Original article

Prevalence of active trachoma among children between 1-9 years, in Woliso Town, Central Ethiopia

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Abstract

Background: Trachoma is the leading cause of preventable blindness worldwide. Communities with endemic trachoma usually live in unhygienic/unclean and dusty areas and are associated with poverty, poor sanitation, and low socioeconomic status. The objective of this study was to assess the prevalence of active trachoma among children between 1-9 years old in Woliso town, central Ethiopia.

Methods: Community-based cross-sectional study was conducted in Woliso town from December 1-30 2014. A random cluster- sampling technique was employed and all children 1-9 years old from selected households were clinically assessed for active trachoma based on the World Health Organization's simplified trachoma grading system. Data was collected using a structured questionnaire. The data was entered and analyzed using SPSS version 17 statistical package.

Results: From a total of 961 children screened for trachoma, overall prevalence of active trachoma was 196 (20.4%). Trachomatous inflammation follicular accounted for 176(18.3%) and Trachomatous inflammation intense cases were 20(2.1 %.). In multivariate analysis, age, unclean face, and not using soap for face washing were all found statistically associated with trachoma. On the other hand, access to water supply and presence of latrines were not statistically associated with active trachoma.

Conclusion: Active trachoma is a public health problem and is associated with a number of risk factors such as? in Woliso town. Therefore, we recommend mass antibiotic distribution, and health education on environmental and personal hygiene especially on face washing to every implementing partner. We also recommend further investigations into the behavior and life style of the public in such urban communities to understand why trachoma is still a public health problem despite having access to water and latrines. [*Ethiop. J. Health Dev.* 2018; 32(2):110-115]

Key Words: Active trachoma, Trachomatous inflammation, Children

Introduction

Trachoma is a bacterial infection caused by *chlamydia trachomatis* and it is one of the major causes of preventable blindness in the world (1). It is a chronic kerato-conjunctivits infection, which results in chronic follicular conjunctivitis, conjunctiva scarring which leads to entropion, trichiasis and ultimately blinding corneal opacification (2).

Globally, 40-80 million people are infected and between 1.3-8 million have permanent blindness due to trachoma (3). The national blindness and low vision survey conducted in 2006 has estimated trachoma as being the second major cause of blindness in Ethiopia (4).

More than 55 countries have been identified as endemic for trachoma worldwide most of which are in Africa and Asia (5). In many of these communities, women are three times more likely than men to be blinded by the disease, due to their roles as caretakers of children (3). The number of people living in trachoma endemic districts is estimated to have decreased from 317 million in 2010 to 241 million in 2012(4). Ghana, Mexico, Iran, Morocco and Oman report that the disease is nationally eliminated (6). Australia is the only developed country to still have endemic blinding trachoma (7).

Communities with endemic trachoma usually live in unhygienic and dusty areas and have been associated with poverty, poor sanitation, and low socioeconomic status (8,9). Factors such as poor water supply and availability, absence of latrines, presence of flies, disposing of animal dung close to households were identified as risk factors for transmission (10-15).

Active infection is mostly seen in young children with peak incidence around four to six years, while subsequent scarring is seen in adults (14).

In tropical countries, it is estimated that 25 million people are blind from preventable causes and of those trachoma is the most important, contributing to approximately 4% of global blindness (16).

In 1998 the World Health Organization (WHO) established an alliance for the Global Elimination of Blinding Trachoma by 2020 (GET 2020). This promotes trachoma control through SAFE strategy. **S**: Surgery for trichiasis, **A**: Antibiotic treatment with Azithromycin to treat infection, **F**: Facial cleanliness and **E**: Environmental improvement to interrupt transmission (17).

Global trachoma mapping project (GTMP) which was started in December 2012 for mass antibiotics distribution coverage, and other similar trachoma prevalence surveys have been conducted in rural communities in Ethiopia. However, such surveys have been excluding towns like Woliso under the assumption that trachoma is not a public health problem in such towns which have better access to safe

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water, latrines, health facilities and health education compared to rural areas (18).

Therefore, the objective of this study was to determine the prevalence of active trachoma among children between 1-9 years of age in Woliso town and identify the socio-demographic characteristics of families with children between 1-9 years of age with active trachoma.

