

## Dry Eye Home and Office Conventional Treatments Explored

### Dry Eye Disease Overview

Dry eye is one of the most under-diagnosed ocular diseases, and yet it is the most common reason why patients go see their eye care professional in the United States. Dry eye occurs when the eyes produce poor quality or low quantity of tears.

### Symptoms of Dry Eye

Common signs and symptoms of dry eyes include: burning, itchiness, tearing, light sensitivity, tired eyes, and contact lenses discomfort, including blurred vision which worsens at the end of the day or after prolonged computer or other near work. These symptoms can significantly diminish the quality of life by hindering daily activities such as reading, computer usage, contact lens wear, enjoying outdoor activities, or working in an air-conditioned environment.

Severe dry eye can affect up to 10% of the population over 50 having a major impact on their quality of life. Many dry eye patients complain that those symptoms worsen throughout the day. Dry eye symptoms are amongst the most common reasons people visit their eye doctor. Untreated dry eye can lead to pain, corneal scarring, and decrease in vision.

How common dry eye disease is really dependent on how we define the disease. We can make some broad conclusions based on the Tear Film and Ocular Surface Society (TFOS) Dry Eye Workshop (DEWS) II Study. Those findings indicate that signs of dry eye can occur in up to 75% of the population. That number includes both symptomatic and non-symptomatic patients. As I explain to patients, whether you are symptomatic or not, there are long term consequences that can permanently alter your quality of life and vision. Just as a hypertensive patient with no symptoms is treated, dry eye patients with non-symptoms must also be treated for their long-term well-being.

The DEWS study found the following:

- 1- the incidence of dry eye disease increases with age.
- 2- Women were found to have a higher incidence than men and the prevalence rate became more significant with age. This is often caused by hormonal changes due to aging and menopause or medical conditions.

Other studies have found that both school-aged children and young adults show surprisingly high rates of dry eye. These studies hypothesize that with the increased use of digital device in these populations, the prevalence of dry eye increases.

Dry Eye is not well understood by most people yet it affects a large percentage of the population. It is quite common for people to ignore dry eye or even mistake it for allergies, environmental conditions or just tired eyes from work. Certainly, many environmental conditions can aggravate dry eye symptoms but they are not the underlying cause of dry eye.

The eyes need a constant layer of tears to maintain and protect the out covering of the eye (the cornea and conjunctiva). In dry eye disease, changes to the health of the glands that produce components of tears (meibomian gland and lacrimal gland) can result in poor quality and quantity of the tear film you produce. Poor quality and quantity of tear film causes poor nourishment and protection to the ocular surface of your eye which eventually damages your eye's surface and leads to symptoms of dry eye.

Dry eye can be separated into 2 types: aqueous deficient and evaporative. Both types of dry eye results from deficiencies that negatively affect the cornea. Tear film can be broken down into essentially 3 layers. The inner layer is composed of mucin, which provides lubrication and bonds to the cornea surface. Without adequate mucin production, the aqueous (water) component of the tears is repelled from the corneal surface. The middle layer is the aqueous layer which bonds to the mucin. The last, outer layer, is composed of oils (also called lipids) which lubricate the underside of the eyelids as they slide across the cornea during a blink as well as slow down the evaporation of the aqueous layer.

The aqueous deficient form of dry eye is caused by low tear production. The most common form of dry eye is evaporative and that accounts for up to 85% of all dry eye cases. Over 80% of evaporative dry eye cases have meibomian gland dysfunction (MGD). Meibomian glands are found in the upper and lower lids and are responsible for the oil (lipid) production for your tears. This lipid, also known as meibum, comprises the bulk of the outer tear film. Without enough meibum, the aqueous component of the tears breaks down and evaporates quickly. Typical symptoms experienced would include burning, itchy even painful eyes due to the exposure of the cornea surface to the environment without the protection of the tear film.

Though we do not know the exact causes of meibomian gland dysfunction, we do know the sequence of this disease process. Over time, the meibum thickens and there is increased loss of cells within the glands. Together, this leads to a reduction in meibum production and blockage of the meibomian ducts. With the loss of meibum, eyelids can become inflamed further reducing the meibum secretion. The stagnation of meibum secretion coupled with inspissated meibomian glands can cause bacteria to proliferate on the lid margins. The byproducts of these bacteria can further inflame the eyelid and eye further degrading the quality and quantity of tears.

It is at this point that the inflammation can become chronic and is then referred to as blepharitis. There are essentially 2 types of blepharitis – anterior and posterior. Anterior blepharitis typically associated with inflammation from skin disorders caused by bacteria, parasites or allergic reactions. On examination, flaking and scaling can be seen on the eyelids and at the base of the eyelashes. Traditional treatments would include lid hygiene (lid wipes, baby shampoos scrubbed along lash line) and topical antibiotics. Posterior blepharitis inflammation occurs due to meibomian gland dysfunction. It is quite common for patients to have both types together.

