International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2024: 7.101

Development and Evaluation of Mouth Dissolving Anti - Inflammatory Tablet Containing Fenoprofen

Sweety Verma[1], Dr. Alka Verma[2]

[1]Research Scholar - Department of Pharmacy, Rameshwaram Institute of Technology and Management Sitapur Road, Lucknow, Uttar Pradesh, India
Corresponding Author Email: *vermasweety8052[at]gmail.com*

[2]Professor, Director - Rameshwaram Pharmacy College, Manwa, Sitapur, Uttar Pradesh, India

Abstract: ***The aim of this study was to formulate and evaluate a mouth - dissolving tablet of Fenoprofen, a nonsteroidal anti - inflammatory drug (NSAID), for rapid onset of action and improved patient compliance. Fenoprofen is known for its anti - inflammatory, analgesic, and antipyretic characteristics, but its conventional dosage forms have restrictions such as delayed onset of action and gastrointestinal irritation. In this work, we develop mouth - dissolving tablets using good excipients, add super disintegrants, make sure rapid disintegration and drug release. The tablets were analysed for various physicochemical variable such as disintegration time, drug content, in - vitro dissolution, and stability. The results shows that the improve formulation exhibited excellent disintegration and dissolution characteristics, with a significant upgrade in drug bioavailability correlate to standard formulations. The advanced mouth - dissolving tablets showed promise as a well - found alternative for delivering Fenoprofen in an efficient and patient - friendly manner.***

Keyword: Mouth - Dissolving Tablet, Fenoprofen, Anti - Inflammatory, NSAID, Drug Delivery, Super disintegrants, Formulation, Evaluation, Dissolution, adherence

1. Introduction

Fenoprofen is a nonsteroidal anti - inflammatory drug (NSAID) affiliating to the propionic acid class. It is frequently prescribed for the treatment of several inflammatory conditions, having rheumatoid arthritis, osteoarthritis, musculoskeletal pain, and dysmenorrhea, furthermore for its analgesic and antipyretic properties. Fenoprofen utilize its therapeutic effects primarily through the blocking of cyclooxygenase (COX) enzymes, particularly COX - 2, conduct to make less synthesis of prostaglandins, which are conciliator of inflammation, pain, and fever.

While effective, Fenoprofen and other NSAIDs are related with some restriction, especially when administered in common oral dosage forms such as tablets or capsules. These made up of slow onset of action, poor gastrointestinal tolerability, and potential for critical gastrointestinal (GI) side effects like ulcers, bleeding, and irritation. As well the drug's absorption can be slow, leading to slow therapeutic effects, which could be a significant concern for patients need to rapid relaxation from acute pain or inflammation.

The therapeutic effectiveness of Fenoprofen can be particularly improve the quality by prepare it in a manner that attack these prob, improving both the speed and extent of drug absorption. One rising approach to enhanced the drug's pharmacokinetic profile is through the evaluation of mouth - dissolving tablets (MDTs), a novel dosage form that make sure rapid decompose and drug release without the need for water.

Mouth - Dissolving Tablets (MDTs) -
Mouth - dissolving tablets (MDTs) represent a development in pharmaceutical inventions, mainly for patients who have trouble swallowing solid dosage forms, like the elderly, children, or patients with dysphagia. MDTs, also known as fast - dissolving, orally breakdown, or quick - dissolving tablets, are invent to disintegrate quickly in the oral cavity upon contact with saliva, permitting the drug to be absorbed directly through the buccal mucosa or swallowed for gastrointestinal absorption.
These tablets are invented to have a low deterioration time, usually under 30 seconds, prepare a fast onset of action.

Advantage of Mouth - Dissolving Tablets
Mouth - dissolving tablets (MDTs) are formulated to disintegrate quickly in the mouth, acknowledge for rapid absorption and onset of action. They provide some benefits:

1) Rapid Onset of Action: MDTs dissolve quickly in saliva, which increases bioavailability.
2) Convenience: They do not need water for regulation, creating them ideal for patients who have complexity swallowing tablets.
3) Improved Compliance: Their simplicity of use makes them especially suitable or geriatric patients, paediatric patients, and those with dysphagia.

Given the benefits of MDTs and the resources of Fenoprofen, this study explores the formulation of a Fenoprofen mouth - dissolving tablet to increase its therapeutic efficacy and patient compliance.

