Design, and in vitro evaluation of Orodispersible tablets (ODTs) of Rizatriptan

[1]Mohammedi Iqra Mubeen, [2]Dr Mohd Omar

Arya College of Pharmacy

***Abstract*: Rizatriptan oral disintegrating tablets were prepared using different concentrations of superdisintegrants like Croscarmellose sodium (CCS), Sodium starch glycolate (SSG). Tablets were prepared by direct compression method and evaluated for hardness, friability, wetting time, disintegration time and percent drug release. FT-IR studies revealed that there was no interaction between Rizatriptan and the excipients used in the study. The results indicated that formulation prepared with 8% crospovidone was found to be optimized (F3) which provides maximum drug release (95.6%) and minimum disintegration time (less than 20sec). Dissolution rate of tablets with croscarmellose sodium (CCS), sodium starch glycolate (SSG) improves when concentration increased from 2% to 4% and 4% to 8%. Dissolution rate of tablets with sodium starch glycolate (SSG) was significantly less when compared to the tablets with croscarmellose sodium (CCS), at initial time points. From the above results of the study it can be concluded that the best formulation is with 8 % of crospovidone (CP) showed faster disintegration time within 11sec when compared to the other formulations and it showed 95.6% drug release at the end of 30 min.**

***Keywords*: Rizatriptan, Serotonin receptor agonist, triptans, acute, migrane.**

Introduction:

Medication conveyance frameworks are getting progressively refined as drug researchers procure a superior comprehension of the physicochemical and biochemical boundaries relevant to their presentation. In the course of recent decades, orally breaking down tablets (ODTs) have increased extensive consideration as a favoured option in contrast to ordinary tablets and containers because of better patient consistence. ODTs are strong dose structures containing therapeutic substances which break down quickly, for the most part in a matter of seconds, when put on the tongue. Results of ODT advances entered the market during the 1980s, have become consistently popular, and their item pipelines are quickly extending. New ODT advancements address numerous drug and patient needs, running from upgraded life-cycle the executives to helpful dosing for pediatric, geriatric, and mental patients with dysphagia. This has empowered both scholarly community and industry to create new orally breaking down plans and innovative methodologies in this field. The point of this article is to survey the advancement of ODTs, challenges in detailing, new ODT advances and assessment procedures, appropriateness of medication up-and-comers, and future possibilities.

Some of the common applications of ODTs are listed in table

MEDICATION TYPE	INDICATIONS
Fast acting	Pain, fever, migraine, diarrhoea, heart burn, anxiety, insomnia
Compliance-critical	Parkinson's disease, Alzheimer's disease, Psychosis, Schizophrenia, Hypertension, Cholesterol, Transplantation
Paediatric	Cough, cold, allergy, pain, fever

Requirements of ODTs:

The presentation of ODTs relies upon the assembling innovation and the most essential property of such a dose structure is the capacity of quickly deteriorating and scattering or dissolving in the salivation, subsequently hindering the requirement for water admission. ODTs ought to delineate some ideal qualities to recognize them from customary traditional measurements structures. Significant attractive qualities of these measurements structures.

- Convenient and simple to direct as doesn't need water for oral organization for gulping reason, yet it should break down or deteriorate in the mouth for the most part inside couple of moments.
- Allow high medication stacking.
- Provide wonderful inclination in the mouth.
- Be viable with taste concealing and different excipients.
- Leave unimportant or no buildup in the mouth after oral organization.
- Have adequate solidarity to withstand the afflictions of the assembling cycle and post-producing taking care of.
- Insensitive to ecological conditions, for example, mugginess and temperature.
- Adaptable and managable to traditional handling and bundling types of gear at ostensible cost.

