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Review on Sustained Release Matrix Tablet

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ABSTRACT:
Oral drug delivery is highly favoured for administering a variety of drugs, including tablets, capsules, syrups, and solutions. A novel approach in the field of drug delivery is the use of sustained release dosage forms. These oral sustained release products offer significant advantages over conventional drug delivery systems. They optimize the bio-pharmaceutical, pharmacokinetic, and pharmacodynamic characteristics of the drug while also providing a means to minimize its side effects.Sustained release drug delivery systems bring several benefits, such as improved patient compliance, reduced fluctuations in steady-state drug levels, enhanced utilization of the drug, increased safety margin for potent drugs, and decreased healthcare costs associated with therapy. Among the various sustained release dosage forms, matrix tablets are widely utilized. These tablets are prepared using different types of polymers.This review article focuses on the various types of polymers employed in the preparation of matrix tablets, the methods used for their formulation, and provides essential information about sustained release matrix tablets.

Keywords: Sustain release drug delivery, Matrix tablets, Polymers, Methods of preparation, Evaluation of Matrix tablet

I. INTRODUCTION:

The administration of a single dose of a drug that is released gradually over an extended period of time, as opposed to taking multiple doses, is an area of great interest for scientists in the pharmaceutical industry. The primary goal of sustained release drug delivery is to achieve a steady-state blood or tissue level of the drug that is therapeutically effective and non-toxic for an extended duration. Various types of oral dosage forms exhibit modified release properties, including repeated action, sustained release, extended release, controlled release, delayed release, and prolonged release. These modified release dosage forms are designed to rapidly attain a drug plasma level that remains constant within the therapeutic range for a significant period of time. To maintain a constant concentration of the drug in the body, two conditions must be met: (1) the drug must be released in a zero-order manner, and (2) the rate of release from the maintenance dose (and subsequently the absorption rate) should be equivalent to the rate of drug elimination at the desired steady-state concentration. In this article, we will define a list of important terms that describe various types of modified release dosage forms.

If the active compound has a long half-life, it exhibits sustained effects independently. When the pharmacological activity is not directly influenced by its concentration in the blood, the drug is absorbed through active transport. Conversely, if the active compound has a very short half-life, a large amount of the drug is necessary to maintain an effective dose over an extended period. The objective of extended release dosage forms is to sustain therapeutic drug levels in the bloodstream for a prolonged duration. The matrix system is a commonly employed approach for achieving sustained release. This system prolongs and regulates the release of the dispersed drug. The matrix is composed of well-mixed hydrophilic polymer gelling agents and one or more drugs. The choice of polymers used in formulating matrix tablets depends on the physicochemical properties of the drug intended for incorporation and the desired type of drug release.

1. Modified release dosage form:

Modified release dosage forms are designed to achieve therapeutic and convenience objectives that are not provided by conventional dosage forms. These forms control the drug release characteristics in terms of time period and location.

2. Controlled release dosage form:

In a controlled release dosage form, the drug is released at a constant rate, resulting in a consistent drug concentration over time after administration.

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3. Delayed release dosage form:

A delayed release dosage form is one where the drug is released at a specific time, rather than immediately after administration.

4. Extended release dosage form:

An extended release dosage form is designed to slowly release the drug, maintaining therapeutic plasma concentrations for an extended period of time, typically between 8 and 12 hours.

5. Prolonged release dosage form:

A prolonged release dosage form refers to a type of medication that allows for gradual absorption over an extended period compared to conventional dosage forms. However, this may result in a delayed onset of action due to the slower release rate from the dosage form.

6. Repeat action dosage form:

The repeat action dosage form is designed in such a way that the initial dose is released almost immediately after administration, while subsequent doses are released at irregular intervals.

7. Sustained release dosage form:

In a sustained release dosage form, the drug is released slowly and steadily, with the release rate being controlled by the delivery system.

Oral Sustained Release Form:

Oral sustained release formulations, also known as stable release, continuous action, extended action, controlled release, or depot formulations, are designed to deliver drugs over an extended period of time after a single dose administration, thereby achieving a long-lasting therapeutic effect. This release period can range from hours for oral administration to days or even months for injectable formulations. When formulating a sustained release dosage form, several factors need to be considered, including the varying pH levels in the gastrointestinal tract, the rate of intestinal flow, the presence of enzymes, and their impact on the drug dose and formulation.Most sustained release dosage forms employ a combination of distribution and dispersion methods to ensure a slow and controlled release of the drug at a predetermined rate. The goal is to achieve a release pattern that mimics the plasma drug concentration profile obtained from intravenous injection. Figure 1 illustrates the plasma drug concentration profiles for conventional immediate-release tablets or capsules, sustained release formulations, and zero release formulations.

