHO) has published a simple classification scheme for assessing trachoma in community-based surveys which is reliable, easy and has been used in a number of studies (1,2).

The proportion of the population with follicular trachoma (TF) and/or inflammatory trachoma (TI) represent the presence of active disease. The stability and endemicity of the disease in the community largely determines the age distribution of the individual signs of trachoma. In hyperendemic areas, active disease is more common in pre-school children (3,4). The prevalence of active trachoma decreases with increasing age.

Although trachoma has largely disappeared from most of the western world, it continues to be a major cause of blindness in developing countries (2). Trachoma is more common in underdeveloped areas, where good water supplies and basic sanitation services are lacking. Even within hyperendemic areas, trachoma clusters both at the neighborhood and at the household level (3,5,6).

Several risk factors were identified for the disease transmission. Crowded living conditions in the family unit specifically increasing number of persons per sleeping area appears to increase the likelihood of contact with infected individuals (5,7-11). The association between the presence and severity of trachoma and risk factors like poor hygienic conditions due to lack of available water, fly density in the household or presence of flies on children's faces, and cattle have been documented (12-16). Trachoma is also common in the areas of the world characterized by lack of health care/eye care services and isolation,

lack of water and sanitation, excess of flies and poverty.

As trachoma is a major public health problem there is an urgent need for its prevention and control through systematic approach. The establishment of priorities and, therefore the availability of adequate information are prerequisite for formulation and implementation of trachoma control program strategies. The purpose of this small-scale community based survey was to document the prevalence of trachoma in the rural population of Woreilla *Woreda* and to identify important determinants of the occurrence of trachoma, which are amenable to change within the available resources.

MATERIALS AND METHODS

Study area and population: Woreilla *Woreda* is found in South Wollo Administrative Zone. The town Woreilla is found 91 Kms Southwest of Dessie, the capital of South Wollo Zone. The projected total population for mid 1996 was 125,958 of which 50.19% were females. Almost all people are Amharas and Christians by religion. The staple diet is *Teff*. In the study *Kebele* springs and river water are the main source of water for the residents. The average distance in time from a water source to the center of the villages was estimated to be 20 minutes both ways. There was only one functional community health agent (CHA) in one of the *Kebeles*. The nearest health facility is Woreilla health center where there is no special eye care clinic. Two elementary schools and three adult literacy classes were also found in these *Kebeles*. In addition two outreach EPI centers give services on a monthly basis.

Lowland areas of the *Woreda* (District) were covered by these three *Kebeles*, with a total population of 7,320. Children between the ages of 5 to 15 years account for 29%

of the total population. Using prevalence of trachoma 58.7% obtained from a previous community based survey (17) with 95% confidence interval, a power of 80% and a margin of error of 5% the sample size was calculated to be 560. First a sketch map of the villages (locally known as "Gote") was conducted to facilitate sampling of households. The number of participants for each Gote was determined proportional to its population size. Households with an eligible child (age 5 to 15 years) were selected using WHO's EPI coverage cluster sampling method (18). Field data collection was conducted from January 22 to March 07, 1997.

Measurements: Each child had examination of both eyes. A trained health assistant prior to the eye examination conducted a structured interview with the mother/caretaker of the child using a pre-tested questionnaire. Data were collected for each index child including age, sex, household characteristics, face cleaning habit, eye care service seeking habit, and trachoma status. The steps of eye examination and trachoma grading strictly followed the WHO's simplified grading scheme (1,2) by a single examiner. Both eyes were examined in the same sequence using a magnification convergent 2.5x binocular loupe adjustable to pupillary distance of the observer. Hygienic measures were also taken and results of the examination were registered.

The research proposal was approved by the joint Save the Children Fund, (UK), and the Zonal Health Department research steering committee. An official letter was written to each of the study Kebeles from the Woreda Council prior to the data collection. Finally, children who were found to have trachoma were provided with the standard treatment free of charge (19).

Data analysis: Data were edited and analyzed using SPSS II statistical package.

Multiple logistic regression models were used to estimate the independent contributions of the risk factors to the outcome.