Methods

A community based cross-sectional study was conducted among children between 1-9 years of age in Woliso town, central Ethiopia from December 1 to 30, 2014. Woliso town is the capital of South West Shewa Zone in Oromia region located 114 km from Addis Ababa. The total population of South West Shewa zone for 2010 was projected at 160,878. Among these, 11,682 of them are < 14 years of age. The town has mid altitude (2068 meter above sea level).

The study population was all children between the ages of 1-9 years who were residents of the surveyed households. The sample size was calculated according to a previous study from Oromia region where prevalence of trachoma for children 1-9 was estimated at 40.3% (4), margin of errors, design effect and non-response rate were estimated at 5%, 2% and 15% respectively, and 5% precision level considered as acceptable. Based on this calculation sample size of 776 was defined for this study.

Due to the fact that kebeles had variation in terms of access to water, sanitation facilities and latrines, two stage random cluster sampling technique was used for selecting the study units. In the first stage, 5 clusters (kebeles) were randomly selected from a total of 7 clusters (kebeles) in order to give equal chance for each cluster.

In the second stage, 192 samples were taken from each cluster. This number was reached by dividing the calculated sample size to the cluster size for convenience of data collection and additional respondents from calculations margin of error, design effects and non response. It is difficult to know the exact study population size in each cluster but the clusters are assumed to have more or less similar sizes. Before the start of the study, the purpose was explained to the town administration officials. A guide who knows the local language was selected from each cluster. A house-to-house visit was made to collect the data.

Consent from the head of the household or other adult member of the family (18 years and above) was obtained. After offering greetings, introducing team members and explaining the study purpose, interviewer administered questionnaire was used to assess individual and household risk factors. The questionnaire included data on demography (age, sex, occupation and educational status), and sanitary and environmental risk factors (presence of latrine and tap water in the household).

At each selected kebele, an imaginary line was drawn based on convenient reference bodies to divide the kebele into four quadrants. Then, a quadrant was selected by lottery method for data collection and one household was selected at random to be the first household to be surveyed. The households along that direction were then counted to the boundary of cluster until the desired number of sample is achieved. If the sample was less than the desired number, a second quadrant was selected by the same lottery method.

Household eligibility was determined by the presence of at least one child age 1-9 years in the household. Absentees were examined by returning to households the same or next day.

Both eyes of eligible children were examined for trichiasis (in-turned eyelashes) and screened for active trachoma through the inversion of the upper eyelids and inspection of the tarsal conjunctivae using 2.5× magnifying loupe under sunlight or using penlight torches. The face of the child was also inspected for presence of flies on the face and presence of eye and/or nasal discharge.

WHO simplified trachoma grading was used in this study (19). For children who had active trachoma, two tubes of 1% tetracycline eye ointments were given with proper instructions on how to apply twice a day and advised to continue for 6 weeks.

Data was cleaned, edited and analyzed using SPSS for Windows version 17. Frequencies in percentage tables were used in univariate analysis. Bivariate analysis using Chi Square was used. A P-value of ≤ 0.05 was considered statistically significant.

In this study, active trachoma is categorized as trachoma inflammation follicular (TF) or trachoma inflammation intense (TI). Trachoma inflammation follicular (TF) is defined as the presence of five or more follicles, each of which at least 0.5 mm in diameter, on the flat surface of the upper tarsal conjunctiva. Trachoma inflammation intense (TI) is characterized by the presence of marked inflammatory thickening of the upper tarsal conjunctiva that obscures more than half of the deep tarsal vessels and Trachoma Trichiasis (TT) refers to when at least one eyelash rubs on the eye ball or the presence of evidence for recent removal of in-turned eyelashes.

Ethical Considerations: Ethical clearance was obtained from the Research and Publication Committee of Ophthalmology Department of which university. Cooperation letter was obtained from town and kebele administrations. Verbal Consent from the head of the household or other adult member of the family (18 years and above) was obtained in the absence of household heads to collect household data and examine children eligible for the study. For those who had active trachoma, two tubes of Tetracycllin eye ointment 1% were provided and a health education was given to the parents or guardians.

Results

Socio- demographic characteristics: A total of 961 children aged 1-9 years from 745 households of 5 kebeles (clusters) were selected. The mean ± standard deviation (SD) age of children was 4.93± 2.35 years. Of all, 512 (53.3%) were boys and 419 (46.7%) were girls. Four hundred eighty seven (50.6%) children were preschool age whereas 474 (49.3%) were attending school. preschool age whereas 474 (49.3%) were attending school.

