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RESEARCH ARTICLE

Red Eye Outbreaks Rock India! Chlamydia Trachomatis 1968 to Adenovirus Conjunctivitis 2023 Transition

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Abstract

Should Global Health Stake holders and promisers of Universal Health Coverage by 2030 be concerned of Viral Conjunctivitis? Just like proverb in India "why should a trader of ginger do keep track of ships coming to the port?

A survey of conjunctivitis researchers inferred that Conjunctivitis outbreaks are common worldwide, afflicting people across age and socio-economic strata and aetiologies are often undetermined. A lack of systematic conjunctivitis surveillance and diagnostic microbial confirmation in clinical practice and in public health efforts contributes to the paucity of information globally.

Even in best of the developed countries like USA Conjunctivitis affects about 1% of all primary care office visits affecting about 6 million people annually and in United Kingdom there was an increase in conjunctivitis consultations, particularly in children aged 5 to 14 years in the week 5 of 2023.. Only about 30% of primary care patients with infectious conjunctivitis are confirmed to have bacterial conjunctivitis, although 80% are treated with antibiotics. The bacterial aetiology often depends on geography and age, but the most common include Staphylococcus, Streptococcus, Corynebacterium, Haemophilus, Pseudomonas, and Moraxella species

Incessant rains and flood situation in many parts of the country have led to poor hygiene. The high humidity is also a favourable factor for the spread of the disease. The main reason behind the outbreaks in the last decade is linked to a viral infection that has been spreading rapidly across various regions in the world. People with weak immune systems like diabetes, People who do not wash their hands before inserting or removing contact lenses are more at risk. Viral Conjunctivitis often follows a recent cold or sore throat. Some patients early in the Covid 19 pandemic with the original COVID strain developed infection of conjunctivitis or pink eye. Recently, this has been noticed in a small number of patients with COVID, even those without other symptoms. Conjunctivitis associated with COVID-19 tends to occur in the later stages of the disease.

The outbreaks in India since early June 2023 prompted to this review of the global and national status of viral conjunctivitis, track the history of 'red / Pink eyes' from 1968 when the author entered Indian health system and status, to urge for a systematic conjunctivitis surveillance and diagnostic microbial confirmation in clinical practice and in public health efforts.

Material and Methods: Media coverage in India about the conjunctivitis outbreaks since June 2023, Review of global and national Literature and real time data in public domain.

Keywords: Ophthalmia Neonatorum, Trachoma, Granular Conjunctivitis, Blinding Trachoma Bacterial Conjunctivitis, Viral Conjunctivitis and Allergic Conjunctivitis, Trachoma Control Program.

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1. Introduction

The risk of transmission of chlamydial, gonococcal, herpetic, and streptococcal pathogens to the foetus during vaginal delivery and consequent Ophthalmia Neonatorum comes to our generation of medical graduates since early 1960 in India. Preliminary presumptive treatment with topical erythromycin ointment and an IV or IM cephalosporin, based on the clinical picture and the findings on Gram, Giemsa, and Papanicolaou stains were taught and practiced. Confirming the presence of a sexually transmitted disease in the neonate, examining, and treating the mother and her sexual partner was stressed. Therapy was modified after the results of culture and sensitivity were known.

Red (Pink) Eyes in school children and adults caused by Trachoma was a common cause of infectious blindness, due to infection with the bacterium Chlamydia trachomatis. Indication of Trachoma has been found in China dating back to 2600 B.C. The first clear description of disease is from 1500 BC in the Ebers Papyrus which is a collection of medical prescriptions found in Egypt. In 1750, neonatal conjunctivitis ophthalmia neonatorum was first described by S.T. Quellmaz and in 1881, Crédé introduced 2% silver nitrate for the first time as a prophylaxis treatment method for conjunctivitis in the newborns in Leipzig. By the early and mid-20th century, trachoma was widely endemic with the prevalence rate of more than 60% in Iran. When this author entered the public health system as a medical officer of Health at a GOI- PHC in Karnataka in July 1968, the Trachoma Control Programme which had started in 1963 was in aggressive control stage. It was merged under NPCB a 100% centrally sponsored program in 1976 [1].

