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Review Article

A Review On : Sustained Release Oral Drug Delivery System

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ABSTRACT

Oral drug delivery is the most preferred and convenient option as the oral route provides maximum active surface area among all drug delivery system for administration of various drugs. The attractiveness of these dosage forms is due to awareness to toxicity and ineffectiveness of drugs when administered by oral conventional method in the form of tablets & capsules. Usually, conventional dosage form produces wide range of fluctuation in drug concentration in the bloodstream and tissues with consequent undesirable toxicity and poor efficiency. The maintenance of concentration of drug in plasma within therapeutic index is very critical for effective treatment. These factors as well as factors such as repetitive dosing and unpredictable absorption lead to the concept of oral Sustained release drug delivery systems. Sustained release drug delivery system works on many different mechanisms to control the release rate of drugs. Developing oral sustained release matrix tablets for drug with constant release rate has always been a challenge to the pha rmaceutical technologist. Drug release through matrix system is determined by Water penetration, Polymer swelling, Drug dissolution, Drug diffusion, Matrix erosion have been utilized as formulation approaches. The present article contains brief review on various formulation approaches for Sustained release drug delivery system.

INTRODUCTION

Oral course of medication conveyance is the most favored course of the different medication atoms among any remaining courses of medication conveyance as a result of simplicity of organization, patient consistence, and adaptable plan of dose form (1).discharge is the interaction by which a medication leaves a medication item and is exposed to ingestion, circulation, digestion and discharge, in the end to opening up for pharmacological action (2). Presently a day's customary measurements types of medications are quickly being supplanted by the new and the original medication conveyance frameworks. Among, these the controlled delivery/supported discharge measurements structures have become very famous in present day therapeutics. Lattice framework is the delivery framework which delays

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and controls the arrival of the medication, which is broken up or dispersed (3). The customary measurements structures are quickly supplanted by these original controlled discharge procedures. The terms Supported discharge, delayed discharge, changed discharge, expanded delivery or stop details are utilized to distinguish drug conveyance frameworks that are intended to accomplish or expand restorative impact by consistently delivering drug over an expanded timeframe after organization of a solitary dose (4).

Sustained Release Drug Delivery System.(5)

During the beyond couple of years, ordinary measurements types of drugs are quickly being supplanted by the new and the book drug conveyance frameworks. Among, these the controlled discharge/supported discharge measurements structures have become very well known in current therapeutics.Sustained release drug organization implies not just prolongation of span of medication conveyance, however the term too infers the consistency and reproducibility of medication discharge energy. The controlled arrival of medication substances and their compelling vehicle to locales of activity can be taken advantage of to augment the helpful clinical reaction and to limit the frequency of unbeneficial unfriendly responses and side effects.

Reasonable for creating of SRDDS(9,10).

1. Plan of SRDDS limits dosing recurrence what's more, supported discharge gives accessibility of a medication at activity site all through the treatment to work on clinical effectiveness of a medication particle.
2. To lessen cost of treatment by diminishing number of measurements prerequisite.
3. To limit harmfulness due to go too far which is frequently in regular dose from.
4. To upgrade the action length of a medication having short half-life.

Benefits of SRDDS:

Following are a few benefits of SRDDS:

1) Clinical advantages (15,16,17,18)

- Decrease in recurrence of medication organization .
- Worked on understanding consistence.
- Decrease in drug level change in blood.
- Decrease in complete medication utilization when contrasted and traditional treatment
- Decrease in drug gathering with ongoing treatment.
- Decrease in drug harmfulness (neighborhood/foundational).
- Adjustment of ailment (due to more uniform medication levels).
- Improvement in bioavailability of certain medications on account of spatial control.
- Affordable to the medical services suppliers and the patient.

2) Commercial advantages (19):

- Product life-cycle extension
- Product differentiation
- Market expansion
- Patent extension.

