

Eyelid Hygiene: An often Overlooked Gateway to Healthy Eyes

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ABSTRACT

In modern day life, eyes are subjected to number of factors that include air pollution, unhygienic rubbing of eyes, eye cosmetics, contact lenses, preservatives in eye drops which all are potential risk factors for myriad of Lacrimal Functional Unit (LFU) disorders like blepharitis, Meibomian Gland Disease (MGD), dry eyes, allergic and infectious conjunctivitis, etc. the course of which may even result in to sight threatening conditions if left untreated. These conditions can be prevented and controlled with proper eye hygiene practices that integrates eyelid cleansing and massage which are well accepted and recommended in management of many of these conditions.

Lacrimal functional unit that comprises of cornea, conjunctiva, lids, meibomian and lacrimal glands, and a neural network that connects them is cornerstone to a healthy ocular surface and healthy eyes. Dysfunction of any component of LFU leads to these eyelid conditions which form major burden in routine ophthalmic practice. Eyelids, being an integral part of LFU play very important function of not only protecting eyes in keeping out foreign bodies but also regularly spreading tears on the surface to keep it moist.

Eyelid hygiene that integrates eyelid cleansing and massage is well accepted and recommended in management of many of these conditions. However, not much attention has been given to incorporate practice of regular eyelid hygiene in day to day life to help keep these conditions at bay. Thus, there needs to be better awareness to inculcate daily eye hygiene habits aided by products designed for eyelid cleansing that help in keeping lids clean for healthy eyes.

Keywords: Eye health; Eyelid hygiene; Preventive eye care; Blepharitis; Dry eye; MGD

INTRODUCTION

Eye care is largely focused upon treatment of eye disorders, although many of them can be prevented with healthy practices.

Lacrimal functional unit disorders are one of such most commonly encountered pathologies seen in routine ophthalmic outpatient department. Blepharitis, MGD, Dry eye, Conjunctivitis encompass major burden for practicing ophthalmologists. Maintenance of daily eyelid hygiene may help in prevention and management of these conditions.

The present review is to understand spectrum of these different clinical conditions, various factors in our daily life which may

contribute to these conditions and importance of routine eyelid hygiene to encourage improved ocular health.

LACRIMAL FUNCTIONAL UNIT AND EYELIDS

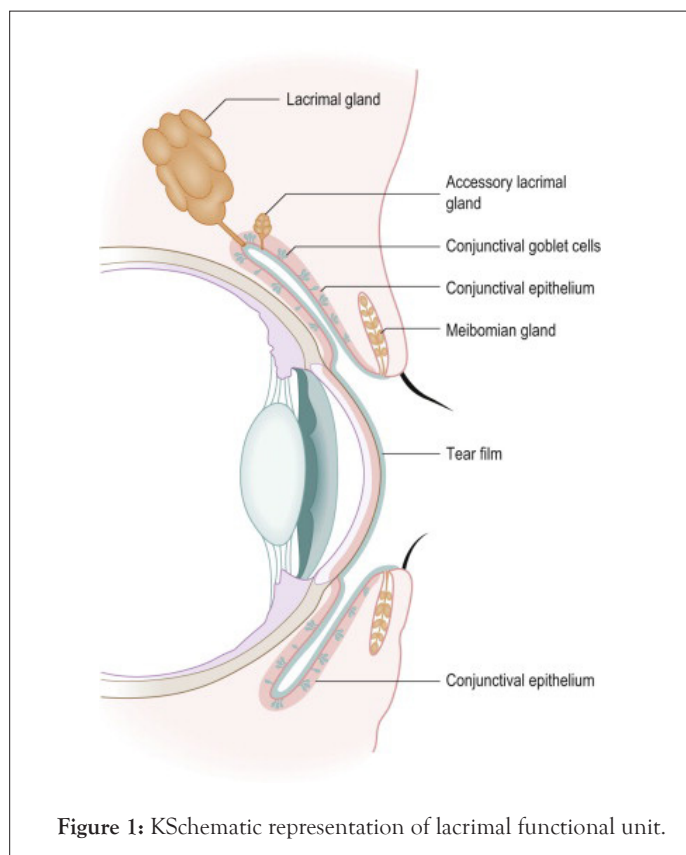
The Lacrimal Functional Unit (LFU) is defined by the 2007 International Dry Eye WorkShop as 'an integrated system comprising the lacrimal glands, ocular surface (cornea, conjunctiva and meibomian glands) and lids, and the sensory and motor nerves that connect them'. The LFU maintains a healthy ocular surface primarily through a properly functioning tear film that provides protection, lubrication, and an environment for corneal epithelial cell renewal (Figure 1) [1].

