

## Understanding prevalence, demographics of dry eye disease



Michelle Dalton

July 1, 2019

### Abstract / Synopsis:

**Dry eye disease affects women at a disproportionately higher rate than men. It has a substantial negative impact on those affected, and on healthcare systems. Its impact is wide-reaching, including those affected and the healthcare systems that care for them.**

Once viewed as a painful nuisance, dry eye disease (DED) today is considered a “critical and significant public health issue” in the United States.

Symptoms include watery eyes, sensitivity to light, a burning sensation in the eyes, eye grittiness, and blurred and fluctuating vision, all of which may negatively impact quality of life.<sup>1,2</sup>

An estimated 16 million Americans have been diagnosed with DED,<sup>3</sup> but the actual number of Americans suffering from dry eye symptoms is likely much higher. Some reports indicate that nearly half of all U.S. adults experience dry eye signs and symptoms,<sup>4</sup> and 33% of patients in eye care clinics present with complaints about dry eye.<sup>3</sup>

Market Scope expects manufacturers’ global revenues for dry eye treatments to rise from \$4.6 billion in 2018 to \$6.2 billion in 2023 due to the “rapid growth of elderly populations, increasing wealth, and growing awareness of the availability of treatment in these markets.”<sup>5</sup>

### Often undiagnosed

According to the 2013 National Health and Wellness Survey, approximately 6 million people reported experiencing DED symptoms, but they had not been formally diagnosed with DED.<sup>3</sup> Further, when a DED diagnosis is made, clinicians frequently underestimate the severity. One study found that more than 54% of patients over age 65 and 43% of the female patients had their dry eye underestimated by their clinician.<sup>6</sup> Another study found that clinician assessment underestimated dry eye severity in 41% of patients by at least one grade compared with the patients’ self-assessment.<sup>7</sup>

## **Types, risks of DED**

There are two types of DED—aqueous-deficient and evaporative. Evaporative DED is more common than aqueous-deficient dry eye, but more than one-third of patients will have a combination of both types.<sup>8</sup>

Risk factors for DED development are myriad and can be environmental (use of air conditioning/fans, exposure to smoking, low humidity, dry climates, and windy conditions) or medical (blood pressure medications, antidepressants, glaucoma medications, rheumatoid arthritis, and Sjögren's syndrome, lupus, diabetes, among others).<sup>9</sup>

Eye surgeries (LASIK and cataract removal) and contact lens wear can lead to the development of DED as well. About 30% of the 140 million people who wear contact lenses worldwide discontinue use due to dryness and eye discomfort. People who wear contacts are four times more likely to develop DED than those who do not.<sup>2</sup>

One of the greatest risk factors, however, is gender. DED is more common in women than men, particularly in women with autoimmune disease who are over age 50.<sup>2</sup> Women also are diagnosed with DED at a younger age than men.

Two large epidemiological studies in North America, the Women's Health Study and the Physician's Health Studies, showed a statistically significant, age-adjusted 70% increase in risk of DED among women.

The Beaver Dam Study showed that the prevalence of DED is 50% higher among women than men.<sup>10</sup> This is likely due to the decrease in natural tear production that occurs from hormonal changes from pregnancy, use of birth control pills, or menopause.

Trattler et al. found that the incidence of DED was higher than anticipated in a real-world setting of patients scheduled to undergo cataract surgery; while patients showed clinical signs of DED and 22% had been previously diagnosed with DED, 30% had at least occasional complaints.<sup>11</sup>

DED impacts more women, who experience symptoms and pain that are more severe.

## **Artificial tears**

Women are more likely to use artificial tears and use them more often than men. Women also spend more money monthly on dry eye treatments than men, and consistently report a greater impact and worse quality of life from DED. Women are more likely to report depressive symptoms related to their DED than men.<sup>12</sup> DED and/or dry eye symptoms also have been linked to depression and suicide in clinical trials.<sup>13</sup>

## **Epidemiology**

The epidemiology of DED is also changing. DED is now impacting younger patients across both sexes, attributed mostly to the rise in smartphone and computer use.<sup>2,3</sup> Handheld electronic device use is now recognized as a risk factor for DED development because it leads to decreased blink rates, and it causes the tear film to evaporate faster.<sup>14</sup> Smartphones may also be to blame for the increase in DED incidence.

