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TYPES OF PHARMACEUTICAL AGENTS USED IN EYE DISEASES AND THEIR MECHANISMS OF ACTION

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Abctract: This article provides a scientific and comprehensible overview of pharmaceutical agents used in ocular diseases, their types, and mechanisms of action. Detailed information is presented on antibacterial, antiviral, anti-inflammatory, antiallergic, antiglaucoma agents, as well as artificial tear preparations. The article also discusses pharmaceutical dosage forms, the preparation of sterile and isotonic ophthalmic solutions, storage and administration requirements, and the pharmacist's critical role in the treatment process.

Keywords: Eye diseases, Pharmaceutical agents, Antibacterial drugs, Antiviral preparations, Anti-inflammatory agents, Pharmacology, Sterile solutions, Glaucoma, Conjunctivitis

The Importance of Proper Use of Ophthalmic Pharmaceuticals. The eye is one of the most important sensory organs, and the correct use of medications is crucial for maintaining its healthy function. The field of pharmaceutics plays a key role in the treatment of ocular diseases because ophthalmic drugs must be prepared under special sterile conditions, formulated as isotonic solutions, and be physiologically compatible with ocular tissues.

Major Types of Eye Diseases and Their Pharmaceutical Importance. From a pharmaceutical perspective, eye diseases require safe and sterile medications.

For a pharmacist, the most important aspect is selecting the correct dosage form based on the type of disease and providing clear instructions for proper use.

CONJUNCTIVITIS

Conjunctivitis is one of the most common inflammatory eye diseases. In this condition, the conjunctiva becomes irritated due to infectious or allergic factors, leading to redness, burning, tearing, and purulent discharge.

From a pharmaceutical standpoint, proper selection, storage, and administration of medications are essential, as ophthalmic preparations must be sterile, isotonic, and have balanced pH levels.

Types of Conjunctivitis:

1. Bacterial conjunctivitis — caused by bacteria such as staphylococci, streptococci, or gonococci.
2. Viral conjunctivitis — commonly associated with adenovirus or herpes virus.
3. Allergic conjunctivitis — triggered by pollen, dust, drugs, or cosmetics.
4. Fungal conjunctivitis — rare but difficult to treat.
5. Irritative (non-inflammatory) conjunctivitis — occurs due to chemicals, smoke, or dust.

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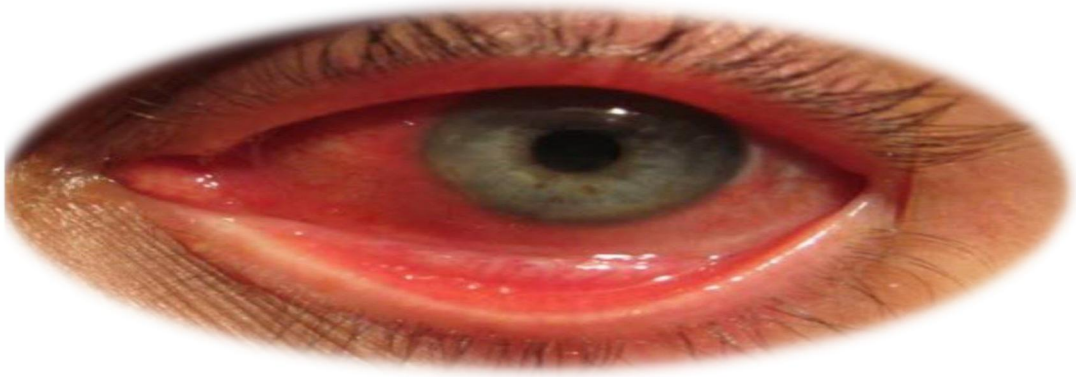

Conjuncti vit

Clinical Symptoms: Burning and itching, Redness (hyperemia), Purulent or mucous discharge, Photophobia,Temporary blurred vision
All these symptoms are associated with conjunctival inflammation and are addressed by appropriate pharmaceutical therapy.
Pharmaceutical Agents Used in Conjunctivitis . Antibacterial agents
Pharmaceutical form: sterile eye drops or ointments in 5–10 ml bottles; shelf-life 2–3 years; 28 days after opening.
Examples: Levomycetin 0.25%, Tobrex (Tobramycin), Tsiprolet (Ciprofloxacin)
Mechanism: inhibit bacterial protein synthesis and cause bacterial death.
Pharmacist's advice: do not use antibiotic drops for more than 7–10 days; discontinue if allergic reactions occur.

Antiviral agents. Pharmaceutical form: must be stored in dark bottles as they degrade in light.
Examples: Oftan-IMU (Idoxuridine), Actipol, Ophthalmoferon
Mechanism: inhibit viral DNA synthesis and promote tissue repair.