Advantages of orally disintegrating tablets:

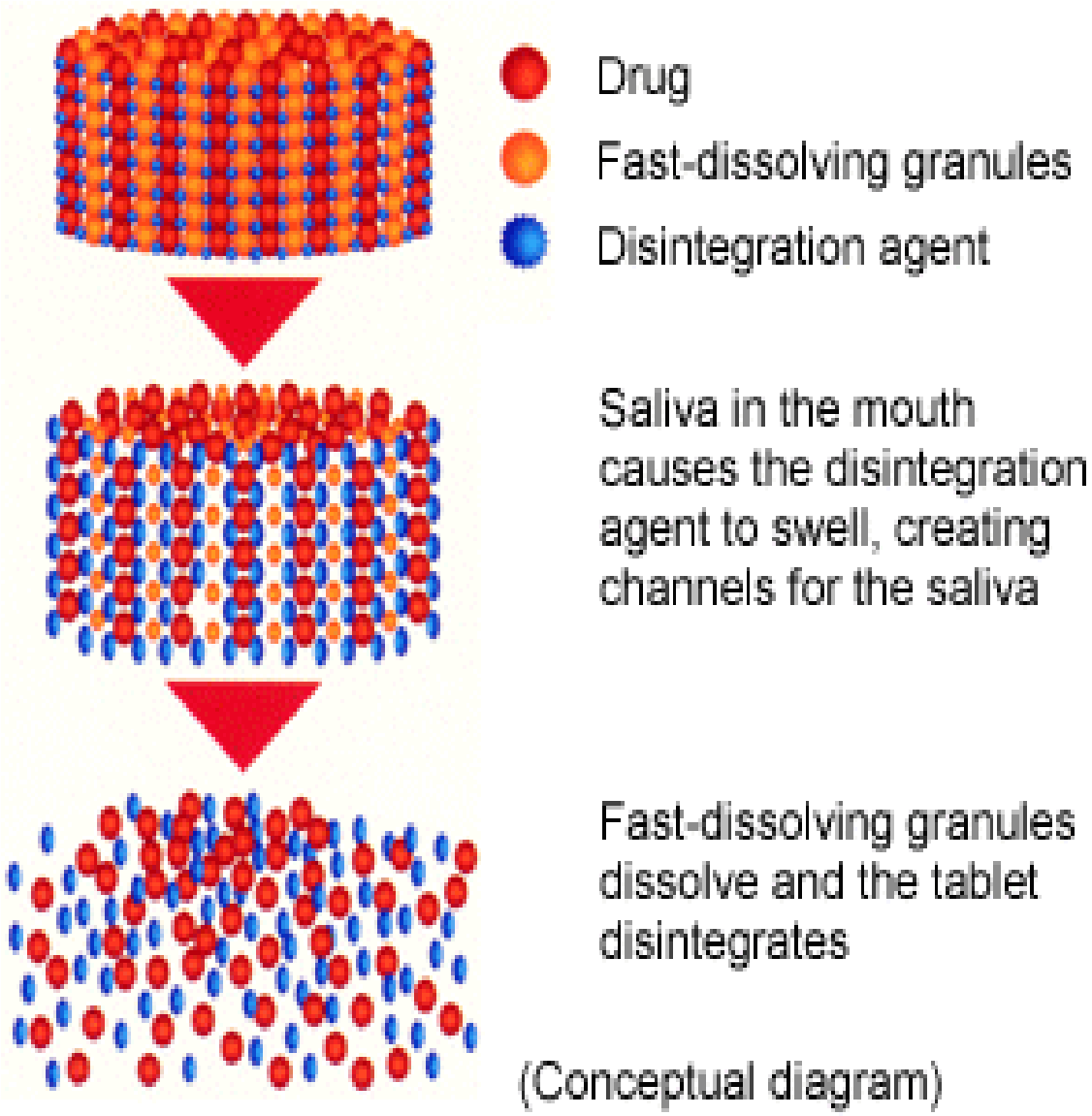
- Improved consistence/included accommodation
- Ease organization for patients who are intellectually poorly, handicapped and uncooperative

- added items for veterinary prescriptions, OTC, Rx meds and line expansions.
- The new exclusive strategy permits the joining of microencapsulated drugs for upgraded bioavailability, adaptability of dosing and quick as well as controlled delivery.
- For prevalent helpful advantage.

