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Prevalence and associated risk factors of trachoma among women aged 15 to 49 years in North Western Ethiopia

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Abstact

A community-based cross-sectional survey to determine the prevalence and associated risk factors of trachoma among women aged 15 to 49 years was conducted in two districts of North Western Ethiopia between February and May 1999. A total of 830 women chosen randomly by stratified scheme and 919 children 1 - 7 years old who were living in the selected households were included in the study. Examination of the eye was performed on the women and children included in the study and the prevalence rates of trachoma were 41.7% and 71.3%, respectively. Trained health workers who were given a two-day intensive training were responsible for the examination of the eye. Active trachoma, i.e., Trachomatous Follicles(TF) and/or Trachomatous intense inflammation(TI) was present in 268(32.3%) of the women. The study also showed that 50(6%) of the cases require lid surgery for Trachomatous Trachiasis(TT) and 14 (1.7%) had corneal opacity(CO). The investigation carried out regarding the association of child caretaking and active trachoma among women revealed that caretakers were at a higher risk of acquiring the disease than noncaretakers and those women without children aged 1-7 years (Trend test, P<.001). Educational Status, frequency of face washing, availability of latrine facilities, age of women and family size were found to be highly associated with trachoma (P<.001).The development of community-based strategies which would increase the awareness of women of childbearing age about the prevention of trachoma and the introduction of mechanisms that interrupt household transmissions are recommended.

Introduction

Trachoma is a form of kerato conjunctivitis that is communicable and usually of chronic course. Its causative agent, chlamydia trachomatis, is spread by direct contact, dirt and flies. The distribution over the eye ranges from conjunctivitis (often follicular) to most disabling forms of trachiasis formation, corneal scarring, complete corneal opacity, and blindness (1).

The course of the disease may vary considerably. In some cases, the trachomatous processes may resolve with little or no visible trace; in other repeated infections, possibly associated with hypersensitive reaction, may retard spontaneous healing and lead to progression and scarring (2,3).

More than 90% of the global burden of blindness from trachoma is found in the developing countries and the vast majority of the problem is seen in the rural areas of these countries where poverty, overcrowding, and low health service coverage prevail(4).

Blindness, apart from the stigmas it brings on the individual, has a profound socio-economic

impact on the development of a given country. Rehabilitation and education of the blind constitute a significant economic burden particularly among many developing countries.
In Ethiopia, the prevalence of blindness has been estimated to be 1.5% (5). According to a survey done in collaboration with WHO in 1981, the leading cause of blindness in the country was trachoma (42%) followed by cataract (29%) (5,6,7).

Due to the natural course of blinding trachoma almost all trachoma associated blindness occurs in adults and adult women are at a higher risk of acquiring the disease than adult men (2,3). This is a usual phenomenon seen in the rural areas of Ethiopia where women carry large economic and family care responsibilities (8).

Therefore, to prevent blindness from trachoma, particularly among women who are highly exposed to the disease, much emphasis should be given on reaching and treating cases of trachoma and design control strategies in areas where it is prevalent. However, to do so, the need for adequate information on the magnitude and distribution of the disease and the associated risk factors (mainly child caretaking among women) in such areas is beyond doubt. Accordingly, the objectives of this study were:

1. To determine the prevalence of trachoma (all grades) among women aged 15 to 49 years in the study area.

2. To find out the prevalence of active trachoma among women aged 15 to 49 years in the study area.

3. To determine the association between child caretaking and active trachoma.

4. To compare the burden of trachoma between women(aged 15 to 49 years) living in rural areas and urban centers.

5. To find out the degree of association between a number of other covariates (e.g. habits of washing, availability of toilet, etc.) and trachoma.

Methods

A community-based cross-sectional study to determine the prevalence and associated risk factors of trachoma among women aged 15 to 49 years was conducted in two districts (Dembia and Dabat) of North Gondar administrative zone, North Western Ethiopia, between February and May 1999. Four of the 16 rural villages found within a distance of not more than two kms from the main road of the two districts (there is only one main road in each district)and the two urban centes of the respective districts (Kola Diba and Dabat Towns) were included in our study. Two rural villages were randomly selected from each district. Stratification was done by living area, urban centers (population 23046) and rural villages (population 24300) and a total of 830 women aged 15 to 49 were selected by simple random sampling technique using a table of random numbers. By taking account of the number of women aged 15 to 49 to be 20.9% of the total population of the study areas (9), 404 and 426 women were randomly selected by proportional allocation to size from the two urban centres and the four rural villages, respectively.

