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Review Article

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A review of the prevalence of Trachoma, its Control program and challenges in Ethiopia

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Abstract

The most prevalent infectious cause of blindness is trachoma. Trachoma is the third most common cause of low vision and the second most common cause of blindness in Ethiopia. It is more common in regions where personal and community cleanliness standards are inadequate. This review's objectives are to explore trachoma epidemiology and look at trachoma preventive and control initiatives in Ethiopia. Document review and Pub-med searches were made based on the search items: trachoma, epidemiology of trachoma worldwide and in Ethiopia, and prevention and control program of trachoma in Ethiopia. Trachoma prevalence declined from an average of 26.6% in 2015 to 13.3% in 2020 in Ethiopia, and Trachomatous trichiasis prevalence among those under the age of 15 decreased from 4% to 0.85%. Trachoma continues to be a serious public health issue in the nation despite the persistent efforts that were successful in ending the issue.

Keywords: Trachoma, Control Program, Epidemiology of trachoma, Ethiopia, Trachomatous Trichiasis (TT), WHO

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1. Introduction

1.1. Background

Ethiopia is situated between 33 and 48 degrees east longitude and 3 to 15 degrees north latitude. It shares borders with five nations: Eritrea in the north, Djibouti in the east, Sudan in the west, Kenya in the south, and Somalia in the south-east. Its total area is around 1.1 million square kilometers. Topographically, there are peaks as high as 420 meters above sea level and depressions as law as 110 meters below sea level. Ecologically, the country is divided in to three zones. These are the ‘‘Kolla’’ (below 1000 meters) ‘‘Weyna Dega’’ (1000-1,500 meters) and ‘‘Dega’’ (1,500- 3000 meters) above sea level. (1,2)

The estimated population of Ethiopia in 2013 EFY is 102.9 million. The population is expected to increase to 109.5 million by 2024. With a crude birth rate of 32 per 1000, the overall fertility rate is 4.6 births per woman (2.3 in urban areas and 5.2 in rural regions). The overall mortality rate is 6.3 per 1000 people (CSA projection). The typical household has 4.6 members. (3)

Eleven regional states and two municipal administrations make up the country's administrative divisions. The 800 woredas and around 15,000 kebeles that make up the regional states and city administrations are arranged under peasant organizations in rural regions and urban dwellers associations in towns. (4) The overall adult literacy rate is 36% (46% for men and 25% for women), according to data on schooling. At the national level, the gross enrollment ratio for primary schools is 68.4% (59.1% for females). Ethiopia is an agrarian nation, with 54% of its GDP coming from agriculture (GDP). About 80% of people are employed in agriculture, which also generates 90% of exports. (5)

1.2. Overview of Global and National burden of Trachoma

The most common infectious cause of blindness in the world is trachoma. It is well established that there is a strong relationship between it and poverty, a lack of access to healthcare, and water. (6-9) Data from June 2022 show that 125 million people are at risk of developing trachoma blindness and live in endemic locations for the disease. (10)

In addition to several regions of Latin America, the Middle East, and the Western Pacific, it is common in Africa, Asia, and Africa. Youngsters and women are the main groups affected by active trachoma, and women are typically three times more likely than males to develop

cicatricial trachoma as a result of their frequent contact with infected children. (6, 10, 11)

The average prevalence of active trachoma (TF in children aged 1-9) was 47% (range 15%–87%) in East and Central Equatorial States, Northern Bahr El Gazal, Jonglei State, and Upper Nile State of Southern Sudan with available survey data. This is significantly higher than the 10% cutoff point advised for control interventions. An estimated 3.9 million patients require antibiotic therapy overall, and 206,000 require emergency trichiasis surgery. (9)

Ethiopia, one of the poorest countries in the world with a significant trachoma burden, is located in an arid region of tropical Africa. (12-14) According to a recent national survey, the prevalence of blindness and low vision was estimated to be 1.6 and 3.7%, respectively. It also revealed that trachomatous corneal opacity caused 11.5% of blindness and 7.7% of low vision, and that 40.1% of children aged 1 to 9 had an active disease. The prevalence in rural areas was also found to be four times higher than in urban areas. (15)

Previously the trachoma situation of the Ethiopian population was seen to worsen from time to time. However, very recent reports show that the trend in the prevalence of trachoma in the country is somehow improving. The Ethiopian government is implementing many programs targeted at improving the prevention of trachoma in the population. Many of the programs also call for concerted efforts to combat the problems of trachoma in the country. This review therefore aims at documenting the epidemiology of trachoma in the Ethiopian population and describing and evaluation of prevention (control) trachoma programs in the country.