Trachoma also known as Granular conjunctivitis, blinding trachoma, Egyptian ophthalmia etc. Starting with Symptoms Eye pain, redness and leading to blindness. The disease was described in 5 stages of i) Inflammation — follicular ii) Inflammation — intense iii) Eyelid scarring iv) In-turned eyelashes (trichiasis) and v) Corneal clouding (opacity). Trachoma was a disease of poor environmental and personal hygiene and inadequate access to water and sanitation. It was highly infectious disease. Without medical treatment, recurrent infections and inflammation caused corneal scarring and eyelid deformities. A common late complication was eyelid inversion (entropion) and the lashes turned inwards (trichiasis) and continually rubbed against the cornea [2]. Surgical repair of in-turned eyelid and eyelashes resulting from trachoma was done only at Minto eye Hospital in Bangalore in 1968. The key strategies followed included Antibiotics to clear infection, through mass drug administration of Azithromycin. The two antibiotics commonly used for the treatment of trachoma were azithromycin (single dose by mouth) and tetracycline (ointment applied to the eye over several weeks). Azithromycin was donated by the manufacturer through the International Trachoma Initiative. Other strategies included Facial cleanliness; Environmental improvement- improving access to water and sanitation [2].

A national trachoma control programme was developed with implementation of extensive trachoma control activities, in the States of Punjab, Rajasthan and Uttar Pradesh where the disease was a major public health problem - (Punjab, 79.1%; Rajasthan 74.2%; Uttar Pradesh 68.1 %). It was then expanded to the States of Gujarat (56%), Madhya Pradesh (41.3%), Bihar (30%) and Jammu & Kashmir (up to 60%, in the plains) and high and moderate (between 20 to 50%) endemicity of trachoma in the States of Assam, Mysore and Maharashtra [2].

National Trachoma Survey Report (2014-17) released on 8 December 2017 declared that India was free from 'infective trachoma, as the Trachoma prevalence was found to be only 0.7% in India, much below the elimination criteria (1%) of infective trachoma as defined by WHO then [3]. As of 5 October 2022, 15 countries – Cambodia, China, Gambia, Islamic Republic of Iran, Lao People's Democratic Republic, Ghana, Malawi, Mexico, Morocco, Myanmar, Nepal, Oman, Saudi Arabia, and Vanuatu – had been validated by WHO as having eliminated trachoma as a public health problem. Despite herculean effort as of June 2022, 125 million individuals live in trachoma endemic areas and are at risk of trachoma-related blindness, and the disease is a public health problem in 42 countries, and Africa is still considered the worst affected area, with over 85% of all known active cases of trachoma [4].

World Health Organization has sets 2030 as the new target date for global elimination of Trachoma through the neglected tropical diseases road map 2021–2030.

(1) Elimination of trachoma as a public health problem is defined as: (i) a prevalence of trachomatous trichiasis "unknown to the health system" of <0.2% in adults aged ≥15 years (approximately 1 case per 1000 total population), (ii) a prevalence of trachomatous inflammation – follicular in children aged 1–9 years of <5%, sustained for at least two years in the absence

of ongoing antibiotic mass treatment, in each formerly endemic district; plus (iii) the existence of a system able to identify and manage incident trachomatous trichiasis cases, using defined strategies [4].

Conjunctivitis can result from many causes, including viruses, bacteria, allergens, contact lens use, chemicals, fungi, and certain diseases. Bacterial Conjunctivitis is caused by Staphylococcus aureus (commonest cause of bacterial conjunctivitis), Haemophilus influenzae, Streptococcus pneumoniae, Moraxella catarrhalis, Chlamydia trachomatis, Moraxella lacunata, Neisseria gonorrhoea, Neisseria meningitides.

Viral conjunctivitis includes epidemic keratoconjunctivitis (EKC) and pharyngoconjunctival fever (PCF) caused by adenovirus, acute haemorrhage conjunctivitis (AHC) caused by enterovirus and coxsackievirus, and herpetic conjunctivitis caused by herpes simplex virus (HSV). Varicella–zoster virus (VZV), measles virus, and mumps virus. Viral conjunctivitis is predominantly of the follicular type, and characterised by redness, blood vessel engorgement, ocular discharge, pain, photophobia, and pseudo membranes. EKC infectivity is particularly robust, and infection is prevalent in summer. Diagnosis is mainly clinical; sometimes viral cultures or immunodiagnostic testing is indicated. Most forms of viral conjunctivitis heal naturally, patients may sometimes experience deterioration in their quality of life through symptoms such as blurred vision and loss of visual acuity. Infection is self-limited, but severe cases sometimes require topical corticosteroids. Specific treatment is required to improve quality of life, reduce subjective symptoms, and shorten the treatment period [1].