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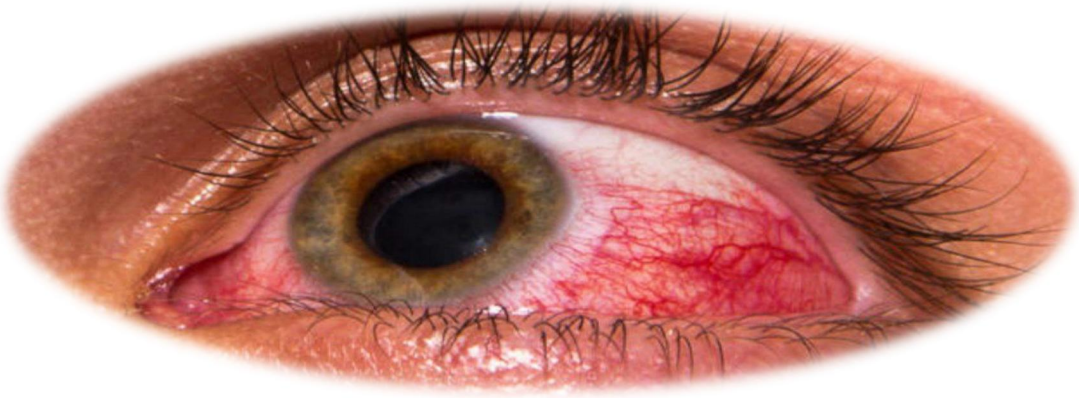
Antiallergic agents. Pharmaceutical aspect: should be hypoallergenic; preservative-free forms are preferred. Examples: Lekrolin (Cromoglicic acid), Olopatadine, Azelastine
Mechanism: block histamine receptors and reduce itching and inflammation.
Note: symptomatic treatment alone is insufficient if the allergen is not identified.
Adjunct cleansing solutions. Used to wash the eye during conjunctivitis.
Examples:
Furacillin 1:5000
Boric acid 2% solution
Highly diluted potassium permanganate
Advice: solutions must be freshly prepared and used warm (36–37°C).
Anti-inflammatory agents. Examples: Dexamethasone (steroid), Indocollir, Diclo-F (NSAIDs)
Note: prolonged use may increase intraocular pressure; patients must be warned.
Conjunctivitis may seem simple, but improper treatment can damage vision. The pharmacist is a key figure in ensuring drug quality, sterility, proper storage, and correct administration.

GLAUCOMA

Glaucoma is a chronic disease characterized by increased intraocular pressure, resulting in optic nerve damage and reduced vision. The primary cause is impaired outflow of aqueous humor, leading to elevated pressure and nerve fiber compression.
Types of Glaucoma
Open-angle glaucoma — develops slowly as fluid drainage decreases gradually.
Closed-angle glaucoma — drainage is suddenly blocked, causing rapid pressure increase.
Secondary glaucoma — develops due to another disease or medication.
Pharmaceutical Approach to Glaucoma Treatment. Pharmacists play a crucial role in choosing the correct drug combination and monitoring dosage. Most glaucoma drugs are in the form of eye drops to deliver the active substances directly into the eye.



Glaucoma

Main Pharmaceutical Agents
Beta-blockers
Examples: Timolol, Betaxolol (Betoptic)
Mechanism: decrease aqueous humor production.
Pharmaceutical details: sterile solution, pH 6.5–7.5, 10 ml bottles.
Instruction: drops must be used at the same time each day.
Carbonic anhydrase inhibitors
Examples: Dorzolamide (Trusopt), Brinzolamide (Azopt)

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Mechanism: decrease aqueous humor production.
Often produced in combination with Timolol.

Prostaglandin analogues. Examples: Latanoprost, Travoprost, Tafluprost
Mechanism: increase aqueous humor outflow.
Storage: 2–8°C; use within 4 weeks after opening.
Recommended to administer in the evening.
Combination preparations. Examples:
Cosopt (Timolol + Dorzolamide)
Xalacom (Latanoprost + Timolol)
Duotrav (Travoprost + Timolol)
These combinations improve treatment adherence.
Glaucoma and dry eye syndrome require careful pharmaceutical management. The pharmacist is not only a dispenser of medicines but also a trusted advisor to patients.

Pharmaceutical Dosage Forms in Ophthalmology

Eye drops — most commonly used; must be discarded 28 days after opening.
Ointments — prepared using vaseline or lanolin; have prolonged effect.
Eye-washing solutions — prepared from furacillin or boric acid.
Injection forms — administered only by qualified professionals.
Gels/emulsions — provide longer retention on the eye surface.

CONCLUSION

Eye diseases are complex pathological conditions affecting one of the most vital sensory organs. The role of pharmaceutical agents in managing these conditions is invaluable. This article thoroughly described various ocular diseases, the drugs used in their treatment, and their mechanisms of action.

Antibacterial and antiviral drugs are essential for eliminating ocular infections. Anti-inflammatory agents reduce inflammation and pain, while antiallergic drugs control

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hypersensitivity reactions. Antiglaucoma medications regulate intraocular pressure and protect the optic nerve. Artificial tear preparations alleviate dry eye syndrome and improve the patient's quality of life.

Pharmaceutical dosage forms — including drops, ointments, washing solutions, and injections — must be selected according to the specific disease and patient needs. Pharmacists not only prepare and store these medications correctly but also guide patients on proper usage, ensuring maximum therapeutic effect and preventing complications. Sterility, isotonicity, physiological compatibility, correct storage, and use within the recommended time frame are essential for patient safety.

Overall, a pharmaceutical approach plays a decisive role in the effective treatment of ocular diseases, symptom relief, preservation of vision, and improvement of patients' quality of life. The pharmacist's expertise in drug selection, mechanism explanation, and patient counseling is fundamental to successful therapy.

References

1. Karimov A.X. Fundamentals of Pharmacology. — Tashkent: TMA, 2021.
2. Murodova D.R. Ophthalmic Pharmaceuticals. — Tashkent, 2022.
3. WHO. Guidelines on Ophthalmic Preparations. — Geneva, 2023.
4. Rang H.P., Dale M.M. Pharmacology. — Elsevier, 2022.
5. TMA Study Manual: Preparation of Sterile Solutions in Pharmaceutical Technology, 2020.