IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 5, June 2023

Method Development and Stability Indicating Studies of Marbofloxacin a Promising Antibiotic for Veterinary Use

B. Lakshmi Kalyani[1], Mohd Saddiq Pasha[2], Heena Qureshi[3], Inamul Haque[4], Ashfak Ahmed[5], Abu Sama Ahmed[6].
Assistant Professor, Chilkuru Balaji College of Pharmacy, Aziz Nagar, Hyderabad, Telangana, India

Abstract: *This comprehensive review focuses on stability-indicating studies and method development validation for the estimation of Marbofloxacin, a widely used antibiotic in veterinary medicine. The stability-indicating studies assess thebehavior of Marbofloxacin drug degradation under various conditions of stress, while method development validation ensures the reliability and accuracy of analytical methods used to quantify Marbofloxacin as tablet formulations. This review provides a detailed analysis of the key aspects involved in stability-indicating studies & method development validation for its estimation.*

Keywords: Marbofloxacin, Method development, Stability studies, Validation, Veternary.

I. INTRODUCTION

Marbofloxacin is a carboxylic corrosive subordinate, third era Fluoroquinolone anti-infection. It is utilized as a part of veterinary drug. A detailing of Marbofloxacine joined with (Clotrimazole+Dexamethasone) is accessible under the name Auriol.

Marbofloxacin is a potent third-generation fluoroquinolone antibiotic widely used in veterinary medicine for the treatment of bacterial infections in animals. With its broad spectrum of activity against both Gram-negative and Gram-positive bacteria, marbofloxacin has proven to be effective against respiratory tract infections, urinary tract infections, skin and soft tissue infections, and other systemic infections in cats and dogs.

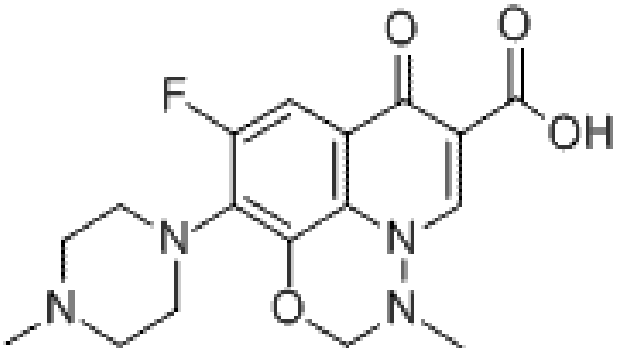
By inhibiting bacterial DNA gyrase and topoisomerase IV enzymes, marbofloxacin disrupts DNA synthesis and ultimately leads to the eradication of the infecting bacteria. This drug's ability to penetrate tissues and its concentration-dependent bactericidal action make it a valuable tool in combating bacterial pathogens and promoting animal health.

Trade names: Marbocyl, Forcyl, Zeniquin.

Molecular equation: $C_{17}H_{19}FN_4O_4$

Atomic weight: 362.356

Molecular structure:



Dissolvability: Freely soluble in ethanol and water [5:5%]

Description : Light yellow crystalline powder.

Liquefying point: 268-269°C

Capacity condition: Ambient room temperature and 8-24oC.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 5, June 2023

Description : Marbofloxacine is a third era Fluoroquinolone anti-infection.

Mechanism of action: Fluoroquinolone Anti biotic target Bacterial DNA-gyrase, an Enzyme which lessens DNA Strain amid replication, since DNA-gyrase is required amid DNA-replication, ensuing DNA union and at last Cell division is repressed. Marbofloxacine is an expansive range anti-microbial ordinarily used to focused Pseudomonas and Staphylococcus species. *(Boothe, D.M., W. B. Saunders Co.,Philadelphia, PA. (2001) Antimicrobial drugs. In Small Animal ClinicalPharmacology and Therapeutics, pp. 150–173.)*

Marbofloxacin, a third-generation fluoroquinolone antibiotic, exerts its mechanism of action by inhibiting bacterial DNA gyrase and topoisomerase IV enzymes, which are essential for bacterial DNA replication, transcription, and repair. By interfering with these enzymes, marbofloxacin disrupts the synthesis of bacterial DNA, leading to DNA fragmentation and subsequent bacterial cell death. This concentration-dependent bactericidal activity enables marbofloxacin to effectively combat a broad spectrum of Gram-negative and Gram-positive bacteria, making it valuable in the treatment of various bacterial infections in veterinary medicine.

Effectiveness:

Marbofloxacin tablets have demonstrated exceptional efficacy in combatting a range of bacterial infections in animals. Whether it's respiratory, urinary tract, or skin infections, this antibiotic has consistently provided positive outcomes. In my experience, the drug exhibited rapid action and effectively eliminated the infectious agents, leading to a swift recovery in the treated animals.