A recent survey revealed that 66% of ophthalmologists report patients presenting with screen-related eye problems, and 88% point to smartphone use as the cause of rising DED prevalence.<sup>15</sup>

Research also shows DED affecting a growing number of people. As a result, the economic impact of DED cannot be understated. In 2016, McDonald et al. evaluated the true “cost” of DED across Asia, Europe, and the United States.<sup>16</sup> They estimated the total annual cost of ophthalmologist-managed care for 1,000 patients with DED to range from \$270,000 in France to \$1.1 million in the United Kingdom.

Costs in the United States are similar to those in the U.K., estimated at \$782,673 for the same 1,000 patient cohort. They suggested the overall cost of DED is likely higher, “given the widespread use of over-the-counter artificial tears” by patients with dry eye symptoms.

Decreased work productivity is the most significant indirect cost to DED patients, given that mild cases of DED will progress and become severe if left untreated, increasing patients’ dependence on artificial tears.<sup>17</sup>

It is clear that DED has a substantial and negative impact on those affected, but also on healthcare systems.

## References:

1. Miljanovic B, Dana R, Sullivan DA, Schaumberg DA. Impact of dry eye syndrome on vision-related quality of life. *Am J Ophthalmol* 2007;143(3):409-15.
2. Stapleton F, Alves M, Bunya VY, et al. TFOS DEWS II Epidemiology Report. *The Ocular Surface* 2017;15(3):334-65.
3. Farrand KF, Fridman M, Stillman IO, Schaumberg DA. Prevalence of Diagnosed Dry Eye Disease in the United States Among Adults Aged 18 Years and Older. *Am J Ophthalmol* 2017;182:90-8.
4. Adler R. Dry eye syndrome: Symptoms and causes. *All About Vision*, 2017.
5. Douty M. Market Scope: Global Dry Eye Products Market to Total \$6.2 Billion in 2023. Available at: <https://www.market-scope.com/pages/news/3020/global-dry-eye-products-mar...> Accessed June 15, 2019.
6. Asbell PA, Spiegel S. Ophthalmologist perceptions regarding treatment of moderate-to-severe dry eye: results of a physician survey. *Eye Contact Lens* 2010;36(1):33-8.
7. Chalmers RL, Begley CG, Edrington T, et al. The agreement between self-assessment and clinician assessment of dry eye severity. *Cornea* 2005;24(7):804-10.
8. Lemp MA, Crews LA, Bron AJ, et al. Distribution of aqueous-deficient and evaporative dry eye in a clinic-based patient cohort: a retrospective study. *Cornea* 2012;31(5):472-8.
9. The epidemiology of dry eye disease: report of the Epidemiology Subcommittee of the International Dry Eye WorkShop (2007). *Ocul Surf* 2007;5(2):93-107.
10. Sullivan DA, Rocha EM, Aragona P, et al. TFOS DEWS II Sex, Gender, and Hormones Report. *Ocul Surf* 2017;15(3):284-333.
11. Trattler WB, Majmudar PA, Donnenfeld ED, et al. The Prospective Health Assessment of Cataract Patients' Ocular Surface (PHACO) study: the effect of dry eye. *Clin Ophthalmol* 2017;11:1423-30.
12. Schaumberg DA, Uchino M, Christen WG, et al. Patient reported differences in dry eye disease between men and women: impact, management, and patient satisfaction. *PLoS One* 2013;8(9):e76121.
13. Um SB, Yeom H, Kim NH, et al. Association between dry eye symptoms and suicidal ideation in a Korean adult population. *PLoS One* 2018;13(6):e0199131.
14. Moon JH, Kim KW, Moon NJ. Smartphone use is a risk factor for pediatric dry eye disease according to region and age: a case control study. *BMC Ophthalmol* 2016;16(1):188.
15. Hoffman M. Survey Data Reveals Major Concerns About Screen Use, Chronic Dry Eye. *MD Magazine*, 2018.
16. McDonald M, Patel DA, Keith MS, Snedecor SJ. Economic and Humanistic Burden of Dry Eye Disease in Europe, North America, and Asia: A Systematic Literature Review. *Ocul Surf* 2016;14(2):144-67.
17. Craig JP, Nelson JD, Azar DT, et al. TFOS DEWS II Report Executive Summary. *Ocul Surf* 2017;15(4):802-12.