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A Concise Review on Rationale for Development of Sustained Release Drug Delivery System

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Abstract: Modern drug delivery systems are characterized by immediate and repeated drug release, which can increase the risk of drug changes and the need for controlled release systems that regulate close or uneven blood flow. Sustained-release preparations provide an important means of reducing side effects by preventing changes in the therapeutic concentration of drugs in the body. Extended-release drugs have many advantages over prescription drugs, such as increasing patient compliance, using less medication, maximizing drug use, increasing the energy safety of existing drugs, reducing the drug in transition phase, and reducing the cost of treatment. Cost due to better treatment and shorter treatment time. The main purpose of sustained release data is to improve drug therapy by evaluating the relationship between the advantages and disadvantages of sustained technology. The main purpose of this review is to provide complete information about continuous drug delivery and its benefits and to describe various methods for drug selection for drug delivery.

Keywords: Physicochemical Properties of Drugs, Matrix System, Controlled Release, Osmotic Pump.

1. Introduction

Oral method of drug delivery is the most widely used method of administration among all research methods for the delivery of drugs from various pharmaceutical products in various pharmaceutical forms. [1] Description of oral dosage forms with sustained release properties; they include delayed release, repeated, sustained release, intermittent release, sustained release, and controlled release. [2] The design of an oral drug delivery system is influenced by many important interactions, such as the mode of delivery, the disease being treated, the patient, the duration of treatment, and the drug products. Release mechanism includes any drug delivery system that provides slow release of the drug over an extended period of time.[3] During treatment, extended release tablets are taken once or twice a day, to achieve sustained results, the dosage of the drug requires 3-4 doses per day Same treatment.[4]

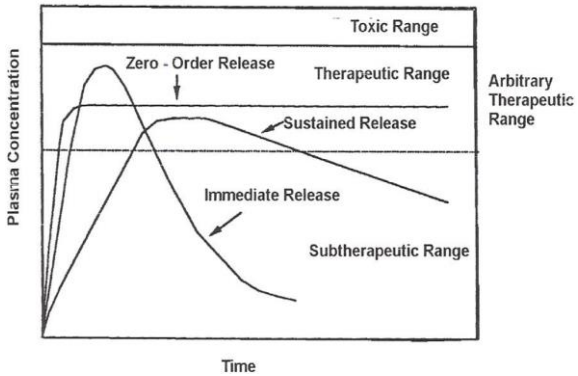

Figure 1: Arbitrary Therapeutic Range Of Dosage Forms In Blood

Rational for developing of SRDDS [5,6]

1. SRDDS model reduces the frequency of administration and sustained release keeps the drug at the site of action during treatment, thus enhancing the therapeutic effect of the drug molecule.
2. Reduce medical costs by reducing doses.
3. This is usually a medication to reduce toxicity from overdose.
4. It prolongs the duration of action of drugs with short half-lives.

Advantages: [7]

1. Increase patient compliance and comfort.
2. Reduce dose more frequently.
3. Minimize changes in drug use.
4. A lot of things happened.
5. Use less medication to reduce or eliminate local side effects.
6. Reduce or eliminate side effects in the body.
7. Reduce the amount of medication for long-term medication use.
8. A small improvement or reduction in drug use is achieved with long-term use.

Disadvantages of SRDDS: [8.9]

1. Sudden termination is not allowed.
2. There is rarely a change in dosage.
3. These prescriptions are based on the average biological half-life.
4. They are very expensive.

Classification of SRDDS Formulation:

The ways to achieve oral release are: [10]

1. Diffusion system
   - Reservoir device
   - Matrix device
2. Dissolution system
3. Osmosis system
4. Ion exchange resins
5. Floating systems
6. Adhesive or muco-adhesive systems.

1. Diffusion system

a) Matrix System: [11]

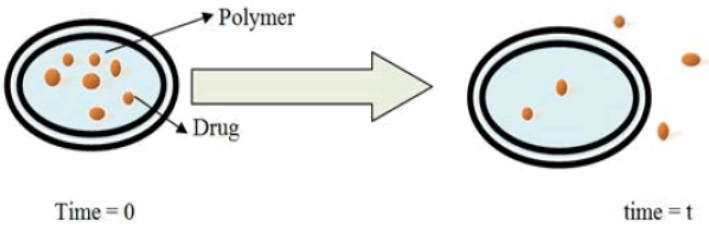

Figure 2: Sustain Release Matrix Systems

As the name suggests, the matrix material consists of particles within the same polymer matrix.In the model, the outer layer is exposed to a chemical bath before dissolving and then dispersed within the matrix. This process continues at the interface between the solvent and the solute in the solvent, obviously for a controlled separation system the dissolution rate of the drug in the matrix must be high enough that the dispersion cannot absorb and remain in solution. matrix.

Advantages of Matrix system: [12]

1) Demonstrate long-term recovery.
2) You do not have high blood pressure.

3) Reduce toxicity by reducing drug absorption.
4) Reduce local side effects and infections.
5) Improve the quality of treatment.
6) Use better medicine.
7) Reduce the amount of medication from long-term administration.
8) This may result in the release of high molecular weight products.

Disadvantages of the Matrix System:

1) Its importance depends on the length of the diet plan.
2) Improve metabolism for the first time.

