Original Article

A clinico-epidemiological study of trachoma in urban and rural population of Sagar District Madhya Pradesh, India

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ABSTRACT

Background and Objectives: Trachoma is the most common cause of infectious blindness worldwide and despite various control programs, it persists, leads to significant ocular morbidity. In this article, we aim to determine the burden of trachoma and its related risk factors amongst the urban and rural populations of Sagar, Madhya Pradesh. **Materials and Methods:** Rapid assessment for trachoma was conducted in urban and rural Community Health Center (CHC) of Bundelkhand Medical College, Sagar according to standard World Health Organization guidelines. An average of 60 children in rural CHC and 50 children in urban CHC aged 1–10 years was assessed clinically for signs of active trachoma with status of hygiene. Additionally, all adults above 15 years of age in these centers community were examined for evidence of trachomatous trichiasis (TT) and corneal opacity. Environmental risk factors contributing to trachoma like limited access to potable water and functional latrine, presence of animal pen, hand wash and garbage within the urban and rural CHCs populations. **Results:** Overall, 18 of 110 children (16.36%; confidence interval [CI]: 9.5–23.2) had evidence of follicular stage of trachoma and 12 children (10.91%; CI: 5.2–16.6) had evidence of intense trachomatous inflammation intense and scarring stages trachomatous scarring of trachoma. Nearly 19 (17.27%; CI: 10.3–24.2) children were noted to have unclean faces and 17 (15.45%; CI: 8.8–22.1) children were found with unclean hands in both the centers. TTs & TO was noted in 19 adults (1.05%; CI: 0.8–1.2). The environmental sanitation was not found to be satisfactory in the study centers mainly due to the co-habitance of people with domestic animals like pigs, hens, goats, dogs, etc., in most (66.67%) of the person households. **Conclusion:** Active trachoma and trachomatous trichiasis were observed actively in both urban and rural populations wherein trachoma surveillance and control measures are needed.

Key words: Prevalence, risk factors, trachoma active, underserved area

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INTRODUCTION

Trachoma, the leading cause of infectious blindness was globally.[1] Currently, it affects more than 150 million people, with 10 million people developing trichiasis and approximately 1.3 million are blind from trachoma and it causes about 1.3 million disability-adjusted life years from the sequel of the disease across the globe,[2] usually affects the most socioeconomically disadvantaged regions of the world. It is apparent that regional factors like personal hygiene, social customs, environmental sanitation and climatic variations are all as important if not more, in determining the clinical picture of trachoma in a particular area. According to recent estimates, trachoma is endemic in 57 countries of the world and India is one of the five countries accounting for nearly half of the global burden of active trachoma.[3]

Trachoma related blindness was a major public health problem in India during 1959–1963 with active trachoma rates ranging from 56% to 79% in children under 10 years of age in four states of the country.[4] Thereafter by the Government of India with the help of World Health Organization (WHO) were started public health interventions and trachoma control measures along with mass antibiotic treatment.[5] In 2006 a national survey on trachoma was conducted in the previously endemic states, it was reported that 5.8% of children aged 1–9 years demonstrated clinical signs of active trachoma, while the magnitude of trichiasis was very low (0.15%).[6,7] Hence, it was inferred that trachoma has ceased to be a public health problem in India.

India is committed to eliminate trachoma-related blindness by 2020 as partner to the alliance for the global elimination of trachoma launched by the WHO.[8] To active elimination of trachoma from all parts of India with a population of nearly 1.21 billion,[9] remote, marginalized and underserved populations in the country where trachoma is likely to be endemic need to be surveyed. A preliminary visit was conducted to confirm whether the reported cases at urban and rural Community Health Centers (CHCs) of corneal opacification and blindness could be attributable to trachoma. After confirmation, it was then planned to conduct the present trachoma prevalence survey in the Sagar district of Madhya Pradesh, India to provide evidence whether trachoma has really been eliminated from the district or not interventions in.

MATERIALS AND METHODS

Ethical statement

The study protocol received ethical approval and clearance from the ethical committee of Bundelkhand Medical College, Sagar before study. The study was explained to the medical officer I/C of urban and rural CHCs and each adult participant. The examination protocol was explained to each adult also in their local language. Verbal consent for enrollment and examination was obtained from all adults for their own participation. Consent was documented on the forms by the epidemiologist/field investigator of the respective study team.

Verbal consent was obtained from parents or appropriate guardians of eligible children before they were included in the study in accordance with the principles of the declaration. The study involved basic ocular examination according to standard of care and to invasive procedures were performed on any of the participants during the study. Individuals for whom informed consent was not given by their parents were not included in the study.