Ideal properties of medication appropriate for SRDDS:(20)

- It ought to be really consumed by oral course and stable in gastro-digestive (GI) liquid.
- Drugs that have short half-lives (2-4 hrs) are ideal medication contender for detailing into SR measurements structures eg.Captopril, Salbutamol sulfate.
- The portion of medication ought not be under 0.5gm and most extreme portion of medication for planning SRDDS is 1.0 gm. eg. Metronidazole.
- The restorative scope of the medication ought to be high in SRDDS for medication ought to have wide remedial reach enough with the end goal that 1variety in the delivery doesn't result in focus past the base poisonous levels.

● Classification of oral sustained/controlled delivary system:-

1. Dissolution controlled Frameworks :

(a) Repository gadgets:

A center of medication (supply) encompassed by a polymeric layer describes them. The idea ofthe layer decides the pace of medication discharge. The attributes of supply dissemination frame works are:(12)

- Zero request drug discharge is imaginaable.
- The delivery rate is reliant upon the sort of polymer.
- High atomic weight compounds are hard to convey through the gadget.

(b) Framework gadgets:

It comprises of medication scattered homogenously in a network. The qualities of lattice dissemination frameworks are:(13)

- Zero request discharge can't be acquired
- Simple to deliver than repository gadgets.
- High atomic weight compounds are conveyed through the device

2. Disintegration controlled frameworks:

a. Lattice disintegration-controlled frameworks: Watery scatterings, solidifying, circular agglomeration, and so forth. can be utilized.
b. Encapsulation disintegration-controlled frameworks:Particles,seeds, granules can be covered by strategies, for example,microencapsulation

3. Dispersion and disintegration-controlled frameworks:

In a bioerodible network, the medication is homogenously scattered in a network and it is delivered either by enlarging controlled instrument or by hydrolysis or by enzymatic attack:(14)

Difficulties for SRRDS:(24,25)

● Portion unloading:

This can enormously build the centralization of a medication in the body and there by produce unfriendly outcomes or even medication incited harmfulness. Portion unloading implies the somewhat enormous amount of prescription in a supported delivery detailing is gradually delivered. On the off chance that the portion unloading can prompts fatalities in instance of powerful medication, which have a tight remedial, list for example Phenobarbital.

● Restrictrd decision of choosing desire portion in unit:

In the event of customary measurements shapes, the portion changes are much straightforward for example tablet can be separated into two bits. In instance of supported discharge dose frames, this can have all the earmarks of being substantially more muddled. Supported discharge property might get lost, assuming that dose structure is cracked.

● Poor in-vitro - in-vivo relationship:

In supported discharge dose structure, the pace of medication discharge is gradually diminished to accomplish drug discharge potentially over a huge district of gastrointestinal parcel. Consequently, it is alleged as 'Ingestion window' becomes significant and lead to unacceptable medication assimilation in-vivo in spite of astounding in-vitro discharge qualities.

● Patient variety:

The time span expected for retention of medication set free from the measurements structure might shift among people. The co- organization of different medications, presence or nonappearance of food and home time in gastrointestinal lot is different among patients. This additionally brings about variety in clinical reaction among the patien.

Polymers Used In Formulation Of Sustained Released Drug:(7,8)

Since the structural and physicochemical characteristics of the polymer are decisive in the drug release mechanism, some will be more suitable than others, depending on the aim pursued and the drug desired

A. Hydrophilic polymers

✓ Cellulosic

1. Methylcellulose
2. Hydroxypropyl methyl cellulose (Hypromellose, HPMC)
3. Hydroxypropylcellulose (HPC)
4. Hydroxyethylcellulose (HEC)
5. Ethylhydroxyethylcellulose (E-HEC)
6. Sodium carboxymethylcellulose (Na-CMC)

✓ **Non-cellulosic**

1. Sodium alginate
2. Xanthan gum
3. Carrageenan
4. Chitosan
5. Guar gum
6. Pectin
7. Cross-linked high amylose starch
8. Polyethylene oxide
9. Homopolymers and copolymers of acrylic acid

B. Hydrophobic polymers:

1. Ethylcellulose
2. Hypromellose acetate succinate
3. Cellulose acetate
4. Cellulose acetatepropionate
5. Methacrylic acid copolymers

- **Apart from these two types, waxes and insoluble polymers are also used.**

1. Waxes:

Carnauba wax, beeswax, candelilla wax, microcrystalline wax, ozokerite wax, paraffin waxes, and low molecular weight polyethylene.

