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A REVIEW ON THE APPROACH OF ORAL DISPERSIBLE SYSTEM IN DRUG DELIVERY

Mrs. Savita Devi[1] Dr. Rakesh Kumar Jat[2]
[1]PhD Research Scholar, Department of Nursing Shri JJTU Rajasthan,India
[2]Research Guide, Department of Pharmacy Shri JJTU Rajasthan,India
Corresponding Author- Mrs.Savita Devi

Abstract
The means by which a drug is introduced into a living body is referred to as the dosage form. To achieve the desired effect, the drug must be delivered to the location where it will have its effect at a rate and concentration that will allow for the greatest possible therapeutic benefit with the fewest possible unwanted side effects. Because the oral route is still widely accepted, despite the fact that it has the common disadvantage of being difficult to swallow tablets and capsules. As a result of this, a significant amount of investigation has been put into the development of innovative drug delivery systems. Oral dispersible tablets are a novel approach in drug delivery systems that are now a day's more focused in formulation world, and laid a new path that, helped the patients to build their compliance level with the therapy, as well as reduced the cost and eased the administration, particularly in the case of pediatrics and geriatrics. This review will discuss oral dispersible tablets. The primary benefits of this dosage form include rapid absorption and action, as well as a reduction in the amount of drug lost.

Key words: *Fast dissolving/disintegrating tablets, orodispersible tablets, GIT, bioavailability, first pass metabolism, superdisintegrants*

Introduction

The basic requirement and need of today is for drug manufacturers to formulate their products into a form that is presentable. A drug's application to a living body requires a delivery system that can administer the medication in the appropriate dosage form. There are many different types of dosage forms available, including tablets, syrups, suspensions, suppositories, injections, transdermal patches, and patches. Each of these types of dosage forms has a unique mechanism for delivering the drug. These traditional and contemporary dosage forms each have their own set of benefits and drawbacks; consequently, the formulation of an ideal drug delivery system presents a significant obstacle for pharmacists to overcome in the current environment. To achieve the desired effect, the drug must be delivered to the location where it will have its effect at a rate and concentration that will allow for the greatest possible therapeutic benefit with the fewest possible unwanted side effects. A comprehensive investigation into the physicochemical principles that govern a particular formulation of a drug ought to be carried out prior to the development of an appropriate dosage form [1]. [Citation needed]

It is necessary to have knowledge about each ingredient, including its physical, chemical, and biological properties, as well as its compatibility with the active drug, in order to establish a dosage form for a drug. This is done to ensure that the product that is formed is palatable, stable, and effective [2]. The majority of drugs are able to penetrate the barrier through a process known as molecular diffusion or pore diffusion, which occurs when they pass through pores. The drug release rate is determined by the crystal size, molecular size, pore size, pore structure, and tortuosity of the polymers. Pore diffusion is one method of drug delivery. In Fick's first law, which describes passive transport, the drug moves from a region of high concentration to a region of low concentration. On the other hand, in active transport, energy is required for the movement of the drug from a region of low concentration to a region of high concentration via one or more transport mechanisms. It is necessary to have a source of energy or a carrier, such as an enzyme or protein [1].

General Considerations In Dosage Form Design

Before moving forward with the development of a new dosage form, several physicochemical properties need to be taken into consideration. During the process of formulating a dosage form, the most important factors to take into account include the following: the

formulation that satisfies the target parameters is referred to as the master formulation, and the formulation of any batch must adhere to the specifications of the master formula. It is possible to include active agents in a wide variety of dosage forms in such a way as to achieve a drug delivery system that is both practical and effective for the treatment of diseases based on the route of administration. Tablets and capsules, which are intended for oral use and have a systemic effect and can be easily managed by the majority of patients, are prepared for the systemic effect. However, injectable forms of the medication are used in the event of an emergency because they produce results more rapidly. Other dosage forms, such as patches and suppositories, can be administered in a manner that is tailored to the individual patient's needs [1].