Assessment of cases

To confirm reliability of clinical grading of trachoma cases, agreement analysis was done between the two junior residents of ophthalmology involved in the current study. The cases for assessing the agreement were identified from the ophthalmic outpatient department of the Bundelkhand Medical College, Sagar. The two ophthalmology junior residents were also assessed for their agreement with the standard WHO slides in the final grading examination. A kappa score of 0.75 ($P = 0.001$) or more for grading of active trachoma was acceptable between the two graders. Standardization of all field practice procedures, including trachoma grading, form filling, hygienic status grading, and data entry was ensured at all stages.

Methodology

The WHO standard methodology for TRA was followed for the present trachoma study conducted in February-March 2015. This methodology involves purposive sampling of deliberately choosing those children and adults where trachoma is likely to be present.[10] In each urban and rural CHC, 50 and 60 children respectively of <10 years of age were examined for signs of active trachoma through house-to-house visits by the study team.

All participants were examined for signs of trachoma. The findings were graded according to the standard WHO simplified grading system.[10] "Active trachoma" was defined as trachomatous follicular inflammation (TF) and/or trachomatous inflammation intense (TI) in either eye. "Scarring trachoma" included trachomatous scarring, trachomatous trichiasis (TT) and/or corneal opacity (CO) in either eye. TT was defined as at least one eyelash rubbing the eyeball or evidence of recent removal of in-turned eyelashes. Observation of hygiene was done in all the children examined for active trachoma; wherein unclean and unhygienic faces, unwashed hands were defined as either presence of discharge from the eyes/nose, crusting of discharge around the eye and nose, or presence of flies around eye/nose and don't wash hand after defecation.

Data management and statistical analysis

Information on the questionnaires was entered into a Microsoft office excel version 2007 database. Frequency distribution of study participants were explored with 95% confidence interval (CI) and Chi-square tests and univariate analysis (odds ratio) were used to determine association between occurrence of disease and associated risk factors. Cross tabulations were used to describe the frequency distribution of characteristic among the sample population. Potential risk factors were categorized into sanitary (e.g., facial hygiene, presence of fly-eye and unclean hand), demographic (e.g., gender, age) and environmental factors (e.g., accessibility to water and functional latrine, presence of animal pens) and analyzed accordingly. Any $P < 0.05$ was considered statistically significant.

RESULTS

A total of 110 children in the sagar district were examined for clinical signs of active infection due to trachoma. In accordance to TRA guidelines, the number of preschool children included in the study (aged 1–4 years) was 53 nearly equal to those examined in the age group of 5–9 years (1:1.07). The total number of adults examined for evidence of trichiasis and CO attributable to trachoma was 280. 158 females contributed to nearly 56.4% of the adult population included in the study.

The majority of the active disease 85% (>50% in below 10 years age group and up to 35% in 15–30 years) was seen in young, <30 years age group. In childhood, male children were more affected than female while in adulthood more females were affected than male.

Active trachoma in Sagar district

Thirty children (27.27%; CI: 19.07–35.47) demonstrated signs of active trachoma infection with the proportion of infected children ranging from 24.0% to 30.0% in urban area to rural area. Among them, follicular stage of trachoma (TF) was noted in 27 children (90.0%) while 03 children (10%) demonstrated inflammatory changes (TI) due to active trachoma infection. Unclean faces were seen in 19 children (17.27%; CI: 10.3–24.2) of Sagar district with not much variation (18.3–14.0%) amongst the rural and urban CHC [Table 1].

Distribution of patients according to World Health Organization classification

Table 2 shows the distribution of trachoma cases according to WHO Clinical manifestation. TF and trchomatous inflammation (TI) was the most commonly reported in children of the age of 1–9 years old followed with TT with or without CO in adults and in univariate analysis, the distributions were found to be significant statistically ($P < 0.05$).

Trichiasis load in Sagar district

Population in both urban and rural CHCs demonstrated evidence of TT. 21 cases of trichiasis were detected by house-to-house visits for clinical examination in a population cluster of 1800 in urban and rural CHCs, amounting to a trichiasis load of 1.16% (CI: 3.8–6.1). CO was present in 33.33% of cases with TT [Table 3]. The proportion of cases with severe entropion amounted to 15% of TT cases. No patients with TT demonstrated features of recurrent entropion due to trachoma.

