



Review article

Ocular manifestations of dengue fever

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ABSTRACT

Dengue fever is one of the seventeen neglected tropical diseases identified by World Health Organization (WHO), which has an important economical impact on developing countries. It has undergone important epidemiological changes since the earliest virologically confirmed outbreak of dengue fever in India. There have been larger and more frequent outbreaks in a wider span of geographical areas. Along with its spread, more and more atypical manifestations have been recognized including ophthalmological involvement which was not considered an important manifestation earlier. Therefore there is an increasing need to sensitize the physicians to the ocular manifestations of dengue fever so that early recognition of the eye involvement can translate into timely interventions to prevent irreversible visual loss.

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1. Introduction

Dengue fever, identified as one of the seventeen neglected tropical diseases by WHO, is transmitted by *Aedes* mosquitoes [1]. There are four serotypes of the virus (DEN-1, DEN-2, DEN-3 and DEN-4), which cause dengue fever/dengue hemorrhagic fever. This illness has acquired significance due to its rapid spread in last few decades. With increasing geographical distribution, more and more atypical presentations are being reported [2]. Ocular complications, hitherto believed to be an uncommon complication of dengue fever, have been identified to be a significant hazard in various observational studies [3]. A range of ocular 'hemorrhagic' and 'inflammatory' complications, involving both the anterior and posterior segments have been reported worldwide. We present here a short and relevant review on ophthalmological complications in dengue fever, with a special focus on the available Indian data. Sensitization to the ocular manifestations of the dengue fever and their early identification may help the specialists to identify the complications at the earliest. The epidemiological data may also help the public health officials to plan a response by optimally utilizing the scarce resources.

2. Pathophysiology

The pathogenesis of ophthalmological involvement has been linked to direct viral infection, hemorrhagic complications and the immunological phenomenon [4]. The hemorrhagic complications of eye in dengue fever have a significant association with thrombocytopenia. For this reason, there is a high likelihood of involvement of eye in patients with dengue hemorrhagic fever, rather than uncomplicated dengue fever [5]. Leukopenia and hypoalbuminemia have also been identified as predictors of eye involvement. Leukopenia predisposes to opportunistic infections of the eye and hypoalbuminemia leads to edema formation in eye tissues [6].

3. Clinical signs and symptoms

The prevalence of ocular involvement in hospitalized patients in India has been evaluated to be between 7.9% and 40.3% in various studies [4,5]. The mean age of the affected individuals has been reported to be 31.3 years with 63.4% being males [5]. The onset of symptoms is between 2 days to 5 months from the beginning of fever consequent to either a hemorrhagic or an inflammatory mechanism. Most of these symptoms have been noted to occur within 1 day of nadir of thrombocytopenia i.e. within 7 days after onset of fever coinciding with maximum immunological response [3]. However, ocular findings have been

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reported even if patients have no visual complaints [5]. This underscores the need for high index of suspicion for ophthalmological involvement in Dengue fever.

The most common ocular symptom is blurring of vision [7] (60%), with deficits in visual acuity being more common in patients with macular involvement [8]. The Snellen visual acuity varies from 6/6 to counting fingers only [7]. The next most common symptom after blurring of vision is scotomas. The areas of scotomas usually match with areas of macular edema and hemorrhages [9]. The other main symptoms reported include eye strain (30%), retro-ocular pain (20%), diplopia (3%), foreign body sensation (3%), photopsia (2%) and floaters (1%) [6]. The triad of symptoms, comprising of eye flashes, floaters and blurring of vision, together have a high predictive value for development of retinal hemorrhages [6]. Seet et al. have suggested that this triad of symptoms may be useful as a screening tool for severe ophthalmological complications following dengue infection. Blurring of vision, central scotomas, metamorphopsia, floaters and near vision disturbances are more common in patients with established ocular pathology [10]. Malhotra et al. found that transient blurring of vision, central scotoma and floaters were more common in dengue hemorrhagic fever as compared to dengue fever [8]. Loss of vision has been attributed to retinitis and retinal/subhyaloid hemorrhages, panophthalmitis and rupture of the globe [11–13]. Deficits in visual acuity in the convalescent phase of dengue fever may also occur due to retinal artery occlusions, which may be a consequence of an immunological mechanism [14]. The circulating immune complexes probably get deposited in the branch of artery narrowed by a preexisting vasculitis. It is important to point out that dengue patients may present with uveitis even after 3 to 5 months of the episode of fever [4]. An association between low complement C3/C4 levels and maculopathy has been observed. This delayed complication should always be remembered in areas with high prevalence of dengue fever.

