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COMPREHENSIVE REVIEW OF OCULAR ALLERGY: TYPES, PATHOPHYSIOLOGY, CLINICAL FEATURES, AND MANAGEMENT

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ABSTRACT
ocular allergy is a common hypersensitivity disorder that affects the conjunctiva and other ocular structures, often resulting in significant discomfort and visual disturbance. It encompasses a spectrum of allergic conditions, including seasonal allergic conjunctivitis (SAC), perennial allergic conjunctivitis (PAC), vernal keratoconjunctivitis (VKC), atopic keratoconjunctivitis (AKC), and contact allergic conjunctivitis. These conditions are primarily mediated by IgE-dependent mechanisms and involve complex immune responses, including the activation of mast cells, eosinophils, and T lymphocytes. Clinical manifestations range from mild itching and redness to severe inflammation, corneal involvement, and potential vision impairment. An ocular allergy is crucial for healthcare provides to effectively diagnose and manage this condition. This review serves as a roadmap for clinicals and researches alike, offering invaluable insights into the multifaceted landscape of eye allergy. All affects more than 15% of the world population, and some studies have shown that up 30% of the US population has some form of allergy. Allergen-specific immunotherapy may be considered in cases of failure of first-line treatments or to modify the natural course of OA disease.

KEYWORDS: Eye infections, Eye allergy, Types of eye allergy, seasonal allergic conjunctivitis, perennial allergic conjunctivitis, atopic kerato conjuctivitis, giant papillary conjunctivitis, vernal keratoconjunctivitis, Etiology, Signs and symptoms, Pathophysiology, Treatment.

INTRODUCTION

Eye allergy, also known as **allergic conjunctivitis**, is a common ocular condition that affects individuals of all ages worldwide. Characterized by symptoms such as itching, redness, tearing, and swelling of the conjunctiva, it significantly impacts the quality of life and daily functioning of affected individuals. Eye allergies can be seasonal or perennial, with allergens such as pollen, dust mites, animal dander, and mold playing a central role in triggering hypersensitivity reactions.[1] Over the past 200 years, our understanding of ocular allergy has evolved and is now recognized as a heterogeneous collection of immunoglobulin(Ig)E and non-IgE- mediated diseases. The conjunctiva is the transparent lubricating mucous membrane covering the eye's outer surface and comprises 2 parts: the bulbar conjunctiva that covers the globe and the tarsal conjunctiva that lines the eyelid's inner surface.[2]

EYE ALLERGY

Eye allergies, also known as allergic conjunctivitis, occur when the eyes react to allergens such as pollen, dust, pet dander, mold, or certain chemicals. These allergen trigger an immune response in the eyes, leading to symptoms such as.

- Redness
- Itching
- Tearing
- Swelling of the eyelid.[3]

Eye allergies can be seasonal, occurring during specific times of the year when certain allergens are prevalent, or perennial, happening year-round due to indoor allergens like dust mites or pet dander. Managing eye allergies typically involves avoiding triggers, using over-the-counter or prescription antihistamine eye drops, and sometimes employing cold compresses to alleviate symptoms.[4]

TYPES

1. **Seasonal Allergic Conjunctivitis (SAC)**
- **Most common form** of ocular allergy.
- Triggered by **airborne allergens** like pollen during specific seasons (spring, summer, or fall).[5]
- **Symptoms:** Itching, redness, watery eyes, and mild eyelid swelling.
- Often associated with **allergic rhinitis** ("hay fever").[6]

2. **Perennial Allergic Conjunctivitis (PAC)**
- Occurs **year-round**, usually due to **indoor allergens** such as dust mites, mold, pet dander.
- **Symptoms:** Similar to SAC but generally **milder and chronic**.
- Frequently coexists with **perennial allergic rhinitis**.[7]

3. **Vernal Keratoconjunctivtis (VKC)**
- **Chronic, severe**, and often **seasonal**; mostly affects **young males**, especially in warm climates.
- **Symptoms:** Intense itching, photophobia, thick mucus discharge, and foreign body sensation.
- **Signs:** Giant papillae on the upper tarsal conjunctiva, limbal infiltrates, and Horner-Trantas dots.
- Can involve the **cornea**, potentially leading to visual Impairment.[8]

4. **Atopic Keratoconjunctivitis (AKC)**
- **Chronic and bilateral**, associated with **atopic dermatitis** or eczema.
- More common in **young to middle-aged adults**.
- **Symptoms:** Severe itching, burning, tearing, and blurred vision.
- **Complications:** Corneal scarring, cataracts, and risk of vision loss.
- Often more **chronic and sight-threatening** than VKC.[9]

5. **Giant Papillary Conjunctivitis (GPC)**
- Not a true allergy, but an **immune-mediated response** usually associated with **contact lens wear** or ocular prostheses.
- **Symptoms:** Itching, mucous discharge, blurred vision, and discomfort with lenses.
- Characterized by **large papillae** on the upper tarsal conjunctiva.[10]

6. **Contact Allergy (Contact Hypersensitivity)**
- Caused by **topical medications**, cosmetics, or preservatives (e.g., benzalkonium chloride).
- **Symptoms:** Redness, itching, swelling, and sometimes dermatitis around the eyes.
- Involves **delayed-type hypersensitivity (Type IV)** reaction.[11]

ETIOLOGY

The etiology of eye allergies, or allergic conjunctivitis, involves an immune system response to specific allergens. Main factors contributing to eye allergies.