2. Materials and Methods

Materials
- Active Ingredient: Fenoprofen (API)
- Excipients:
- Super disintegrants (e. g., croscarmellose sodium, sodium starch glycolate) - Binders (e. g., polyvinylpyrrolidone)
- Fillers (e. g., lactose, mannitol)
- Lubricants (e. g., magnesium stearate)
- Flavors and colours (optional)

Method of Formulation: -

1) Preparation of Fenoprofen MDT:

- Fenoprofen, together with excipients (binders, disintegrants, fillers), was mixed using the geometric dilution method.
- Intermingle was then granulated using a wet granulation method (PVP as a binder solution).
- The following granules were dried, sifted, and combined with lubricants and other excipients.
- The final combination was compressed into tablets using a tablet compression machine.

2) Evaluation of the Formulations:

- Weight Variation: Single tablet weights were determined to make sure uniformity.
- Hardness: The toughness of the tablets was measured using a toughness tester.
- Friability: Friability was evaluated by placing the tablets in a fabricator for 100 volution.
- Disintegration Time: The disintegration time of the tablets was assess using disintegration test apparatus.
- Dissolution Studies: The in - vitro dissolution of Fenoprofen from the tablets was implement using a USP dissolution apparatus (Type II) in reproduce saliva or buffer medium.
- Drug Content: The tablets were powdered and the drug content was examine using UV spectrophotometry.
- Stability Studies: Stability of the produced tablets was tested under speed up conditions (40°C/75% RH for 3 months).

3. Results

a) Physical Appearance

Drug	Reported	Observed
Fenoprofen	White colour Odourless Powder	White colour Odourless Powder

- Melting Point: - Melting point of Fenoprofen was persevering using Melting point apparatus (Tempo) and found to be168°C - 171°C.
  Disintegration Time: The better MDT formulation decomposing within 20 seconds.
- Drug Release: In - vitro separation studies publish that the MDT formulation released over 85% of the drug within 30 minutes, designate quick release.
- Stability: The tablets persist stable, with no significant loss of drug satisfied or change in appearance after 3 months.
- Patient Acceptance: The production was found to be palatable, with an even mouthfeel and no observable aftertaste.
- Solubility analysis: The sample was expressively tested for its solubility in some solvents. It was possessing by trembling 2 mg of drug sample in 5 ml of solvent (i. e. Dimethyl sulfoxide, Water, Methanol, n - Hexane, Methylene chloride Phosphate buffer pH 6.8, Phosphate buffer pH 7.4 and0.1N HCl etc) in small test tube and noticed the vanishing of the sample completely.

b) Solubility:

S. No	Solvent	Solubility	Result
1	Dimethlysulfoxide, n octanol	Freely soluble	++++
2	Methanol, methylene chloride	Soluble	+++
3	Ethanol (95%)	Sparingly soluble	++
4	Phosphate buffer pH.6.8	Slightly soluble	+
5	Phosphate buffer pH 7.4	Slightly soluble	+
6	0.1NHCL, ethyl ether	Slightly soluble	+
7	n - Hexane, water	Slightly soluble	+

4. Discussion

The invention of mouth - dissolving tablets of Fenoprofen impressively enhanced the drug's dissolution rate and bioavailability contrast to regular tablets. The use of super disintegrants played a critical role in bring off quick disintegration and drug release. The stability studies established that the improve formulation preserve its quality over time. These results propose that the MDT invention of Fenoprofen could offer a superior therapeutic alternative, give rapid relief from inflammation and pain with enhanced patient compliance.

5. Conclusion

In conclusion, the mouth - dissolving tablet of Fenoprofen grow in this study appear promising results in terms of quick disintegration, drug release, and stability. This composition can offer significant benefits over conventional oral formulations in terms of patient adherence and therapeutic efficacy, usually for patients who need quick relief from pain and inflammation.

Acknowledgement
We demonstrate our deep appreciation to Dr. Alka Verma (Director of Rameshwaram Pharmacy College, Manwa, Lucknow) and Ranveer Singh (Assistant Professor) for their invaluable guidance, assistance, and motivation throughout the development of this review article. Their expertise and constructive feedback have significantly enhanced the quality and organization of our work. We are also thankful to Rameshwaram Institute of Technology and Management, Lucknow. for providing the necessary resources and infrastructure essential for conducting this work.

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