Justification for Developing Sustained Release Drug Delivery System :

1. To extend the time duration of action of the drug.
2. To reduce the fluctuations in plasma level concentration.
3. Increased drug utilization.
4. To reduce the frequency of dosing for the uniform drug delivery.

Advantages of Sustained Release Drug Delivery:

i) Patient compliance:

Non-compliance is a common issue in the treatment of chronic diseases that require long-term medication. The effectiveness of drug therapy relies heavily on the patient's ability to adhere to the prescribed treatment. Patient compliance can be influenced by several factors, including their understanding of the disease, confidence in the treatment, and adherence to a strict medication schedule. Additionally, the complexity of the treatment regimen, the financial burden of therapy, and the potential local or systemic side effects of the medication can also impact patient compliance. One potential solution to address this problem is the utilization of sustained release drug delivery systems.

ii) Reduced 'see-saw' fluctuation:

Drug concentration in the systemic circulation and tissue compartments often exhibit a "see-saw" pattern when conventional dosage forms are administered. The extent of these fluctuations primarily relies on drug kinetics, including absorption, distribution, elimination rates, and dosing intervals. The prominence of the "see-saw" pattern is particularly notable for drugs with a biological half-life of less than four hours, as recommended dosing intervals are seldom shorter than four hours. By employing a well-designed sustained release drug delivery system, both the frequency of drug administration can be significantly reduced, and a consistent drug concentration can be maintained in the bloodstream and target tissues.

iii) Total dose reduction:

To address a diseased condition, Sustained Release (SR) drug delivery systems utilize a lower quantity of the total drug, thereby minimizing the occurrence of systemic or local side effects. By reducing the overall amount of medication

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administered, this approach offers several benefits, including a decrease in adverse effects and improved cost-effectiveness.

iv) Improvement of deficiency in treatment:

Attaining optimal therapy for a disease necessitates the efficient delivery of active drugs to the specific tissues and organs requiring treatment. Frequently, higher doses than necessary must be administered to reach therapeutically effective concentrations within the cells. Regrettably, this approach can result in undesired toxicological and immunological effects on non-targeted tissues. Implementing a sustained release dosage form offers improved control over acute or chronic disease conditions.

v) Economy:

The cost per unit of sustained release products is typically higher compared to conventional dosage forms due to their unique characteristics. However, it is worth noting that the average cost of treatment over an extended duration may be lower.

Disadvantages of Sustained Release Drug Delivery:

1. Eliminating the leftover matrix becomes necessary once the drug has been fully released.
2. It relies on the duration of the drug's stay in the gastrointestinal (GI) tract.
3. There is an elevated risk of experiencing the first-pass effect.
4. There is a delay in the initiation of drug action.
5. The release rate can be influenced by food intake and the speed at which the drug travels through the digestive system.

Criteria to be met to incorporate the drug into sustained release dosage form:

Several physicochemical parameters are crucial for selecting a drug to be formulated in a sustained release dosage form, with particular emphasis on understanding the drug's absorption mechanism from the gastrointestinal (GI) tract.

Physicochemical parameters for drug selection:

Parameters	Criteria
Molecular size	< 1000 Daltons
Aqueous Solubility	More than 0.1 mg/ml for pH 1 to pH 7.8
Apparent partition coefficient	High
Absorption mechanism	Diffusion
General absorbability From all GI segments	Release Should not be influenced by pH and enzymes

Table 1. Physicochemical parameters for drug selection

Pharmacokinetic parameters for drug selection:

Parameters	Comment's
Elimination half-life	Between 2 to 8 hrs
Absolute bioavailability	Should be 75% or more
Absorption rate constant (Ka)	Must be higher than release rate
Apparent volume of distribution(Vd)	Larger Vd and MEC, Larger will be the required dose
Total clearance	Not depend on dose
Elimination rate constant	Required for design
Therapeutic concentration (Css)	The lower Css and smaller Vd, the

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	loss among of drug required.
Toxic concentration	Apart the value of MTC And MEC safer the dosage form[4][10][11]

Table 2. Pharmacokinetic parameters for drug selection

Classification of Sustained Release Drug Delivery System:

1. Diffusion System -
 a) Reservoir Devices
 b) Matrix Devices
2. Dissolution System.
3. Osmotic Pump.
4. Ion exchange System.
5. Swelling and Expansion System.
6. Floating System.
7. Biomucoadhesive System.
8. Matrix System.

