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Short Review paper

Innovative dosage forms: Exploring the world of fast dissolving tablets

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Abstract

Fast-dissolving tablets (FDTs) are the newly popular dosage form that is especially well-liked by patients who have trouble swallowing regular tablets. Due to the fast-dissolving properties of FDTs, it is too simple to administer them. FDTs are the best option for geriatric and bedridden patients and patients with dysphagia or nausea because FDTs dissolve rapidly in the buccal cavity and there is no need for water. There are different types of techniques have been employed for the preparation of FDTs, including direct compression, freeze-drying, and spray-drying. Moreover, there are many different types of drugs that can be integrated into FDTs. An overview of the methods utilized to manufacture FDTs and evaluation are also covered in this article along with the benefits of FDTs, decreased risk of choking, and simple transportation. The development of ODTs represents a significant advance in the field of drug delivery and offers important benefits for patients and healthcare providers. Thus, research in this area is essentially required to address the formulation challenges and improve the efficacy and safety of FDTs.

Keywords: Fast dissolving tablets (FDTs), freeze drying, spray drying, direct compression, dysphagia.

Introduction

There are various ways by which we can deliver the drug despite all routes oral route is the most common route of administration of therapeutic agents[1]. Various physiological and neurological conditions were changing in some patients, making it difficult for them to swallow the capsules or tablets associated with the problems of dysphagia (difficulty in swallowing), during travelling, bedridden patients, and risk of choking[2]. During very long periods of time fast dissolving tablets (FDTs) shows prominence upon administration. FDTs are the solid dosage form having a medicinal substance that disintegrates quickly in the mouth with the help of saliva and gives a rapid onset of action[3]. When we take FDT it rapidly converts into a foam-like substance and dissolves in the mouth a hard solid shell is transformed into a foam-like structure which allows an easy way to intake medicine by the patient. The disintegration of the tablet is taking only some seconds not more than one minute[2-4]. FDTs are different from conventional tablets. The FDTs was having various unique properties, quick disintegrating time, quick onset of action also disintegration in the mouth without water[5].

Importance of FDTs[4]

i. Without water we can easily take FDTs and dissolves quickly in mouth, ii. It gives a pleasant mouth feel. iii. Permits high drug loading, iv. It is an economical process.

Drugs that can be integrated into FDTs: These are some main categories of drugs that can be integrated into FDTs.

Table-1: List of some categories of drugs that can be integrated into FDTs[5-8]

Categorization	Drugs that can be integrated into FDTs
Analgesic and anti-inflammatory agents	Ibuprofen, Mefenamic acid, Ketoprofen
Antimalarial agents	Chloroquine, Mefloquine, Pyrimethamine
Antifungal agents	Clotrimazole, Amphotericin, Ketoconazole, Fluconazole
Antibacterial agents	Ciprofloxacin, Rifampicin, Nalidixic, Erythromycin
Anxiolytic, Sedative, Hypnotics, and Neuroleptics agents	Alprazolam, Chlordiazepoxide, Meprobamate, lorazepam
Antihypertensive agents	Amlodipine, Diltiazem, Nifedipine
Diuretics	Acetazolamide, Amiloride, Hydrochlorothiazide, Furosemide

Different techniques of preparation of FDTs: There are some techniques by which we use to manufacture FDTs, some of them are given below: i. Freeze drying, ii. Direct compression, iii. Sublimation, iv. Spray drying, v. Mass extrusion.

Lyophilization/Freeze drying: Freeze drying is a process that involves freezing a substance and then subjecting it to a vacuum to remove the moisture through sublimation, leaving behind a dry product. This method is commonly used in the

pharmaceutical industry to create FDTs. The lyophilization process helps maintain the active ingredients' potency and improve their bioavailability by creating a porous structure that dissolves quickly in the mouth. This makes the medication easier to administer and enhances its effectiveness, particularly for patients who struggle with swallowing pills or require fast-acting medication[9].

Direct compression: Direct compression is the most common method for producing fast-dissolving tablets that involve compressing a mixture of active pharmaceutical ingredients and excipients into a tablet without the need for granulation or any other preparatory steps. This method is preferred because it is simple, economical, and results in tablets that are easy to swallow and quickly dissolve in the mouth[10].

Sublimation: Sublimation is a promising method for the production of fast-dissolving tablets because it does not require any type of solvent, and is also used to improve the solubility and bioavailability of poorly soluble drugs. The method is also environmentally friendly and cost-effective, making it an attractive option for the pharmaceutical industry[11].

Spray drying: Spray drying is a method for producing fast-dissolving tablets that involve the conversion of a liquid formulation into a dry powder using a spray dryer. In this process, the liquid is atomized into small droplets that are dried by a hot air stream, resulting in a fine powder with good flow properties.