The assumptions made for the sample size calculation were: a 95% confidence level (two-sided), an expected proportion of 50% (women with trachoma) to get the maximum sample size and a 3.4% marginal error. Moreover, 919 children 1 - 7 years of age who were living in the selected households were also included in the study. After repeated visits, only 58 of the total eligible children were not found in their respective houses making a non-response rate of only 5.9%. There were no women who were absent during the study.

Three nurses, one health officer, one medical doctor and twelve senior medical students who were given a two-day intensive training were responsible for the examination of the eye and the collection of the relevant data. A special emphasis was given on how to correctly diagnose the study subjects. Soon after the completion of the training, each of the trainees was required to perform eye examination on 20 individuals and a minimum of 85% correct diagnosis was required from each of them. The individuals to be examined (which consisted of all grades of trachoma) were selected by the ophthalmologist of the Gondar College of Medical Sciences (GCMS) who served as a "Gold Standard". Following this procedure, it was found out that each examiner correctly diagnosed above 90% of the individuals who were arranged by the ophthalmologist for that purpose.

Numbering of the houses in the study areas was carried out by the data collectors and three other enumerators. Every woman included in the study was examined and interviewed using a questionnaire which was pre-tested on a similar nearby area. Some of the variables included in the questionnaire were: age, family size, number of children 1-7 years old, child caretaking, type of fire fuel commonly used, water consumption, frequency of washing face, and availability of toilet facilities.

The examination of the eye was conducted outdoors during day light. The women or children (relatively older ones) to be examined sat face to face with the examiner keeping head and looking down to facilitate easy evertion of the eye lid. In very young children examination was done by keeping (holding) the children in between the legs of the examiner. Both eyes were examined in the same way using a magnification convergent binocular loups adjustable to pupillary distance of the observer.

Once the individuals with trachoma were identified, the WHO simplified method of clinical signs was used to determine and classify the grades of trachoma (10).

During the time of data collection, apart from the strict supervision, a reliability study was also conducted on both women and children. In this study it was decided to get a minimum of 85% accuracy by cross-checking the examined individuals. Accordingly, 83(10%) women and 46(5%) children were randomly selected and re-examination of the eye was done by the ophthalmologist of the GCMS. There were only 7(5.4%) individuals who were misdiagnosed. There were no positive diagnoses who were misdiagnosed as negative or vice versa. All wrong diagnoses were misdiagnoses within the active form of trachoma. It was also noted that there were no diagnoses of chronic trachoma which were incorrectly diagnosed as active trachoma or

vice versa. The examiners also knew that what they examined would be cross-checked by the ophthalmologist of the GCMS who was one of the investigators of the research project.

Each woman included in the study was told about the objective of the survey. Identified active trachoma cases were treated with tetracycline eye ointment free of charge and that in turn facilitated data collection. Patients identified with trachiasis were referred to the nearby health institution where trachiasis surgery is available.

Data were entered into the computer using EPI-INFO version 6 software programme. Cleaning and analysis of data were also carried out using this statistical software package. Statistical tests like, chi-square test, chi-square for trend test, Z-test, etc. were used as appropriate. P-values less than or equal to .05 were considered significant.

Results

A total of 830 households were included in the survey and examination of the eye was performed on 830 women aged 15 to 49 years (one woman from each household) and 919 (94.1%) children aged 1 - 7 years residing in the selected houses. There were 446 (48.5%) male and 473(51.5%) female children. The majority of the women (93.7%) were Orthodox Christians. The mean family size of the households was found to be 5.2 (median 5). Of the total women examined, 526(63.6%) were housewives and 511(61.6%) could not read and write. The age group of 25-29 years was noted to have the largest proportion (19.9%) of the women. The socio-demographic characteristics of the study subjects are given in Table 1.