Matrix System:

The matrix system consists of a polymer matrix that contains a substance evenly dispersed within it. When the device is in contact with a bath solution, the outer layer dissolves initially, causing the dispersed substance to be released from the matrix. This dissolution and dispersion process continues as the solvent solution interacts with the solvent-soluble solution. It appears that in order for the system to regulate the dispersion, the rate at which the drug particles dissolve within the matrix must be sufficiently rapid so that the dispersion does not deplete the dissolved drug, thus maintaining the integrity of the matrix.

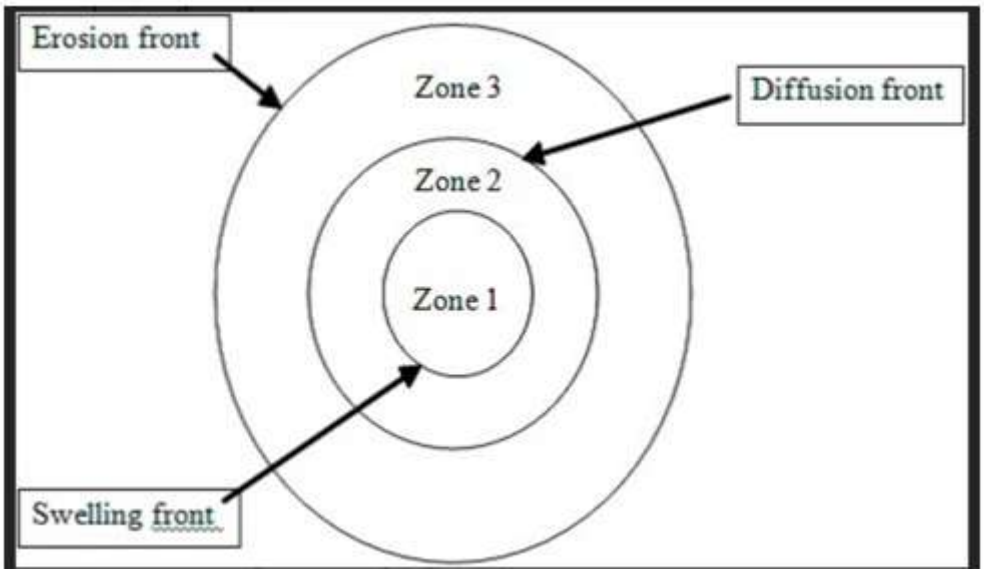

Fig 1: Sustain Release Matrix System

Advantages of the Matrix System:

I) Long-term therapeutic focus is maintained.
II) High blood pressure is avoided.
III) Drug absorption is reduced, thereby minimizing toxicity.
IV) Both local and systemic side effects are minimized.
V) Treatment success is improved.
VI) Drug use is optimized.
VII) Chronic dosing reduces the risk of drug overdose.
VIII) Release of compounds with varying molecular weights is possible.
IX) Stability of the drug is enhanced by protecting it from hydrolysis or other mutations in the gastrointestinal tract (GIT).
X) Healthcare costs are reduced.
XI) Substantial reduction in drug usage.
XII) Ability to achieve specific outcomes, such as managing morning rheumatoid arthritis with the use of a sleeping pill.
XIII) Patient compliance is improved.

Disadvantages of the Matrix system:

I) The removal of the residual matrix is necessary once the drug is released.

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II) The Matrix system is highly reliant on the gastrointestinal (GI) duration of the dosage form.
III) First pass metabolism is intensified, leading to increased drug metabolism.

Matrix Types:

- **Hydrophobic Matrix:**

In order to achieve sustained release in oral dosage forms, the hydrophobic matrix technique is employed. This involves blending the drug with an inert or hydrophobic polymer, which is then compacted into tablet form. The resulting tablets exhibit consistent release patterns due to the gradual dissolution of the solvent, which permeates through a network of pre-existing channels within the composite polymer particles. Various materials have been utilized as inert or hydrophobic matrix agents, such as polyethylene, polyvinyl chloride, ethyl cellulose, acrylate polymers, and their copolymers.