Need Of Innovative Drug Delivery System

Orally administered drug delivery is still considered a standard system in the pharmaceutics field. It is also still considered the safest, most convenient, and most cost-effective method of administration, providing the best route for patient compliance [3]. However, in the case of tablets and capsules, there is a common drawback of difficulty in swallowing, which leads to poor compliance especially in geriatrics [4].

The development of novel dosage forms has taken on a key role in recent years due to the growing necessity of improving patient compliance and simplifying administration. Conventional oral drug delivery presents a drug with a quick and full release, which may result in the drug not producing the desired effect. This may be caused by factors such as the presence of food in the stomach, the pH of the stomach, enzymatic degradation, a change in GIT motility, and so on, which does not allow the drug sufficient time to be absorbed [5,6]. Recently, a lot of attention has been paid to the field of engineering drug delivery systems that have organoleptic elegancy and maximal patient acceptance, particularly in the context of paediatrics and geriatrics [7-9]. There is a lot of innovative work being done on drug delivery, and the oral route is preferred because it is easier to administer, more cost effective therapy, patients can self-medicate, and it is a noninvasive method, all of which contribute to patients complying with treatment at a higher level [10]. Tablet coating is one of the parameters that are used in the construction of drug delivery systems. Its purpose is to reduce unpleasant side effects and taste, while simultaneously improving elegance and drug bioavailability [11].

Oral Dispersible Tablets

Drinking water is often necessary for the oral administration of pharmaceuticals like tablets and capsules, in which some patients feel discomfort while swallowing the bulky traditional dose forms [12]. This is the case because drinking water helps dilute the drug and makes it easier to swallow. Orodispersible tablets are an alternative in oral DDS that have been created in order to reduce dysphagia and enhance patient compliance. These tablets are meant to dissolve in the mouth without the need for the assistance of water. Therefore, they are effective in situations such as kinetosis, cough episodes caused by neurological stimulation, or chest infections. They are also useful in situations in which water is not accessible or is banned, such as before a surgery. Orodispersible tablets are manufactured using a variety of processes, all with the intention of achieving the desired effect of rapid disintegration of the dosage form upon coming into contact with saliva while maintaining a pleasing mouthfeel [13]. Patients who have trouble swallowing are candidates for receiving these orodispersible tablets (ODT). They are also known as porous tablets, mouth dissolvable pills, melt-in-mouth tablets, rapid dissolving tablets, and quick dissolving tablets [14]. These are tablets that, upon coming into contact with saliva, either scatter or disintegrate, resulting in the release of the active medication [15,16]. This kind of dosage form offers the greatest possible drug bioavailability in comparison to more traditional forms [17]. This dispersible quality is conferred to the dosage form by the inclusion of superdisintegrants, which cause the medicine to be released in the mouth, hence boosting the bioavailability [18]. Disintegrants may be added in one of three distinct ways: intra granularly (inside the granules), extra granularly (after the granulation process), or by a mixture of the two approaches [19].

It is generally agreed that less than a minute is the optimal amount of time for an orodispersible tablet to get dispersed [20,21]. Direct compression, solid dispersion, lyophilization, or moulding are the most common procedures used in the preparation of disintegration times, which typically range from 5 to 30 seconds. Direct compression is the technique of choice for all of these other approaches due to the fact that it is simple, the process is rapid, and it is cost effective [22]. ODTs are created by adding super disintegrants

such as cross-linked cellulose derivatives, carboxymethyl cellulose, sodium starch glycolate, and polyvinylpyrollidone. These disintegrants cause a burst of disintegration when they come into contact with saliva or water. Because of oral and pregastric absorption, the bioavailability of medicines may increase, which results in decreased first-pass metabolism in the gastrointestinal tract [23].

Techniques For Preparing Orodispersible Tablets

The production of rapid disintegrating or dissolving tablets may be accomplished via a variety of methods; some of these methods will be covered in further detail in the sections that follow.