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Thus eyelids being an integral part of LFU, play a crucial role to maintain health of underlying eye. Their primary function is to protect the eyes from small particles such as dust, sand or debris from entering and harming the eye. They provide coverage of the cornea and aid in the distribution and elimination of tears. An exposed cornea will develop epithelial defects, scarring, vascularization or infection. Resulting symptoms include ocular irritation, pain and loss of vision [2].

Eyelid closure distributes tears over the surface of the eye and pumps them through the lacrimal puncta into the tear duct. Thus, tearing or epiphora may result from various eyelid disorders [2]. Majority of eyelid disorders range from benign, self-resolving processes to malignant, possibly metastatic, tumors. Fortunately, most of these eyelid disorders are not vision-threatening or life-threatening; however, conditions that leads to dysfunction of lacrimal functional unit cause irritative symptoms such as burning, foreign-body sensation or pain, 2 the course of which could plausibly be changed by incorporating routine eyelid hygiene.

BLEPHARITIS

Blepharitis is a common disorder affecting external eye. It involves inflammation of eyelid margins with accumulation of debris along the eyelid margins. Secondary changes in cornea and conjunctiva may be seen in chronic cases and patients may have associated tear film instability. Blepharitis can be classified

as anterior when the inflammatory process affects the base of the eyelashes, ciliary follicles and the palpebral skin, or posterior when there is dysfunction of the Meibomian glands located on the posterior eyelid margin. Anterior blepharitis involves the anterior lid margin and eyelashes, and is associated with staphylococcal infection. Anterior blepharitis is divided into staphylococcal and seborrheic. Former has hard crusts at the base of the eyelashes, and is the result of an abnormal cellular response to the cell wall components of *Staphylococcus aureus*, whereas latter is frequently associated with generalized seborrheic dermatitis, and has soft, greasy crusts that stick to the eyelashes [3].

Demodex mites have also been hypothesized to play a role in the etiology of posterior blepharitis. Infestation along the lid margin at the lash base, including the sebaceous glands, potentially causes obstruction and an associated inflammatory cascade [4]. The true prevalence of blepharitis is difficult to estimate due to the different ways how blepharitis may manifest itself and ill-defined diagnostic criteria; however figures cited in the literature range from 37%-50% [5-9].

The condition is generally not sight threatening but may result into permanent damage to eyelids margins.

MEIBOMIAN GLAND DYSFUNCTION

Meibomian glands are oil glands along the edge of the eyelids and line the lash margin. They form the oily layer of tear film that keeps tears from drying up too quickly.

Meibomian Gland Dysfunction (MGD) is a common disease that is often overlooked in clinic [8].

The International Workshop on MGD defined the disease as “a chronic, diffuse abnormality of the meibomian glands, commonly characterized by terminal duct obstruction and/or qualitative/quantitative changes in the glandular secretion. It may result in alteration of the tear film, symptoms of eye irritation, clinically apparent inflammation, and ocular surface disease” [10].

Severe blockage of Meibomian glands can lead to a cyst (chalazion) or bacterial infection (hordeolum) [11,12].

The prevalence of MGD in general population varies between 30.5 and 54.1%, and it appears to be higher in Asian population [5,13].

In Indian context, the reported prevalence of MGD was 31.7% in a hospital based population in India [14].

DRY EYE DISEASE (DED)

Dry Eye Disease (DED) is a common sequelae of blepharitis and MGD. It occurs when decreased tear production or tear film abnormalities do not allow for adequate lubrication of ocular surface which helps in maintaining clear vision.

Dealing with DED definition and classification, DEWS II report in 2017 redefined dry eye as: “A multifactorial disease of the ocular surface characterized by a loss of homeostasis of the tear film, and accompanied by ocular symptoms, in which tear film instability and hyperosmolarity, ocular surface inflammation and damage, and neurosensory abnormalities play etiological roles” [15].

