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Review Article

A Review on Mouth Dissolving Tablets and Meloxicam

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ABSTRACT

Mouth dissolving tablets (MDTs) have emerged as a novel dosage form designed to enhance patient compliance and therapeutic efficacy, particularly for pediatric, geriatric, and dysphagic patients. These tablets rapidly disintegrate in the oral cavity within seconds, releasing the drug for quick absorption without the need for water. Meloxicam, a non-steroidal anti-inflammatory drug (NSAID) belonging to the oxicam class, exhibits poor water solubility and delayed onset of action when administered as conventional tablets. The development of Meloxicam MDTs aims to overcome these limitations by improving solubility, enhancing bioavailability, and providing rapid analgesic and anti-inflammatory effects. This review highlights the fundamental principles of MDT formulation, including the role of super-disintegrants, excipients, and formulation techniques such as direct compression and lyophilization. It also discusses evaluation parameters, challenges in taste masking, and recent advancements in fast-dissolving technology. The study concludes that MDTs of Meloxicam represent a promising alternative to conventional oral dosage forms, offering rapid onset, improved patient acceptability, and better therapeutic performance.

Keywords: Mouth dissolving tablets, Meloxicam, Super-disintegrants, Bioavailability, Fast dissolving**ARTICLE INFO:** Received 14 Feb 2025; Review Complete 25 April 2025; Accepted 19 August 2025. ; Available online 15 Oct. 2025

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INTRODUCTION

Oral drug delivery remains the most preferred route due to its safety, ease, and cost-effectiveness. However, many patients—especially pediatric, geriatric, and dysphagic—face difficulty swallowing conventional tablets, leading to poor compliance and reduced therapeutic efficacy. This has prompted the development of innovative dosage forms that ensure convenience, rapid action, and better patient adherence. Mouth dissolving tablets (MDTs), also known as orally disintegrating or fast-dissolving tablets, were introduced in the 1980s to overcome swallowing difficulties. They rapidly disintegrate in the mouth within 30 seconds without water, allowing quick absorption through oral or gastrointestinal mucosa. Continuous advancements in excipients and techniques like lyophilization, sublimation, and direct compression have made MDTs a popular and patient-friendly dosage form¹.

MDTs enhance therapy for pediatric, geriatric, and dysphagic patients by offering easy administration without water and improved palatability. They also benefit travelers,

psychiatric, and bedridden patients. The rapid onset of action makes MDTs especially suitable for conditions like pain and inflammation where immediate relief is desired. Meloxicam, a selective COX-2 inhibitor NSAID, is used to treat pain, fever, and inflammatory disorders such as rheumatoid and osteoarthritis^{2,3}. Its poor aqueous solubility and slow dissolution limit bioavailability and delay therapeutic effect^{4,5}. Formulating Meloxicam as an MDT can enhance dissolution, ensure faster relief, and improve patient compliance.

This review focuses on the formulation, development, and evaluation of mouth dissolving tablets, emphasizing Meloxicam as a model drug^{5,6}. It covers excipient selection, manufacturing techniques, evaluation parameters, and taste-masking strategies. The article also outlines challenges and prospects for enhancing Meloxicam's solubility, bioavailability, and clinical efficacy through MDT technology⁵.

Advantages of Mouth Dissolving Tablets (MDTs)

- Ideal for geriatric, pediatric, and dysphagic patients who face difficulty swallowing conventional tablets.
- Can be taken anytime and anywhere, improving patient convenience and compliance.
- Quick disintegration and dissolution in saliva lead to faster drug absorption and therapeutic effect.
- Partial absorption through the oral mucosa can bypass first-pass metabolism.
- Pleasant mouthfeel and taste-masking techniques improve acceptance.
- Useful where rapid drug action is needed, e.g., in pain, allergy, or motion sickness^{2,3}.

Disadvantages of Mouth Dissolving Tablets (MDTs)

- Not suitable for drugs requiring high doses (>25–50 mg).
- Bitter or unpleasant-tasting drugs need additional formulation efforts.
- MDTs are fragile and require special packaging to prevent degradation.
- Tablets are soft and may break during handling or transport.
- Some drugs may degrade due to exposure to saliva or environmental moisture^{1,3}.

Formulation Aspects of Mouth Dissolving Tablets (MDTs)

Drug Selection Criteria: The choice of drug for MDT formulation depends on several factors:

- Drugs with low to moderate doses (generally below 25–50 mg) are preferred to ensure compact tablet size and mechanical strength.
- Drugs with poor aqueous solubility benefit from MDT formulation, as rapid disintegration enhances dissolution and absorption².
- Pleasant-tasting drugs are ideal; bitter drugs require effective taste-masking techniques for patient acceptability.
- The drug must be stable under ambient and humid conditions and should not react with excipients during processing or storage.

Excipients Used: Excipients play a crucial role in ensuring rapid disintegration, good mouthfeel, and acceptable tablet strength.

- **Super-disintegrants:** Promote rapid tablet breakup and dissolution. Commonly used agents include Croscopovidone, Croscarmellose Sodium, and Sodium Starch Glycolate (SSG).
- **Fillers/Diluents:** Provide bulk and improve mouthfeel; examples include mannitol, microcrystalline cellulose, and dicalcium phosphate.

- **Sweeteners and Flavors:** Enhance palatability and patient compliance. Common agents are aspartame, sucrose, sorbitol, and fruit flavors.
- **Lubricants:** Facilitate manufacturing and prevent sticking; typical examples include magnesium stearate and stearic acid¹.

Formulation Techniques: Several techniques are employed to prepare MDTs, each influencing disintegration time, hardness, and stability.