- **Lipid matrix:**

These matrices are formulated for lipid waxes and similar compounds. Drug release within these matrices involves a combination of pore distribution and erosion. Consequently, the release is influenced more by the presence of digestive fluids rather than a fully insoluble polymer matrix. In various sustained-release formulations, a traditional base comprising carnauba wax blended with stearyl alcohol or stearic acid has been employed.

- **Hydrophilic Matrix:**

A hydrophilic matrix refers to a compound consisting of one or more chemicals that are thoroughly mixed together, incorporating a gelling agent in the form of a hydrophilic polymer. These matrices are commonly known as swellable controlled release systems. Hydrophilic matrices employ polymers, which can be categorized into three main groups, during their formulation.

1) Cellulose Derivatives:
Methylcellulose 400 and 4000cPs, Hydroxy ethyl cellulose; Hydroxypropylmethylcellulose (HPMC) 25, 100, 4000 and 15000cPs; and sodium carboxymethylcellulose.
2) Natural non-cellulose or semi synthetic polymers:
Agar-Agar; Carob gum; Alginates; Molasses; The polysaccharides of mannose and galactose, chitosan and modified starch.
3) Polymers of acrylic acid, such as Carbomer 934

- **Biodegradable matrices :**

Biodegradable matrices consist of polymers that incorporate monomers linked together through functional groups, forming unstable connections within the structure. These matrices can undergo biological deterioration or degradation through the action of enzymes produced by nearby living cells or through non-enzymatic processes, leading to the breakdown of oligomers and monomers that can be metabolized or excreted. Examples of such matrices include natural polymers like proteins and polysaccharides, as well as their synthetic counterparts such as aliphatic polyesters and poly anhydrides.

- **Mineral Matrices:**

Mineral matrices consist of polymers that are naturally occurring in various types of seaweed. One example is alginic acid, a hydrophilic carbohydrate found in brown seaweed (Phaephyceae) through the use of refined alkali. The porosity of matrix tablets categorizes them into three types:

A) Macro porous systems:
In macro porous systems, the distribution of the drug or active substance takes place through the holes present in the matrix, which typically range in size from 0.1 to 1 μm. These hole sizes are larger than the size of the separated molecules, allowing for effective distribution.

B) Micro porous systems:
Distribution in micro porous systems occurs primarily through pores. In these systems, the pore size ranges between 50-200 Å (Angstroms), slightly larger than the size of various molecules. The pores play a crucial role in facilitating the controlled release of the active ingredients.

C) Non-porous systems:
Non-porous systems lack pores, and the molecules are dispersed throughout the polymeric network without the presence of a pore phase. In this case, only the polymeric phase exists, and it is responsible for the dispersion and release of the active substances.

BIOLOGICAL FACTORS INFLUENCING RELEASE FROM MATRIX TABLET:
Biological half-life:

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Absorption:
Metabolism:
Distribution:
Protein binding:
Margin of safety:

1) Biological half-life:

The basic concept behind an oral sustained-release (SR) formulation is to maintain therapeutic levels of a drug in the bloodstream for an extended period. This is achieved by ensuring that the drug enters the bloodstream at a rate that closely matches its elimination rate. The elimination rate encompasses various processes such as metabolism, urinary excretion, and other mechanisms responsible for permanently removing the drug from the bloodstream.

Drugs with a short half-life are considered suitable for sustained-release formulations. However, drugs with a half-life of less than 2 hours, such as levodopa, are not ideal candidates for SR formulation. On the other hand, drugs with a longer half-life exceeding 8 hours are also not suitable for SR formulations since their effects are already sustained. Examples of drugs that are not suitable for SR formulation due to their half-life include Digoxin and Phenytoin.

2). Absorption:

Absorption control is the primary objective when developing a sustained-release (SR) product. The aim is to ensure that the drug's release rate is significantly slower than its absorption rate. Assuming that most drugs take approximately 8-12 hours to pass through the absorptive areas of the gastrointestinal (GI) tract, the maximum absorption half-life should be around 3-4 hours. Otherwise, the dosage form will exit the potential absorptive regions before the drug is fully released. This requirement corresponds to a minimum apparent absorption rate constant of 0.17-0.23 h-1, achieving 80-95% absorption over this time frame.Thus, it is crucial that drug absorption occurs at a relatively consistent rate throughout the entire length of the small intestine for optimal SR formulation. However, if a drug relies on active transport or is restricted to a specific region of the intestine for absorption, utilizing an SR preparation may be disadvantageous.

