

Summer, sun and dry eyes disease. Facts and myths



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HIGHLIGHTS

Dry eye disease is a chronic disorder of the tear film and ocular surface, where effective management requires not only lubrication but also reducing tear evaporation, maintaining eyelid hygiene, and protecting the eyes from environmental factors, especially during summer.

ABSTRACT

Dry eye disease is a chronic, multifactorial disease of the ocular surface that requires long-term and regular treatment. The symptoms of DED are influenced by environmental factors and, in some patients, may worsen during the summer months. Effective treatment should be based on selecting a preparation according to the dominant mechanism of DED. Therefore, in addition to frequent, daily lubrication of the ocular surface, it is also important to support the lipid layer of the tear film, promote regeneration and protection of the ocular surface, and maintain regular eyelid hygiene.

Key words: dry eye disease, tear film, Meibomian gland dysfunction, eyelid hygiene, Demodex

DRY EYE DISEASE: A DISORDER OF THE TEAR FILM AND OCULAR SURFACE, NOT JUST “DRY EYES”

Dry eye syndrome (DES), or dry eye disease (DED), is a chronic, heterogeneous disease of the ocular surface. According to the TFOS (Tear Film & Ocular Surface Society) DEWS (Dry Eye Workshop) III definition, it is characterized by a loss of tear film homeostasis accompanied by ocular symptoms. Tear film instability and hyperosmolarity, ocular surface damage and inflammation, and neurosensory abnormalities play key pathophysiological roles [1].

The definition of DED is important from the perspective of primary care physicians, optometrists, and pharmacists because patients frequently report nonspecific symptoms such as burning, a gritty or sandy sensation under the eyelids, tearing, redness, eye fatigue, photophobia, or transient blurred vision. These symptoms are not always immediately associated with DED, particularly because the condition is often equated simply with a sensation of ocular dryness.

Dry eye disease traditionally encompasses tear film instability and hyperosmolarity, ocular surface inflammation and damage, and neurosensory abnormalities. In clinical practice, these mechanisms often coexist and exacerbate one another, while the presence of systemic diseases or the use of medications may make it difficult to identify the predominant mechanism.

In aqueous-deficient dry eye, the lacrimal gland does not produce a sufficient volume of tears, resulting in reduced tear film volume, increased osmolarity, and inadequate lubrication of the ocular surface. In environmentally induced evaporative dry eye, tear production may be normal or even increased, but the tear film is unstable and evaporates too rapidly. The most common cause of this mechanism is meibomian gland dysfunction, as the gland orifices are located along the free eyelid margins.

Chronic blepharitis, including inflammation associated with *Demodex* infestation, may also play an important role. *Demodex* mites residing in the eyelash follicles and the orifices of the eyelid glands may contribute to obstruction and even atrophy of the meibomian gland orifices [2]. These glands are responsible for producing the lipid layer of the tear film, which limits tear evaporation. When the quantity or quality of meibomian secretions is abnormal, the lipid layer becomes deficient, leading to increased evaporation and tear film instability [2].

Excessive evaporation and/or aqueous tear deficiency lead to tear film hyperosmolarity. Hyperosmolarity damages corneal and conjunctival epithelial cells as well as goblet cells, both directly and indirectly through the induction of inflammation. This results in further deterioration of tear film quality and stability and a further increase in tear film hyperosmolarity. A vicious cycle thus develops, in which tear film abnormalities, inflammation, and ocular surface damage mutually exacerbate one another [1, 4].

Discomfort and pain in dry eye disease result from loss of lubrication, increased friction, and the effects of neurosensory and inflammatory factors. Transient visual disturbances, in turn, are caused by irregularities of the tear film and the optical surface of the eye. Severe or prolonged dry eye disease may lead to chronic damage and marked inflammation of the conjunctiva and cornea [1].

SUMMER AND DRY EYE DISEASE

Dry eye disease is a chronic condition that persists throughout the year, with possible periods of exacerbation and remission depending on the season and environmental factors. In some patients, conditions typical of the summer months may increase tear film instability and aggravate ocular surface symptoms.

During summer, average ambient temperatures increase, which may contribute to enhanced tear film evaporation. Frequent temperature changes may constitute an additional potentially harmful factor, for example when moving from a warm outdoor environment into air-conditioned rooms. By reducing ambient humidity and increasing air circulation, air conditioning may increase tear evaporation, destabilize the tear film, and exacerbate symptoms of dry eye disease [4].

Fluctuations in ambient humidity are also important. Low humidity is a well-established factor that can impair tear production and adversely affect tear film stability. In addition, dry air alters the concentration of water vapor in the surrounding environment, which in turn influences the rate of tear evaporation from the ocular surface [5].

Higher temperatures also encourage greater outdoor activity. Under these conditions, the ocular surface is exposed to wind, dust, pollutants, and allergens, all of which may have an irritant effect. Consequently, during the summer months, symptoms of dry eye disease often overlap with those of allergy or ocular irritation [4]. In addition, increased exposure to ultraviolet (UV) radiation may induce the formation of reactive oxygen species and oxidative stress, which are involved in mechanisms of ocular surface damage and inflammation [6].

