

# Dry eye disease: a comprehensive overview for pharmacists

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## Abstract

The tear film, which provides moisture and protection to the eyes with each blink, can be compromised by various conditions, leading to ocular discomfort such as dry eyes. Individuals presenting with symptoms of dry eyes in a pharmacy setting, are often recommended lubricating eye drops as a first-line treatment. However, incorporating nutritional interventions may offer additional support and complement the effectiveness of standard therapies.

**Keywords:** dry eye disease, ocular discomfort, nutritional interventions, standard therapies

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## Introduction

Dry eye disease is a multifactorial and complex condition, characterised by a disruption in the tear film. This results in ocular discomfort, visual disturbances, and potential damage to the ocular surface. The tear film, comprising lipid, aqueous, and mucin layers, is essential for maintaining eye health and clear vision. Any changes in the production, composition or drainage of tears can lead to the development of dry eye disease. There are glands on the edge of the eyelid, the meibomian glands that secrete the lipid layer of the tear film. Any changes on the meibomian glands, for instance blockage, will result in an unstable tear film and increased tear evaporation.

At local pharmacy level, pharmacists play a crucial role in recognising symptoms, as well as advising individuals with dry eye disease on appropriate treatment. Pharmacists also educate on both pharmacological and non-pharmacological dry eye disease management strategies.

## Aetiology of dry eye disease

Dry eye disease arises from either reduced tear production or excessive tear evaporation, or a combination of both, which leads to an unstable tear film. Various factors contribute to the development of dry eyes, including meibomian gland dysfunction. This occurs when the dysfunction of the meibomian glands leads to an insufficient lipid layer, causing increased tear evaporation.

Environmental factors such as low humidity, air pollution, and exposure to cigarette smoke can exacerbate symptoms by accelerating tear evaporation. Age-related decline, can negatively affect tear production, which can compromise the tear film integrity. Hormonal changes and resulting hormonal fluctuations, particularly in women during pregnancy, menopause, and hormone therapy, are known contributors to dry eye disease. Autoimmune disorders such as Sjögren's syndrome and rheumatoid arthritis directly impair tear production. Certain drugs, including antihistamines, antidepressants, decongestants,

and some glaucoma treatments, can reduce tear secretion. Eye surgeries may result in nerve disruption, further compromising tear production, leading to eye dryness. Contact lenses, particularly if the lens is poorly fitted or not properly maintained, can lead to dry eye symptoms due to eye surface and altered tear film quality.<sup>1,2</sup>

## Clinical presentation

Patients with dry eye disease commonly report a burning, stinging, or scratchy sensation in the eyes, often described as a gritty feeling. Other hallmark symptoms include stringy mucus in or around the eyes, light sensitivity (photophobia), redness, and irritation. The patient may report blurred vision, eye fatigue and excessive tearing as a reflex response to dryness. The sensation of having a foreign body in the eye is a primary concern amongst individuals with dry eyes, contributing to discomfort and visual disturbance.<sup>2</sup> These symptoms can vary in intensity and may fluctuate over time. Dry eye disease is therefore considered a long, lifetime condition. If left untreated, dry eye disease can severely impact an individual's quality of life, interfering with daily activities such as reading, driving, and prolonged screen use.

## Treatment options

### Pharmaceutical intervention

The management of dry eye disease is focused on improving tear film stability and relieving symptoms. Eye drops, known as artificial tears are the primary treatment for dry eyes and help reduce inflammation and improve lubrication.<sup>4</sup>

The main formulations are described below:

- 1. Lubricants** are first-line treatment for most patients with dry eye disease. These formulations contain ingredients such as cellulose derivatives, carbomers, povidone and hyaluronic acid. These ingredients increase the thickness of the tear film and reduce evaporation.
- 2. Electrolytes** such as sodium, potassium, and chloride help maintain tear film osmolarity and ocular surface homeostasis.

**Table I:** Examples of pharmaceutical agents in dry eye intervention

Brand	Action	Sustained relief	Evaporative status	Nocturnal use
Artelac™	Splash moisture	Intense	Advanced complete	Advanced gel
Blink™	Contacts refresher	Intense +	-	-
Optive™	Original	Fusion	Plus	Gel drops
Systane™	Ultra-fast action	Complete long-lasting hydration	Balanced	Gel drops
Xailin™	Fresh hydrate	HA/Plus gel	-	Gel drops

Osmo-protectants containing betaine and glycerine protect against cellular stress and dehydration.

**3. Lipid-based and surfactant** formulations help replenish the deficient lipid layer and prevent tear evaporation, particularly in cases of meibomian gland dysfunction. Examples include castor oil, paraffins and lanolin.<sup>4</sup>

**4. Preservative-free formulations** are recommended for patients requiring frequent application, those with sensitive eyes and for single application.