Situation in India August 2023: Come June- July every year Conjunctivitis cases sharply rise across India. Current year is witnessing outbreaks of viral conjunctivitis since early June 2023, in Bengaluru Delhi, Mumbai etc since early July 2023. While the rise in cases was expected this season, the numbers are much higher than usual in last 3 years. Most of these cases are viral caused by adenovirus infections and the variations this year could be due to some mutation in the virus. According to a recent survey by Local Circle, Delhi NCR, parts of Maharashtra like Mumbai, Pune, Nagpur, Karnataka, Gujarat, Telangana and UP are among areas where many cases have been reported seeking medical help [7,8].

Delhi-National Capital: Adenoviral conjunctivitis has been the most common type of conjunctivitis among cases being reported at the Dr Rajendra Prasad Centre (RPC) for Ophthalmic Sciences, AIIMS, Delhi, since last week of July 2023. This is the most common subtype causing current inflammation or irritation of the conjunctiva. The chief of the RPC centre reported that almost 100 cases of conjunctivitis are being reported each day. Doctors at both government and private hospitals have been seeing conjunctivitis cases largely from the younger population in the city. Presently, eye hospitals in Delhi are reporting that a 20-25% rise in patients OPD these days. In Okhla's Holy Family Hospital, and Apollo Indraprastha Hospitals big private sector eye hospitals are seeing more than 50% of their eye OPD patients (40-45 out of 80) with symptoms of conjunctivitis. Many schools in Delhi have sent an informal advisory on WhatsApp, asking parents not to send their wards to school if anyone in the house is having any kind of eye infection [9].

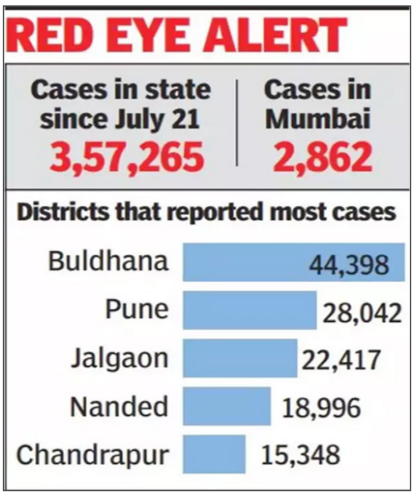
Karnataka: Health and Family Welfare department, Karnataka has reported over 40,000 cases of conjunctivitis between July 25 and August 4 alone. The common symptoms of conjunctivitis include redness and watery eyes with mild discharge. Some of the patients experience pain and discomfort due to the swelling of the eyes and eyelids. With 7,693, 6,558 and 6,493 cases, Bidar, Haveri and Raichur respectively share the maximum caseload, Shivamogga, Hassan, Vijayanagar, Belagavi, Bijapur and Dharwad recorded 3,411, 1,279, 2,200 and 1,843 and 1615 cases of respectively. As many as 400 cases were recorded within the Bruhat Bengaluru Mahanagara Palike (BBMP) limits [10,11,12].

Sankara Eye Hospital, one of the leading eye hospitals in private sector reported numbers have increased by about 50 % from first week of July and confirm that 90% of patients recover in a week. Narayana Nethralaya, another popular and major eye hospital reported getting about 100 conjunctivitis patients a day across its four centres, of whom 35-40 per cent are children. Over a quarter of their patients have aggressive conjunctivitis, which require aggressive treatments with steroids. In 3-6% of cases, scars on the cornea, ulcers, etc, have been identified and such patients take six months to one year to heal. Patients with allergies, asthma, and dry eyes and contact lens users are more vulnerable to developing aggressive conjunctivitis. Director of Minto Ophthalmic Hospital, the biggest eye hospital in public sector in Bangalore reported that 20% of about 600 patients coming to the hospital OPD daily now have conjunctivitis. Major complaints Patients feel are a dull pain and heaviness in the eyes, with more redness and discomfort among younger patients. The institution manages by prescribing

mild antibiotic drops to prevent secondary bacterial infections and lubricant drops to flush out toxins [12].