2. Insoluble polymers:

Ammoniomethacrylate co-polymers (Eudragit RL100, PO, RS100, PO), ethylcellulose, cellulose acetate butyrate, cellulose acetate propionate, and latex dispersion of methacrylic ester copolymers.

Physicochemical parameters that are considered in formulation of SDDS

Table no.1 Physiochemical parameters for drug selection

Parameter	Preferred Value
Molecular Weight/size	<1000 Daltons
Solubility	>0.1 mg/ml for pH 1-7.8
Apparent partition coefficient	High
Absorption mechanism	Diffusion
General absorbability	From all GI segments
Release	Should not be influenced by pH and enzymes

Method AND Definition OF ORAL Supported Delivery Medication Conveyance Framework AND THE Elements Influencing There Of : (26.27.28.29)

The oral course of organization is the most favored course because of adaptability in measurement structure, plan and patient consistence. In any case, here one has to think about, the different pH that the dose structure would experience during its travel, the gastrointestinal motility, the chemical framework also, its effect on the medication and the dose structure. Most of oral supported discharge frameworks depend on disintegration, dispersion or a mix of the two components, to create slow arrival of medication to the gastrointestinal milieu. Hypothetically and attractively a maintained discharge conveyance gadget, ought to deliver the medication by a zero-request process which would result in a blood-level time profile like that later intravenous steady rate complexation., Supported (zero-request) drug discharge has been endeavored to be accomplished, by following classes of sustained release drug delivary system.

A) Dispersion supported framework.

I. Repository type
II. Network type

B) Disintegration supported framework.

I. Repository type.
II. Network type

C) Techniques utilizing Particle trade.

D) Techniques utilizing osmotic strain.

E) pH free details.

F) Adjusted thickness details

A] Dispersion supported framework:(26.27.28)

Essentially dissemination process shows the development of medication particles from a district of a higher focus to one of lower fixation. The transition of the medication J (in sum/region - time), across a film toward diminishing focus is given by Fick's regulation.

J= - D dc/dx.

D = dispersion coefficient in region/time

dc/dx = change of focus 'c' with distance 'x'

In like manner structure, when a water insoluble layer encases a center of medication, it should diffuse through the film, the medication discharge rate dm/dt is given by,

dm/dt= ADK C/L

Where A = region

K = Parcel coefficient of medication between the film and medication center

L= dissemination way length [i.e. thickness of coat]

c= fixation distinction across the film.

I. Repository type:

Schematic presentation of dissemination supported drug discharge: repository framework. In the framework, a water insoluble polymeric material encases a center of medication. Medication will segment into the film and trade with the liquid encompassing the molecule or tablet. Extra medication will enter the polymer, diffuse to the outskirts and trade with the encompassing media.

Description : Drug center encompassed by polymer layer which controls discharge rate.

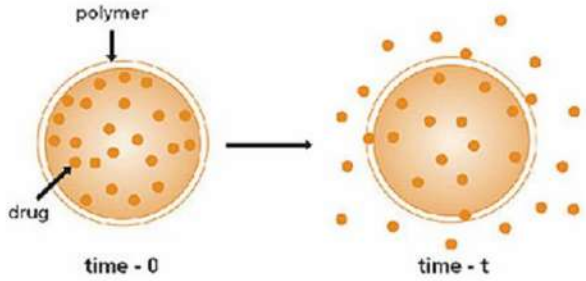

Figure No-1

Benefits:

Zero request conveyance is conceivable, discharge rates variable with polymer type.