Summer is also a time of holidays, travel, and changes in daily routines. During this period, patients travel more frequently, use portable digital devices more often, and may be more likely to wear contact lenses. Travel involves exposure to varying temperature and humidity conditions. Air travel may further exacerbate dry eye disease symptoms because of low cabin humidity, air conditioning, and increased tear film evaporation.

In some patients, contact lens wear may cause microdamage to the ocular surface and exacerbate symptoms of dry eye disease. Some contact lens care solutions may also adversely affect tear film stability [7]. When using mobile devi-

ces, blink frequency decreases, which increases tear film instability and promotes tear evaporation. In addition, sustained visual attention to the screen may delay the patient's response to the first signs of discomfort, so symptoms may only become noticeable once they are more pronounced, for example as burning, a sensation of dryness, or transient blurred vision [7].

During the summer months, particular importance should be placed not only on regular lubrication of the ocular surface, but also on reducing tear film evaporation, protecting the eyes from environmental factors, and maintaining proper eyelid margin hygiene.

FROM MECHANISM TO PRODUCT SELECTION: LUBRICATION, LIPIDS, REGENERATION, AND EYELID HYGIENE

In the practice of primary care physicians, pharmacists, and optometrists, patients presenting with symptoms of dry eye disease require an attempt to identify the likely predominant disease mechanism. Management should include not only the use of lubricating eye drops, but also patient education, reduction of factors that exacerbate symptoms, and regular eyelid margin hygiene. It is important to explain to patients that dry eye disease is a chronic condition requiring ongoing treatment, not only during periods of exacerbation. The Softeye range includes a broad selection of ophthalmic products, including eye drops, gels, and eyelid wipes, allowing treatment to be tailored to individual patient needs. Softeye Duo contains 0.15% sodium hyaluronate and 2% dexpanthenol, providing both ocular surface lubrication and a soothing effect. It may be particularly useful in patients with common symptoms of dry eye disease, including burning, irritation, and ocular discomfort.

In patients whose dry eye symptoms worsen in air-conditioned environments, during prolonged screen use, or with exposure to dry air, reducing tear film evaporation is particularly important. In addition to its lubricating component, Softeye Lipid Balance contains lipid-based ingredients, including 0.25% castor oil, vitamin E, and surfactants, which help support the outer lipid layer of the tear film and reduce evaporative tear loss.

In patients with significant discomfort caused by minor abrasions or superficial ocular surface injury, it is important to protect the ocular surface and reduce friction between the eyelids and the eye. Softeye Gel is a lubricating gel formulation containing 0.15% sodium hyaluronate and 1% xanthan gum. Its gel consistency provides a protective layer over the ocular surface and helps minimize friction during blinking. Softeye NET is also available as a gel and additionally contains 0.3% netilmicin, a broad-spectrum aminoglycoside antibiotic. The addition of netilmicin helps reduce the risk of bacterial infection. If warning signs develop, such

as purulent discharge, worsening pain, photophobia, reduced vision, or failure to improve, the patient should be referred to an ophthalmologist.

Regular eyelid hygiene is an important component of dry eye disease management, particularly in patients with meibomian gland dysfunction. It typically includes the use of warm compresses (approximately 40°C), massage directed toward the meibomian gland orifices, and cleansing of the eyelid margins with dedicated products.

Softeye Blepha and Softeye Blepha+ are ophthalmic wipes intended for eyelid hygiene. They contain, among other ingredients, sodium hyaluronate, aloe vera, tea tree-derived extracts, and terpinen-4-ol, which is used in the management of Demodex-associated blepharitis. Softeye Blepha+ also includes a warming compress designed to facilitate the expression of retained meibomian gland secretions and support eyelid margin cleansing.

Ophthalmic wipes are easy to use and should be applied by gently cleansing the closed eyelids and eyelashes from the outer toward the inner canthus. A separate wipe should be used for each eye.

TABLE 1

Overview of Softeye products and their use in dry eye disease.

Softeye Duo	lubrication and relief of ocular irritation
Softeye Lipid Balance	lubrication and reduction of tear evaporation
Softeye Net	protective gel with netilmicin for ocular surface abrasions and risk of bacterial infection
Softeye Gel	lubrication and ocular surface protection
Softeye Blepha/ Blepha+	eyelid margin hygiene (Blepha + additionally a warming compress)

CONCLUSIONS

Dry eye disease is a chronic, multifactorial disorder of the ocular surface that requires regular, long-term management. Symptoms are influenced by environmental conditions and, in some patients, may become more pronounced during the summer months. Effective treatment should be tailored to the predominant mechanism of dry eye disease. In addition to frequent daily lubrication of the ocular surface, management may therefore include support of the tear film lipid layer, protection and recovery of the ocular surface, and regular eyelid hygiene. Because the term "dry eye syndrome" focuses primarily on a constellation of symptoms, contemporary terminology has shifted toward the underlying pathophysiological changes affecting the ocular surface. The term "dry eye disease" therefore more accurately reflects the complex and heterogeneous nature of the condition.

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