Environmental assessment

In Sagar districts, 98.2% of residents had access to potable

Table 1: Distribution of children with signs of active trachoma infection and its related risk factors in Sagar district

CHC	Survey cluster population	Children examined	Children with TF/TI *n* (%; CI)	Children with TT/ CO (%)	Unclean faces *n* (%; CI)	Unclean hand *n* (%; CI)	Number. of households assessed	Presence of solid waste or animal pens *n* (%; CI)	Absence of functional latrine *n* (%; CI)
Urban CHC (Chameli chowk)	870	50	12 (24.0; 2.1-35.9)	0 (0.0)	8 (16.0; 5.7-26.2)	7 (14.0; 4.3-23.7)	30	17 (56.67; 38.1-75.2)	5 (16.67; 2.7-30.6)
Rural CHC (Banda)	930	60	18 (30.0; 18.4-41.56)	2 (1.8)	11 (18.33; 8.5-28.1)	10 (16.67; 7.3-26.1)	30	23 (76.67; 60.8-92.5)	9 (30.0; 12.8-47.1)
Total	1800	110	30 (27.27; 19.1-35.4)	2 (1.8)	19 (17.27; 10.3-24.2)	17 (15.45; 8.8-22.1)	60	40 (66.67; 54.6-78.7)	14 (23.33; 12.5-34.1)

TT: Trachomatous trichiasis, TF: Trachoma Follicular, TI: Inflammatory stage of trachoma, CO: Corneal opacity, CHC: Community Health Center, CI: Confidence interval

Table 2: Distribution of trachoma cases according to World Health Organization clinical manifestation

Clinical manifestations	Children 1-9 years (*n*=32) (*n*=110) *n* (%; 95% CI)	Adults >15 years (*n*=26) (*n*=280) *n* (%; 95% CI)	OR (95% CI)	*P*
TF	18 (56.2; 40.8-71.6)	1 (3.84; 3.7-11.4)	0.03 (0.0-0.2)	0.002**
TI	10 (31.2; 16.9-45.6)	2 (7.7; 2.8-18.2)	0.18 (0.3-0.9)	0.028*
TS	2 (6.2; 1.27-13.8)	4 (15.4; 1.2-29.6)	2.72 (0.4-16.2)	0.260#
TT	1 (3.1; –2.3-8.5)	13 (50.0; 30.3-69.6)	31.0 (3.6-262.0)	0.0003**
CO	1 (3.1; –2.3-8.5)	6 (23.1; 6.5-39.7)	9.30 (1.04-83.1)	0.021*

*Significant, **Highly significant, #Not significant. TF: Trachomatous follicular, TI: Trachomatous inflammation/intense, TS: Trachomatous scarring, TT: Trachomatous trichiasis, CO: Corneal opacity, OR: Odds ratio, CI: Confidence interval

Table 3: Comparative data on magnitude of active trachoma and trachomatous trichiasis in children and adult

CHC	Cluster population survey	Number of TT cases	Number of TT with CO (%)	Magnitude of TT (%; CI 95%)	Number of children examined	Number of children with TF/TI	Proportion of children with signs of active trachoma (%)	Burden of active trachoma in the community*
Urban	870	8	2 (25)	0.92; −7.6-9.5	50	12	24.0	13.79
Rural	930	13	5 (38.5)	1.39; 5.9-8.7	60	18	30.0	19.35
Total	1800	21	7 (33.3)	1.16; 3.8-6.1	110	30	27.27	16.66

*Per thousand. TT: Trachomatous trichiasis, TF: Trachoma follicular, TI: Trachomatous inflammation/intense, CO=Corneal opacity, CI: Confidence interval, CHC: Community Health Center

water within 15 min of walking distance from their households. Functional latrines were available in most of the households (83.33% in urban and 70.0% in rural respectively), in contrast, the environmental sanitation was not found to be satisfactory mainly due to the co-habitance of people with animals like pigs, hens, goats, dogs etc., in Sagar. The majority of the households in Sagar (56.67% in urban and 76.67% in rural) had an animal pen within the households was significantly associated ($P = 0.001$) with occurrence of TF in children aged 1–9 years. There is an absence of proper water drainage system in both urban and rural area surveyed. It was noted that there is no proper garbage disposal facility available anywhere in the urban and rural area.

Access to facilities

Urban as well as rural CHC does not have access to a trichiasis treatment facility. The patient needs to approach Ophthalmology Department of Bundelkhand Medical College or some other private ophthalmologist in the Sagar city, for availing surgical services. The access to primary health center and village health subcenter was better. All the areas of urban and rural CHC had access to a subcenter and basic health services were being provided by Auxiliary Nurse Midwife (ANM) at these subcenters. Accredited Social Health Activists (ASHA) workers have been appointed under National Rural Health Mission, Government of India in all the villages. Primary schools and markets were within walking distance.

