Dry eye syndrome among students: A review

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ABSTRACT

Dry Eye Syndrome (DES) or Dry Eye Disease (DED) is a common ophthalmological condition that affects millions of people worldwide. Although it is most commonly associated with older age, there has been a concerning increase in the prevalence of DES among young people, especially students. This review aims to address aspects of the prevalence and impact of DES among students, highlighting risk factors, consequences for eye health, and academic performance.

Keywords: Dry eye syndrome, Dry eye, Disease, Students.

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INTRODUCTION

Dry eye syndrome (SOS) or dry eye disease (DOS) is a common eye condition that affects millions of people worldwide. One of its most accepted definitions is: "a multifactorial disease of the ocular surface characterized by the loss of tear film homeostasis, accompanied by ocular symptoms, in which the instability and hyperosmolarity of the tear film, as well as ocular surface damage and inflammation and sensorineural abnormalities, contribute to the pathophysiology" (Craig et al., 2017; I Y Hasan et al., 2022).

Dry eye disease can be categorized as aqueous deficiency, evaporative deficiency, or mixed mechanisms. Aqueous deficiency originates from decreased tear secretion, and evaporative disease is caused by abnormalities in the lipid layer of the tear film. Dysfunction of the Meibomius glands is a major cause of disruption of the lipid layer of the tear film and consequently of dry eye disease (I Y Hasan et al., 2022).

It is estimated that the prevalence of the disease ranges from 5 to 50% in world populations, depending on the definition adopted and other contextual factors, as well as the prevalence of Meibomius gland dysfunction is estimated between 3.5 and 69.3%. In a meta-analysis conducted with studies on the American population, the prevalence of DED ranged from 5.3% to 14.5% (McCann et al., 2022).

Despite being more commonly associated with advanced age, there has been a worrying increase in the prevalence of SOS among young people, especially among students. This review aims to address aspects of the prevalence and impact of SOS among students, highlighting risk factors, consequences for eye health, and academic performance.

SIGNS AND SYMPTOMS

Dry eye disease can cause various symptoms, such as pain, discomfort, burning, foreign body sensation, redness/hyperemia, tearing, mucoid discharge, eye strain, contact lens intolerance, blurred vision, and sensitivity to light. Symptoms that may also be associated are: fluctuation of vision and visualization of halos around lights at night. In addition, tear film insufficiency can predispose to complications, such as keratitis and corneal ulcers (Guo et al., 2020).

Visual acuity represents a static measure of image resolution in the focal plane in an optical system (retina in the human eye). Visual function, on the other hand, has a broader concept, which represents how well visual acuity remains in the dynamics of daily tasks. The quality of the image on the retina depends on how transparent the path is that the light travels through all the structures of the eye (optical media). The tear film on the surface of the cornea is the first structure that has a direct influence on the path that light passes. When dry eye is present, the tear film is degraded, usually due

to insufficient tear secretion (aqueous deficiency) and/or poor tear film quality and instability that leads to earlier tear rupture, which can cause impaired visual function (Guo et al., 2020).

Functional visual acuity is a contrast measure of visual acuity during and after sustained visual activity, which is believed to be a more accurate representation of visual function in real-life situations such as reading, computer work, and driving. In fact, dry eye has been pointed out in several studies as a cause of visual function degradation in sustained visual activities, as well as negatively affecting contrast sensitivity and is associated with irregular astigmatism and high-order visual aberrations (Guo et al., 2020).

RISK FACTORS AND PREVALENCE

There are several risk factors associated with DED, among which the following stand out: female gender, use of contact lenses, use of computers, thyroid abnormalities, and use of antidepressants and antihistamines (I Y Hasan et al., 2022).

The global prevalence of dry eye disease is estimated at 11.59%. For symptomatic disease, the estimate is 9.12%, 9.5% in women and 6.8% in men. The estimated prevalence is lowest in North America, 3.5%, and highest in East Asia, 42.8%. Using the TFOS DEWS II diagnostic criteria, the overall prevalence was estimated to be 29.5% (Papas, 2021).

Recent studies have shown a high prevalence of SOS among college and high school students. Factors such as excessive use of electronic devices, prolonged exposure to computer screens and *smartphones,* air-conditioned environments, and inadequate use of contact lenses have been identified as major contributors to the development of SOS in this demographic.

Studies also reveal a significant increase in the incidence of DED among students during the Covid-19 pandemic, probably due to the increase in the time of use of electronic devices for work, recreation and study used during the *lockdown* (Lulla, 2023; García-Ayuso et al., 2022).

In a study conducted among graduate students in Ethiopia, the prevalence of symptomatic dry eye syndrome was 50.5% (Zelek et.al., 2022), similar to that of a study conducted on university students in Ghana, where it was 44.3% (Asiedu et al., 2017). In the population of medical students in Serbia, the prevalence found was 60.5% (Aćimović et al., 2022) and in university students from Poland, it was 57.1% (Wróbel-Dudzińska et al., 2023). In a survey conducted among Brazilian university students, the prevalence varied between genders: 24.0% among men and 42.6% among women, in accordance with other studies that indicate that females are more likely to have symptomatic dry eye disease (Yang et al., 2021). In students from Jordan, the prevalence of dry eye symptoms was 74.6%, higher than the average of populations of other nationalities.