2. Objectives

2.1. General Objectives

This paper's main goals are to review recent developments in trachoma epidemiology on a national and international scale, as well as Ethiopia's prevention and control initiatives.

2.2. Specific objectives

- To review documents available on the epidemiology of trachoma in Ethiopia.
- To review the national trachoma prevention and control programs.
- To evaluate the programs and forward constructive recommendations.

3. Methods

Document review was done on relevant topics related to epidemiology of trachoma in Ethiopia. Pub-med search was made based on the search items: trachoma, epidemiology of trachoma worldwide and in Ethiopia and prevention and control programme of trachoma in Ethiopia. The studies published in the different Journals were concerned with trachoma were reviewed. Relevant documents in the Ministry of Health library were also reviewed.

4. Epidemiology of Trachoma

4.1 Definition, Transmition

The most common infectious cause of blindness in the globe, accounting for 3.6% of all cases of blindness, is trachoma. (5, 8, 16) It is carried from eye to eye by fingers, insects, fomites, coughing, and probably sneezing and is most common in developing nations. (8, 17) The formation of subepithelial follicles and chronic inflammation (trachomatous inflammation, intense (TI)) are both possible effects of C. trachomatis infection. Active disease, also known as active trachoma, is the presence of TF and/or TI, and it primarily affects children.

It's possible for conjunctival scarring to develop after years of re-infection. Trichiasis, which is caused by the eyelashes curling inward and scratching the eyeball, may finally cause corneal opacity and blindness. (6, 8, 18)

4.2 Causes

Chlamydia trachomatis is the cause of trachoma, which is contracted by coming into contact with the eye, nose, or throat secretions of those who have the disease or by coming into contact with fomites (inanimate objects), such as towels and/or washcloths that have come into contact with the same secretions. Another means of mechanical transfer is through flies. (6, 8) Entropion is a painful kind of irreversible blindness brought on by the eyelids turning inward and the eyelashes scratching the cornea when untreated, recurrent trachoma infections. Due to their propensity to get dirty readily, children are the most susceptible to infection; however, the blinding effects or more serious symptoms frequently do not manifest themselves until maturity. (8, 18)

Endemically high rates of trachoma, which can blind people, are found in unhygienic neighborhoods. Many variables, including as a lack of water, the lack of toilets or latrines, general poverty, flies, being close to cattle, crowding, and so forth, are indirectly related to the existence of trachoma. (18, 19)

4.3 Signs and symptoms

Blinding endemic trachoma arises from repeated episodes of reinfection that maintain the severe inflammation in the conjunctiva. The bacterium has an incubation period of 5 to 12 days, after which the afflicted individual experiences symptoms of conjunctivitis, or irritation comparable to "pink eye." The inflammation will gradually go away if there is no re-infection. (18, 20)

Active trachoma, the term for the conjunctival inflammation, is typically seen in youngsters, particularly in preschoolers. It is distinguished by white lumps (conjunctival follicles or lymphoid germinal centers) on the underside of the upper eyelid, as well as by generalized swelling and thickening that is frequently accompanied by papillae. Additionally, follicles may develop where the sclera and cornea meet (limbal follicles). Trachoma that is active frequently stings and discharges water. A subsequent bacterial infection that results in a purulent discharge is possible. (10, 20)

"Cicatricial trachoma" refers to the later structural alterations caused by trachoma. These include scarring in the eyelid's tarsal conjunctiva, which causes the lid to buckle and deform, causing the lashes to grind against the eye (trichiasis). These lashes will cause corneal scarring and opacities, which will ultimately result in blindness. Additionally, the top cornea may be invaded by blood vessels and scar tissue (pannus). (10)

A more straightforward grading scheme for trachoma is advised by the World Health Organization.

• Five or more >0.5 mm follicles on the upper tarsal conjunctiva are indicative of a trachomatous inflammation (TF) condition.

•Papillary hypertrophy and inflammatory thickening of the upper tarsal conjunctiva, which obscures more than half the deep tarsal arteries, is a sign of trachoma.

• Trachomatous trichiasis (TT) - At least one ingrown eyelash in contact with the globe, or signs of epilation (eyelash removal)

• Corneal opacity (CO): A portion of the pupil margin is obscured by corneal opacity.