Evaporative dry eye can be caused by blockage of the meibomian glands leading to MGD. The limited secretion of oil by leads to quick evaporation of tears. Aqueous Dry Eye occurs when the lacrimal gland does not produce enough tears to keep the eyes moist. Both these conditions can lead to hyperosmolar state and an unstable tear film leading to desiccation of ocular surface [15]. Severe DED may lead to complications such as ocular surface keratinization; microbial keratitis; corneal neovascularization, ulceration, perforation, and scarring; and severe vision loss [16]. The prevalence of DED in India is higher than the global prevalence and ranges from 18.4% to 54.3% [17,18].

ALLERGIC CONJUNCTIVITIS

Conjunctivitis involves inflammation of conjunctiva, a thin membrane that lines the eyelids and covers the exposed surface of the sclera. Allergic conjunctivitis is distinguished from its infectious counterpart by severe itching and allergen exposure. It is a common disorder, with recent studies finding prevalence rates as high as 40% [19].

Though generally self-limiting, both seasonal and perennial forms of allergic conjunctivitis cause considerable discomfort and have profound effects on quality of life.

CONTRIBUTING FACTORS FOR EYELID DISORDERS

Air pollution and the eyes

There are innumerable proofs suggesting air pollution causes illnesses such as asthma, lung cancer, Chronic Obstructive Pulmonary Disease (COPD), cardiovascular diseases, and neurological disorders. However, very less attention is paid to eye related diseases. Air pollution leads to exposure of not only dust and particulate matter but also toxic substances and biological materials that cause harm and discomfort to eyes. Several studies have attempted to outline the impact of air pollution on eyes. One study found increase in the concentration of particulate matter and CO₂ were associated with increases in cases of blepharitis [20].

Research also implies significant increase in the frequency of meibomian gland inflammation leading to tear film instability in subjects exposed to higher levels of NO₂ [21]. Another study suggests that high ozone levels and low humidity levels are associated with dry eye in the Korean population [22]. Moreover, subclinical ocular surface changes were found among persons travelling in highly polluted areas in India [23]. The result of these studies suggests strong connection of air pollution and varied ill effects on components of lachrymal functional unit.

Environmental factors

Allergy is becoming a major disease burden globally. Pollens are considered as the main component of aeroallergens that lead to not only rhinitis and asthma but also conjunctivitis [24]. Both seasonal and perennial forms of allergic conjunctivitis share a pathology involving a classical immunoglobulin E/mast cell-mediated reaction to airborne allergens (typically pollen in the seasonal form, and mites, mold, and animal dander in the perennial form) [25].

Eye cosmetics

Eye cosmetics are frequently applied among female populations of all age groups around the world. Topical ocular cosmetics, especially mascara and eyeliner, as well as oil-based facial creams applied near the eye, can cause changes to the tear film and its stability. Moisturizing creams used in the prevention of skin aging are often applied around the eyes, and retinoids present in these formulations can have negative effects on meibomian gland function and may be a contributing factor to dry eye disease [26]. Researchers at the University of Waterloo found that within five minutes, 15%-30% more particles moved into the eye's tear film when subjects applied eyeliner to the inside of the lash line, compared to outside it [27]. An observational study reported a significant correlation between eye cosmetic wear and reduced tear film lipid layer thickness [28].

Another observational study found that female eye cosmetic wearers were less likely to exhibit foaming at the inner palpebral canthus than female participants who were not wearers of eye

cosmetics [29]. In a study that compared ocular comfort and OSDI scores between cosmetic users (N=1,360 females, median age 25 years; 83% reported wearing cosmetics >3 times per week (mascara most common) and nonusers, OSDI scores were found to be similar. When cosmetics were not used by habitual users, the perception of ocular comfort significantly increased [30]. These evidences imply for the migration of cosmetic products across the eyelid margin and this is thought to exacerbate tear film instability and symptoms of dry eye.

Contact lens wear

Many studies have shown that CL wear negatively affects the condition of Meibomian glands. Researchers first described the association of MGD with contact lens intolerance in 1980. They reported obstructive meibomian gland disease due to blockage of the glands by desquamated epithelial cells as the cause of dryness and discomfort in intolerant contact lens wearers [31]. Other studies report that Meibomian Gland atrophy was statistically higher in the contact lens wearers compared to the non-lens wearers and worsened with duration of contact lens wear [32].