West Bengal: West Bengal especially Kolkata is witnessing a sudden spike in cases of what they call 'Joy Bangla' (Conjunctivitis) due to a new strain of Adenovirus. The infection is primarily affecting children but not sparing adults either, Ophthalmologists [15].

Maharashtra: Maharashtra saw a staggering 3.6 Lakh conjunctivitis cases by 10 August 2023, recorded across the state in less than a month of the first outbreak reported from Alandi in Pune, making it one of the most severe outbreaks in recent years. Adenovirus conjunctivitis is driving the surge in cases this year. The outbreak started from Pune with a cumulative number of 28,042 cases, but Buldhana has overtaken it now has 44400 case the highest in the state [13].



Gujarat: Gujarat has witnessed 2.17 lakh cases of conjunctivitis since June. According to health officials, a mutated strain of adenovirus has caused the widespread infection. Conjunctivitis outbreak started in Surat in the first week of June and was at its peak in the beginning of July, with close to 700 cases being reported every day. As of early August 2023, 9,000 patients having contracted the infection in Surat city. It began declining in second week of July and currently, only about 30 new cases are being reported every day [14].

Uttar Pradesh: GSVM Medical College, Kanpur, and Jhansi Medical College, about 70 patients are coming daily to the OPD with conjunctivitis, which is highly contagious this time. 55 students at a residential school are suffering from the infection and 12 had to be sent back home due to the severity of the infection. 61 patients were reported in Kanpur Dehat's district hospital, and 49 in Jalaun district hospital 50-70 conjunctivitis cases are reported daily in the fourth week of July 2023. Lucknow is witnessing a surge in conjunctivitis or eye flu, particularly among school children, a rise in cases by more than 50% in the first week of August 2023, with most patients in the 10–16-year age [16].

Telangana: In Telangana the outbreak first emerged in July and has continued to escalate over the past month. The L.V. Prasad Eye Institute (LVPEI) in Hyderabad alone has reported over 1,000 cases within a month, while the government-run Sarojini Devi Eye Hospital recorded 1,670 cases from July 19 to August 1. The infection started with 38 cases on July 19 and reached 358 cases on July 31 and 260 cases on August 1. In Jagtial district, an outbreak occurred at the KGBV school, reporting about 45 cases, in Jangaon district recorded 50 cases, with a recent outbreak at a government school infecting 25 students. Mulugu district's Health department conducted a door-to-door fever survey, identified 20 cases of conjunctivitis on Wednesday 2nd August. Nalgonda district, which also faced heavy rains, recorded 150 cases, and Peddapalli district, about 600 cases were reported in the first week of August 2023. In other affected districts like Mancherial and Asifabad, a high number of cases were recorded in educational institutions. At a social welfare school in Mancherial, about 500 students were infected, while about 200 children were affected in various schools across Asifabad district. About 40-60% of the cases being reported across the State are of children below the age of 12 years. Around 80% of the cases are caused by viral infections, while the remaining 20% are bacterial [17].

Chhattisgarh: The state capital is reeling under an outbreak of conjunctivitis, with widespread occurrence of the seasonal infection. Surge in the eye infection has also been reported in other parts of the state with around 20,000 cases emerging in the last week of July 2023 of which 25% cases are in the state Capital Raipur [18].

Despite the MOH &FWs claim of well-established integrated diseases surveillance Program (IDSP) in the country since 2004, It's a pity that real-time data of either the outbreaks or the number of cases by districts is not in the public domain. The last weekly (23rd week of 2023, June 4-11) outbreak report of the IDSP does not show any conjunctivitis outbreaks. Most of the data quoted in this article is from media coverage.

2. Discussion

2.1 Global Situation of Conjunctivitis

Globally there is lack of data on conjunctivitis as it is not notifiable condition in most of the countries. A lack of systematic conjunctivitis surveillance and diagnostic microbial confirmation in clinical practice and in public health efforts contributes to this paucity of information [6].

A survey of conjunctivitis researchers about perceived trends in prevalence, incidence and aetiologies of conjunctivitis epidemics inferred that Conjunctivitis outbreaks are common worldwide, afflicting people across age and socio-economic strata. Recurrent conjunctivitis epidemics are prevalent worldwide and aetiologies are often undetermined [6].