Among the total women examined, 346 (41.7%) had trachoma (all stages). When these cases of trachoma were investigated according to age there was generally an increasing pattern of the disease as we go to the higher age groups and a statistically significant association was observed (trend test, $P < .001$). A marked tendency was also observed for trachoma to increase positively with increasing family size in general and increasing number of children of 1 - 7 years old in particular (table 2). In this study a significant difference was observed between the prevalence rates of the rural communities (48.8%, or 208 out of 426) and the urban centres (34.2%, or 138 out of 404), Z-test, $P<.01$.

An attempt was also made to see whether there had been a difference in the prevalence of trachoma between the Dega (altitude over 2500m above sea level) and Kola (below 2000m above sea level) areas of Dabat and Dembia, respectively. However, there was no significant difference between the prevalence rates of the Dega areas of Dabat (41.4%, or 172 out of 415) and the Kola areas of Dembia (41.9%, or 174 out of 415), $P=.9$.

The association of a number of other variables with the presence of trachoma of all grades was also investigated. Accordingly, as shown in Table 2, variables like educational status, availability of latrine, amount of water consumed and face washing habits were found to be significantly associated with trachoma (P-values were <.001 for each factor).

During the survey it was found out that only 120 (14.5%) of the households had latrine facilities and 115 (96%) of these were pit latrines. The water sources of 57% of the households were from pipeline systems, protected spring, and well water while the remaining 43% of the households obtained water from river and other unprotected sources. As far as water

consumption was concerned, 25.8% of the households consumed <20 litres of water per day, 41.3% of the households consumed 20-40 litres/day while the remaining 32.9% of the households were able to use above 40 litres of water per day for all water consuming activities. The mean water consumption of each household was noted to be 42 litres/day. Accordingly, the daily mean water consumption per head was about 8 litres. It was also observed that virtually all the women/households (99.9%) included in this study used fire wood and/or dried animal dung (mainly "Kubet" or cow dung) as their most important fire fuel.

Active trachoma (TF and/or TI) was present in 268 (32.3%) of the women. It was also observed from this study that 50 (6%) of the cases require lid surgery for trachiasis and 14 (1.7%) were observed to have had corneal opacity (Table 3). The number of children with active trachoma (TF and/or TI) was found to be 655(71.3%). When the effect of sex on trachoma was investigated, there was no significant difference between the prevalence rates of male (72.9%) and female (69.8%) children (Z-test, P=.3).Almost all infected children showed signs of active trachoma. There were only two children (.2%) who developed signs of Trachomatous Scarring (TS).

As indicated in Table 4, the investigation carried out regarding the association of child caretaking and active trachoma among women revealed that caretakers were at a higher risk of acquiring the disease than noncaretakers and those women without children of the same age group. A higher burden of the disease was also observed as the size of children aged 1 - 7 years of the household increased from zero to four (trend test, p <.001).

Among those who lived in households with young children, the prevalence of active trachoma in women increased with the total number of young children cared for in general and with the number of infected children cared for in particular (trend test, P <.001).

Discussion

The prevalence rates of trachoma in general and active trachoma in particular among women 15 to 49 years of age in the study areas were found to be 41.7% and 32.3%, respectively. This indicates that trachoma affects a large segment of the women population in those communities where poor personal hygiene and poor environmental sanitation are much more prevalent. These findings were very much compatible with the findings of earlier studies carried out elsewhere in the country (5,7,11,12).It is highly probable that the continued exposure of these women to smoke which resulted from the use of dried animal dung and fire wood as fire fuel might have contributed a lot in increasing the risk of trachoma.

In this study, an increasing trend of trachoma was observed as we go to the higher age groups (i.e., from 15 to 49), trend test, P<.001. This could be due to the large number of children and the higher family size associated with the older women. As can be seen from Tables 4 and 5, as the family size or the number of children aged 1 - 7 years increase, the prevalence of trachoma also increases. The comparison made between the prevalence rates of trachoma of male and female children aged 1 to 7 years showed a non-significant difference (P=.3). This could probably be due to the fact that males and females of the indicated age group were more or less equally exposed to the risk factors of trachoma (3). As might be expected, almost all children who had trachoma were active cases. This is generally true for the mere reason that it takes

quite a long time to develop the chronic form of the disease and hence small kids included in our study are not expected to develop higher forms of trachoma.

The level of education was also one of the most important variables that showed a significant association with the prevalence of trachoma. As indicated in Table 2, as the level of education increased, the risk of acquiring the disease decreased. This protective effect of education obtained in this study is in agreement with previous studies (7).