3). Metabolism:

Metabolism plays a crucial role in determining the bioavailability of drugs, particularly when they are administered in slow-releasing dosage forms. Certain drugs undergo significant metabolism before they are absorbed, either in the lumen or the tissue of the intestine. Consequently, the bioavailability of these drugs can be reduced when administered through slow-releasing dosage forms.To address this issue, drugs with poor water solubility can be formulated in sustained-release dosage forms. Several techniques are available to enhance the solubility of such drugs. Once the drug's solubility has been improved, it becomes feasible to develop a sustained-release formulation. However, it is important to be cautious during this process to prevent drug crystallization when it enters the systemic circulation. Preventive measures should be taken to avoid this undesirable outcome.

4). Distribution:

The rate of drug elimination is primarily determined by the apparent volume of distribution. Drugs with a high apparent volume of distribution have a significant impact on the elimination rate of the drug. Consequently, such drugs are generally not suitable candidates for oral sustained-release (SR) drug delivery systems. An example of such a drug is Chloroquine.

5). Protein Binding:

In order to achieve a pharmacological response, the concentration of unbound drug is crucial rather than the concentration of bound drug. It is a well-known fact that drugs bind to plasma and tissue proteins to varying degrees. The extent of protein binding of a drug plays a significant role in its therapeutic effect, regardless of the dosage form. When a drug exhibits extensive binding to plasma proteins, it can result in an increase in biological half-life. Consequently, there are instances where a sustained-release (SR) drug delivery system is unnecessary for such drugs.

6).Molecular size and diffusivity:

Molecular size and diffusivity are critical factors in various sustained release systems where drugs are required to diffuse through rate-controlling membranes or matrices. The diffusivity of a drug, also known as the diffusion coefficient, is primarily determined by its molecular size. The molecular weight of the diffusing species significantly influences the diffusivity (D) within polymers.

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7). Margin of safety:

The margin of safety for a drug is typically determined by its therapeutic index. A higher therapeutic index indicates a safer drug, whereas drugs with a lower therapeutic index are generally not suitable for oral sustained-release (SR) drug delivery systems.

Physicochemical Factors Influencing Release From Matrix Tablet:

a) Dose size:

In general, a conventional dosage form typically consists of a single dose containing a drug concentration of approximately 500mg-1.0g. This dosage range is also applicable for sustained release dosage forms. However, there are instances where compounds with larger dosing requirements may be administered in multiple amounts or formulated as liquid systems. Another important factor to consider is the margin of safety, which pertains to the administration of a drug in large quantities when it has a narrow therapeutic range.

b) Ionization, pka and aqueous solubility:

Most pharmaceutical drugs are categorized as weak acids or bases. The permeation of these drugs across lipid membranes occurs predominantly in their unchanged form. Therefore, the relationship between the pKa (acid dissociation constant) of the compound and the environment in which absorption takes place is crucial. Maintaining the drug in its unchanged form offers advantages for drug permeation. However, this conversion to the unchanged form can lead to a decrease in aqueous solubility, which poses a more complex challenge. Delivery systems that rely on diffusion or dissolution are also influenced by the drug's solubility in aqueous media. Such dosage forms must operate within an environment where pH fluctuates; the stomach is acidic, while the small intestine is more neutral. Consequently, the impact of pH on the drug release process needs to be considered. Compounds with low aqueous solubility (<0.01 mg/ml) inherently exhibit sustained release characteristics. This is because the release of these drugs over the course of a dosage form in the gastrointestinal tract is primarily limited by the dissolution of the drug. Therefore, it is evident that poorly soluble compounds are not suitable choices for slightly soluble drugs since the driving force for diffusion, which is the drug's concentration in solution, will be low.

c) Partition Coefficient:

When a drug is administered to the gastrointestinal (GI) tract with the intention of producing a therapeutic effect in another area of the body, it must traverse various biological membranes. These membranes are commonly regarded as lipid-based, thus emphasizing the significance of the partition coefficient of oil-soluble drugs in determining their ability to penetrate the membrane barriers effectively. Compounds that possess lipophilic properties and exhibit a high partition coefficient tend to have poor aqueous solubility and remain in the lipophilic tissues for extended periods of time. Conversely, compounds with a very low partition coefficient face challenges in penetrating the membranes, resulting in diminished bioavailability. Moreover, the principles of partitioning also apply to diffusion through polymer membranes. The selection of membranes that impose diffusion limitations primarily depends on the partitioning characteristics of the specific drug.