RESULTS

Description of the Study Population:

Results of the study showed that out of the total 560 children 267(47.7%) were females and the rest 293 (52.3%) were males. The age distribution showed that 29.8%(167) of the children were between the ages of 5 to 7 years, of which 53.9% were females (Table 1). The mean and median ages for females and males were found to be 9.78 and 10 years respectively. Almost all were Christians by religion and their parents were farmers. Distribution of the study sample by literacy status showed that 341(60.9%) were illiterate, of which 63.7%(190) were above the age of 7 years and 30.2%(103) between the ages of 11 and 15 years. From the total study participants only 18.8%(105) were enrolled at school for the academic year (Table 1).

Distribution of risk factors: Nearly two-third of the children (60.7% to 61.8% of females and 59.7% of males) of didn't have the habit of face washing or wash their face less than once a day. The rate of face washing less than once per day among those who were not going to school was 62.2%.

Nearly 33% of the total of the children live in households with proper waste disposal and only 10% of study participants live in households where animals live inside the house with people. Concerning the cooking place, a total of 505 (90.9%) children were living in houses where the family cook in the living room. Furthermore, only 30.7% of children and their family responded as having habit of going to a health institution when having eye problem (seek eye care services when ill). Yet, in 66.3% of the total children

there was at least one other member of the family with symptoms of trachoma ("Avne-mazz" as the local people call it) [Table 1].

Table 1: Demographic, environmental and behavioral risk factors for the development of trachoma among study participants, Woreilla Woreda, January -March 1997.

| Characteristics | Total No (%) | Trachoma cases No (%) |
|---|-----------------|--------------------------|
| Age group (years): | | |
| 5 - 7 | 167(29.8) | 62(37.1) |
| 8 - 10 | 168(30.0) | 62(36.9) |
| 11 - 13 | 142(25.4) | 59(41.5) |
| 14 - 15 | 83(14.8) | 46(55.4) |
| Sex: | | |
| Female | 267(47.7) | 117(43.8) |
| Male | 293(52.3) | 112(38.2) |
| Currently enrolled at school: | | |
| No | 455(81.3) | 204(44.8) |
| Yes | 105(18.7) | 25(23.8) |
| Face washing habit: | | |
| Less than once a day | 340(60.7) | 159(46.8) |
| At least once a day | 220(39.3) | 70(31.8) |
| Presence of Trachoma symptoms in other family member: | | |
| No | 189(33.8) | 73(38.6) |
| Yes | 371(66.3) | 156(42.0) |
| Animals living in the living room with people: | | |
| No | 509(90.9) | 199(39.1) |
| Yes | 51(9.1) | 30(58.8) |
| Cooking place in the living room: | | |
| No | 55(9.8) | 15(27.3) |
| Yes | 505(90.2) | 214(42.4) |
| Presence of proper waste disposal: | | |
| Yes | 184(32.9) | 57(31.0) |
| No | 376(67.1) | 172(45.7) |
| Eye care service seeking behavior: | | |
| Yes | 172(30.7) | 57(33.1) |
| No | 388(69.3) | 172(44.3) |

Distribution of eye problem/trachoma: From the total 420 children or their caretakers, 76.1% reported that the child complained of eye problems. Majority of eye complaints were eye discharge, itching and excessive tears (Table 2). On examination of both eyes, 229 (40.9%) children were found to have trachoma. From those suffering from the disease, 51.1% were females; 62(27.5%) were between the age of 5 and 7 years; and only 25 (10.9%) were enrolled at schools during the time of the study (Table 1). The prevalence of active trachoma, TF and/or TI, was found to be 28.8%. Out of 229 cases of trachoma 22 were complicated with entropion /trichiasis in 8/22 (36.4%) cases; corneal infiltration in 12/22 (54.5%) cases; massive keratitis in 1/22 (4.55%) and blindness (a case of only light perception) in 1/22 (4.55%) case.

Associated risk factors: To test the presence of association, between the categorical exposure variables and the outcome variable, logistic regression was employed. On bivariate analysis sex of the child and presence of "Ayne-mazz" in other member of the family showed no significant association with the presence of trachoma ($p>0.05$). Age was found to be associated with the presence of trachoma. Trachoma cases had a significantly increased odds for exposure to poor household and environmental conditions, poor face washing habit, not going to school and absence of eye care service seeking habit. These factors were included in a multiple logistic regression model and adjusted odds ratios were calculated for the exposure to these risk factors. Table 3 summarizes the analysis.