The results in general show a higher prevalence of symptomatic dry eye disease in students when compared to the general population, as well as in the female population (due to hormonal factors and contraceptive use) and with longer screen use.

IMPACT ON EYE, MENTAL, AND FINANCIAL HEALTH

SOS can result in a variety of symptoms, including a burning sensation, itching, red eyes, blurry vision, and eyestrain. Additionally, untreated SOS can lead to more serious complications, such as corneal damage and chronic inflammation, which can significantly compromise students' quality of life.

The World Health Organization recognizes quality of life as a multifaceted concept in which health conditions can alter physical health, psychological well-being, level of independence, environmental impact, social relationships, and personal and spiritual beliefs. Dry eye disease mainly affects physical health, due to the symptoms of pain, discomfort and blurred vision and mental health, since the reddish appearance that dry eye can cause, can impact body image and self-esteem. In addition, the disease can negatively affect cognitive processes, sleep, mood, and mental health. Vision fluctuation can cause slower reading speed and impair day-to-day activities that require visual concentration for long periods of time (Guo et al., 2020).

Many studies show that dry eye has negative effects on concentration and productivity, creating substantial losses in the job market and academia. SOS can also negatively impact leisure and rest activities, including sports activities, where fluctuating visual acuity is due to the influence of poor tear film dynamics on visual tracking accuracy and ability to fix moving targets while incorporating hand-eye coordination (Guo et al., 2020).

Dependence on medications and drug therapies may also occur, as long-term management of dry eye symptomatology may include the use of topical immunomodulators, topical corticosteroids, artificial tears/gels/ointments, eyelid and eyelash cleansers, tear point plugs, omega-3 fatty acid supplementation, glasses to preserve periocular moisture, and autologous serum eye drops (Guo et al., 2020).

The economic impact of long-term management of dry eye can be significant, including the costs of ophthalmologist visits, medications, and dietary and palliative supplements (Guo et al., 2020).

Many studies have reported the correlation between SOS and mental illness, including depression and anxiety. When compared to other eye diseases, dry eye patients are more likely to develop anxiety and depression. In addition, symptoms can impact the quality of life of these patients (He Q et al., 2022).

IMPACT ON ACADEMIC PERFORMANCE

The discomfort caused by SOS can negatively affect students' academic performance. Difficulty concentrating due to constant eye irritation, the need to interrupt activities to blink more often, and reduced visual acuity can hinder productivity and efficiency in studying.

PREVENTION AND MANAGEMENT STRATEGIES

It is crucial for students to take preventative measures to reduce the risk of developing SOS, such as taking regular breaks while using electronic devices, limiting the amount of time spent on these devices when possible, adjusting the work environment to reduce eye dryness, and following recommendations for proper contact lens wear.

There are many environmental and behavioral modifications that can be implemented in an attempt to improve SOS. For example, you can increase the humidity level inside the rooms, avoid dry conditions that can exacerbate the disease (such as walking with car windows open, air conditioning, prolonged plane trips, etc.). In addition, the ergonomics of work/study environments can be improved, such as lowering the height of the computer screen, which causes the gaze to be directed a little downwards and reduces the exposure of the surface of the eye to air and reduces the evaporation of the tear film. Routine changes such as implementing the habit of cleaning the eyelids and eyelashes daily (to reduce exposure to allergens as well as the proliferation of bacteria), frequent pauses in the use of screens (to ensure adequate blinking for corneal protection through the distribution of tear film) and the appropriate use of glasses to prevent eye fatigue, They may be beneficial in conducting dry eye. Increasing overall health, such as maintaining adequate sleep, hydration, exercise, nutrition, and psychological well-being, can also improve the state of dry eye disease, reduce symptoms and associated stress. Environmental and behavioral changes are usually the first recommendations in treatment, and are very important for long-term therapeutic response (Sheppard et al., 2023).

Many pharmacological agents can be used for patients with dry eye disease. Topically, lubricants, corticosteroids, *lifitegrast*, and cyclosporine A may be used. Systemic agents that may be administered orally may include antibiotics (azithromycin and tetracyclines), omega-3 fatty acids, and antioxidant supplements. In addition, treatment of SOS includes the use of artificial tears, heat therapy, and, in more severe cases, medications prescribed by an ophthalmologist. Recently, varenicline nasal spray (Tyrvaya), a cholinergic agonist nasal spray (Tyrvaya™), has been approved for the treatment of the signs and symptoms of dry eye (Sheppard et al., 2023).

Non-pharmacological interventions for the treatment of the condition may include procedures such as occlusion of the lacrimal points, pulsation and thermal extraction of the Meibomius glands,

pulsed light therapy, and microblepharoexfoliation. Some therapies include eyelid hygiene devices, neurostimulation, heat or humidity glasses, and warm compresses (Sheppard et al., 2023).

CONCLUSION

SOS represents a significant eye health problem, particularly among students, with the potential to negatively impact both health and academic performance. It is imperative that effective prevention and management strategies are implemented to mitigate the adverse effects of this condition and promote a better quality of life for academics and the general population. The continued engagement of educators, health professionals, and students in raising awareness and adopting healthy practices is critical to addressing this growing challenge.

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