Mechanism of disintegrations by super disintegrants :

The mechanism by which the tablets are broken into small pieces and then produce a homogeneous suspension is based on:

- Capillary action
- By swelling
- Air expansion
- Due to disintegrating particle
- Due to deformation
- Due to release of gases
- By enzymatic reaction.



Techniques for preparing Orally disintegrating Tablets:

Freeze drying:

A cycle where water is sublimated from the item in the wake of freezing. Lyophilisation is a drug innovation which permits drying of warmth touchy medications and biologicals at low temperature under conditions that permit expulsion of water by sublimation. Lyophilisation brings about arrangements, which are profoundly permeable, with an exceptionally high explicit surface territory, and which break up quickly and show improved retention and bioavailability.

Molding:

Tablet created by embellishment are strong scattering. Formed tablets break down more quickly and offer improved taste on the grounds that the scattering framework is commonly produced using water solvent sugars. The dynamic fixing much of the time is ingested through the mucosal covering of the mouth. The assembling cycle of trim tablets includes saturating the powder mix with a hydro-alcoholic dissolvable followed by squeezing into shape plates to frame a wetted mass (compacting forming).

Spray drying:

Shower drying is a cycle by which profoundly permeable, fine powders can be created. Spray-dryers are constantly utilized in the drug business to deliver profoundly permeable powders. Applying this cycle to the creation of oral disintegratingtablets. The plans that were created contained hydrolyzed and unhydrolyzed gelatin as a help specialist for the lattice, mannitol as a building operator, and sodium starch glycolate or croscarmellose as a disintegrant.

Sublimation:

The way to fast deterioration for mouth dissolving tablets is the nearness of a permeable structure in the tablet network. Traditional packed tablets that contain profoundly water solvent fixings regularly tumble to break up quickly due to low porosity of the lattice. Consequently, to create permeable framework, unpredictable fixings are utilized that are later exposed to a cycle of sublimation.

Direct compression:

It is the most effortless approach to produce tablets. Regular gear, generally accessible excipients and a set number of handling steps are engaged with direct pressure. Likewise high portions can be obliged and last weight of tablet can without much of a stretch surpass that of other creation techniques. This strategy would now be able to be applied to oral disintegratingtablets on account of the accessibility of improved tablet excipients, particularly tablet disintegrants and sugar-based excipients.

PATENTED TECHNOLOGY FOR THE ORALLY DISINTEGRATING TABLETS:

Each technology has a different mechanism, and each fast dissolving/ disintegrating dosage form varies regarding the following.

- Mechanical strength of final product;
- Drug and dosage form stability;
- Mouth feel;
- Taste;
- Rate of dissolution of drug formulation in saliva;
- Swallow ability;
- Rate of absorption from the saliva solution; and
- Overall bioavailability.

ZYDIS TECHNOLOGY:

Zydis, the most popular of the quick dissolving/Disintegrating tablet arrangements, and was the principal advertised new innovation tablet. The tablet breaks down in the mouth inside seconds after position on the tongue. Zydis tablet is delivered by lyophilizing or freeze-drying the medication in a lattice for the most part comprising of gelatin. The item is extremely lightweight and delicate, and must be apportioned in an extraordinary rankle pack. Patients ought to be exhorted not to push the tablets through the foil film, yet rather strip the film back to deliver the tablet. The Zydis plan is additionally self-preserving on the grounds that the last water focus in the freeze-dried item is too low to even consider allowing for microbial development. A significant case of the Zydis item is expanded bioavailability contrasted with conventional tablets. Due to its scattering and disintegration in spit while still in the oral cavity, there can be a significant measure of pre-gastric ingestion from this plan. Buccal, pharyngeal and gastric locales are for the most part zones of ingestion of the Zydis definition. Any pre-gastric assimilation evades first-pass digestion and can be a bit of leeway in drugs that go through a lot of hepatic digestion. Notwithstanding, if the measure of gulped tranquilize changes, there is the potential for conflicting bioavailability. chy to debasement at mugginess more noteworthy than 65%.