The powder is then compressed into tablets, which disintegrate rapidly in the mouth, allowing for quick dissolution and absorption of the active ingredients[12].

Mass extrusion: Mass extrusion is a promising method for the production of fast-dissolving tablets because it can be used to produce tablets with a high degree of uniformity and consistency. Additionally, it can be used to improve the solubility and bioavailability of poorly soluble drugs by incorporating them into a highly soluble matrix[12].

There are various scientists who prepare FDTs by different methods. Every method was having some pros and cons. However, the most suitable method of preparation is a direct compression method.

The rationale of the study and major excipients used in the: i. Patients having physical problems with swallowing (dysphagia). ii. FDTs offer removal of the need to swallow a pill or capsule, thereby reducing the effort and physiological stress associated with tablet swallowing.

Challenges in the formulation of FDTs[13]

There are some challenges that occur in the formulation of FDTs, they are needed to address so that by which help in the future explores more research in the particular area.

Table-2: Major excipients and their percentage used for the preparation of FDTs[8].

Excipients	Examples	Percentage
Super disintegrant	Croscarmellose sodium, sodium starch glycolate	1-5
Binders	Tragacanth, lactose, MCC	5-10
Antistaticagents	Talc, magnesium stearate	0-10
Diluents	MCC, lactose	0-85

Table-2: Challenges that occur in the formulation of FDTs.

Challenges in the formulation of a FDTs	Elaboration of the problems
Insolubility of drugs	To overcome these challenges, various techniques such as solid dispersions, nanosuspensions, and cyclodextrin complexes have been used to enhance the bioavailability and solubility of poorly soluble drugs in fast-dissolving tablets. Other strategies such as the use of taste-masking agents and the optimization of tablet disintegration time can also improve patient acceptability and compliance[14].
Taste masking of bitter and obnoxious drug	To overcome this challenge, various taste-masking techniques such as complexation with cyclodextrins, microencapsulation, and ion exchange resins have been employed. Additionally, the use of sweeteners and flavor can also help to mask the unpleasant taste of the drug and improve patient acceptability[15,16].
Co-administration of drugs	To address this challenge, various approaches such as the use of multi-layer tablets, co-spray drying, and solid dispersion techniques have been employed to improve the compatibility and stability of co-administered drugs in fast-dissolving tablets[13].
Needspecial packaging	Various types of packaging materials such as blister packs, sachets, and strip packs have been used for fast-dissolving tablets. Additionally, the use of desiccants, such as silica gel or molecular sieves, can also help to maintain the stability of the tablets during storage[17].
Dose uniformity	Various techniques, such as direct compression and spray drying, have been used to improve the uniformity of fast-dissolving tablets. Additionally, the use of specialized equipment such as high-shear mixers and fluidized bed dryers can also help to ensure the uniformity of the final product[13].

Benefits of the Fast-Dissolving Tablets[18-20]**:** i. The patient who has a problem from motion sickness, cold, bronchitis, congestive heart failure, and asthma whereas the quick onset action. ii. Administration of drugs without water. iii. Suited for geriatric and infant patients who have difficulties in swallowing and may experience problems using conventional oral dosage forms. iv. Ability to permeate the oral mucosa. v. Fast breakdown of particles of tablets leads to quick dissolution and rapid absorption which may produce rapid onset of action.

Future Potential of Fast-Dissolving Tablet[21-23]

In the future, fast-dissolving tablets have the potential to be used in various fields such as gene therapy, vaccine delivery, and tissue engineering. However, the formulation of such tablets requires a significant amount of research and development to ensure that they are effective and safe. One of the key challenges in the future would be to develop a faster and more cost-effective manufacturing process while maintaining the quality of the final product. Additionally, new technologies such as 3D printing and nanotechnology could be utilized to improve the delivery of drugs through fast-dissolving tablets.

Conclusion

In conclusion, fast-dissolving tablets (FDTs) have emerged as an innovative dosage form that has transformed the pharmaceutical industry. FDTs offer several advantages over conventional tablets, particularly for patients who have difficulty swallowing. They are easy to administer, reduce the risk of choking, and offer simplified transportation. The various techniques employed in the manufacture of FDTs, such as direct compression, freeze-drying, and spray-drying, offer a wide range of options for integrating different types of drugs into tablets. The development of FDTs represents a significant advancement in the field of drug delivery and holds promise for the future of pharmaceuticals. However, challenges such as formulation and safety issues must be addressed through continued research to improve the efficacy and safety of FDTs. This article has explored the world of FDTs, highlighting the benefits and challenges associated with their development, and providing an overview of the methods used for their manufacture and evaluation. As innovative dosage forms, FDTs offer an exciting avenue for drug delivery, with the potential to enhance patient care and improve health outcomes.

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