Disadvantages:

Framework should be genuinely eliminated from embed locales. Challenging to convey high sub-atomic weight compound, by and large inflated cost per measurements unit, expected harmfulness in the event that framework falls flat.

ii] Network type:

A strong medication is scattered in an insoluble network and the pace of arrival of medication is subject to the pace of medication dispersion and not on the pace of strong disintegration. Higuchi has inferred the proper condition for drug discharge for this framework,

Q = D/T [2 A - Cs] Cst ½

Where;

Q = weight in gms of medication delivered per unit area of surface at time t

D = Dispersion coefficient of medication in the discharge medium

Cs = dissolvability of medication in discharge medium

T= Convolution of the grid

A = convergence of medication in the tablet, as gm/ml

Benefits:

Simpler to create than repository or epitomized gadgets, can convey high sub-atomic weight compounds.

Disservices: Can't give zero request discharge, expulsion of outstanding grid is vital for embedded framework.

Description: Homogenous scattering of strong drug in a polymer blend.

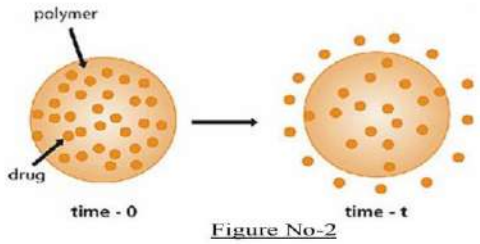

Figure No-2

•Schematic representation of dissolution maintained drug discharge:

lattice framework.

A third conceivable diffusional system is the framework where a somewhat solvent film encases a medication center. Disintegration of part of film takes into account dissemination of the compelled drug through pores in the polymer coat.

The delivery rate can given by follow condition:-

Discharge rate = Promotion/L = [C1-C2]

Where,

A = Region

D = dispersion coefficient

C1 = Medication focus in the center

C2 = Medication fixation in the encompassing medium

L = diffusional way length

Hence dissolution supported items depend on two methodologies the main methodology involves position of the medication in an insoluble framework of some sort. The eluting medium enters the lattice and medication diffuses out of the framework to the encompassing pool for extreme retention. The second methodology includes encasing the medication molecule with a polymer coat. For this situation the part of the medication which has broken up in the polymer coat diffuses through an unstirred film of fluid into the encompassing liquid.

B. Disintegration supported frameworks:(27.28)

A medication with a sluggish disintegration rate is intrinsically maintained and for those medications with high water dissolvability, one can diminish disintegration through proper salt or subordinate arrangement. These frameworks are generally regularly utilized in the creation of intestinal covered measurement structures. To safeguard the stomach from the impacts of medications such as Ibuprofen, a covering that disintegrates in normal or antacid media is utilized. This restrains arrival of drug from the gadget until it comes to the higher pH of the digestive tract. Much of the time, intestinal covered measurement structures are not really supporting in nature, however act as a valuable capability in coordinating delivery of the medication to an extraordinary site. A similar methodology can be utilized for intensifies that are corrupted by the cruel circumstances viewed as in the gastric locale.

I. Repository type:

Drug is covered with a given thickness covering, which is gradually disintegrated in the items in gastrointestinal lot. By rotating layers of drug with the rate controlling coats as displayed in figure, a beat conveyance can be accomplished. On the off chance that the external layer is rapidly delivering bolus portion of the drug, starting levels of the medication in the body can be immediately settled with beat stretches. Albeit this is certainly not a genuine supported discharge framework, the natural impacts can be comparable. An elective technique is to direct the medication as gathering of globules that have covering of various thickness. This is displayed in figure. Since the globules have different covering thickness, their discharge happens in a dynamic way. Those with the most slender layers will give the beginning portion. The upkeep of medication levels at late times will be accomplished from those with thicker covering. This is the guideline of the

spansule case. Cellulose nitrate phthalate was orchestrated and utilized as an intestinal covering specialist for acetyl salicylic corrosive tablets.

