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Review Article

A NOVEL ANTIBIOTIC TO TREAT BACTERIAL CONJUNCTIVITIS - BESIFLOXACIN

Chandragiri Sridivya[1], Gayathri Paturi[2], Suryam Gugulothu[3], Rajitha E[4], Manjula Jatoth[5], Rajasree Suram[6], Thabitha Jatoth[7], Priyanka Ramisetty[8]

[1]*Assistant Professor, Department of Pharmacognosy, Gyanajyothi College of Pharmacy Uppal, Hyderabad, Telangana.*

[2,4]*Assistant Professor, Department of Pharmacology, Vishnu Institute of Pharmaceutical Education and Research, Narsapur, Medak, Telangana.*

[3]*Assistant Professor Department of Pharmaceutics, Vishnu Institute of Pharmaceutical Education and Research, Narsapur, Medak, Telangana.*

[5]*Assistant Professor, Department of Pharmacology, Gyanajyothi College of Pharmacy, Hyderabad, Uppal, Telangana.*

[6]*Assistant Professor, Department of Pharmaceutical Analysis, Gyanajyothi College of Pharmacy, Hyderabad, Uppal, Telangana.*

[7]*Assistant Professor Department of Pharmaceutics, Gyanajyothi College of Pharmacy, Hyderabad, Uppal, Telangana.*

[8]*Department of Pharmacology, Srivishnu Colllege of Pharmacy, Bhimavaram, Andhra Pradesh.*

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Abstract:

The prevalence of bacterial conjunctivitis, popularly known as pink eye, which is caused by a variety of aerobic and anaerobic bacteria, is unaffected by demographics. To avoid possibly irreversible eye damage, prompt empiric therapy with a wide-ranging anti-infective, including a surface fluoroquinolone, is essential. The growth in methicillin-resistant Staphylococcus samples to ocular illness as well as fluoroquinolone resistance patterns throughout persons with various ocular bacterial infections need the development of novel eye-specific medicines. Besifloxacin, a brand-new broad-spectrum fluoroquinolone medication, has been approved for the treatment of bacterial conjunctivitis. It is associated with a decreased rate of resistance development and inhibits DNA gyrase and topoisomerase IV with a distinctly balanced dual-targeting activity. The only bacterial populations that are exposed to besifloxacin are those in and around the eye because it is not available in other formulations. By deliberately avoiding direct besifloxacin interaction with bacteria because a consequence of widespread use, this lowers the risk that bacterial tolerance might develop.In vitro, besifloxacin shown equal or greater activity than other common topical antibiotics. In clinical trials, besifloxacin has frequently demonstrated efficacy and safety in treating individuals with bacterial conjunctivitis. Besifloxacin is considered safe, well tolerated, and has no known side effects.

Keywords: *Conjunctivitis, Besivance, Fluoroquinolones, Bacterial conjunctivitis, Besifloxacin*

***Corresponding Author:**

Rajitha E.

Assistant Professor, Department of Pharmacology, Vishnu Institute of Pharmaceutical Education and Research, Narsapur, Medak, Telangana.

Email id: suryam.g@viper.ac.in

INTRODUCTION

Conjunctive inflammation often known as reddish eye or pinkish eye, is typically caused by an infection with bacteria, yet it may additionally be caused by viral infections, fungi, or non-infectious factors such allergies, toxins, or extended contact lens wear. Bacterial conjunctivitis is an infectious condition that affects the conjunctiva, the mucous membrane that covers the sclera and lines the inside of the eyelids. The standard treatment for bacterial conjunctivitis is empiric broad-spectrum topical antibiotics.

Although empiric antibiotic therapy is used to stop the spread of infection, hasten healing, ease patient discomfort, and avoid potentially fatal side effects including keratitis, it is not without possible drawbacks. A given antibiotic's effectiveness tends to decline over time as more people use it because the germs it targets often change and become resistant. Besifloxacin, a potent new fluoroquinolone antibiotic, will be discussed in this paper. It was created specifically for topical ocular use and has been shown to be effective against the most prevalent pathogens causing bacterial conjunctivitis. Additionally, it possesses an appropriate dual-targeting mode of engagement that aids in preventing the emergence of unexpected tolerance.

Fig. 1: Conjunctive inflammation

BACTERIAL CONJUNCTIVITIS

An illness known as bacterial conjunctivitis is caused by both anaerobic as well as aerobic bacteria. The most prevalent aerobic bacteria are Moraxella organisms, S. aureus, S. pneumoniae, other streptococci, and various streptococci.

N. gonorrhoeae, N. meningitides, Pseudomonas organisms, Proteus organisms, and Corynebacterium genus are some other, less frequent bacteria.

Fig. 2: Bacterial Conjunctivitis

NEW TREATMENTS AND ENHANCED TECHNOLOGIES: BESIFLOXACIN

Recent attention has been focused on novel fluoroquinolones that display improved action against Gram +ve bacteria, including S. pneumoniae & staphylococci, due to the ongoing challenge of growing resistance, including resistance against older fluoroquinolones. As similar fluoroquinolones, besifloxacin cannot be sold in extra forms for widespread usage. As a result, only the bacterial populations in & surround of the eye are exposed to besifloxacin. Besifloxacin is only used topically for ocular purposes, preventing any systemic exposure to microorganisms that might lead to the development of resistance.

