WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Formulation and Evaluation of Sustained Release by Novel Approach

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ABSTRACT:

The advantages of using a single dose of a long-acting drug instead of multiple doses is now an area of interest for practicing scientists in the Pharmaceutical industry. There are a few benefits of long-term delivery of drugs over the usual dosage forms such as improved patient compliance due to regular drug administration, higher drug use, increased dosage of strong drug dosage, reduced flexibility in drug levels in severe cases, reduced health care. costs for advanced treatment and short duration of treatment. Wide types of polymers such as Hydroxy Propyl Methyl Cellulose [2]available to reduce the rate of drug release which is why they maintain drug action. This review article describes the basic information about the construction of continuous release, its benefits, disadvantages, the choice of drug for release, the method of release, the different types, and the factor involved in the formulation of the oral release form.

INTRODUCTION:

Oral drug delivery route is the preferred method of differentiating drug molecules among all other drug delivery routes due to easy handling, patient compliance, and flexible composition of dose form. Drug withdrawal is the process by which a drug leaves the drug product and becomes subject to absorption, distribution, metabolism and excretion, eventually becoming available for drug use. Now the usual forms of daily doses of drugs are quickly replaced by new and innovative drug delivery systems. In between, these controlled / continuous dosing forms are very popular in modern medicine. The matrix system is a release system that expands and controls the release of a drug, dispersed or dispersed. Ordinary volume forms are quickly replaced by this output control novel novel. Terms of stable release, long-term release, adjusted discharge, extended discharge or depot formation are used to identify drug delivery systems designed to gain or extend the treatment effect by continuing drug delivery long after single-dose administration.

SUSTAINEDRELEASEDRUGDELIVERYSYSTEM:

A long-acting drug product is a dosage form designed to excuse a drug in a prescribed dose by increasing the dose of the drug that does not change over time. Usually, the drug can be treated with the first dose of treatment, followed by a gradual and regular release. , reducing stomach irritation and side effects, toxicity will decrease, and side effects such as the rate of release affected by a different factor such as diet and intestinal tract, higher costs, higher chances of drug tolerance and rejection. invivo.

Rational for developing of SRDDS:

A. The formulation of SRDDS reduces the frequency of dosage and further release provides drug availability to the action site throughout treatment to improve the clinical efficacy of the drug molecule.
B. Reducing the cost of treatment by reducing the amount of need for the dose.
C. Toxicity reduction due to overdose commonly found in the usual dose from.
D. To improve the duration of drug activity with a shorter half-life

ADVANTAGES OF SUSTAINED RELEASE DOS AGE FORMS :

1. Improve patient compliance.
2. Reduction of drug plasma levels.
3. Reduce the total volume.
4. Development of deficiency in treatment.
5. Reduce treatment costs.

DISADVANTAGESOFSUSTAINEDRELEASEDOSAGE FORMS :

1. Dose loss may occur with incorrect construction.
2. Costs more than the standard volume form.
3. Reduced capacity for volume adjustment.
4. Increased opportunities for first pass metabolism.
5. Potential reduction of system availability.
6. Incorrect in vivo and in-vitro interactions.

IDEALPROPERTIES OFDRUGSUITABLEFORSRDDS:

A. It should be effectively absorbed through the oral cavity and settled in the gastro-intestinal fluid (GI).
B. Drugs with a short half-life (2-4 hours) may be prescribed for the appropriate drug to be included in SR dosage forms e.g. Captopril, Salbutamol sulphate.
C. The dose of the drug should not be less than 0.5gm and the maximum dose of the SRDDS design drug is 1.0 gm e.g. Metronidazole.
D. The treatment range of the drug should be high in the SRDDS so that the drug has a wide enough treatment range so that differences in release do not lead to concentrations above low levels of toxicity.

CLASSIFICATION OF ORAL SUSTAINED OR CONTROLLED RELEASE SYSTEMS:

Oral-controlled controlled release systems are generally robust and based on the dispersion, separation or combination of both methods in controlling the release rate of a drug. Depending on the drug delivery system, these systems are classified as follows:
1. Continuous discharge systems
2. Delayed transport and continuous release systems
3. Delayed release systems.