II. Network type:

The more normal sort of disintegration-maintained measurements structure as displayed in figure. It very well may be either a drug impregnated circle or a medication impregnated tablet, which will be exposed to slow disintegration. Two sorts of disintegration supported beat conveyance frameworks:

a. Single dab type gadget with substituting medication and rate-controlling layer.

b. Dabs containing drug with contrasting thickness of dissolving coats.

C. Strategies utilizing lon Trade:(26.27)

It depends on the development of medication pitch complex shaped when an ionic arrangement is stayed in touch with ionic pitches. The medication from these complex

gets traded in gastrointestinal parcel and delivered with abundance of Na+ what's more, Cl- present in gastrointestinal parcel.

Resin + - Drug - + Cl-goes to resin + Cl- + Drug-

Where x- is cl-conversely

Resin - - drug++ Na +goes resin – Na++ Drug

These frameworks by and large use sap compounds of water insoluble cross - connected polymer. They contain salt - shaping practical gathering in rehashing positions on the polymer chain. The pace of medication dissemination out of the gum is maintained by the area of dissemination, diffusional way length furthermore, unbending nature of the sap which is capability of the measure of cross connecting specialist used to plan saps .The delivery rate can be additionally maintained by covering the medication sap complex by microencapsulation process. The saps utilized incorporate Amberlite, Indion, polysterol pitches what's more, others.

D. Method using osmotic pressure:[27]

A semi porous film is put around a tablet, molecule or medication arrangement that permits transport of water into the tablet with possible siphoning of medication arrangement out of the tablet through a little conveyance opening in tablet covering.

Two kinds of osmotically supported frameworks are:-

Type A contains an osmotic center with drug

Type B contains the medication in adaptable pack with osmotic center encompassing.

Sustained Releasedrud delivary can be classified conveniently on following bases:)

A. Single chamber osmotic pump

- Elementary osmotic pump (EOP)

A. Multi chamber osmotic pump

- Push pulls osmotic pump.
- Osmotic pump with non-expanding Second chamber.

B. Specific types

- Controlled porosity osmotic pump.
- Monolithic osmotic systems.
- Osmotic bursting osmotic pump.
- OROS – CT
- Multi particulate delayed release systems (MPDRS)

E. pH-Free details:[26.29]

The gastrointestinal parcel presents some uncommon highlights for the oral course of medication organization with moderately short travel time through the gastrointestinal lot, which imperative the length of prolongation, further the compound climate all through the length of gastrointestinal parcel is limitation on dose structure plan. Since most drugs are either powerless acids or feeble bases, the discharge from supported discharge details is pH subordinate. Nonetheless, cushions, for example, salts of amino acids, citrus extract, phthalic corrosive phosphoric corrosive or tartaric corrosive can be added to the plan, to assist with keeping a steady pH in this way delivering pH autonomous medication discharge.

A supported discharge detailing is ready by blending a fundamental or acidic medication in with at least one buffering specialist, grinding with suitable drug excipients and covering with gastrointestinal liquid porous film shaping polymer. At the point when gastrointestinal liquid saturates through the film, the buffering specialists change the liquid inside to reasonable consistent pH consequently delivering a consistent pace of medication discharge for example propoxyphene in a cradled supported discharge detailing, which altogether increment reproducibility.