Further symptoms include: Eye discharge, swollen eyelids, Trichiasis (turned-in eyelashes), swelling of lymph nodes in front of the ears, corneal scarring, further ear, nose and throat complications. (21)

4.4 Prevention

Trachoma has been mostly eradicated from the industrialized world during the past century, but it still exists in many developing countries, especially in areas where there is inadequate access to water and sanitation. Due to their responsibilities as family caregivers, women in many of these communities are up to six times more likely than males to get blindness from the disease. (10, 22, 23)

The WHO recommended SAFE program, which is implemented by national governments working with numerous nonprofit organizations, consists of the following control measures: surgery for trichiasis (an extremely painful condition), antibiotics for infectious trachoma, facial hygiene to reduce transmission, and environmental improvements like the control of disease-transmitting eye seeker flies and access to clean water. (24)

To divert the lashes away from the globe in those with trichiasis, a bilamellar tarsal rotation surgery is necessary. (23) Early intervention is advantageous since more advanced disease has a higher rate of recurrence. (25)

According to WHO guidelines, when the prevalence of active trachoma among one to nine-year-old children is greater than 10%, a region should get community-based, mass antibiotic treatment. (26) Three years of subsequent annual treatment should be given, after which the prevalence should be reevaluated. Until the prevalence falls below 5%, annual therapy should be given. The use of antibiotics should be family-based in cases of reduced prevalence.

At least two times as many kids with clean faces have active trachoma as kids with substantially apparent nasal discharge, ocular discharge, or flies on their faces. (18) The prevalence of active trachoma, particularly intense trachoma, can be greatly reduced by intensive community-based health education initiatives that encourage face washing (TI) and enhancing the government commitment to improve the situation is critical. (27 - 29)

To lessen the spread of C. trachomatis, changes to water use, fly control, latrine use, health education, and proximity to domestic animals have all been suggested. The execution of these modifications will provide several difficulties. It appears likely that these environmental changes will eventually have an effect on how easily facial impurities can spread eye infections. Environmental conditions that restrict clean faces need special consideration. (18)

4.5 Global and Regional Burden of Trachoma

Around 1.9 million people have been rendered blind or visually disabled by trachoma, which is still widespread in 44 nations today. (30) Sub-Saharan Africa, notably the Sahel belt and East Africa, has the highest prevalence of disease. Trachoma is also endemic throughout Southeast Asia, the Indian subcontinent, and certain Middle Eastern nations, albeit these regions have a patchier distribution. (18, 31)

4.5.1 Global estimates

The predicted number of individuals living in endemic districts, at risk of trachoma blindness, has dropped from 317 million in 2010 to 145.6 million in 2021, due to a combination of improved data and implementation of SAFE Strategy (Surgery, Antibiotics, Facial cleanliness, Environmental improvement) (Surgery, Antibiotics, Facial cleanliness, Environmental improvement). In 2021, 69 thousand people are claimed to have received procedures for the late, blinded stage of trachoma (trachomatous trichiasis), while a reported 64.6 million people received antibiotics for trachoma. Since 2011, the WHO has recognized fifteen nations as having completely eradicated trachoma as a public health issue: Cambodia, China, Gambia, Ghana, Islamic Republic of Iran, Lao People's Democratic Republic, Malawi, Mexico, Morocco, Myanmar, Nepal, Oman, Saudi Arabia, Togo, and Vanuatu. (32)

4.5.2 Regional estimates

Estimates of trachoma prevalence and SAFE Strategy implementation were categorized by WHO regions (Table 1). 13 nations (Cambodia, China, Gambia, Ghana, Islamic Republic of Iran, Lao People's Democratic Republic, Mexico, Morocco, Myanmar, Nepal, Oman, Saudi Arabia, and Togo) have received WHO certification that trachoma is no longer a public health concern. Burundi, Iraq, and Tunisia are the other 3 nations that have reported achieving the prevalence goals for elimination. Table 1 does not include some nations that are thought to not need interventions, such as those without a recent trachoma history (such as all of the nations in the WHO's European Region). (6)

Table 1. Trachoma Prevalence and SAFE Strategy Implementation by WHO Region, 2022

WHO Region	Districts with prevalence of Trichiasis of unknown to health system > 0.2% > 15yrs olds (as of June 2022)	Population in the area that warrant treatment with antibiotics, facial cleanliness and environmental improvement for elimination of trachoma as a public health problem (as of June 2022)
Africa	1495	105,286,061
America	6	5,525,899
Eastern Mediterranean	117	10,291,548
South East Asia	6	0
Western Pacific	25	3,852,615
Global	1,649	124,956,123

4.6. Epidemiology of trachoma in Ethiopia

48.5% of the world's active trachoma cases are in Ethiopia, India, Nigeria, Sudan, and Guinea. However, only three nations—China, Ethiopia, and Sudan—represent 50% of the world's trichiasis burden. (11)