Table 2. Reported eye symptoms of children, residents of Woreilla Woreda, (n = 420), Woreilla, January -March 1997.

| Complaint | Frequency | % |
|----------------------|-----------|------|
| Discharge | 360 | 84.5 |
| Itching | 279 | 65.5 |
| Excessive tear | 161 | 37.8 |
| Redness of eyes | 43 | 10.1 |
| Visual impairment | 32 | 7.5 |
| Photophobia | 8 | 1.9 |
| Swelling of eye lids | 8 | 1.9 |
| Blindness | 1 | 0.2 |

Table 3. Bivariate and multivariate logistic regression of presence of trachoma on the potential risk factors. Woreilla, January -March 1997.

| Characteristics | Bivariate adjusted OR (95%CI) | Multivariate OR (95% CI) |
|--|----------------------------------|-----------------------------|
| Age group (years): | | |
| 5 - 7 | 0.48(0.28,0.81)** | 0.51(0.29,0.90)* |
| 8 - 10 | 0.47(0.28,0.80)** | 0.51(0.29,0.90)* |
| 11 - 13 | 0.57(0.33,0.99)* | 0.54(0.30,0.97)* |
| 14 - 15 | 1.00 | 1.00 |
| Sex: | | |
| Female | 1.00 | - |
| Male | 0.79 (0.57,1.11) | - |
| Currently enrolled at school: | | |
| Yes | 1.00 | 1.00 |
| No | 2.60(1.60,4.23)*** | 2.61(1.58,4.32)*** |
| Face washing habit: | | |
| At least once a day | 1.00 | 1.00 |
| Less than once a day | 1.88(1.32,2.68)*** | 1.72(1.18,2.51)** |
| Presence of trachoma symptoms in other family member: | | |
| No | 1.00 | - |
| Yes | 1.15(0.81,1.65) | - |
| Animals living in the living room with people: | | |
| No | 1.00 | 1.00 |
| Yes | 2.23(1.24,3.40)** | 2.02(1.09,3.76)* |
| Cooking place in the living room: | | |
| No | 1.00 | 1.00 |
| Yes | 1.96(1.06,3.64)* | 2.20(1.14,4.22)* |
| Presence of proper waste disposal: | | |
| Yes | 1.00 | 1.00 |
| No | 1.88(1.29,2.73)** | 1.73(1.17,2.56)** |
| Eye care service seeking behavior: | | |
| Yes | 1.00 | 1.00 |
| No | 1.61(1.10,2.34)* | 1.69(1.14,2.52)** |

*p<0.05, **p<0.01, ***p<0.001

Keeping the other variables constant, the risks of children being in the younger age group among the trachomatous group is 50% less compared to the non-trachomatous group. Similarly, compared to children without trachoma, the risks of getting children who didn't go to school or who wash his/her face less frequently (less than once per day) is significantly higher among the trachomatous children (2.61 and 1.72 times higher respectively). These associations were independently significant at 95% level.

Trachoma cases had independent and significantly increased odds of exposure to poor household and environmental condition. The difference in the exposure is nearly two times higher for children with trachoma compared to those without trachoma. The strongest association was found between presence of trachoma and cooking place in the living room. Furthermore, the odds for absence of proper waste disposal is 1.73 times higher (95% CI=1.17,2.56; $P<0.001$).

Another independent and positive association was found between the presence of trachoma and habits of seeking eye care service by the mother or caretaker or by the child in the case of older children. A 69% higher risk of not seeking the service was detected in cases of trachoma compared to those without the disease. This association is also found to be statistically significant ($P<0.05$).

DISCUSSION

This study indicates that trachoma has a high prevalence (40.9%), similar to study findings from other parts of the country (7,17, 20). But this figure may be higher than the national figure (19). This can be attributed to the fact that the study includes only the rural population where the health service facilities are poor and lower environmental and personal hygiene

prevail. Scarcity of water is also the other contributing factor.