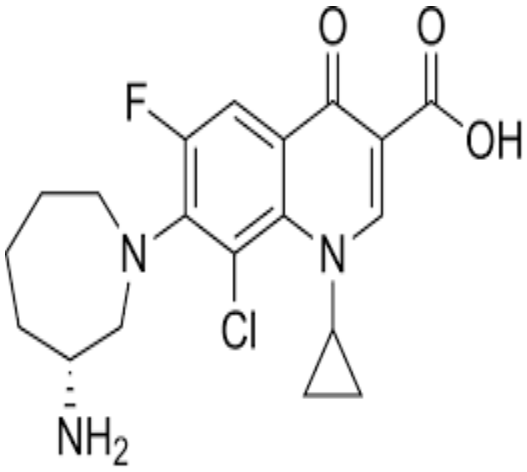

Fig. 3: Besifloxacin

The mucoadhesive polymer used in the formulation of besifloxacin ophthalmic suspension 0.6% is intended to increase the amount of time the medicine

spends on the ocular surface. As a preservative, the suspension contains 0.01% benzalkonium chloride. It has been demonstrated in vitro that benzoyl chloride has some bacterial inhibition and bacterial killing properties.

PHARMACOKINETICS/PHARMACODYNAMICS

Besifloxacin showed high eye penetration and quick absorption in animal trials. Having an overall the maximum Cmax of 6.44 g/g in conjunctiva, 2.11 g/g in the cornea, and 0.797 g/g in the monkeys' vitreous humor, a single topical dosage was followed by a half-life of between five and fourteen hours. Besifloxacin showed a mean residence time in tears, conjunctiva, and aqueous humor of more than 7 hours in rabbits. Conjunctival concentrations for the majority of Gram-negative and Gram-positive organisms as well as nonresistant ophthalmic isolates were higher than the minimal inhibitory concentration (MIC) needed to stop 90% of organisms from growing for at least 12 hours after a single injection.

Besifloxacin showed quick absorption and good ocular penetration in animal trials.TypicalCmax values for a single topical dosage were 6.44 g/g on conjunctiva, 2.11 g/g for cornea, and 0.797 g/g within monkey aqueous humor, with a half-life of between five and fourteen hours following a topical treatment.Besifloxacin demonstrated a mean residence length in rabbits of more than 7 hours for sobs, conjunctiva, and aqueous humor.Conjunctival doses above the minimum inhibitory concentration (MIC) necessary to stop the development of 90% of organisms for at least 12 hours following a single dose for most Gram-negative and Gram-positive pathogens in addition to nonresistant ocular strains.

ACTION'S MECHANISM

In order to preserve the proper arrangement of the DNA of bacteria for transcription of DNA becoming RNA, replication of DNA, and microbial proliferation, besifloxacin interacts and blocks two enzymes.

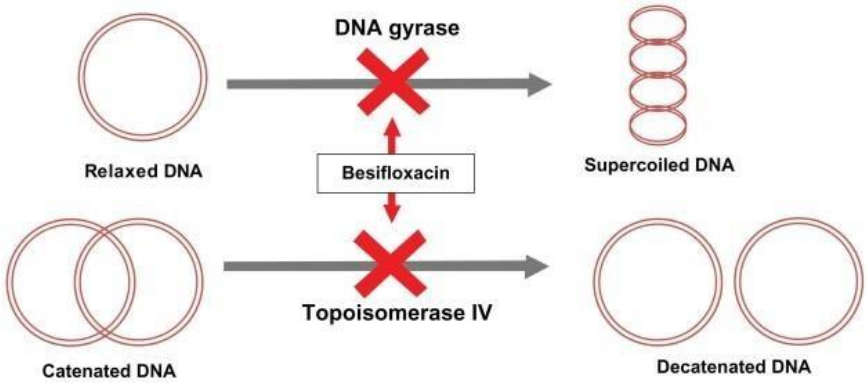

Fig.4: Action of Mechanism

ACCEPTABILITY AND SAFETY

Besifloxacin is thought to be safe, is well tolerated, and has no known negative effects. Conjunctival redness, which affected about 2% of individuals, was the most typical adverse event in clinical studies.

DOSING

The recommended dosage for besifloxacin ocular fluid 0.6% is one drop three times per day, spaced between four and twelve hours apart, for an entire span of seven days. Besifloxacin's dose regularity is equivalent to that of moxifloxacin, although other ocular fluoroquinolones are given more often, perhaps causing cooperation issues, a key feature in the battle against increasing microbial tolerance. It has been established that compliance is inversely related to the quantity and intricacy of the dosage.Besifloxacin is even more convenient due to the suggested dosing intervals, which can range from between four and twelve hours and offer some flexibility.

CONCLUSION

A novel synthetic fluoroquinolone with a broad spectrum that has just received approval for the management of bacterial conjunctivitis is called besifloxacin. Clinical investigations have shown that besifloxacin is more effective than a vehicle and is clinically equivalent to moxifloxacin (noninferior). Besifloxacin has shown significant action in vitro that is frequently superior to other topically applied anti-infectives that are frequently utilized. Inhibiting both

DNA gyrase and topoisomerase IV, besifloxacin has a particularly well-balanced dual-targeting activity that may prevent the emergence of resistance.

Besifloxacin is used in a more selective manner compared to other fluoroquinolones. It is solely made in formulations for ocular usage; systemic forms are neither being marketed nor being developed. While there has been some cross-resistance with other fluoroquinolones, the restricted contact of besifloxacin to populations of bacteria is anticipated to reduce the likelihood of bacterial resistance developing primarily a consequence of any nonocular contact to the medication. In comparison to the other eye fluoroquinolones, all of that have also been employed for over a decade in an array of nonophthalmic illnesses, the initial-line employ of a powerful new corneal fluoroquinolone alongside a smaller chance for developing resistance may lead to a better resistance growth profile. This is due to the evolving susceptibility profiles of the main responsible pathogens.

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