2.2 Map Depicting Locations of Conjunctivitis Outbreaks from 2012 and 2017

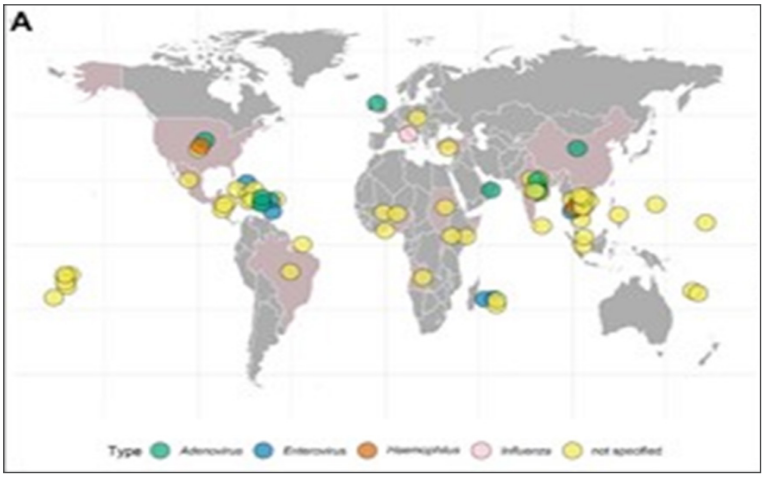
Of the 155 participants, in the survey 7% endorsed globally variable and dynamic microbial aetiologies of conjunctivitis epidemics. Increased incidence of conjunctivitis epidemics over the last decade were reported by 21% of respondents. Peak seasons differed between the northern and southern hemispheres. Experts opined that high-prevalence regions include i) Central sub-Saharan Africa, ii) the Caribbean and iii) high-income Asia Pacific. The study recommends investigation of global surveillance and microbial characterization of conjunctivitis outbreaks to improve prevention and outcomes. Increasing incidences in the 5 years period of the study was observed in Latin America, central sub-Saharan Africa, & southern Latin America. A lack of systematic conjunctivitis surveillance and diagnostic microbial confirmation in clinical practice and in public health efforts contributes to this paucity of information [6].

The 3 most common causes of conjunctivitis today are: infection (infective conjunctivitis- bacterial or Viral) an allergic reaction (allergic conjunctivitis) something irritating the conjunctiva, such as a loose eyelash (irritant conjunctivitis). With the advent of antimicrobials, the bacterial conjunctivitis has reduced a lot across the world including in India and Viral conjunctivitis dominates in the last decade. Globally in adults, viruses cause 75% of all cases. Of those, up to 90% of cases are due to adenoviruses.

3. Epidemiology

Conjunctivitis is commonly, is seen among all ages and occurs seasonally when pollen is released in May and June. One study in India in 2017 reported prevalence of bacterial conjunctivitis is around 68.1%, affection of both eyes is 51.7%. Conjunctivitis among rural residents is 59% when compared to urban residents which are 34.66%. Conjunctivitis among males is found to be 59.4% whereas it is 40.6% among females. Percentage of individuals with PCR positive for adenoviral conjunctivitis was 53.37% [17]. Itching followed by watering and a burning sensation is seen in these patients. Almost alternate years there are outbreaks keratoconjunctivitis and mainly, it is due to adenovirus only with different strains.

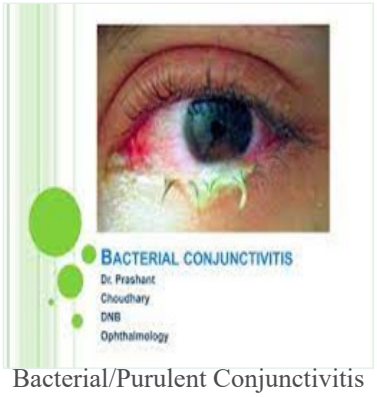
Though conjunctivitis can be caused by viruses or bacteria, the current (2023) outbreaks across the country in rainy seasons is because of adeno virus family, a mutant variety is blamed this year as they are very contagious. It spreads through physical contact, wherein an uninfected individual may contract the virus by contacting the secretions from an infected person's eye and subsequently touching their own eyes. Incessant rains and flood situation in many parts of the country have led to poor hygiene. The high humidity is also a favourable factor for the spread of the disease. The main reason behind the outbreak is linked to a viral infection and that has been spreading rapidly across various regions in the country. The case reported in UP in the past few days are majorly



of perceptual cellulitis caused mainly by bacteria, viruses, fungi, or helminths.There are reports that conjunctivitis was the only sign of COVID-19 too!