The prevalence of trachoma is highest in Ethiopia. By the end of 2020, trachoma was endemic in 798 woredas, affecting 342 800 TT cases and 72 million persons at risk. (17)

Trachoma is the third most common cause of impaired vision and the second most common cause of blindness in Ethiopia. Trachoma is still a serious public health issue in Ethiopia despite the persistent efforts that were successful in ending the condition. (33)

The 1224 districts with TF prevalence in children aged 1 to 9 years of less than 5% at any point in 2021 were home to a total of 145.6 million people. These people were eligible to participate in the SAFE strategy's A, F, and E components for trachoma elimination that year. 86% (124.7 million) of the 145.6 million people lived in the African Region of the WHO, including 49% (71.8 million) in Ethiopia. (6)

The frequency of TT among those under the age of 15 reduced from 4% to 0.85%, while the average prevalence of trachoma decreased from 26.6% in 2015 to 13.3% in 2020.

In 2016, the National Program completed 75 impact studies. 40 districts have a trachomatous inflammation-follicular (TF) prevalence below the 50% eradication criterion, according to impact survey data up to 2016. Eight of the districts in the Oromia region, 14 in the SNNP region, and 18 in the Amhara region are those that have achieved this goal. Trachoma is still extremely prevalent in 259 districts across the nation, with a TF prevalence of more than 30%. Although data is available for nearly all of the country's districts, 20 districts still need to be mapped.To reach every single person in Ethiopia, resources from within the nation are being mobilized. The National Program is also concentrating on standardizing the approach for impact surveys that will be applied across all regions, as demonstrated below. (34)

Studies carried out in various regions of Ethiopia found varying rates of active trachoma among children aged 1 to 9 years old, including 22% in the Madda Walabu rural district in South east Ethiopia, 12.1% in the Gonder Zuria district in North Gondar, 16.6% in the Dera district in South Gondar, 17.2% in the Baso Liben district in West Gojjam, and 13.6% in the Lemo district in Hadiya Zone. (35-39)

224 (36.7%) of the children who were all tested for trachoma had the disease in a clinical sense. Trachomatous follicle (TF), trachomatous intensity (TI), and combination of TF/TI were among them, accounting for 207 (92.4%), eight (3.57%), and nine (4.0%) of these cases, respectively. Trachoma was prevalent in the district on average at 36.7%. During the course of the trial, no trachomatous scare (TS), trachomatous trichiasis (TT), or corneal opacity (CO) stages were seen. (40)

5. Ethiopia Trachoma Control Program

Cognizant of the burden of NTDs in Ethiopia, the Ministry of Health (MoH) developed national NTD strategic plans, prioritizing eight diseases. NTDs were also included in the country's Health Sector Transformation Plans (HSTP I and II).

For the years 2006 to 2010, a national five-year strategy plan for trachoma was created and completed. The Federal Ministry of Health has designated 2015 as the deadline for eradicating blinding trachoma in the plan. The trachoma control campaign in Ethiopia is one of the most successful in the world because to their leadership. By implementing the SAFE method at the local level, the primary objective is to decrease trachoma-related blindness in all endemic regions by the year 2010. (41-42)

The Ethiopian Federal Ministry of Health has developed two human resource strategies throughout eye health services and the trachoma program in order to maximize the impact of its national trachoma program and advance toward trachoma elimination goals. Both strategies train allied eye health professionals; one trains general health professionals. (43) In addition, made efforts to integrate: (a) the identification of TT cases and the provision of services with other community-based interventions, such as vaccination campaigns; (b) the delivery of antibiotic MDA with other community-based interventions, such as preventive chemotherapy for human helminth infections; and (c) environmental improvement programming with the water, sanitation, and hygiene and education sectors. (44)

The results of one study support the notion stated above. The Ethiopian government has shown unwavering

dedication to the mission of eradicating trachoma as a public health issue. The establishment and continued operation of national, regional, zone, and woreda trachoma task forces, as well as the inclusion of "treatment of active trachoma, promotion of facial cleanliness, and environmental improvement education" as one of the 18 health intervention packages provided to local communities by health extension workers, are just a few examples of how this commitment is visible at all levels of the health system. (44)

WHO advises combining the SAFE method with other measures to control trachoma. Several studies have assessed the combined impact of the SAFE strategy's various elements. A three-round azithromycin course, a clean face, and more frequent face washing were all independently linked with a lower prevalence of active illness in children, according to a cross-sectional examination of the A, F, and E components' implementation in Ethiopia. (45, 46) Thus, implementation of the different SAFE components would have an additive effect in trachoma control.