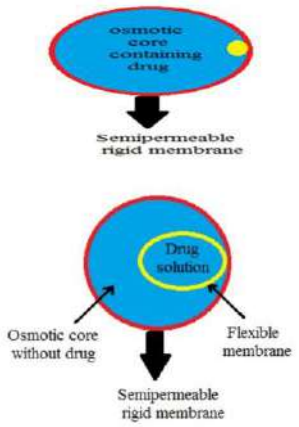

Fig No:3 Type A osmotic system

F. Modified thickness definitions: (30)

Expecting that except if a delivery is sensible framework stays nearby the assimilation site until the vast majority of its medication contents is delivered, it would have restricted utility. To this end, a few methodologies have been created to draw out the home season of medication conveyance framework in the gastrointestinal parcel. High thickness approach In this approach the thickness of the pellets must surpass that of ordinary stomach content and ought to hence be no less than 1-4gm/cm3. Low thickness approachGlobular shells which have an evident thickness lower than that of gastric liquid can be utilized as a transporter of medication for supported discharge reason.

Mechanisms of drug release of SRDDS(31.32)

Diffusion is rate limiting

Diffusion is driving force where the movement of drug molecules occurs from high concentration in the tablet to lower concentration in gastro intestinal fluids. This movement depends on surface area exposed to gastric fluid, diffusion pathway, drug concentration gradient and diffusion coefficient of the system. In practice we can follow either of the two methods,

I. The drug is formulated in an insoluble matrix; the gastric fluid penetrates the dosage form and dissolves the medicament and release the drug through diffusion.

II. The drug particles are coated with polymer of defined thickness so as the portion of drug slowly diffuse through the polymer to maintain constant drug level in blood.

Dissolution is rate limiting

The drugs with poor water solubility (BCS class 2 and 4) are inherently sustained release forms. While for water-soluble drugs, it's possible to incorporate a water insoluble carrier to reduce dissolution of the drug particles are coated with this type of materials for example Polyethylene Glycol. One might skirt the utilization of breaking down specialist to advance deferred discharge.

Osmotic strain is rate restricting

Assimilation is a peculiarity where the progression of fluid happens from lower focus to higher fixation through a semi penetrable layer which permits move of fluid as it were. The entire medication is covered with a semi penetrable film with an opening toward one side of tablet made by a laser shaft. The gastric liquid enters through the layer, solubilizes the medication and builds the inner strain which siphons the medication arrangement out of the gap and deliveries the medication climate. The conveyance rate is consistent given that the abundance of medication

present inside the tablet. Be that as it may, it declines to nothing.

Discharge is constrained by particle trade

Particle exchangers are water insoluble resinous materialscontaining salt framing anionic or cationic gatherings. While fabricating, the medication arrangement is blended in with sap and dried to frame globules which are tableted. The medication discharge depends upon high convergence of charged particles in gastro digestive lot where, the medication particles are traded and diffused out of the sap into the encompassing liquid. This system depends upon the climate of pitch and not pH or chemical on retention site

- **Evaluation for SRDDS**

Evaluation of these measurement structure done by two different ways:

I. Evaluation of granules
II. Evaluation of tablets

I. Evaluation of granules include following test

- **Point of repose:(33)**

The point of rest was resolved utilizing the pipe technique. A pipe was gotten on a stand at a proper level h) over a chart paper put on a level surface. The example was poured until the pinnacle of the conelike heap contacted the tip of pipe. The range of the conelike heap was estimated and the point of rest determined as follows:

$$V = Tan^{-1} (h/r)$$

- **Mass density:(34)**

The mass thickness was determined utilizing condition:

$$\rho b = MV,$$

where ρb is the bulk density and M is the granules' mass in grams, and V is the final untapped volume in milliliters.

- **True density:(35)**

The following equation was used to measure the true density:

$$\rho t = M/VP$$

where ρt is the true density and
M is the mass of the granules in grams,
VP = Last tapped volume of granules in ml.