The main sources for the spread of the disease are children in the ages 1-10 years, who have highest prevalence of TF and TI and who are responsible for most shading of chlamydial organism. Transmission occurs primarily within the family, between children and the older daughters looking after the small children. In the current study, 55.6% of Trachoma cases were found in children in the age group 5-10 years, and 89% were not enrolled in any school at the time of the study.

A study in the rural highland community in Gondar region showed hyperendemicity, with prevalence rate of 43% and the highest was identified in the age group of 5-9 years, accounting for 59.8%. The lowest rate was found in those who wash their face regularly (27.4%) and among educated (20.7%) compared to the illiterate which was 57.4% (20). This showed that the above figures were comparable with the current study findings.

Trachoma was complicated in 9.6% of the cases. The commonest sequel of trachoma was found to be entropion/trichiasis 36.4%, corneal infiltration 54.5%, keratitis and blindness each 4.5% as has been found in other studies (20).

Risk factors for the development of trachoma were also compatible with other studies in other parts of the country. A study in Gondar region in a new village reported 80% prevalence showing a statistically significant inverse relationship between face washing and literacy. Another study conducted in the rural areas of Sidamo showed increased risks of exposure among trachoma cases for garbage disposal near residential areas (7).

In the current study, unlike findings from Sidamo (7), the presence of animals in the living room is significantly and independently associated with the presence of trachoma. The presence of cattle and

cattle ownership has been associated with trachoma in some African countries (12,16). In arid environments, cattle droppings create an optimal environment for breeding flies, and this has been the explanation for the association of cattle with trachoma, even if few studies indicated these factors to be independent predictors (12). On top of this, cattle also mark families with traditional lifestyle who tend to have the poorest living conditions.

One potential source of infection is obviously the ocular and nasal secretions of preschool children. However, determining the frequency of face washing among children is difficult and prone to bias. As seen in some studies (2), self-reported frequency of washing children's face was believed to be high. The lack of association between this behavior and presence of trachoma was also attributed to the lack of variance in this variable (7). As concerns to the current study, face-washing habit at least once per day is independently and significantly associated with the presence of trachoma. A similar association was also documented in other cross-sectional as well as longitudinal intervention studies (12,21,22).

Eye care service seeking habit by the family of the children showed a protective effect over the development of trachoma. Inquired reasons for failure of seeking eye care service are of interesting combination. Health institution is too far, inconvenient time, mother is too busy etc. shows that these families did not for some reason want to reveal their reasons for failure of seeking health care services. Economical status (cost of treatment) and fate on the treatment may play some role.

Changing the living standard of these communities may be difficult considering its direct relation with the economical status. But in those who had both poor face washing habit less than once per day and poor household/environmental conditions

the occurrence of trachoma could be prevented through public health measures. These measures include health education and changing the attitude and practice of people regarding personal and environmental hygiene. Especially the effect of regular face washing is well documented in intervention studies (21,22).

All in all trachoma is a communicable disease, the transmission of which is heavily dependent on poor socio-economic and environmental conditions. In areas where it remains a blinding disease, a combination of encouraging regular programs must be functional. In the study area it is recommended that, in addition to regular detection and treatment of people with active trachoma, families and individuals should be told to do something to protect themselves from the infection. That is teaching them to increase the number of times that their children wash their face so as to remove discharge and to reduce flies that are attracted by dirt in the face. Assessing reasons behind poor face washing will also be beneficial in this regard.

The difficulty of carrying out behavioral interventions is evident, but such an approach is likely to be more sustainable than the constant provision of antibiotic treatment. Based on the study findings it was also indicated that, the other priority areas for the zonal health department, donor agencies and the community to intervene will be improving water supply, sanitation and housing conditions to prevent trachoma altogether. Furthermore, evaluating the impact of socio-economic factors and services at health institutions on help seeking behavior has to be conducted. Additional emphasis should focus on other common and preventable blinding diseases. Effort must be directed to improve the literacy rate and at insertion of eye health promotion and education into schools' curricula.