Among 745 household heads, 279 (37.4%) respondents were illiterate while 466 (62.5%) had attended primary school and above. The majority of household heads 310 (41.6%) were farmers and daily laborers (Table 1).

Table 1: **Socio-demographic characteristics of household heads in Woliso town, central Ethiopia, Dec, 2014.**

Characteristics	Number (N=745)	Percent
Educational status of head of the household		
Illiterate	279	37.4
Grade 1-6	163	21.8
Grade 6-12	256	34.3
12+	47	6.3
Occupation		
Daily laborer	310	41.6
Government employee	271	36.4
Farmer	7	0.9
Others	157	21.1
Total	**961**	**100**

Active trachoma among children of 1-9 years old: Overall, 196 children had active trachoma during the study period yielding a prevalence of 20.4%. Of these, 176 (18.3%) were TF cases while 20 (2.1%) were TI cases.

The proportion across the ages varies reaching peak of 47 (24.6%) at the age 2 years and slowly decrease as age increased and subsequently increase at 6 and 7 years (Table 2).

Prevalence among girls was 20.7% (n=103) while among boys it was 20.1 %(n=93) with p-value of 1.0.

The prevalence of active trachoma (TF/TI) among the age group 1-4 years and 5-9 years was also assessed, showing prevalence of 21.8% among those below 5 years of age (P≤ 0.001) (Table 3).

Factors associated with active trachoma

Children with unclean face were more likely to have active trachoma than those with clean faces (Table 4).

Table 2: **Prevalence of active trachoma in age 1-9 years by each year of age in Woliso town, central Ethiopia, Dec, 2014**

Age	Number	TF(N)	TI(N)	Percent
1	150	34	1	23.3
2	191	38	9	24.6
3	65	10	2	18.5
4	81	14	0	17.3
5	77	9	2	14.3
6	64	11	1	18.6
7	103	20	1	20.4
8	98	19	2	21.4
9	132	21	2	17.4
Total	**961**	**176**	**20**	**20.4**

Table 3: **Age group 1-4 years and 5-9 years with prevalence of active trachoma in Woliso town, central Ethiopia, Dec, 2014**

Age	TF/TI	Total	Percent	Odds ratio(95%CI)	p-value
1-4 yrs	106	487	21.8	1.235	≤ 0.001
5-9 yrs	90	474	18.1	1(0.894-1.678)	
Total	**196**	**961**	**20.4**		

Table 4: **Risk factors associated with active trachoma in Woliso town, Central Ethiopia, Dec, 2014**

Characteristics	Trachoma status		Odds ratio (95%CI)	P-value
	Total examined N (%)	Positive N (%)		
Facial cleanness of child Nasal discharge				
Yes	222 (23.1)	158 (71.17)	1	
No	739 (76.9)	379 (5.0)	2.845 (0.81-0.94)	≤0.001
Ocular discharge				
Yes	214 (22.3)	176 (82.2)	1	
No	747 (77.7)	20 (2.7)	3.593 (0.71-0.84	≤0.001
Flies on the face				
Yes	244 (25.4)	174 (71.3)	1	
No	717 (74.6)	22 (3.1)	2.363 (0.008-0.021)	0.01
Presence of latrine in the household				
Yes	860 (89.4)	181 (21.1)	1	
No	101 (10.5)	15 (14.8)	1.801 (0.499-1.390)	1.0
Usage of soap				
Yes	258	23 (8.9)	1	
No	507	172 (14.3)	2.35(0.166-0.416)	≤0.001
Source of water consumption				
Tap water in the compound	655 (68.2)	152 (23.2)	1	
Shared water point	306 (31.8)	43 (14.3)	1.4 (0.007-0.16)	0.4

In multivariate analysis, presence of nasal discharge, ocular discharge, flies on the face were found to have statistically significant association with active trachoma whereas access to water source and presence of latrine was not associated statistically. Moreover, children who do not use soap to wash their face were more likely to develop active trachoma than those who claimed to use soap to wash their face (Table 4).