ORASOLV TECHNOLOGY:

The OraSolv innovation, not at all like Zydis, scatters in the spit with the guide of practically subtle foam. The OraSolv innovation is best depicted as a quick deteriorating tablet; the tablet lattice disintegrates in under one moment, leaving covered medication powder. The taste veiling related with the OraSolv definition is twofold. The unsavory kind of a medication isn't simply neutralized by sugars or flavors, both covering the medication powder and fizz are methods for taste veiling in OraSolv. This innovation is often used to create over the counter (OTC) details. The significant weakness of the OraSolv plans is its mechanical quality. The OraSolv tablet resembles a conventional packed tablet. Be that as it may, the OraSolv tablets are just softly compacted, yielding a more vulnerable and more weak tablet in examination with ordinary tablets. Thus, Cima built up an uncommon taking care of and bundling framework for OraSolv.

DUROSOLV TECHNOLOGY:

DuraSolv is Cima's second-generation fast-dissolving/breaking down tablet detailing. Created in a manner like OraSolv, DuraSolv has a lot higher mechanical quality than its forerunner because of the utilization of higher compaction pressures during tableting. DuraSolv tablets are set up by utilizing customary tableting hardware and have great unbending nature (friability under 2%). The DuraSolv item is hence delivered in a quicker and more savvy way. DuraSolv is tough to the point that it tends to be bundled in conventional rankle bundling, pockets or vials.17 One hindrance of DuraSolv is that the innovation isn't viable with bigger dosages of dynamic fixings, in light of the fact that the plan is exposed to such high weights on compaction.

FLASH DOSE TECHNOLOGY:

Fuisz Technologies has three oral medication conveyance frameworks that are identified with quick disintegration. The initial two ages of fast dissolving tablets, Soft Chew and EZ Chew, require some biting. Nonetheless, these made ready for Fuisz's latest turn

of events, Flash Dose. The Flash Dose innovation uses a special turning system to create floss like glasslike structure, much like cotton sweets. This glasslike sugar would then be able to fuse the dynamic medication and be packed into a tablet. This technique has been protected by Fuisz and is known as Shear structure.

Some ODT technological patents:

ODT Technologies	Technological basis	Patent owners
Zydis	Lyophilisation	R.P.Scherer Inc.
Quicksolv	Lyophilisation	Janseen Pharmaceutica
Flashtab	Multiparticulate compressed tablets	Prographarm
Lyoc	Lyophilisation	Cephalon Corporation
Orasolv	Compressed tablets	Cima Labs Inc.
Durasolv	Compressed tablets	Cima Labs Inc.
Wowtab	Compressed molded tablets	Yamanouchi Pharma Technologies, Inc.
Flashdose	Cotton candy process	Fuisz Technologies, Ltd.
AdvaTab	Microencapsulation	Eurand
Multiflash	Multi-unit tablet	Prographarm
EFVDAS	Effervescent system	Elan Corporation

OBJECTIVES:

Plan of the study:

Preformulation studies.

Prepared mouth dissolving tablets of cetrizine will be subjected for the following evaluation parameters.