The ocular findings observed in cases of dengue fever have been categorized into anterior chamber, posterior chamber and neuro ophthalmic disorders. The posterior chamber findings have been observed variably from 7.5% to 47% of the patients in various studies from India [5,8]. These findings have been summarized in Table 1. Most common finding has been reported to be subconjunctival hemorrhage in a case series from East India [5]. In this series, out of 134 patients ocular involvement was observed in 54 (40.3%). Sub conjunctival hemorrhage was seen in 50/54 patients with 84% of them having petechial type of hemorrhages [5]. In the posterior chamber of eye, retinal vein dilatation or tortuosity was identified as the most common finding (40.67% of the patients) followed by changes in the optic disk (8.4% of the patients) and

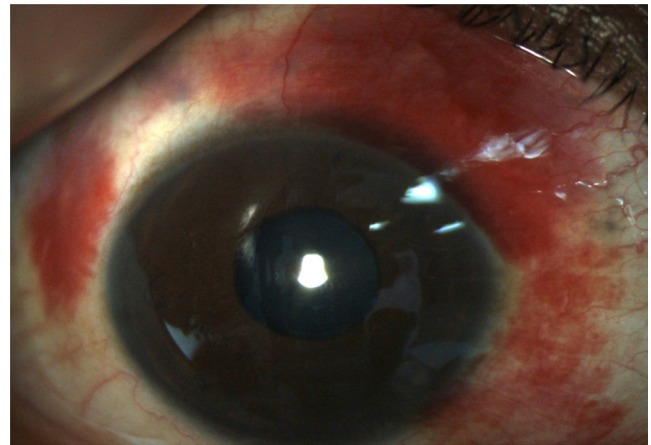


Fig. 1. Sub-conjunctival hemorrhage.

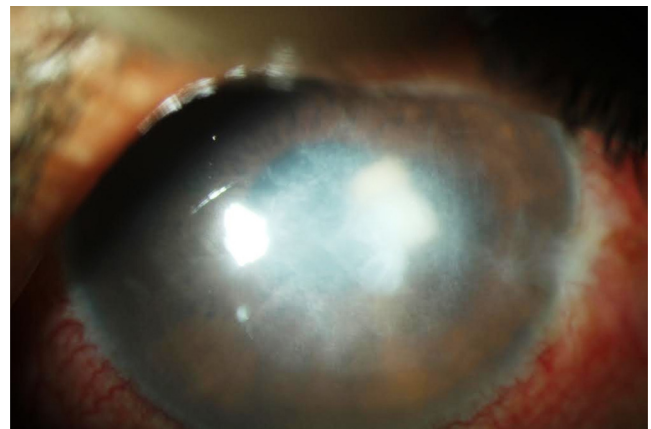


Fig. 2. Keratitis.

background hemorrhages (6.7% of the patients) [8]. In contrast, investigators from Singapore [7] found that the most frequent signs involved the macular region of the retina in form of macular hemorrhage (69%) and edema (77%), often occurring together. This type of macular involvement was followed by retinal vasculitis (23%), intermediate uveitis (12.3%) and posterior vitreous cells (10.8%). Interestingly, subconjunctival hemorrhage was an infrequent finding in this study [7].

Table 1

Ocular complications of dengue fever/dengue hemorrhagic fever either due to hemorrhagic or inflammatory mechanisms. MC, most common.

S. No.	Anterior segment abnormalities	Posterior segment abnormalities	Neuro-ophthalmic disorders	Others
1.	Subconjunctival hemorrhage (MC) [8] (Fig. 1)	Retinal hemorrhages (Fig. 6)	Optic neuritis	Panophthalmitis (Fig. 13)
2.	Keratitis (Figs. 2 and 3)	Posterior uveitis	Cranial nerve palsies (Figs. 11 and 12)	Periorbital ecchymosis
3.	Corneal erosion	Foveolitis	Neuromyelitis optica	Globe rupture
4.	Acute angle closure glaucoma (Figs. 4 and 5)	Maculopathy		Other hemorrhagic complications
5.	Anterior uveitis	Retinal vascular occlusions (Fig. 7)		
6.	Intermediate uveitis	Serous retinal detachment		
7.		Cotton wool spots		
8.		Hard exudates (Fig. 8)		
9.		Dilatation and tortuosity of vessels (MC) 8 (Fig. 9)		
10.		Subhyaloid hemorrhages (Fig. 10)		

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