Ocular Manifestations of Chikungunya Infection

Subjects: Infectious Diseases

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The Chikungunya virus (CHIKV) can cause long lasting symptoms and manifestations. The most frequent ocular symptoms of CHIKV infection included ocular pain, inflammation and reduced visual acuity, whilst conjunctivitis and optic neuritis were the most common manifestations of the disease.

Keywords: Chikungunya infection ; ocular manifestations ; ocular symptoms

1. Introduction

The Chikungunya virus (CHIKV) is an arbovirus transmitted through the bite of the female mosquito of the Aedes spp. family [1]. In the 1950's, the first outbreak was observed in Tanzania, in patients who reported a hypothermia accompanied by intense joint pain [2]. Over the next fifty years, outbreaks of the disease were registered in Thailand (1950s' and 1960s') and India (1960s' and 1970s'). Since 2004, the CHIKV infection has spread in many countries of Africa, Asia, Europe and especially in the Americas [3]. According to the Pan American Health Organization (PAHO), 1.7 million cases of the disease have been reported up to September 2015. Of these, >770,000 cases were confirmed in Brazil from 2013 to 2017 [4]. The European Centre of Disease Prevention and Control (ECDC) indicated that in first 6-months of 2021, the global reach of the disease was of 85,304 notified cases [5].

Diagnosis is sometimes difficult as the CHIKV infection presents symptoms, which are similar to those caused by other arboviruses (dengue, Zika and Mayaro) [6]. Most of the infected individuals are symptomatic. The acute phase of the disease (up to three-weeks post-infection) is characterized by a range of nonspecific symptoms such as high fever (>39 °C), headache, fatigue, rash, myalgias and arthralgias. Of those, the most prevalent is a severe and often debilitating pain and swelling of the joints [7]. The post-acute phase (which lasts from the third week for up to three months following infection) is characterized by resolution of the acute phase symptoms, except for persistent polyarthritis, often observed as joint stiffness, pain and oedema [8]. The available data varies with the population studied and the methodologies used. Usually, >50% of the patients infected with CHIKV in the Americas develop the chronic phase of the disease [9], suffering especially from polyarthralgia. The chronic phase can last from months to years, markedly decreasing the quality of life of the patients [10].

Besides causing joint pain, the virus can also affect other organs and systems including the nervous and cardiovascular systems, skin and kidneys [11]. Prevalence studies have been useful to aid the public health systems to define surveillance policies and design the better management of infectious diseases [12]. Reports indicate that the eyes can be affected by CHIKV; however, the prevalence and the most common types of ocular manifestations triggered by the disease are unclear, as well as their associations with population characteristics.

2. Ocular Manifestations of Chikungunya Infection

NA viruses that cause infectious diseases can cause a wide spectrum of ocular disorders [13]. Although the most common symptoms of CHIKV infection are fever, headache, rash and polyarthralgia, the virus appears to present tropism for the nervous system in the ocular tissue [14]. In fact, eye alterations are recognized as important complications of Chikungunya fever, although their exact characteristics had not previously been defined [15][16].

The data indicates that CHIKV infection may cause eye alterations in a quarter of the infected population. This frequency implies the relevance of these manifestations, and the possible burden they can imply in the health system and in the patient's quality of life [17].

Ocular pain and inflammation, as well as visual defects were the ocular symptoms most associated with CHIKV infection. Retro-orbital pain is a frequent symptom of the viral infection which can be present in the acute phase of the disease and sometimes become persistent following disease resolution [17]. Furthermore, the exact temporal relationship between the appearance of typical symptoms such as fever and headache and of ocular pain is unclear. Its appearance can vary depending on the ocular structure affected and the degree of ocular involvement [18]. A range of ocular structures can become inflamed during CHIKV infection, including the choroid, uvea, nerve, vitreous, retina and retinal vessels [19]. Even though each eye structure has its own physiology, redness of the eye has been considered as the main indicative of virus-induced eye inflammation [19][20][21].

Different types of visual defects have been linked to CHIKV infection. The decreased visual acuity is the major visual defect linked to the virus. Moderate to severe reduction in visual acuity has been observed in CHIKV-infected patients [22][23]. Reduced visual acuity has also been reported for other arbovirus infections (Zika and dengue) [24][25].

The most common ocular manifestations of CHIKV infection included corneal involvement, conjunctivitis, episcleritis, optic neuritis and uveitis. Corneal involvement was found in three patients. The corneal tissue (mainly corneal fibroblasts and corneal endothelium) is suggested to be the eye structure with the greatest viral tropism [14]. Indeed, viral RNA was detected in the eye tissue of patients and corneal grafts from potential donors—even in one with negative serology [26]. Keratitis is the most common form of corneal involvement [15].

Conjunctivitis may be the most prevalent ocular manifestation. It is observed in the acute phase of the disease [27] and it is the most common eye manifestation in travellers who go to countries where this arbovirus is emergent [28]. Optic neuritis was the second most frequently reported ocular manifestation. Uveitis was another ocular manifestation identified. Patients with uveitis may present vision loss, scotoma, colour vision and peripheral field defects [29]. This manifestation can occur either in the acute or chronic phase of the disease [30]. Anterior uveitis (in the form of retinitis, choroiditis or neuroretinitis) is more common than posterior uveitis [31] which can be acute in immunocompromised patients [32].

3. Conclusions

Ocular pain, inflammation and reduced visual acuity were the most common symptoms, whilst conjunctivitis and optic neuritis were the most common manifestations of the disease. Women are the most affected by ocular symptoms and manifestations of CHIKV infection. The few available reports and the moderate-high ROB observed for these studies, highlight the need for further research in the field to gather more substantial and detailed evidence on the link between CHIKV infection, the eye and age/gender. Ocular alterations are meaningful occurrences of CHIKV infection, which can substantially affect the patient's quality of life. This should bring awareness when dealing with infected patients.

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