CONTINUOUS RELEASE SYSTEMS:

Continuous release systems release the drug for a long time across the entire length of the abdominal canal and the normal flow of the volume form. The different systems under this category are as follows:

I. Delivery systems controlled by Diffusion

II. Controlled exhaust systems eliminated

III. Discharge and distribution distribution control systems

IV. Ion exchange resin- complex drugs

V. Independent composition of pH

VI. Systems controlled by Osmotic pressure

DELAYEDTRANSIT AND CONTINUOUS RELEASE SYSTEMS:

These programs are designed to extend the duration of their stay on the GI tract and their release. Usually the dosage form is made to close the stomach so the available medicine should be stable to the pH of the stomach. The systems included in this section are mucoadhesive adhesive systems and size-based systems.

DELAYED RELEASE SYSTEMS:

The construction of such systems involves the extraction of the drug only locally in the GIT. The drugs contained in such a program are:
A. It is known to cause stomach upset
B. It is destroyed in the stomach or by enzymes in the intestines.
C. Specifies the effect of location on a specific GI area
D. Taken from the intestinal tract Two types of delayed release systems are:
E. Gastrointestinal tract systems

F.Colonialliberation systems.

NOVEL TRENDS INSRDDS:

In oral contraceptive forms, the continuous action of the drug is achieved by affecting the rate at which the drug is released in the dosage form and or by reducing the transit time of the dose form through the intestinal tract. Zahirul Khan divided the form of continuous volume extraction on the basis of its structural and physical appearance as a single unit volume form, as well as a multi-unit volume form and mucoadhesive delivery systems.

SINGLEUNITDOSAGEFORMS

This refers to a controlled distribution system in which the therapeutic agent is evenly distributed (dispersed / dissolved) throughout the solid matrix. The program can be categorized as follows.

IONEXCHANGERESINS

The drug-resin complex is made by the long-term exposure of the drug to the amber. The drug from these compounds is exchanged in the gastrointestinal tract and is later released with Na + and Cl-present overgrown in the intestinal tract.

OSMOTIC PUMP

The system is made up of a core tablet surrounded by a stretchable membrane the size of a 0.4mm hole produced by a laser beam 16. through a small delivery hole in the tablet installation.30. Eg. Glucotrol XL (glipizide) tablets (Pfizer), Covera - HS ® (verapamil HCl) tabs. (Searle)

MULTIPLE UNIT DOSAGE FORMS

Represents a mixture of volume form, the source of which may be the same or different. Different types available by Multitablet system Small compressed tablets 3 to 4 mm wide can be customized to have different drug release properties. They can be placed in gelatin capsule shells to give the desired pattern of drug extraction. Using a regular pan or air suspension, the drug solution is applied to small, stainless pearls or beads made of sugar and starch or microcrystalline cellulose sphere. The pellets are prepared by coating the stainless steel pellet with a film-forming polymers. Drug release depends on the composition of the composite of polymers and the number of coatings. Microencapsulation is the process by which solids, liquids, or even gases can be trapped in very small particles by the formation of thin layers of wall material. Mucoadhesive Delivery System. It uses the bioadhesion principle to bring about the complete effect of the drug on the fence. The mucoadhesive system is suitable for prolonging the contact time of the drug with a absorbent membrane and to facilitate local delivery of the drug to the targeted areas.

FORMULATION OF SRDDS :

There are no. of formulation are considered in-

DRUG COMPLEXES:

The main advantage of prescribing the drug for continuous release is that such substances can be formulated into various dosage forms. This method has been shown to be effective in the development of injection form forms, where the release profiles are not subject to symptoms of diarrhea. Sensitivity to in vivo variability is a specific lack of orally administered forms; in vivo studies may not consistently support ongoing claims for release.