Discussion

Active infection is mostly seen in children with peak incidence around four to six years, while subsequent scarring is seen in adults (14). Global Trachoma Mapping Project methodology has excluded towns which have municipality offices from the trachoma survey for mass antibiotic distribution coverage. This study was therefore conducted on the basis that understanding the prevalence of trachoma within a town is essential for the design of effective intervention program (SAFE) strategy.

This community based cross-sectional prevalence study in Woliso town, central Ethiopia, showed overall prevalence of 20.4% active trachoma. This result was almost in agreement with a study done in Malawi, which recorded a prevalence rate of 21.4% for children 1-9 years of age (20).

Higher prevalence rates, such as 51.1% in Dalocha District, central Ethiopia (cite), 45% in Jimma Zones, South Western Ethiopia (cite), and 88.3% in South Sudan (cite) were recorded in other studies. Even though the prevalence from this study is lower than the above figures reported, the findings still confirm that trachoma is a disease of public health interest in towns like Woliso.

In Woliso, all households reported having access to tap water either within their compounds or within 30 minutes walking distance outside their compounds. Therefore, access to water was not considered a serious problem. Despite the relatively good water supply, the ≥ 10% prevalence of active trachoma thus indicates the need for strong health education, especially on face washing which is known to have a strong impact on prevalence of trachoma (cite).

Prevalence of active trachoma is known to strongly vary with age(23,24), peaking in preschool children, age <5yrs ($p<0.05$) as shown in this study. This is consistent with the studies conducted in South Sudan and East Gojjam, Ethiopia (1,5).

In terms of gender, girls and boys tend to have similar prevalence of active trachoma (p-value=1.0). Similar finding was reported from Sudan and Mali (1,8). On the other hand, a study done in Nigeria (2) showed that girls had higher prevalence rates than boys. The reason could have been a higher sample of girls than boys or due to cultural factors where by girls stay more with their mother at home. This is due to close contact for a longer time of the day with small children who are likely to have active trachoma that increases transmission of infection by fomites and flies.

The study did not reveal statistically significant association between active trachoma and access to latrine in the household. The reverse was reported in the study done in Ankober, Ethiopia (25). The reason could be access to latrine does not necessarily mean the latrine is used frequently (26). Thus, measurement of latrine use rather than latrine access may be valuable marker of the effect of trachoma prevalence.

There was statistically significant association between active trachoma and unclean face. This finding was consistent with others studies (21,23,25). The presence of ocular and nasal discharge is a risk factor for the presence of flies on the face and active trachoma. Our finding is also consistent with the GTMP finding from Oromia (TF=23.4%) and South West Shewa (TF=31.2%)(27).

Limitations of the study

Positive result of active trachoma could not be confirmed by advanced laboratory tastes. Therefore, differential diagnosis may have lead to some overestimation of the result. Some of the answers were solely based on replies from respondents such as source of water supply, and socioeconomic status of the household, which may be uncertain. This study noted that measurement of latrine use rather could be valuable marker of the effect of trachoma prevalence instead of access to latrine.

Conclusions

The study found that the prevalence of active trachoma (TF/TI) among children between 1-9 years was 20.4 %, while specifically that of TF was 18.3% in Woliso town. Therefore, the study has confirmed that trachoma is a public health problem in Woliso as its active trachoma prevalence rate exceeds 10%. The distribution of risk factors of active trachoma showed statistical significant association with age, unclean face and flies on face while no statistically significant association with environmental factors such as water supply and presence of latrine in the household was recorded.

Recommendations

Many baseline trachoma surveys like GTMP excluded towns like Woliso and others because?. Therefore, considering the active trachoma prevalence recorded in Woliso, we recommend that similar surveys should not disregard small towns.

We also recommend mass antibiotic distribution in Woliso town and health education on behavioral change, environmental and personal hygiene especially on face washing. We also recommend further studies on behavior and life style of the public in such urban communities where trachoma is still a public health problem, despite having relatively good water supply and presence of latrines.