ACKNOWLEDGEMENTS

This study was financially supported by Save The Children Fund (UK) and the South Wollo Zonal Health Department. I would like to thank all the families of the study children in the study area and the community health agent W/ro Askale Teshome who made the study possible.

REFERENCES

1. Thylefors B, Dawson CR, Jones BR, *et al*. A simple system for the assessment of trachoma and its complications. *Bull Wld Health Org* 1987; 65:477-83.
2. Munoz B, West S. Trachoma: the forgotten cause of blindness. *Epidemiologic Review* 1997; 19(2): 205-217.
3. West SK, Munoz B, Turner VM, *et al*. The epidemiology of trachoma in central Tanzania. *Int J Epidemiol* 1991; 20:1088-92.
4. Courtright P, Sheppard J, Schachter J, *et al*. Trachoma and blindness in the Nile delta: current patterns and projections for the future in the rural Egyptian population. *Br J Ophthalmol* 1989; 73:82-7.
5. Bailey R, Osmond C, Mabey DC, *et al*. Analysis of the household distribution of trachoma in a Gambian village using a Monte Carlo simulation procedure. *Int J Epidemiol* 1989; 18:944-51.
6. Katz J, Zeger SL, Tielsch JM. Village and household clustering of xerophthalmia and trachoma. *Int J Epidemiol* 1988; 17:865-9.
7. Sahlu T, Larson C. The prevalence of environmental risk factors for moderate and severe trachoma in southern Ethiopia. *J Trop Med Hyg* 1992; 95:36-41.
8. Assaad FA, Maxwell-Lyons F, Sundaresan T. Use of local variation in trachoma endemicity in depicting interplay between socio-economic conditions and disease. *Bull Wld Health Org* 1969; 41:181-94.
9. Taylor HR, Velasco FM, Sommer A. The ecology of trachoma: an epidemiological study in southern Mexico. *Bull Wld Health Org* 1985; 63:559-67.
10. Congdon N, West S, Vitale S, *et al*. Exposure to children and risk of active trachoma in Tanzanian women. *Am J Epidemiol* 1993; 137:366-72.
11. Taylor CE, Gulati PV, Harinarian J. Eye infections in a Punjab village. *Am J Epidemiol* 1990; 132:946-52.
12. Taylor HR, West SK, Mmbaga BBO, *et al*. Hygiene factors and increase in risk of trachoma in central Tanzania. *Arch Ophthalmol* 1989; 107:1821-5.
13. West SK, Congdon N, Katala S, *et al*. Facial cleanliness and risk of trachoma in families. *Arch Ophthalmol* 1991; 109:855-7.
14. Brechner RJ, West S, Lynch M. Trachoma and flies: individual Vs environmental risk factors. *Arch Ophthalmol* 1992; 110:687-9.
15. West SK, Rapoza P, Munoz B, *et al*. Epidemiology of ocular chlamydial infection in a trachoma-hyperendemic area. *J Infect Dis* 1991;163:752-6
16. De Sole G. Impact of cattle on the prevalence and severity of trachoma. *Br J Ophthalmol* 1987; 71:873-6.
17. Cerulli L, Cedron C, Asefa C. Assessment of visual status in 7 regions of Ethiopia. Report to the Ethio-Italian Project. Office of the National Programme for Prevention of Blindness (NPPB). Addis Ababa. 1981.
18. World Health Organisation. The EPI coverage survey. WHO/EPI/MLM/91.10, 1991.

-
19. Ministry of Health (MOH). Epidemiology and AIDS Department; Guideline for prevention of blindness programmes in Ethiopia. Addis Ababa, 1996.
 20. Hans-Werner Kothe, Wolf-Deiter Sittner: Trachoma: Frequency and treatment in the Gondar region. *Ethiop Med J* 1987; 25: 55.
 21. West SK, Munoz B, Lynch M, *et al*. Impact of face-washing on trachoma in Kongwa, Tanzania. *Lancet* 1995; 342 (8943): 155-8.
 22. Lynch M, West S, Munoz B, Kayongoya A, Taylor H, Mmbaga B. Face washing for trachoma prevention: a participatory strategy to change hygiene behavior. *Trans Royal Soc Trop Med Hyg* 1994; 88: 513-17.