ENCAPSULATED SLOW RELEASE GRANULES:

The first forms of the market for significant market release were composed of slow-release compound beads, in which anti-drug release principles were used, based on model D. In low-milligram potency formations, nonpareil seeds were initially covered with adhesive followed by powder. , and dried pellets. This step is repeated until the required dose of the drug has been used. The resulting granules are then coated with a mixture of strong hydroxylated lipids such as hydrogenated castor oil or glyceryltrihydroxystearate mixed with altered cellulose. The size of the barrier was controlled by no. of clothing used to obtain the desired release features. The actual formulation is applied to the wax formation of bee glycerol monosterate, which is usually physically unstable, indicating a pattern of release that has changed in aging.

TABLETED SLOW RELEASE GRANULATION :

Pressure granulation release time on tablets is one of the encapsulation. Such tablets should be designed to be dispersed in the stomach to promote the administration of a beneficial capsule form associated with the encapsulations of continuous release, while maintaining the benefit of tablet dosage forms. Three examples, each using a different process, illustrate this type of structure. The first is a tablet-based granular grid where a compound with different retardant properties is used to prepare three different, colored pieces to be identified, assembled and integrated into a tablet.

This is the first standard non-slip granular release prepared using gelatin as bond, using vinyl acetate, and the third uses shellac as bonds. Drug release is controlled by granulation erosion in the intestinal fluid vinyl acetate granulation disperses at a faster rate than shellac granulation.
CONTROLLED RELEASE TECHNOLOGY

CONTROLLED RELEASE TECHNOLOGY :

Controlled dosing forms are designed to deliver the drug in vivo according to predictable doses that can be confirmed by in vitro measurements. In the many forms of synthetic drug, those formed as insoluble matrix tablets are close to achieving this goal, as the extraction of soluble drug in these forms should depend on in vivo mutations. Controlled release technology implies a comprehensive understanding of the physicochemical method of drug discovery to the extent that the rate of release of dose forms can be determined. Possible developments and new oral methodscontrolled delivery of drugs includes hydrodynamic pressure-controlled systems, intragastric floating tablets, transmucosal tablets, and tablets combined with a micro porous membrane.

EVALUATIONFORSRDDS

I. Evaluation of granules

II. Evaluation of tablets

EVALUATION OF GRANULES INVOLVE FOLLOWING TEST

Angle of repose

The resting angle was determined using the funnel method. The panel was secured in a stand that did not change h) above the graph paper placed in a horizontal position. The sample is poured until the top of the pile touches the subject of the funnel.
The radius of the conical pile was measured and the angle of repose calculated as follows:V = Tan¯1 (h/r)

Bulk density

The bulk density was calculated using equation:ρb = MV

Where ρb = Bulk density,

M = Mass of the granules in gm

V = Final untapped volume of granules in ml.

I. True density

The true density was measured using equation;ρt = M/VP

Where,

ρ t = true density

M =Mass of granules in gm.,

VP = Final tapped volume of granules in ml.

II. **Loss on drying** (LOD)

The moisture content of the lubricated granules was analysed by using IR moisture analyser.

5.0 gm. or more quantity of granules was heated at 1050c until the change in weight was nomore observed by the instrument. The % loss in weight was recorded.

EVALUATION OF SR TABLETS INVOLVE FOLLOWING TEST

1. Weight variation

To study weight variation, 20 tablets of each formulation were weighed using an electronic balance (citizen India) and test was performed according to official method.

2. Friability

In this twenty tablets were weight and placed in the Roche friabilator and apparatus was rotatedat 25rpm for 4min. After revolution the tablet were dusted and weight.

% friability = Wo - W/Wo × 100

Where, Wo = Initial weight of twenty tablet W = weight of 20 tablet

after 100 revolution.

3. **Hardness**[55]

Tablet hardness was measured by using Monsanto hardness tester from each batch six tablets were measured for the hardness and an average of six values was noted along with and an average of six values was noted along with standard deviation.

CONCLUSION

In conclusion, Oral Sustained Release pills provide a more flexible release of the drug than its counterparts. It is an effective way to confirm therapeutic goalsin line with the senior patient. However, precise adjustment of various physicochemical parameters is required. The Matrix tablet helps to overcome problems related to the standard dosage form. Apart from the various benefits associated with it the cost efficiency and volume and daily value are the important benefits associated with it. Because of its important benefits as well better patient compliance can easily lead the market by replacing its partners.

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