Direct Compression

The method that is both the simplest and most economical when it comes to preparing tablets. The compression is done using conventional machinery using everyday substances, and the number of processing stages is kept to a minimum. In the production of fast dissolving tablets, the components microcrystalline cellulose (MCC) and low substituted hydroxypropyl cellulose (HPC) are often used. Effervescent substance, which generates carbon dioxide and also aids in disguising the taste of a medicine, may be added to a tablet in order to speed up the disintegration process and produce rapid disintegration. The tendency of the effervescent form to hygroscopicity, or collect moisture from the air, is the most significant disadvantage of the form. In order to accomplish excellent oral dispersibility while maintaining a pleasant sensation, sometimes super disintegrants are added in the ideal concentration. Sodium starch glycolate, crospovidone, alginic acid, calcium silicate, and crosscarmellose are some examples of common superdisinterants. They allow for fast disintegration thanks to the swelling that occurs as a result of water absorption [29]. Direct compression has characteristics that are cost-effective and very comparable to those of the traditional dosage form, with the notable exception of having a significant number of disintegrants in some instances, which may result in poor tablet hardness [29].

Molding method

Tablets are made with chemicals that are hydrophilic, and the goal is to achieve maximal medication dissolution via their use. Following the wetting of the powder mass with the hydroalcoholic solvent, dosage form is next compressed. After then, the solvent system is allowed to lose its water content. The flavour of the drug particles can be developed by spray congealing the molten mixture of hydrogenated cottonseed oil, sodium carbonate, lecithin, and polyethylene glycol with an active ingredient into a lactose-based tablet triturate [31]. This process creates a tablet with a taste similar to the drug particles. Molds made using this technique tend to be very porous since the drying process removes the solvents, leaving behind a porous mass that encourages the material to dissolve quickly [31].

Sublimation

Formulating into a porous mass and including inert solid chemicals that volatilize fast, such urea, camphor ammonium carbonate, ammonium bicarbonate, and hexamethylene-tetramine, allows for rapid disintegration and dissolution to be achieved. They were combined with a variety of different components and then compacted. The volatile material is driven out by lowering the pressure and heating the mass very slightly, which results in the mass taking on a porous structure [32]. They have a porous nature, and solvents like cyclohexane and benzene may be employed in the sublimation process [32]. These are the characteristics of the sublimation method.

Spray-Drying

Hydrolyzed and nonhydrolyzed gelatins are used in this method as supporting agents, mannitol is used as a bulking agent, sodium starch glycolate or crosscarmellose sodium is used as a disintegrating agent, and an acidic material (such as citric acid) and or an alkali material (such as sodium bicarbonate) is used to enhance disintegration and dissolution [33]. This process produces quick disintegration (within 20 seconds) when the dosage form comes into contact with an aqueous media, which is one of the characteristics of the spray-drying method [33].

Mass-Extrusion

In this process, the combined components are lubricated by a component that is water soluble, namely polyethylene glycol. Methanol is used as the solvent, and the resulting thin cylinders are formed by feeding the material through an extruder. Which are then cut even further using a hot blade to make little tablets [34]. The fact that these compounds may be used to disguise the bitter taste of medications while simultaneously forming tiny granules and increasing oral bioavailability [34] is one of the characteristics of this strategy.

Conclusion

Orodispersible tablets provide a number of benefits, one of which is the ease with which they may be given to patients who have trouble

swallowing, such as the elderly, those who have had a stroke, and children. The compliance of immobile patients improves as a result, as does the compliance of travellers who have limited access to water. The psychological notion that treatment is effective may be strengthened by drugs that provide a pleasant mouth sensation. Ease of administration to patients of all ages, including children and the elderly. Increased rates of quick and high absorption of medications from the pregastric portions of the GIT, leading to an increase in both bioavailability and effectiveness. Effective in terms of cost since just a small number of components are necessary. Increased peace of mind thanks to the elimination of any risk of choking or blockage during the swallowing process, as is typical with traditional dose forms. Give the drug in a solid dose form so that it may be dissolved or disseminated throughout the body.

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