A mite (called Demodex) can be found on most faces and more common in older adults. These mites can be found in hair follicles and sebaceous glands on the face and near the eyes. There are 2 forms of this mite that can bury themselves in the root of the eyelash as well as in the meibomian duct on the eyelid and thrive.

Often times causes and symptoms overlap with evaporative dry eye, meibomian gland dysfunction and blepharitis. Multipronged treatments can be utilized by your eye care provider to address these issues.

## Causes of Dry Eye

### 1- Environmental Causes:

Hot, cold, dry, windy environments, high altitudes, sun exposure, central heating, air conditioning, hair dryers, smoke, air pollution, air travel

### 2- Medications:(prescription or over the counter)

Antihistamines, antidepressants, blood pressure medications, Parkinson's medications, birth control pills, diuretics, beta blockers, sleeping pills, pain medications, decongestants

### 3- Contact Lens Wear

Annually, two million soft contact lens wearers discontinue wearing their lenses. Approximately 50% of these patients' attribute dryness or intolerance as the primary reason for discontinuing contact lens wear.

### 4- Diseases:

Parkinson's disease, Sjogren's syndrome, rheumatoid arthritis, Lupus, lacrimal gland deficiency, diabetes, sarcoidosis, Stevens-Johnson syndrome, rosacea

### 5- Refractive eye surgeries

Dry eye is one of the most common complaints following LASIK surgery.

### 6- Hormonal deficiencies or changes

Thyroid conditions, hormonal changes during menopause

### 7- Low blink rate

Blinking spreads the tears over the cornea and also stimulates tear production. Low blink rates are most commonly found with computer use, reading, and watching TV and dry eye symptoms are often seen with these activities.

## Possible Long-Term Effects of Dry Eye

Compromised tear production can cause serious irritation to the cornea. Our tear film is not only responsible for lubrication but it also acts as an antimicrobial and mediator of nutrients to our eye surfaces. Untreated dry eye can increase the risk of infection as well as reduce our vision. Over time there is a risk of scarring and permanent damage to the cornea, conjunctiva and inner eyelids.



## CONVENTIONAL TREATMENTS

Home treatment of evaporative dry eye typically includes warm compresses applied to the eyelids twice a day, followed by fingertip massage of the eyelids. These warm compresses work best when the patient can control the temperature for 10 minutes. USB dry eye masks are available to aid in maintaining a relatively fixed temperature. Warm compresses help soften the thickened meibum, and the fingertip massage is intended to help express the now softened meibum whereby clearing the clogged ducts. Lids scrubs with single use pads or tear-free soap or shampoo to wash the eyelids and eyebrows aid in dissolving the flaking on the lids and lashes and help improve lid hygiene which can reduce the bacteria and demodex mites on these lid surfaces. Rewetting eye drops, bedtime ointments and gels as well as omega-3 supplements are also recommended as part of the home therapy. Despite this, at home treatments are often not very effective for the following reasons:

### 1- Warm compresses

Difficult for patients to maintain a steady temperature that would warm the meibum sufficiently allow expression of glands at home. Most patients drop out from this home treatment within a month due to poor relief of symptoms.

### 2- Fingertip massage

Since the meibum is poorly heated at home, massaging the glands will be non-productive. Excessive massaging can also damage the corneal surface and can lead to a condition called keratoconus whereby the corneal surface is damaged, causing substantial distortion of vision.

### 3- Eye drops

Lubrication can temporarily soothe irritated eyes. Since most dry eye sufferers do not have a shortage of tears, the eye drops just mask the evaporation condition without solving the root cause. There are newer drops that contain lipids which aid in supplementing the reduced meibum but they cannot replace the normal secretion of the meibum which occurs with every blink.

## Other treatments

### 1- Oral antibiotics:

Tetracycline, doxycycline and minocycline can reduce inflammation and diminish certain bacteria in and around the eyelids. These antibiotics do have side effects such as harming the normal flora found in our digestive tract. Also, long term use of any class of antibiotics can lead to bacteria becoming resistant to those antibiotics.

### 2- Topical antibiotics:

Ointments, gels and drops such as Azasite (azithromycin ophthalmic solution) may be prescribed, to be applied either to the lid, lid margin, or the eye itself. Azasite is quite effective against certain bacteria and also shows some anti-inflammatory properties.

### 3- Anti-inflammatory drops:

Restasis has been prescribed for dry eye treatment and it has 2 important actions: increase tear production and reduce inflammation. It takes over 3 months for patients to notice an improvement. Xiidra is another anti-inflammatory that was recently approved for dry eye treatment. Both these drugs are expensive and neither help resolve meibomian gland dysfunction.

### 4- Steroid drops:

There are several steroidal suspensions (some combined with antibiotics) that can help reduce inflammation in very symptomatic patients. Zylet (loteprednol and tobramycin), Lotemax (loteprednol) and Tobradex (dexamethasone and tobramycin) are amongst the most common. Ocular steroids can cause increased interocular pressure (leading to glaucoma), and cause premature cataract formation. Steroids are only prescribed for short-term use and can be costly to those uninsured.

## Part 3 Article coming soon: New high-tech treatments for dry eye



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