IOP Lowering medications and preservatives in eye drops

Studies have postulated that IOP Lowering drugs may contribute to Meibomian Gland Dysfunction [33]. Topical PGA may contribute to the formation of chalazion by acting directly to stimulate or alter MG secretion. This can result in MGD features such as blepharitis, MG obstruction, chalazion, or secondary tear film abnormalities [34]. One Study compared the effect of preservative-containing and preservative-free Prostaglandin Analogue (PGA) formulations on the ocular surface, especially on the Meibomian Gland (MG) in patients with Open-Angle Glaucoma (OAG) and found PC formulations induce more ocular discomfort and tear film instability, poorer ocular surface, and more severe MG loss [35].

INTEGRATING EYELID HYGIENE FOR HEALTHY EYES

These eyelid disorders affecting lacrimal functional unit in general are not a sight-threatening conditions, but if left untreated blepharitis has the potential to cause keratopathy, corneal neovascularization and ulceration, and permanent alterations in eyelid morphology [36]. Blepharitis is also one of the risk factors for developing endophthalmitis after cataract surgery [37,38]. In patients undergoing cataract surgery, the reported prevalence of blepharitis is as high as 60% [39]. One study found that blepharitis as the primary risk factor for on the day cancellation of cataract surgeries and recommended to provide preoperative cataract patients with lid hygiene in order to reduce cancellation rates [40]. Researchers have found that presurgical correction of dry eye with eyelid hygiene before refractive surgery in patients with dry eye and Meibomian Gland Dysfunction (MGD) lead to a more significant correction of the eye surface [41]. Furthermore, both the International Meibomian Gland Workshop and the TFOS DEWSII Management reports highlight the mainstream

therapy of eyelid hygiene in the stepwise management approach for blepharitis and dry eye. DEWS II has recommended at-home eyelid hygiene practice from step 1 in the management approach of dry eye disease [42,15]. Despite this knowledge, the importance of eyelid hygiene in ocular and tear film health has often been under-communicated.

Good eyelid hygiene is important to prevent eyelid disorders and maintain a healthy ocular surface. Many times the directions for lid hygiene will incorporate a multistep step approach with heat and massage, eyelid cleaning and treatment whenever necessary. Each step can be enhanced or modified based on the specific findings of a patient and the severity of disease. Heat and massage targets meibomian gland complications to soften meibomian gland secretions and breaks up dried discharge [42].

Eyelid cleansing targets debris removal from the eyelid skin and lashes. Conventional practices for eyelid cleansing encompass warm compresses, lid massage and lid scrubbing with baby shampoo [43]. These days, variety of eyelid cleansing products like ready to use lid wipes, scrubs, spray and foaming preparations etc. are also commercially available which make eyelid cleansing more comfortable and acceptable as a part of routine lifestyle to promote eye health. These products are easy to use and ensure dissolving of eyelid crusts and encourage mechanical removal dirt and debris from delicate and sensitive areas around eyelid margin. Thirdly, Topical antibiotic ointments with or without corticosteroids or oral antibiotics can be used effectively in the treatment of blepharitis. Topical antibiotic ointments with corticosteroids or oral antibiotics can be used effectively in the treatment of blepharitis. Although, because of the risks associated with ocular steroids, their use is less appropriate for long-term management [43].

DISCUSSION AND CONCLUSION

Eyelid disorders that disturb homeostasis of lacrimal functional unit may result into chronic course that warrants long term management. This, in turn may affect quality of life and the ability to carry out normal daily tasks.

In everyday life, various factors that include air pollution, eye cosmetics, contact lens use, preservative containing eye drops etc. put eyes at stress, leading to conditions like blepharitis, MGD, dry eye, allergic conjunctivitis etc. These conditions may require long term management aimed at to not only reduce symptoms, improve ocular comfort but also to prevent, delay early dependence on antibiotics and serious sequelae.

Several studies have shown that ocular comfort is a critical driver of these conditions, satisfaction with post-surgical outcomes, and success with DED management. Role of eyelid hygiene, is well established and accepted in prevention and control of many of these conditions, is yet oftentimes overlooked. Today, with the availability of several eyelid cleansing preparations, lid cleansing has become easier and more effective. Therefore, advocating for a healthy ocular surface and counseling on the importance of

incorporating regular eyelid hygiene on daily basis is crucial, both in patients receiving treatment and in healthy people because proper eyelid cleansing is essential to ensure eye health.

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