2. Dissolution Controlled Systems [13,14]

Chemicals with high water solubility and flow separation have problems in controlling their dissolution rates. Excretioncontrolled release can be achieved by minimizing separation of the drug in the middle of the gastrointestinal tract, incorporating the drug into nonreactive substances, and coating chemicals or polymeric materials of different thicknesses. The ratelimiting step in solution dissolution is diffusion across the aqueous boundary layer. Drug solubility provides the energy source for drug release, which is hindered by the diffusion boundary layer of the stagnant liquid.

a) Encapsulation Dissolution Controlled Systems [15]

Microencapsulation technology is used to coat or encapsulate slowly dissolving materials such as cellulose, polyethylene glycol, polymethacrylate and wax. The rate of dissolution of the layer depends on the solubility and thickness of the layer. Those with the thinnest layer will begiven the first dose. Thick-layer drugs may retain the drug at a later stage.

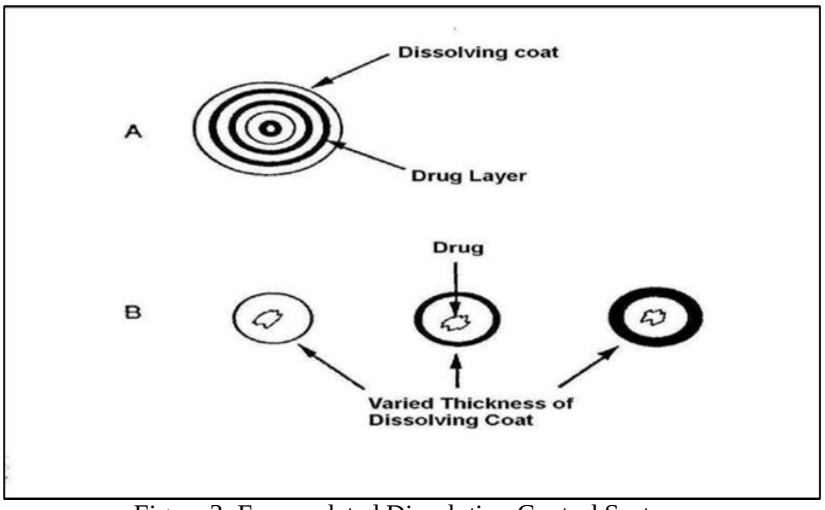

Figure 3: Encapsulated Dissolution Control System.

b) Matrix dissolution control system [16]

In the matrix system, the drug is distributed evenly in the control environment. They use waxes such as beeswax, carnauba wax, and hydrogenated castor oil to control the dissolution of the drug by changing the porosity of the tablet, reducing its wettability, or controlling the penetration of the solute into the matrix. It resolves itself more slowly. Drug release is first determined by such matrices. Wax encapsulated medication is made by dispersing the medication in molten wax, solidifying it, and then granulating it.

3) Osmotic pressure control mechanism: [17,18]

This mechanism, which follows the osmotic pressure mechanism in which the drug is released from zero level, is also called oros. The reservoir contains the drug and osmotic agent (suchas mannitol or KCl) surrounded by a

membrane. A small opening in the plate allows water toenter the reservoir and helps release dissolved substances at the rate of osmotic pressure. Drug released from the reservoir is not affected by intestinal inflammation. Drug release depends on factors such as pore size, semipermeable membrane thickness, membrane permeability, core permeability properties and chemical stability.

Evaluation of sustained-release matrix tablets: [24,25]

Before releasing the drug continuously - ensuring the possibility of quality and safety of the product by establishing in vitro and in vivo analyzes after production and the relationship between the two, stability and reliability. Measurements and methods for evaluating the samples produced are discussed by different authors.

1) Weight variation:

Twenty tablets are weighed one by one and enlarged, and then the average weight of the tablet is calculated.

2) Hardness:

Use Monsanto hardness tester to perform a hardness test on each batch of tablets and calculate the average value.

3) Friability:

Test the friability of tablets by spinning at 25 rpm for 4 minutes using the Roche friability tester.

4) Thickness:

Measure the thickness of the tablet using a spiral micrometer.

5) Non-standard content:

Using UVvisible spectrophotometer and calibration curve method to determine the amount ofthe drug.

6) In vitro dissolution studies:

Drug release studies are generally performed using a rotary wing machine. Tampons are oftenused as tampons. The bath temperature is maintained at 370°C and a sample of the desired dissolution medium is periodically removed and replaced with an equal amount of medium, releasing the solution. The amount of drug released is determined using a UV spectrophotometer and the drug dissolved over a given period of time is plotted as percent released versus time.**7**

7) Stability Study:

Short Term Stability Study:

This is an agreement short term study to determine changes in the in vitro release profile during storage. After satisfactory in vitro curves are obtained for the in vivo method, in vivo tests should be performed and in vitro-in vivo correlations should be established.

2. Conclusion

The main focus of this review article is the production of the sustained release matrix of tablets and the properties affecting the dosage form, the choice of formula for the continuous drug and their advantages and disadvantages and the different polymers used. creating certain systems. From the above discussion, it can be concluded that the antirejection article is one of the most effective documents. It helps increase patient compliance and improve treatment outcomes. In order for the drug to be in sustained release form, certain standards such as size and water solubility must be met. Sustained release dosage forms are affected by specific

drug release mechanisms. Many pharmacokinetic and pharmacodynamic parameters need to be considered before developing a drug into an extended-release form.

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