I. **Pre-compression parameters:**

1. Angle of repose
2. Bulk density
3. Carr's consolidation index
4. Compatibility study

II. **Post-compression parameters:**

1. Uniformity of thickness.
2. Hardness test.
3. Friability test.
4. Weight variation test.
5. Wetting time.
6. Water absorption ratio.
7. *In-vitro* disintegration time.
8. *In-vitro* dissolution studies.
9. Drug content uniformity

REVIEW OF LITERATURE

The following are the research works carried out by various research scholars that strongly support to carry out the present dissertation work. [23]

1. **Mizumoto,T. et al**., studied on "Formulation design of a novel fast-disintegrating tablet" They prepared fast disintegrating tablets which had sufficient hardness and could be manufactured by commonly used equipments. This was achieved by improving compressibility of low-compressibility saccharides and conducting process which made it possible to achieve sufficient hardness while maintain the fast disintegration time.
2. **Schiermeier**,S;Schmidt P.C. designed "Fast dispersible ibuprofen tablets" The work revealed fast dispersible tablets containing coated ibuprofen as a high dosed model drug with acceptable hardness and desirable taste, prepared by direct compression method. To develop an ODT, a tablet rotatable central composite design was applied to predict the effects of the quantitative factors mannitol and crospovidine as well as compression force on the characteristics of the tablet.
3. **Mahajan, A**; Sharma, R. reviewed "COX-2 selective Nonsteroidal Anti-inflammatory drugs: current status" They focused on the potentially lethal side effects associated with use of COX-2 specific inhibitors. However, it had been recommended that the choice of COX-2 selective inhibitor for a particular patient should be used upon their relative efficacy, toxicity, concomitant drug use, concurrent disease status, hepatic and renal function and relative cost.
4. **Szepes, A. et al**. investigated "Freeze-casting technique in the development of solid drug delivery system" The study reported that freeze-casting technique proved to be an appropriate alternate for the development of porous solid drug delivery system and the freeze-casted units revealed a highly porous nature and a remarkable difference in pore volume size distribution.
5. **Fukami, J. et al.** worked on "Evaluation of rapidly disintegrating tablets containing glycine and carboxymethylcellulose "They prepared rapidly disintegrating tablet using glycine as a disintegrant and evaluated the effect of disintegrant on the

disintegration behaviour of the tablet. It was suggested that the tablet formulation containing NS-300 and glycine was highly applicable to water-insoluble drug, such as ethenzamide.

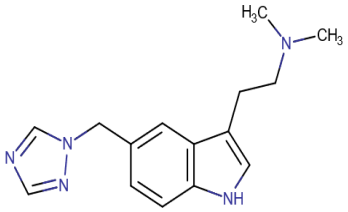
6. **Amin, P. et al,** investigated "Indion 414 as superdisintegrant in formulation of mouth dissolve tablets"The research paper introduced Indion 414, an ion exchange resin, as a new superdisintegrant for pharmaceutical dosage forms. Model drugs belonging to various classes were taste masked and formulated into palatable mouth dissolve tablets and compared with the conventional disintegrants to determine its relative efficacy.

7. **S.A. Desai, et al.** "Oro dissolving tablets of Promethazine Hcl" prepared orodissolving tablets of promethazine Hcl using superdisintegrants, sodium starch glycolate and croscarmellose sodium by direct compression method. They prepared tablets exhibited hardness between 2-4 k/cm.The tablets were disintegrating, in vitro and in vivo within 8 to 16 sec and 9 to 20 sec respectively and almost 100% of the drug was released from all formulations within 5 mins.

DRUG AND EXCIPIENT PROFILE

Drug profile :

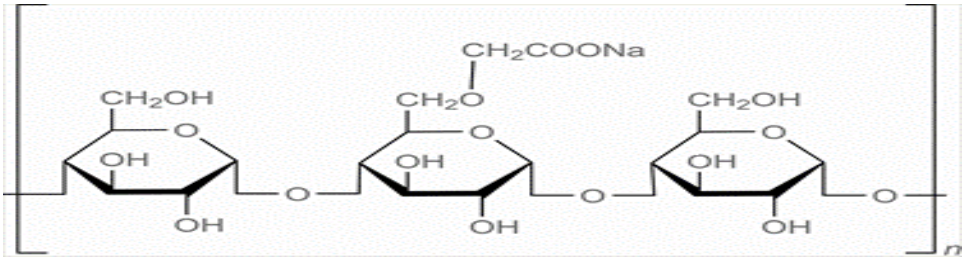
Rizatriptan



Rizatriptan is a triptan drug used for the treatment of migraine headaches. It is a selective 5-hydroxytryptamine1 receptor subtype agonist.