**Note:** Preservatives protect the tear substitute by inhibiting bacterial growth once the bottle has been opened. Some preservatives can irritate the eyes, particularly in severe dry eye cases.<sup>5</sup>

There is growing evidence supporting the use of nutritional supplements to complement pharmacological treatment. Studies have shown that certain nutrients help the eyes stay properly hydrated.<sup>3,6,7</sup>

Key nutrients include:

- Omega-3 Fatty Acids, demonstrated to reduce inflammation and stabilise the tear film.
- Vitamin A (Retinol) – essential for maintaining corneal health and promoting tear production. Improvement of tear quality.
- Vitamins B<sub>2</sub>, B<sub>5</sub>, and B<sub>12</sub>, support tear film stability and optic nerve function.
- Vitamin D and E possess anti-inflammatory properties that may enhance tear film quality. Vitamin C protects against oxidative stress, improves blood circulation and assists in collagen synthesis.
- Lutein and Zeaxanthin are antioxidants that protect against oxidative damage, particularly harmful UV rays.
- Zinc facilitates vitamin A transportation to the retina and

supports melanin production, which protects the eyes from UV damage.

- Several oral supplements combining these nutrients are available, such as OcuVite Complete™, Biogen Ocumax Plus™, FitHealth Dry Eye™, Dry Eye Plus™ and Vital Eye Health™.

Pharmacists should counsel individuals on the potential benefits of these supplements, but also advise caution in specific populations. In high doses, some supplements can be unsafe or contraindicated, such as in patients on anticoagulants who may be at risk when taking omega-3 fatty acids.<sup>7</sup>

Additionally, warnings should be issued to smokers against high-dose beta-carotene and Vitamin E consumption.

**Non-pharmaceutical intervention**

**Lifestyle and environmental modifications**

In addition to pharmacological interventions, individuals should be educated on lifestyle modifications to minimise symptom exacerbation, such as avoiding dry or windy environments, using humidifiers to maintain air moisture, reducing screen time, and staying hydrated to support tear production.

**24-Hour dry eye relief (Day and night time)**

Please see Table II

**Long-term outlook**

It is likely that individuals suffering from dry eye disease may need to take indefinite measures to control dry eye symptoms. People with dry eye disease may experience complications such as eye infection, damage or inflammation of the cornea, vision loss and decreased quality of life.<sup>2</sup>

Pharmacists should refer individuals to a medical doctor or ophthalmologist if they experience the following symptoms:

**Table II:** Treatment options for dry eye syndrome

Drop	Dosage	Indications	Contraindications and warnings
Xailin® Gel	• 1 drop 2–4 times a day	• Lubricates and protects the eye in certain eye conditions, and provides long-lasting relief of dry eye sensations • Preservative-free (in the eye)	• The safety of use in pregnancy or while breastfeeding has not been established
Xailin® Night (Ointment)	• Can be used as often as required	• Provides strong, soothing night-time relief of dry eye sensations; acts as a barrier against moisture loss; ideal for use at bedtime • Preservative free	Not to be used if allergic to lanolin alcohols

Table II: Continued

Drop	Dosage	Indications	Contraindications and warnings
Xailin Plus 0.2 % HA	• 1 drop in conjunctival sac 3–4 times per day	<ul style="list-style-type: none"> <li>• Maintains and restores the condition of the eye surface for prompt and lasting relief from dry, irritated and tired eyes due to external factors</li> <li>• Preservative free</li> </ul>	<ul style="list-style-type: none"> <li>• Do not touch eye or any surface with the tip of the dropper</li> </ul>
Xailin® Hydrate	• 1-2 drops 2–4 times per day	<ul style="list-style-type: none"> <li>• Lubricates and protects the eyes, and provides immediate relief of dry eye sensations</li> <li>• Preservative-free (in the eye)</li> </ul>	<ul style="list-style-type: none"> <li>• The safety of use in pregnancy or while breastfeeding has not been established</li> </ul>
Xailin® Fresh (vials)	• 1 drop 2–4 times a day	<ul style="list-style-type: none"> <li>• Daily, single-dose solution for soothing and lubricating dry, red and irritated eyes</li> <li>• Preservative free</li> </ul>	<ul style="list-style-type: none"> <li>• Can be used on contact lenses</li> </ul>

Note: Always shake the drops before use, and to avoid contamination, never touch the dropper tip of the container to any surface

- Persistent or worsening symptoms despite treatment.
- Severe eye pain, redness or sudden vision changes.
- Frequent infections or corneal ulcers.

## Conclusion

Pharmacists are in a unique position to identify dry eye disease and recommend appropriate treatments. Additionally, they can recommend a combination of artificial tears, nutritional supplements, and environmental adjustments that can provide symptomatic relief and improve patients' quality of life. Pharmacists can also be instrumental in identifying agents that may contribute to or exacerbate dry eye disease.<sup>7</sup>

Long-term management strategies are essential, as dry eye disease is often a chronic condition requiring ongoing care. Healthy nutrition and staying hydrated helps to ensure that eyes

get the vitamins and minerals needed, but a topical remedy may be required to relieve symptoms and improve tear film quality.<sup>2</sup>

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