d) Stability:

When drugs are administered orally, they undergo both acid-base hydrolysis and enzymatic degradation. However, if the drug is in a solid state, degradation will occur at a slower rate. Therefore, a solid state composition is preferred for delivery in problematic cases. For dosage forms that are unstable in the stomach, it is beneficial to use systems that prolong delivery throughout the entire gastrointestinal (GI) tract transit. The same applies to systems that delay release until the dosage form reaches the small intestine.In the case of compounds that are unstable in the small intestine, their bioavailability may decrease when administered from a sustained-release dosage form. This is due to the higher drug delivery to the small intestine, where the drugs are susceptible to degradation.

Types of Matrix Along With Example of Polymers:

Sr.no	Types of Matrix	Examples of Polymers
1	Hydrophobic Matrices	polyethylene, polyvinyl chloride, ethyl cellulose And acrylate polymers and their copolymers.

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2	Lipid Matrice	Carnauba wax combination with stearyl alcohol or stearic acid
3	Hydrophilic Matrices	Methylcellulose 400 and 4000cPs, Hydroxyethylcellulose, HPMC, Sodium carboxymethylcellulose, Agar-Agar, Carob gum, Alginates, Molasses, Polysaccharides of mannose, galactose, chitosan and modified starches.
4	Biodegradable Matrices	Natural polymers, Proteins, polysaccharides, modified natural polymers, aliphatic poly(esters), poly anhydrides.
5	Mineral Matrices	Alginic acid hydrophilic carbohydrate obtained from species of brown seaweeds(Phaephyceae)

Table 3: Types of Matrix Along With Example of Polymers

Methods of Preparation of Matrix Tablets –

1. Wet Granulation:

Milling and gravitational mixing of drug, excipients and polymer

Preparation of binder solution

Wet massing by addition of granulating solvent or binder solution

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Screening of wet mass

Drying of the wet granules

Screening of dry granules

Blending with lubricant and disintegrates to produce “running powder”

Compression of tablet

2. Dry Granulation:

Milling and gravitational mixing of drug

Polymer and excipients

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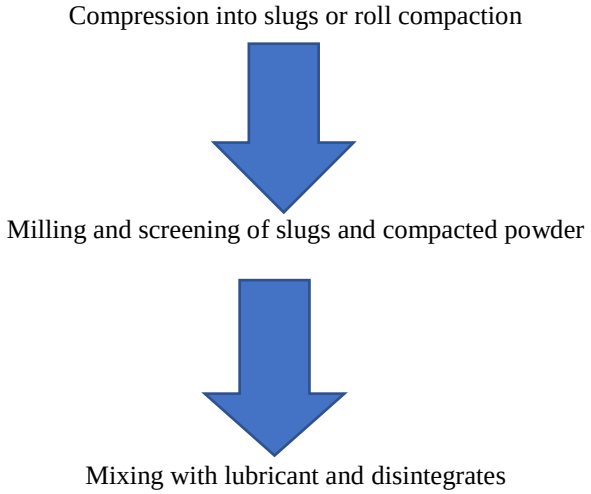

3. Sintering Technique:

Sintering technique refers to the process of bonding neighbouring particle surfaces within a powder mass or compact through the application of heat. In conventional sintering, a compact is heated below the melting point of its solid constituents in a controlled environment under atmospheric pressure. The impact of sintering on tablet hardness and disintegration time was observed when these tablets were stored at higher temperatures. Sintering has proven to be an effective method for creating sustained release matrix tablets, which help stabilize and slow down the release of drugs.

4. Melt granulation :

Melt granulation, also known as melt agglomeration, involves the utilization of a substance that has a low melting point. This substance is applied in its molten state onto a substrate, which is subsequently heated above the melting point. Various lipophilic binders were experimented with using the melt granulation method.

5. Hot-Melt Extrusion Process:

The hot-melt extrusion process involves feeding a combination of active ingredients, thermoplastic polymers, and processing aids into the extruder drum via the hopper. A rotating screw inside the heated drum transfers the materials, causing them to melt at high temperatures. The resulting molten mass is then continuously pushed through a die connected to the drum's end. This process can also produce films by adjusting the dimensions of the die cylinders.