- Allergen exposure
- Immunoglobulin E (IgE) Response
- Histamine release
- Genetic predisposition
- Environmental Factors
- Other Allergic conditions
- Contact Lens wear[12]

SIGNS AND SYMPTOMS

- Redness
- Swelling
- Water eyes
- Puffy eyelids
- Conjunctival Papillae
- Itching
- Burning sensation[13]

NON PHARMACOLOGICAL TREATMENT

- Allergen Avoidance
- Cold compresses
- Artificial tears
- Environmental control
- Personal hygiene and Eye protection
- Immunotherapy[14]

PHARMACOLOGICAL TREATMENT: HERBS

1. **Chamomile (Matricaria chamomilla)**
- **Benefits:** Anti-inflammatory and soothing.
- **Use:** Cooled chamomile tea bags as compresses on closed eyes.[15]

2. **Eyebright (Euphrasia officinalis)**
- **Benefits:** Traditionally used for eye inflammation, allergies, and conjunctivitis.
- **Use:** Available in eye drops (ensure it's sterile and from a reputable source) or as a tea compress.[16]

3. **Green Tea**
- **Benefits:** Rich in antioxidants and anti-inflammatory compounds.
- **Use:** Use cooled green tea bags as compresses over closed eyes.[17]

4. **Calendula (Calendula officinalis)**
- **Benefits:** Anti-inflammatory and antimicrobial.
- **Use:** Use as a cooled tea for compresses; also available in sterile eye rinse formulations[18].

5. **Turmeric (Curcuma longa)**
- **Benefits:** Strong anti-inflammatory properties.
- **Use:** Usually taken orally in capsules or teas; not for topical eye use directly.[19]

6. **Bilberry (Vaccinium myrtillus)**
- **Benefits:** Supports eye health, reduces eye strain and inflammation.
- **Use:** Oral supplements or teas.[20]

Tips for Safe Use
- Always **consult a healthcare provider** or herbalist before trying any herbal remedy, especially for eye issues.
- Never use homemade eye drops unless **sterility is guaranteed**.
- Use herbal compresses only on **closed eyes**, and discard after one use.
- Be cautious of **allergic reactions**—even natural remedies can trigger them.[21]

PHARMACOLOGICAL TREATMENT
ANTI HISTAMINE EYE DROPS
- Blocking histamine receptor, Reducing inflammation, immediate relief.

DROPS
- ✓ Olopatadine (patanol, pataday)
- ✓ Ketotifen (Zaditor, Alaway)[22]

MAST CELL STABILIZERS

- Preventing histamine Release
- Long term control
- Delayed Onset

DROPS

✓ Cromolyn (Crolom, opticorm)
✓ Nedocromil (Alocril)[23]

NON STEROIDAL ANTI-INFLAMMATORY DRUGS (NSAIDS)

- Inhibiting Prostagladin production
- Reducing Inflammation and Swelling
- Symptoms Relief

DROPS

✓ Ketorolac (Acular)
✓ Nepafenac (Nevanac)[24]

CORTICOSTEROID EYE DROPS

- Suppressing the immune response
- Inhibiting Inflammatory
- Controlling Severe Symptoms
- Preventing Tissue Damage

DROPS

✓ Pred forte (Predisolone Acetate)
✓ Maxidex (Dexamethasone)[25]

IS SUNLIGHT ONE OF THE TRIGGER FACTOR FOR EYE ALLERGY?

Sunlight itself is not typically considered a direct trigger for eye allergies. When the eyes encounter allergens (e.g., Pollen, pet dander), the immune system reacts by releasing histamine and other chemicals from mast cell in the eyes. This release causes the familiar symptoms of eye allergies.[26]

- Increased sensitivity
- Dryness
- Outdoor allergens[27]

CONCLUSION

Ocular allergy, or allergic conjunctivitis, is a common condition that results from the eye's reaction to allergens such as pollen, dust, pet dander, or mold. While it's not typically dangerous, it can cause significant discomfort, including itching, redness, tearing, and swelling.[28]

Management includes **avoiding known allergens**, using **lubricating or antihistamine eye drops**[29], and in some cases, prescription treatments. In addition to conventional therapies, **herbal remedies** like chamomile, eyebright, and green tea compresses may offer natural relief, though they should be used cautiously and with proper guidance.[30]

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