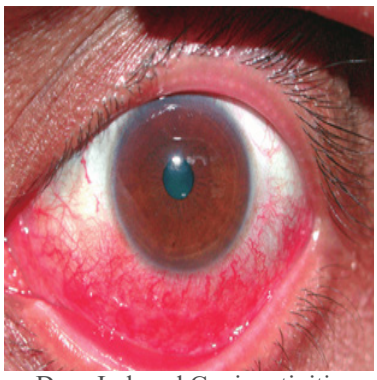
3.1 Diagnosis

Diagnosis of conjunctivitis and differentiation between bacterial, viral, and non-infectious conjunctivitis are usually clinical, but most often differentiation between viral and bacterial conjunctivitis can be difficult as symptoms overlap. Special tissue cultures are necessary for growth of the virus but are rarely indicated. Nucleic acid amplification tests (NAAT) and other rapid, office-based immunodiagnostic tests are useful when the inflammation is severe and to rule out orbital cellulitis [5].



Bacterial/Purulent Conjunctivitis


Viral Conjunctivitis


Drug Induced Conjunctivitis


Allergic Conjunctivitis

Features that help differentiate between viral and bacterial conjunctivitis include: i) purulence of ocular discharge, ii) presence of preauricular lymphadenopathy, iii) chemosis in epidemic keratoconjunctivitis iv) Patients with photophobia are stained with fluorescein and examined with a slit lamp- Punctate corneal staining indicate Epidemic keratoconjunctivitis.

Secondary bacterial infection of viral conjunctivitis is very rare. However, if any signs, purulent discharge, or fever suggest bacterial conjunctivitis cultures and antibiotic sensitivity tests may be useful.

3.2 Treatment

There is no single treatment modality for viral conjunctivitis. Symptom relief with artificial tears, cold-compresses, and antihistamines can be effective. A topical antihistamine / decongestant eye drops like loratadine (Claritin), cetirizine (Zyrtec), or fexofenadine (Allegra) available even without prescription help to relieve the irritation of viral conjunctivitis. Some eye service providers may recommend medicines to help control inflammation, such as decongestants, steroids, and anti-inflammatory drops. Treatment helps to decrease inflammation and alleviate symptoms, but steroids will not treat the infection itself. Some specialists prescribe antiviral eye drops like Acyclovir ophthalmic (Avaclyr), Ganciclovir ophthalmic (Vitracert DSC, Zirgan), Trifluridine ophthalmic (Viroptic), Fluorometholone (Flarex, FML, FML Forte) - fluorinated corticosteroid. Some doctors may prescribe antibiotics to prevent secondary infections, commonly prescribed eye drops include Trimethoprim with polymyxin B, Azithromycin, Gentamicin, Tobramycin, Neomycin, Ciprofloxacin, Ofloxacin and Gemifloxacin. However, these drops can increase bacterial resistance. Attempts are made to remove membranes or pseudo membranes to reduce discomfort and scarring.

3.3 Prevention of Conjunctivitis

Antihistamines are beneficial for allergic conjunctivitis. Administered topically twice a day or taken once a day by mouth, antihistamines block

the action of histamine, a chemical that is produced when the body detects an allergen, such as pollen, dust, Mold, or pet dander. Most viral conjunctivitis symptoms are often relieved with cool compresses and artificial tear solutions.

The Doctors must use hand sanitizer or wash their hands properly (fully lather hands, scrub hands for at least 20 seconds, rinse well, and turn off the water using a paper towel), disinfect equipment after examining patients.

Patients must i) use hand sanitizer and/or wash their hands thoroughly after touching their eyes or nasal secretions ii) Avoid touching the noninfected eye after touching the infected eye iii) Avoid sharing towels or pillows and iv) Avoid swimming in pools.

3.4 Prevention

- Good hand hygiene practise and avoiding sending symptomatic children to school to prevent disease spread.
- To prevent the disease from spreading, practice regular hand washing and avoid touching self-eyes, especially children.
- If infected, isolate yourself at home, refrain from sharing towels/ handkerchiefs and do laundry separately.
- Consult an ophthalmologist instead of using over-the-counter medication for any ocular symptoms - redness, itching and foreign body sensation in eye.
- Early treatment reduces corneal involvement & potential complications affecting vision.

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