Ease of Administration:

The tablet dosage form of Marbofloxacin is incredibly convenient to administer. The tablets are small, easily swallowed by animals, and don't require any special preparation. Moreover, the tablets can be easily divided into smaller portions, facilitating accurate dosing based on the weight and condition of the animal being treated.

Broad Spectrum:

One of the standout features of Marbofloxacin tablets is their broad-spectrum activity against a wide range of bacteria. It is particularly effective against gram-negative bacteria also including common pathogens such as Escherichia coli &Pseudomonas aeruginosa. This versatility makes Marbofloxacin an excellent choice when the specific bacterial strain causing the infection is unknown.

Safety Profile:

Marbofloxacin tablets have exhibited an excellent safety profile in veterinary use. While all medications carry some degree of risk, adverse reactions associated with Marbofloxacin are rare and usually mild. However, it is crucial to follow the prescribed dosage and duration to minimize the risk of adverse effects.

Analytical Techniques:

Several analytical techniques can be employed for the estimation of Marbofloxacin, including HPLC, ultra-high-pressureLiquid Chromatography (UP-HPLC), and liquid chromatography& Mass spectrophotometry (LC-MS). The techniques offer high sensitivity, selectivity, and precision for the quantification of Marbofloxacin in complex matrices. Sample with dilute & concentrations preparation methodssuch as Solid Phase extraction (SPE) or LiquidLiquid extraction (LLE), are often utilized for enhancing the sample's purity and minimize matrix interference.

Stability-Indicating Studies:

Stability-indicating studies are essential to assess the stability profile of Marbofloxacin. These studies subjecting drug into various stress conditions, such as hydrolysis, thermal stress ,oxidation, photolysisto mimic potential degradation pathways. Analytical techniques like high-performance liquid chromatography (HPLC) coupled with Ultraviolet (UV) detection or Mass spectrophotometry (MS) are commonly employed to separate and identify the degradation products. The identification of stability-indicating markers facilitates the establishment of appropriate storage conditions and shelf-life determination for Marbofloxacin formulations.

Method Development &Validation:

The development and validation of analytical methods for Marbofloxacin quantification are crucial to ensure accurate and reliable results. Method development involves selecting suitable conditions of chromatography namely column type, mobile phase, detection wavelength, to achieve optimum separation and quantification of Marbofloxacin. Validation studies encompass parameters like Linearity, Specificity, Accuracy, Precision, Robustness, and System

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 5, June 2023

suitability to evaluate the method's performance and suitability for routine analysis. The validation process ensures method suitability for its intended purpose and providing result reliability.

II. CONCLUSION

In conclusion, Marbofloxacin tablets have proven to be an outstanding antibiotic dosage form for veterinary use. Their effectiveness, ease of administration, broad-spectrum activity, and favorable safety profile make them a reliable choice for treating bacterial infections in animals. Stability-indicating studies and method development validation playing crucial role in ensuring the quality, safety, and efficacy of Marbofloxacin formulations. These studies provide valuable insights into the drug's degradation behavior and establish robust analytical methods for its accurate quantification. By understanding the stability profile and employing validated analytical methods, pharmaceutical companies and regulatory bodies can confidently assess the quality and shelf-life of Marbofloxacin-based products, thereby ensuring the effective treatment of bacterial infections in animals.

REFERENCES

[1]. Boothe, D.M., W. B. Saunders Co., Philadelphia, PA. (2001) Antimicrobial drugs. In Small Animal Clinical Pharmacology and Therapeutics, pp. 150–173.
[2]. British Pharmacopoeia – 2000.
[3]. Christian, G. D. Analytical Chemistry, 6th edition, Wiley International, 2004, 604-620.
[4]. Christopher, JL. Principles of renal physiology. 5th USA: Springer Publishing; 2012.
[5]. Cirimele, V.; Kintz, P.; Dumestre, V.; Goullé, J. P.; Ludes, B.; Forensic Science. Int. 2000, 107, 381.
[6]. Rigaku (2007). CrystalStructure Rigaku, Tokyo, Japan.
[7]. Sheldrick, G. M. (2008). Acta Cryst. A**64**, 112–122. [PubMed]
[8]. Spreng, M., Deleforge, J., Thomas, V., Boisrame, B. &Drugeon, H. (1995). J. Vet. Pharmacol. Ther. **18**, 284–289. [PubMed]
[9]. Thomas, E., Caldow, G. L., Borell, D. &Davot, J. L. (2001). J. Vet. Pharmacol. Ther. **24**, 353–358. [PubMed]
[10]. (Boothe, D.M., W. B. Saunders Co.,Philadelphia, PA. (2001) Antimicrobial drugs. In Small Animal Clinical Pharmacology and Therapeutics, pp. 150–173.)