The proportions of households with latrine facilities and those obtaining water from protected sources were 14.5% (120 out of 830) and 57% (473 out of 830), respectively. These proportions were largely dominated by the figures obtained from the two towns (Dabat and Kola Diba). The actual proportions of the households which had latrine facilities and which got water from protected sources in the rural villages were 3.3% (14 out of 426) and 24.2% (103 out of 426) respectively. Moreover, the daily mean consumption of water per head in the study areas was about eight litres which was very much less than the amount recommended by WHO. According to the recommendation of WHO, a minimum of 20 litres per person per day is required (13). The shortage of adequate and safe water coupled with the continued exposure of the women to smoke could have aggravated the problem in the rural settings. It could probably be due to the above and other (like poor educational status) reasons that the prevalence of trachoma was significantly higher among the women of the rural communities (48.8%) than the women of the urban centres (34.2%), $P<.001$.

A lot of studies done elsewhere have shown that the prevalence of trachoma is lower in individuals with the habit of face washing than those who did not have such practices (4,7,14,15). A similar finding was observed in this study. Those women who had the habit of washing their faces more frequently were observed to be at a lower risk of acquiring the disease than those women who did not have such practices. Furthermore, a relatively high amount of water consumption and the use of soap were observed to have a protective effect against this wide-spread disease and this is generally acceptable (Table 2).

Although there is a general assumption for trachoma to be higher in the Kola areas than in the Dega areas, this was not supported by the findings of our study. In this study, no significant difference was observed between the prevalence rates of the Dega and Kola areas of Dabat and Dembia, respectively ($P =.9$). This could probably be due to the fact that the standard of living of the women of the two geographical areas is similar.

The prevalence of active trachoma was found to be highest in women who were caretakers of children aged 1 - 7 years followed by noncaretakers (who lived with children of the same age group but without taking care of the young children) and women without such children. This could be attributed to the frequent close contact that the caretakers had with the children who are generally believed to be the reservoir of the disease (2,3,8). This fact was further investigated by distributing the women according to the number of children they cared for and the number of infected children they had in the household. It was learned from this analysis that as the number of children cared for or the number of infected children in the household increased, the burden of trachoma among the respective women also increased.

The occurrence of 6% trachiasis and 1.7% corneal opacity in women 15 to 49 years old indicate the extent of potentially blinding and blinding trachoma, respectively. This situation of chronic trachoma coupled with a high prevalence of active trachoma among women (32.3) and children (71.3%) is a good indicator of the seriousness of the disease in the future. The findings obtained in this study are above the key prevalences for operational decisions. As recommended by WHO, the key prevalences for operational decisions are: TF>20% in children; TT>1% in women over 15 years of age, etc. (10). The problem of the disease among all population units in general and among women and children in particular is expected to be even more serious as we go further to the more remote and non-accessible rural areas where the standard of living is very poor (16).

Despite its shortcomings on the selection of the required sample from only two urban centres and four rural villages which were very close to the main road and problems associated with the involvement of quite a considerable number of examiners which resulted in a 5.4% error of misdiagnosis, this study has provided an insight into the problems of trachoma and related risk factors among women aged 15 to 49. It is with an appreciation of these limitations that the results of this study should be interpreted. Accordingly, we recommend the following:

1. The concerned bodies (the Ministry of Health and others working in this area) should give a special emphasis and develop better mechanisms which would facilitate the reduction of the burden of this disease. In this regard, community health agents, community-based distributors, trained traditional birth attendants and other similar groups of people residing within the communities could be given an appropriate additional training about the prevention of trachoma so that they could increase the awareness of the population through continued and related health education (e.g., about hand and face washing, etc.) in those communities. That is, integration of eye care activities with the other health services at the health post and health center levels should be given due emphasis and active trachoma cases should be treated before further complications develop.

2. The development of strategies that interrupt household transmission (e.g., child-mother contact, particularly, after washing or touching the child's face or vice versa) may be considered.

3. The health centers responsible for the health of the given communities should be able to perform surgical correction of lid deformities. This could be achieved by contacting the GCMS or other similar institutions in the area.