References

1. Jonathan DK, Jeremiah N, Gideon G, et al. The burden of trachoma in Ayod country of southern Sudan. PLOS Neglected Tropical Disease 2008; 2(9):?????
2. Caleb M, Barka DL, Hadi BY, Anthony WS. Prevalence of and Risk Factors for Trachoma in Kano State, Nigeria. PLOS Neglected Tropical Disease. July 6, 2012; doi. 10.1371.
3. Mattew JB, David CW. The Global Burden of Trachoma. PLOS Neglected Tropical Disease 2009; 3(10):e410.
4. Berhane Y, Worku A, Bejiga A, Adamu Y, et al. Prevalence of trachoma in Ethiopia. Journal of Health Development 2007;21(3):211-215.
5. Ketema K, Tiruneh M, Desalegn W, Dagnachew M. Active trachoma and associated risk factors among children in Baso Liben District of East Gojjam, Ethiopia. Biomed central public Health 2012;12:1105.
6. World Health Organization. Blinding trachoma; progress toward global elimination by 2020. WHO 2006.
7. Betty T, Jill EK, Hugh RT. Surveillance Report for Active Trachoma, 2006. Commun Dis Intell (CDI) 2007; 31:366-374.
8. Schemann JF, Sacko D, Malvy D, et al. Risk factor for trachoma in Mali. Int J Epidmiol 2002;31(1):194-201.
9. Zerihun N. Impact of trachoma among rural Ethiopian women. Ethiopia J Health Dev 1998;8:53-59.
10. Michael JM, Humphrey DM, Eliningaya JW. Association between water related factor and active trachoma in Hai district, Northern Tanzania. Biomed central public Health Nov 2012;1:10.
11. Brechner RJ, West S, Lynch M .Trachoma and flies. Individual vs environmental risk factors. Arch Ophthalmol 1992;110(5):687-689.
12. Courtright P, Shepard J, Lane S, et al. Latrine ownership as a protective factor in inflammatory trachoma in Egypt. Br J Ophthalmol 1991;75:322-325.
13. De Sole G. Impact of cattle on the prevalence and severity of trachoma. Br J Ophthalmol 1999;71:873-876.
14. Emerson PM, Lindsay SW, Walraven GE, et al. Effect of fly control and diarrhea. Lancet 1999;353(9):1401-1403.
15. Welt S, Lynch M, Turner V, et al. Water availability and trachoma. Bulletin of World Health organization 1989;67(1):71-75.
16. Resinkoffs, Pascolini D, Etyaale D, et al. Global data on visual impairment. Bulletin of World Health organization. 2004;82:844-851.
17. Sarah P, Simon B, Hannah K, et al. Mapping the global distribution of trachoma. Bulletin of World Health Organization 2005;83:913-919.
18. Solomon AW, Pavluck AL, Courtright P. The Global Trachoma Mapping Project: Methodology of a 34-Country Population-Based Study. Ophthalmic Epidemiology. 2015;22(3):214-25.
19. Matthew B., Solomon A. WHO simplified trachoma grading system. Community Eye Health Dec 2004;17(52):68.
20. Khumbo K, Isaac S, Mava M, et al. Scaling up of trachoma mapping in Salima District, Central Malawi. Health 2014;6 (1):57-63.
21. Bejiga A, Alemayhu W. Prevalence of trachoma and its determinants in Dalocha District, Central Ethiopia. Ophthalmic epidemiology, Jul 2001;8(2-3):119-125.
22. Zerihun N. Trachoma in Jimma Zone, South western Ethiopia. Tropical medicine and International health, Dec 1997;2(12):1115-21.
23. Mathiew H, Jean F, Schemann A, et al. Active trachoma among children in Mali: clustering & environmental risk factors. PLOS Neglected Tropical disease, 2010;4(1):583.
24. Abdou A, Nassirorou B, Kadri B, et al. Prevalence & risk factors for trachoma & ocular chlamydia trachomatis infection in Niger. Br J Ophthalmol 2007;91(1):13-17.

25. Ilya G, Larissa J, Bizu G, et al. Access to Water Source, Latrine Facilities & Other Risk Factor of Active Trachoma in Ankober, Ethiopia. PLOS ONE 2009;4 (8):e6702.
26. Simms VM, Makalo P, Bailey RL, Emerson PM. Sustainability and accessibility of latrine provision in the Gambia. Trans R Soc Trop Med Hygien 2005;99:631-637.
27. Berhanu Bero, Colin Macleod, Wondu Alemayehu, et al. Prevalence of and Risk Factors for Trachoma in Oromia Regional State of Ethiopia: Results of 79 Population-Based Prevalence Surveys Conducted with the Global Trachoma Mapping Project. Ophthalmic epidemiology, 2016;23(6) 392–405.