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TFOS: Unique challenges and unmet needs for the management of ocular surface diseases throughout the world

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Allergy
Leprosy

1. Introduction

Ocular surface diseases (OSDs) are extremely common eye diseases, which are leading causes of visual impairment when untreated. However, numerous challenges exist to the effective treatment of OSDs throughout the world. These challenges are often linked to climate, geographical location, poverty, cultural beliefs, regional conflicts, limited access to clinical care and therapeutics, and poor awareness and education in the general population. To better understand these difficulties, the Tear Film & Ocular Surface Society (TFOS) invited experts from Oceania; Eastern and Southern Asia; the Middle East; Northern, Western, Eastern and Southern Africa; Europe; United States and Canada; Mexico and Central America; South America (Spanish-speaking countries); and South America (Portuguese-speaking country, i.e. Brazil) to address from their perspective the unique challenges and unmet needs for the management (e.g., diagnosis and treatment) of OSDs in their regions. TFOS also asked these experts to address what they perceived as the short and long-term scientific and clinical solutions. These medical needs and proposed solutions are the subject of a TFOS Special Meeting report, which appears in entirety on the TFOS website (www.tearfilm.org).

The following excerpts from this report highlight the challenges in two parts of the world, namely the Middle East and Portuguese South America (Brazil). These regions were selected to offer a glimpse of the diverse contrasts around the world for the unmet needs in OSDs, whether they are from ultra-modern cities to rural farms, deserts to jungles, or indigenous reserves to war-ravaged lands. Analogous and/or additional challenges were reported by experts from the other regions included in this TFOS Special meeting report.

1.1. Middle East

As reported by Drs. Elias F. Jarade, Maroun Eid, Reeda Bou Said and Nicole Mechleb, conditions that present particular challenges in the Middle East include trachoma, keratoconus (with pediatric keratoconus being especially problematic), as well as traumatic limbal stem cell deficiency, due to the continual armed conflict in many areas. Dry eye disease (DED) is also common. Management of eye disease is limited by lack of eye banking facilities, patients' medical attitudes (e.g., poor compliance), social medical behavior (e.g. beliefs based on non-evidence-based medicine or myth-based medical advice), and the lack of awareness of eye disease among non-ophthalmic practitioners.

Trachoma is a leading cause of preventable blindness. A survey showed that trachoma plays a major role in blindness in the Middle East, with prevalence of around 25% [1].The visual rehabilitation of keratoconus also presents particular challenges. It is difficult to use hard contact lenses because of the sand and allergens in the air and the resultant dryness of the eyes. It is difficult to obtain tissue for corneal transplant or partial transplant, such as the deep anterior lamellar keratoplasty procedure. Visual rehabilitation is expensive and usually not covered by a third party in this area of the Arab world. Despite these challenges, Dr. Jarade has proposed an algorithm for the treatment of both pediatric [2]and adult (Figure 3, TFOS Special Meeting report) keratoconus.

Blast injury, penetrating eye injury, and thermal and chemical burns incurred during armed conflict may require repeated surgery, leading to limbal stem cell deficiency. Modern methods of rehabilitating the ocular surface using transplantation of stem cells and *ex vivo* cultivated limbal stem cells are practically non-existent in the Middle East.

A recent article in the *Gulf News* [3]stated that DED is the major eye problem in the Middle East and Northern Africa. Its high prevalence was attributed largely to the arid climate, the use of air conditioners, and the widespread use of electronic devices. High prevalence of DED has been demonstrated in other studies in Saudi Arabia [4,5].

Eye banking is absent in most of the Arab world. The only eye bank, which is in Lebanon, functions at very low capacity. The number of corneas needed markedly exceeds the number available. The educational level and the moral concepts of the Arab world population discourage the donation of corneas or other organs. The cost of imported corneal tissues (US$2,500 to US$3,000) is very high relative to the income in most of the Arab world. Moreover, the quality of imported tissues is not optimal, because delivery takes several days and the tissues that are exported are often of poorer quality than those retained for use in the exporting country. Before eye banking can be established in the Middle East, the population needs to be educated about the need to donate corneas and other organs, and a new codified strategy needs to be created to optimize the capabilities of the eye and organ banking system.

A significant unmet need for eyecare in the Middle East relates to the limited access to eye care specialists. Lebanon, for example, has more than 500 ophthalmologists, but only about 35 of those have fellowship training in cornea and OSD.

There is a need to develop campaigns to increase patient awareness of the existence and progression of ocular diseases in order to reduce the risks of blinding visual complications. Patients need to appreciate the importance of regular eye examinations, and these must be included as part of the healthcare system. Regular follow-up must be provided for patients with ocular disease, and patients must comply with the follow-up regimen. All of this requires a healthcare system that can provide education, accessible medical facilities with specialized personnel, and comprehensive services for preventing and managing disease.

1.2. Portuguese South America (Brazil)

As reported by Dr. José P. Gomes, a large percentage of the Brazilian population lives below the poverty line, and social problems are significant. Visual deficiency in Brazil reflects this situation, with non-corrected refractive errors, cataract, glaucoma, diabetic retinopathy, age-related maculopathy, and OSDs being common. Most of the OSDs reflect both the geographic location and socioeconomic characteristics of the country. The climate is predominantly wet and hot, predisposing to certain eye diseases. Infectious and allergic diseases, DED, as well as trauma, are important causes of visual problems in Brazil. As in other developing countries, bacterial, fungal, and parasitic keratitis are common. Often, these infections are secondary to trauma or to other types of diseases, but they may also be related to contact lens wear. Fungal keratitis may also be related to environmental exposure, as it used to be common with sugar cane workers. Neglected infectious diseases that are typical in tropical areas may also be responsible for OSDs.

With sufficient commitment of funding and resources, many of the diseases prevalent in the tropical and poor areas of the world could be eliminated. Trachoma, which is now rarely found endemically in some areas, especially in the northeastern region, was mostly eliminated with the WHO-SAFE (Surgery Antibiotic Facial cleanliness Environmental improvements) and other strategies from the public system. Leprosy, however, continues to be a problem, with Brazil having one of the highest prevalence rates of this disease worldwide.

Especially in the northern part of Brazil, the Amazon region, which comprises almost 40% of the total area of the country, people live on the rivers. Besides being in direct contact with the rivers, they are subjected to ultraviolet light that reflects off the water. Among the diseases typical in this environment is parasitic keratitis, some types of which are underdiagnosed and still under investigation, e.g., *Mansonella* and other

types of filariasis. Degenerative diseases like pterygium affect a large part of the population. A joint study between the Federal University of São Paulo and the Federal University of Amazonas sought to discover the main causes of visual problems in this part of the world. A high prevalence of pterygium – almost 60% – was found in the Amazon region [6]. Pterygium was the cause of 14% of visual problems and 4% of blindness in the Amazon population. Because of the high numbers and severity of pterygia, public health efforts should be devoted to preventing them and providing the best surgical strategies for management.

In summary, Brazil, as other South and Latin American countries, has characteristics of both developed and non-developed worlds. Tropical OSDs, such as infection and pterygium are common conditions that should be addressed, and more studies on health and social policies for treatment and prevention are needed.

2. Conclusions

A myriad of unique challenges and unmet needs for the management of OSDs exist throughout the world. These challenges and needs, as well as the scientific and clinical solutions, may vary significantly depending upon whether, and where, one lives in Oceania, Asia, Africa, Europe and the Americas. Please see the TFOS website for a full report of these global unmet needs and challenges.

Declaration of competing interest

The authors have no conflicts of interest with regard to this report.

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