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Tables

Table 1: **Socio-demographic characteristics of the women (15 to 49 years of age), Dabat and Dembia Districts, North Western Ethiopia, Feb. - May 1999.**

Characteristics	Frequency n=830	Percent

Age group (in years)		
15-19	98	11.8
20-24	144	17.3
25-29	165	19.9
30-34	137	16.5
35-39	120	14.5
40-44	95	11.4
45-49	71	8.6
Geographical area		
Dega area (Dabat)	415	50.0
Kola area (Dembia)	415	50.0
Place of living		
Town		
Rural vilages	404	48.5
Educational Status	426	51.3
Can't read and write		
Can read and write	511	61.6
Grade 1-6	83	10.0
Grade 7-8	75	9.0
Grade 9-12	37	4.5
Higher	88	10.6
Family size	36	4.3
1-2		

3-4		
5-6	80	9.6
7-8	272	32.8
9-10	262	31.6
11-12	145	17.5
	64	7.7
	7	0.8
No. of Children In the household (1 - 7 years old)		
0	259	31.2
1	301	36.3
2	203	24.5
3	56	6.7
4	11	1.3

Table 2: **Influence of some demographic and socio-economic characteristics on trachoma, Dabat and Dembia Districts, North Western Ethipia**

Characteristics (factors)	Trachoma		Odds Ratio (OR)	P-value
	Present	Absent		
Age group				Tend test,
15-19	26	72	1.00	<.001
20-24	57	87	1.81	
25-29	57	108	1.46	
30-34	66	71	2.57	
35-39	44	76	1.60	
40-44	57	38	4.15	
45-49	39	32	3.37	
Ecucational status				
Can not read and write	247	264	1.00	Trend test,
Can read and write	37	46	0.86	<.001
Grade 1-6	26	49	0.57	
Grade 7-8	8	29	0.29	
Grade 9-12	22	66	0.36	
Higher	6	30	0.21	
Latrine facilities				
Yes				

No	35	85	0.53	<.001
Family size	311	399		
1-2				
3-4				
5-6	22	58	1.00	Trend test,
7+	111	161	1.82	=0.22
Water consumption/head/day (in litres)*	117	145	2.13	
<5	96	120	2.11	
5-9				
10-14	62	44	1.00	Trend test,
15+	170	202	0.60	<.001
Frequency of face washing/day	95	167	0.40	
1	19	71	0.19	
2				
3+				
	265	124	1.00	Trend test,
	77	261	0.14	<.001
	4	99	0.02	

* = approximate values

Table 3: **Distribution of women (examination results) by grades of trachoma and child caretaking, Dabat and Dembia Districts, North Western Ethiopia, Feb. - May 1999.**

Grades (signs) of trachoma	Child caretakers n=543		Non caretakers n=28		Women with out children n=259		Total n=830	
	No.	%	No.	%	No.	%	No.	%
TF/TI	203	37.4	74009	25.0	58	22.4	265	32.3
TS	102	18.8		14.3	24	9.3	130	15.7
TT	42	7.7		0	8	3.1	50	6.0
CO	9	1.7		0	5	1.9	14	1.7
Trachoma (all grades)	262	48.3		32.1	75	29.0	346	41.7

N.B. There were 116 mixed grades (i.e, women who developed two or more signs of trachoma).

Table 4: **Impact of child caretaking, number of children 1-7 years old in the household, etc. on active trachoma among women aged 15 to 49 years, North Western Ethiopia, Feb. - May 1999.**

Characteristics (factors)	Active trachoma		Odds Ratio (OR)	P-value
	Present	Absent		
Child caretaking				
Women without children	58	201	1.00	Trend test,
Nonecaretakers	7	21	1.16	<.oo1
Caretakers	203	340	2.07	
Number of children (1-7 years old) in the family				

0	58	201	1.00	Trend test, <.001
1	92	209	1.53	
2	87	116	2.60	
3	25	31	2.79	
4	6	5	4.16	
Number of children for (for women with children)				
0	7	21	1.00	Trend test, <.001
1	88	205	1.29	
2	84	110	2.29	
3+	31	25	3.72	
Number of chldren infected (among caretakers)				
-	8	134	1.00	Trend test, <.001
1-2	174	191	15.26	
3-4	21	15	23.43	
Number of chldren infected (among noncaretakers)				
0				
1	1	9	1.00	
2	5	8	5.63	
	1	4	2.25	

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