Evaluation of matrix tablets:

1. Weight Variation Test :

Tablet weight measurement is essential to ensure the accurate dosage of a drug.

i) The weight variation test is conducted by individually weighing 20 tablets.
ii) The average weight is then calculated by summing up the weights of all the tablets and dividing it by 20.
iii) Next, the weights of each tablet are compared to the average weight.
iv) For a tablet to pass the test, no more than two tablets should exceed the specified percentage limit.

2. Friability Test:

Friability Test is conducted to assess the tablet's resistance to abrasion, edge damage, and breakage during various stages such as packing, handling, and shipping. The Roche friabilator is commonly used to measure friability. In this test, a predetermined number of preweighed tablets are placed in a plastic chamber, which is then rotated at 25 rpm for 100 revolutions. Subsequently, the tablets are de-dusted and reweighed. The friability is determined using the following formula:

$F = (1 – W/W^*) * 100$

Where:

W^* = the original weight of the tablet

W = the final weight of the tablet after the test

The acceptance criteria for friability typically range between 0.5% and 1%.

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3. Hardness Test:

Tablets need to possess a specific level of hardness in order to endure the mechanical stresses encountered during manufacturing, packaging, and transportation. The hardness is typically determined using hardness testers such as the Monsanto tester, Pfizer tester, or Strong cob tester. In this case, the hardness is measured using a Monsanto tester, which consists of a barrel positioned between two plungers containing a compressed spring. The lower plunger is then pressed against the tablet with the help of a threaded bolt until the tablet fractures. As the spring is compressed, a pointer moves along a gauge inside the barrel, indicating the applied force. The force required to fracture the tablet is recorded as the hardness, measured in kg/cm².

4. In Vitro Drug Release:

The release of drugs from matrix tablets can be evaluated through in vitro testing using the USP dissolution apparatus type II. A single matrix tablet is placed in a dissolution flask containing 900 ml of dissolution medium. The flask is then kept at a constant temperature of 37º±0.5ºC using a temperature-controlled bath. The motor of the apparatus is set to rotate at a specified speed of 50rpm, and samples are periodically withdrawn to determine the quantity of drug present in the solution. Matrix tablets gradually release the drug over an extended duration.

LIST OF VARIOUS DRUGS WHICH CAN BE FORMULATED AS A MATRIX TABLET WITH POLYMER AND METHOD USED OR ITS PREPARATION:

DRUGS	Category	Method used	POLYMER USED
Ambroxol HCl	Secretolytic agent	Direct compression	Methocel K15MCR,PVP K30[25]
Diclofenac Sodium	Anti-inflammatry	Wet granulation	Pectin, Guar gum[26]
Metformin hydrochloride	Antidiabetic	Direct compression	Chitosan, Ethyl cellulose HPMC, Xanthan gum[27]
Cefpodoxime	Antibiotic	Direct compression	HPMC(K4M),HPMC(K100M) and Xanthan gum[28]
Risperidone	Antipsychotic	Direct compression	HPMC (K100), HPMC (K4M), Xanthan gum[23]
Lamivudine	Antiviral	Direct compression	HPMC(Methocel K15M CR) Avicel 102[29]
Isoniazide	Anti-tuberculer	Direct compression	Guar gum, Tragacanth gum PEG-6000[24]
Terbutaline sulphate	bronchodilator	Wet granulation	HPMC K200M, Ethyl cellulose[30]
Indomethacin	Anti-inflammatory	Wet granulation	Hibiscusrosa-sinensis, Microcrystalline cellulose, Magnesium stearate[31]
Nateglinide	Antidiabetic	Wet granulation	Xanthan gum, Guar gum[32]
Zidovudine	Anti viral	Wet granulation	HPMC, Xanthan gum, ethyl cellulose[33]

Table 4: list of various drugs which can be formulated as a matrix tablet with polymer and method used or its preparation

II. CONCLUSION:

This review article primarily examines the progress made in the field of sustained-release matrix tablets, including their advantages, disadvantages, and the different polymers employed in designing such systems. Based on the analysis presented above, it can be concluded that matrix tablets contribute to enhanced patient compliance and efficacy of the dosage form, addressing challenges associated with therapeutic response encountered with standard dosage forms. The combined advantages of cost-effectiveness, once-daily dosing, and other benefits make matrix

tablets a promising approach to improve the overall quality of dosage forms.

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