- **Loss on drying (LOD):(36)**

The dampness content of the greased up granules was examined by utilizing IR dampness analyser. 5.0 gm. or on the other hand greater amount of granules was warmed at 1050c until the adjustment of weight was no more saw by the instrument. The % misfortune in weight was recorded

- **Compressibility index:(37)**

This was estimated for the property of a powder to be compacted; as such they are estimated for relative significance of between particulate cooperations. Compressibility list was not entirely set in stone by following condition.

$$\text{Compressibility record} = (Dt - Db) \times 100$$

Where, Dt = Tapped thickness,
Db = Mass thickness

- **Hausner ratio:(38)**

It was determined by following condition.

$$\text{Hausner ratio} = Dt / Do$$

Where Dt is the tapped density and Do is the bulk density

II. The following test is required for the evaluation of SR tablets:

- **Weight variation:(39)**

Twenty tablets from each formulation were weighed using an electronic balance (citizen India) and the official method.

- **Friability:(40)**

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

$$\% \text{ friability} = Wo - W/Wo \times 100$$

Where, Wo = Initial weight of twenty tablet
W = weight of 20 tablet after 100 revolution.

- **Hardness:(41)**

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.

- **Thickness:(42)**

Twenty tablets from the sample were randomly taken and individual tablet thickness was measured using digital Vernier calliper. Average thickness and standard deviation values were calculated.

- **In-vitro drug release rate:(43)**

Formulated tablet were subjected to invitro dissolution study using USP type I / II apparatus (paddle) at 100 rpm with temperature of water bath maintain at 37±0.5oc. Dissolution was carried in 900 ml simulated gastric fluid for 2 hrs and for further 8 hrs in simulated intestinal fluid. The release of different drugs at different time interval was measured at particular wavelength by U.V- visible spectrophotometer.

FUTURE OPEN DOORS FOR SRDDS

1. The oral SRDDS market is the biggest part of the medication conveyance market, and there is no sign that it is dialing back. With drug organizations progressively going to medicate conveyance to broaden the income procuring lifetime of their greatest items, what's more, trying to take advantage of the developing old populace that requires items effortlessly of-purpose and money saving advantage.

2. Oral medication conveyance gives the authoritative separate of the markets. Benefits for short half-life drugs, supported delivery can mean less successive dosing and accordingly better consistence diminish varieties in plasma or blood levels for more predictable outcome.

3. This would give the ideal stimulus to the item advancement researcher, working with additional development of exploration on SRDDS advancements and cutting-edge item dispatches.

4. This patent outline gives a refreshed elevated perspective review account on the distributions and licenses of various novel supported discharge conveyance approaches utilized for the application

MARKETED FORMULATION OF SUSTAINED RELEASE ORAL DRUG DELIVARY SYSTEM

Sr. No.	Technology	Brand Name	Drug	Manufacturer
1.	Diffusion Controlled release	Welbutrin XL	Bupropion	Glaxosmithkline
2.	Matrix system tablet	Ambien	Zolpidem tartarate	Sanofi-Aventis
3.	Method using ion exchange	Tussione X Pennkinetic suspension	Hydrocodone pollistirex & Chlorpheneramine polistirex	UCB Inc.
4.	Method using osmotic • Elementary Osmotic Pump • Push Pull osmotic System	Efidac 24 Glucotrol XL	Chlorphrnira mine maleate Glipzide	Novarti Pfizer Inc
5.	pH free details	Inderal LA	Propranolol HCL	Wveth Inc
6.	Modified thickness Formulation	Modapur	Levopoda & Benserazide	Roche Products, USA

CONCLUSION

The Sustained release drug delivery system is very helpful in increasing the efficiency of the dose, safety of dose as well as the patient compliance. Nowadays, the oral route of administration for Sustained release drug delivery system has

received more attention due to its more flexibility, reduced dosing frequency and better patient compliance. The design of oral Sustained release drug delivery systemdepends on various factors like, physic-chemical properties of drug, type of delivery system, disease being treated, patient condition, treatment duration, presence of food, gastrointestinal motility and co-administration of other drugs. From the above discussion, we can concluded that Moreover; the reasonable cost of oral Sustained release drug delivery system has lead ease of market penetration as replacement of oral conventional drug delivery system.

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