- A simple and cost-effective method using super-disintegrants for rapid tablet breakup.
- Produces porous, highly water-soluble tablets with excellent disintegration properties.
- Uses volatile agents like camphor or urea to create a porous structure after sublimation, enhancing water penetration.
- Employs drying of the drug–excipient solution to produce fine, porous particles with fast disintegration.
- Involves softening the blend with solvents and extruding into uniform shapes that are later dried and punched into tablets^{7,8}.

Importance of Taste Masking in MDTs: Taste masking is critical for ensuring patient compliance, especially for bitter or unpleasant-tasting drugs that dissolve quickly in the mouth. Effective taste masking can be achieved by coating drug particles, complexation with cyclodextrins, use of flavoring and sweetening agents, or encapsulation techniques. Proper taste masking not only improves patient acceptability but also enhances the therapeutic value of MDTs by promoting consistent administration⁸.

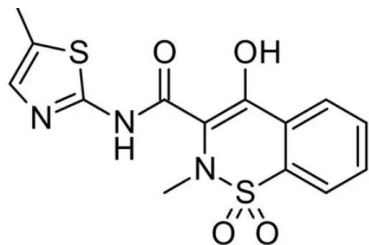
Evaluation and Quality Control Parameters

- The quality assessment of mouth dissolving tablets (MDTs) involves several physicochemical and performance tests to ensure uniformity, stability, and patient acceptability⁹.
- Basic evaluation parameters include weight variation, hardness, and friability, which determine the tablet's uniformity, mechanical strength, and resistance to abrasion during handling.
- Wetting time and disintegration time are crucial indicators of how quickly the tablet breaks down in the oral cavity, directly affecting onset of action.
- The dissolution profile evaluates drug release behavior and helps establish an in-vitro–in-vivo correlation (IVIVC), predicting the therapeutic performance of the formulation.
- Palatability and taste evaluation are conducted using trained volunteers or electronic tongue systems to ensure patient compliance, particularly for bitter drugs¹⁰.
- Stability studies, performed under accelerated and long-term conditions as per ICH guidelines (Q1A–Q1E), assess changes in drug content, physical appearance, and disintegration behavior over time.
- A strong in-vitro and in-vivo correlation confirms the reliability of laboratory tests in predicting clinical

performance, ensuring consistent therapeutic efficacy and patient satisfaction¹¹.

Meloxicam: Pharmacological and Biopharmaceutical Profile

Chemical structure:



- Mechanism of action (COX-2 inhibition):** Meloxicam is a non-steroidal anti-inflammatory drug (NSAID) belonging to the oxycam class. It primarily acts by selective inhibition of the cyclooxygenase-2 (COX-2) enzyme, which is responsible for the conversion of arachidonic acid into prostaglandins key mediators of pain, inflammation, and fever. By selectively blocking COX-2, Meloxicam reduces prostaglandin synthesis at the site of inflammation, thereby producing anti-inflammatory, analgesic, and antipyretic effects. Unlike non-selective NSAIDs, Meloxicam has less inhibitory action on cyclooxygenase-1 (COX-1), an enzyme involved in gastric protection and platelet aggregation. This selective inhibition helps minimize gastrointestinal side effects, such as ulceration and bleeding, while maintaining therapeutic efficacy¹².
- Therapeutic uses:** Meloxicam is used for the treatment of pain, inflammation, and fever associated with various conditions. It is effective in managing osteoarthritis, rheumatoid arthritis, and ankylosing spondylitis. Additionally, it provides symptomatic relief in musculoskeletal and postoperative pain^{13,14}.

Development and Optimization of Meloxicam MDTs

The development of Meloxicam mouth dissolving tablets (MDTs) aims to overcome its poor aqueous solubility and delayed onset of action, ensuring faster drug release and improved patient compliance. The rationale behind selecting Meloxicam for MDT formulation lies in its low solubility, moderate dose, and need for rapid analgesic and anti-inflammatory effect. Various formulation strategies have been explored to enhance its solubility and dissolution rate, including solid dispersion, inclusion complexation with cyclodextrins, and co-grinding with hydrophilic carriers, which improve drug wettability and surface area^{1,7,14}. Literature reports demonstrate significant improvements in disintegration time and percentage drug release across different preparation methods such as direct compression, lyophilization, and sublimation. The incorporation of super-disintegrants like croscopovidone, croscarmellose sodium, and sodium starch glycolate plays a crucial role in achieving rapid disintegration, while carriers such as mannitol and microcrystalline cellulose enhance mouthfeel and tablet integrity. Additionally, taste masking through coating, flavoring agents, or complexation techniques ensures better

patient acceptability and compliance, making Meloxicam MDTs an effective and patient-friendly dosage form for rapid therapeutic relief^{9,15}.

CONCLUSION

Mouth Dissolving Tablets (MDTs) represent a significant advancement in oral drug delivery, offering improved patient compliance, rapid onset of action, and convenience of administration without water. Their unique ability to disintegrate quickly in the oral cavity makes them especially beneficial for pediatric, geriatric, and dysphagic patients. Meloxicam, a poorly water-soluble NSAID, poses formulation challenges due to its limited dissolution and delayed therapeutic response. The development of Meloxicam MDTs effectively addresses these limitations by enhancing solubility, bioavailability, and absorption rate through innovative formulation approaches such as solid dispersion, inclusion complexation, and the use of efficient super-disintegrants. Literature findings confirm that optimized Meloxicam MDTs provide faster disintegration, improved drug release, and better patient acceptability compared to conventional tablets. Overall, Meloxicam MDTs offer a promising and patient-friendly alternative for effective pain and inflammation management, marking a step forward in modern pharmaceutical technology and therapeutic efficacy.

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