From the beginning of the SAFE Strategy in 3 districts in 2003 to the end of 2016, 521 woredas have benefited from the national scale-up of SAFE intervention. During this time, more than 1,000,000 TT surgeries have been performed, leaving an estimated 391,758 TT cases at the end of 2016 needing surgery to correct the eye lid. During annual mass drug distribution campaigns in woredas where SAFE intervention is taking place, 236,316,886 treatments of Zithromax have been distributed. A significant improvement from 13% in 1990, the coverage of access improved water sources reached 65% in 2016 and that of access improved latrines reached 15%, up from 3% in 1990 and pit latrines in 2016 and the percentage of latrines that were unavailable dropped from 45% to 32%. (47, 48)

The nation's efforts to end blinding trachoma are not just constrained by the standard SAFE implementation; rather, SAFE is strengthened by the country's newest flagship initiative, the Fast track Initiative, which will provide TT procedures for 693,037 people in 2 years starting in February 2015. Additionally, there are enormous government-led initiatives to expand WASH coverage that support the momentum for ending blinding trachoma. (47)

After reaching the WHO eradication threshold of a prevalence of follicular trachoma 5% in children aged 1 to 9 years, 202 woredas terminated MDA for trachoma between 2015 and 2020. A prevalence of TT "unknown to the health system" of less than 1 case per 1000 people was reached in 115 woredas as well. By providing MDA to all endemic woredas in 2019, Ethiopia for the first time achieved 100% geographic coverage of trachoma control. Surgical management was used to treat 628,484 TT patients between 2015 and 2020. Despite these significant accomplishments, trachoma was not completely eradicated as a public health issue by 2020 since not all the targets and goals were met. (49)

6. Challenges

The following issues with trachoma prevention in Ethiopia are discovered as a challenge after doing the review. TT surgeons, who must do TT surgery in addition to their other responsibilities in the medical field, have a high attrition rate. It is necessary to increase the number of ophthalmic nurses trained annually to provide full-time eye care services in order to satisfy demand. The majority of people reside in rural areas, which creates ideal trachoma infection circumstances. Data from many research revealed that access to a better water supply, better sanitation, and safe water are less common in rural areas than in urban ones.

7. Conclusion

Trachoma, including active Trachoma and Trachomatous Trichiasis (TT), is concentrated in particular areas of the nation (Amhara, Oromia, SNNPR), which also account for a significant amount of the nation's population both individually and collectively. These areas have a sizable rural population as well as hygienic and environmental circumstances that encourage the spread of trachoma.

The aforementioned information demonstrates unequivocally that eye diseases are among Ethiopia's most serious public health issues and have a significant negative economic and social impact on those who are affected as well as on society as a whole.The severity of the illness and the number of people it has impacted also point to the enormous need for health services (resources) needed to address the backlog in cataract and trachomatous trichiasis (TT) surgery and offer widespread azithromycin antibiotic therapy.

8. Recommendations

It is important to acknowledge the scope and severity of ocular issues in Ethiopia, notably active trachoma and trachomatous trichiasis. Creating community awareness should be done effectively. Future generations will not suffer from trichiasis-related blindness thanks to improvements in community sanitation, hygiene, and access to clean water. The Federal Government of Ethiopia and the regional governments need to strengthen their commitment to prevent needless loss of sight by increasing resources allocation and improving organization capacity and capability at all levels to successfully prevent trichiasis.

Abbreviation

CO - Corneal opacity
CSA - Central Statistics Agency
EFY – Ethiopian Fiscal Year
GDP - Gross domestic product
HSTP - Health Sector Transformation Plan
MDA - Mass drug administration
MOH: Ministry of Health
NTDs - Neglected Tropical Diseases
SAFE: Surgery, Antibiotic, Face Washing and environmental improvement
SNNPR: Southern Nations, Nationalities and Peoples Region
TF - Trachomatous Inflammation – Follicular

TI - Trachomatous inflammation, intense
TT - Trachomatous trichiasis
WASH - Water, Sanitation, and Hygiene
WHO – World Health Organization

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Author Contribution

SG-The author made substantial contributions to the conception and design, acquisition of data, evaluation, editing of data, and drafting of the manuscript, The author agreed to submit it to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

Availability of data and materials

The datasets used for this publication can be obtained from the corresponding author on reasonable request.

Ethics declarations

Not applicable

Consent for publication

Not applicable

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