DISCUSSION

The trachoma survey at Sagar district was the first population-based survey on trachoma in this underserved area. Consequently, there is limited data on the distribution of trachoma in such regions of the Madhya Pradesh. The present survey was conducted in accordance with the WHO guidelines for TRA and demonstrated a very moderate active trachoma infection rate (TF/TI) of 27.27% among children in 1–9 years age group and nearly 1% of the population afflicted with TT. A possible limitation of the present study was nonavailability of microbiological investigations and their results to correlate with the clinical findings of active trachoma in these children. SAFE strategy[11] measures like surgical facilities for patients with TT, mass azithromycin treatment, health education for facial cleanliness and hand washing and measures to improve water and sanitation should be undertaken to eliminate blinding trachoma in this underserved area.

Co-habitance of Sagar district people with animals like pigs, hens, goats, dogs, cats etc., could be a contributory risk factor for high occurrence of trachoma in this population. Pets were observed in close vicinity of most of the households. Insufficient environmental sanitation, particularly for sewage and garbage disposal at the community level and keeping cattle and animals next to human dwellings make fly breeding possible close to households, thus facilitating transmission of trachoma infection. As exemplified in published literature, personal and environmental hygiene are vital determinants for occurrence and spread of trachoma.[12] Accumulated animal excreta and animal manure are an important source of fly breeding.[12] Although human feces may be the larval medium for the housefly, young *Musca sorbens* have been reported emerging from pig, dog, milk-fed calf and cattle feces in addition to that of humans. Removal of human feces from the environment, through improved sanitation facilities is likely to reduce trachoma transmission, but if feces of other animals are present, *M. sorbens* will persists.[13] Many studies have shown that the presence of animals and animals dung within the households is an independent risk factor for occurrence of active trachoma.[14]

It was noted that the living standards and socioenvironmental factors were similar in the surveyed clusters and within the clusters with not much variation in Sagar district. The effectiveness of environmental sanitary measures on the prevalence of active trachoma in endemic areas has been studied extensively.[13] Improvements of personal and community hygiene has great potential for a sustainable reduction in trachoma transmission.[14] Environmental improvements include increasing access to water, use of latrines and other fly control interventions, moving animals away from the households environment; education, both general and specific for trachoma; and improved local economy leading to better living conditions.[15] Environmental factors such as climate and altitude have also been linked to trachoma. Warm and dry climate zones have reported higher trachoma prevalence rates[16,17] while at high altitude, prevalence of trachoma is lower.[18] In addition, common risk factors for active trachoma reported by trachoma surveys conducted globally include dirty face,[19] nasal and ocular discharge and unhygienic hands[20] flies on the face and overcrowding.[21]

The results of the two national trachoma surveys in India conducted in 2006–2007 and 2010 have been evident that the magnitude of active trachoma and TT has markedly decreased to a level that it is no more a public health problem in the country,[7,11] so the success of various health programmes cannot be denied, but the trachoma persisted. Community studies were conducted to find out the true prevalence of chlamydia trachomatis infection using laboratory support in the known hyperendemic belt of Northern India by the trachoma study group in 1998 (Uttar Pradesh)[22] and later in 2007–2008 (Haryana).[23] Sharma *et al*. from RP Center, AIIMS did a 12 years study (1997–2008) in rural northern India and has shown the prevalence of trachoma to be persisting in Northern India, albeit at a lower level[24] Sagar trachoma study has shown that trachoma is still prevalent in the underserved part of India causing significant visual morbidity.

CONCLUSION

Although trachoma may be in the elimination phase in major part of India, it may be present in remote, inaccessible and focal pockets where the need to reach out and implement SAFE strategy and trachoma interventions may be greatest. This survey demonstrates that trachoma remains a still unconquered scourge due to lack of awareness. Remote areas of the country should be surveyed and active surveillance and reporting of trachoma cases should be undertaken as a continuous process to achieve elimination of trachoma from India by 2020. Although the burden of disease is reduced, there are still Trachoma remains a still unconquered scourge due to lack of awareness. In our Rapid Assessment of Trachoma in urban and rural area of Sagar district, we found active cases of trachoma although the magnitude of active trachoma infection was low.

The district administration at Sagar district should use effective health promotion tools for educating people to improve hygiene so as to decrease transmission of trachoma. The people of Sagar district should be educated about trachoma and its spread, encouraging acceptance for surgery and antibiotic treatment, encouraging facial cleanliness, hand wash after defecation and promoting clean environment. There is a need for promoting interpersonal communication and warn people for behavioral changes and preference for nuclear families. The ANMs and ASHA workers, who act as key local health volunteers may be given training to discuss important topics like causes of spread of trachoma, trachoma surgery, antibiotic treatment, facial cleanliness, hand washing, and environmental changes in the community meetings.

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Conflicts of interest

There are no conflicts of interest.

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