Excipient Profile:

Sodium starch glycolate :



Sodium starch glycolate is the sodium salt of a carboxymethyl ether of starch.It is a Very fine, white or off white, free flowing powder; odorless or almost odorless. Practically insoluble in water, insoluble in most organic solvents.

CROSCARMELLOSE SODIUM:

Croscarmellose sodium is a cross linked polymer of carboxymethyl cellulose sodium. Cross linking makes it an insoluble, hydrophilic, highly absorbent material, resulting in excellent swelling properties and its unique fibrous nature gives it excellent water wicking capabilities.

MAGNESIUM STEARATE:

magnesium octadecanoate; stearic acid magnesium salt; octadecanoic acid, magnesium salt.

COLLOIDAL SILICON DI-OXIDE:

Colloidal silicon dioxide is a sub microscopic fumed silica with a particle size of about 15nm.It is a light, loose, bluish-white colored, odorless, tasteless, non gritty amorphous powder.

LACTOSE MONOHYDRATE: Lactose is milk sugar. It is a disaccharide composed of one galactose and one glucose molecule. In pharmaceutical industry, lactose is used to help form tablets because it has excellent compressibility properties. It is also used to form a diluent powder for dry powder inhalations.

Details of materials used

Sl. No.	Materials
1	Cetrizine hydrochloride
2	Sodium starch glycolate
3	Croscarmellous sodium

4	Magnesium stearate
5	Colloidal silicon di-oxide
6	Lactose monohydrate

Details of equipments used

Sl. No.	Instruments
1	UV Visible spectrophotometer
2	Multi station rotary punch tablet compression machine
3	Dissolution test apparatus
4	Friability Tester
5	Hardness Tester
6	Tablet disintegration tester
7	Vernier calliper

Formulation chart of Rizatriptan orally disintegrating tablets

Ingredients (mg)	F1	F2	F3	F4	F5	F6	F7	F8	F9
Rizatriptan	10	1 0	10	10	10	10	10	10	10
Crospovidone (CP)	2	4	8	-	-	-	-	-	-
Cross caramellose sodium (CCS)	-	-	-	2	4	8	-	-	-
Sodium starch glycolate (SSG)	-	-	-	-	-	-	2	4	8
Silicon dioxide	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Magnesium stearate	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Peppermint flavour	1	1	1	1	1	1	1	1	1
Avicel pH 102	84	82	78	84	82	78	84	82	78
Total tablet weight	100	100	100	100	100	100	100	100	100

Formulation chart of Rizatriptan orally disintegrating tablets

Total weight of each tablet – 100 mg
Punch size – 8 mm

Preparation of phosphate buffer pH 6.8

Dissolved 27.22 g of monobasic potassium phosphate in water and diluted to 1000 ml with water.
In 50 ml of above solution added 22.4 ml of 0.2 M sodium hydroxide solution and added water to make up 200 ml.

Procedure:

Orodispersible tablets (ODTs) were prepared by direct compression method according to formula given in Table 1. All the ingredients were passed through mesh # 30 except magnesium stearate. Magnesium stearate was passed through mesh # 40. Drug, and superdisintegrant were mixed by taking small portion of each in ascending order and blended to get a uniform mixture in a mortar. The other ingredients were weighed and mixed in geometrical order and tablets were compressed using 7mm round flat punches on a Cadmach single punch machine.

Tablet punching by direct compression method:

Manufacturing steps for direct compression

Direct compression involves comparatively few steps:

1. Milling of drug and excipients.
2. Mixing of drug and excipients.
3. Tablet compression.

The Orodispersible tablets (ODTs) of batch 50 of formulations of A- series and F- series were prepared by direct compression process and the compositions are shown in tables --. .All the materials i.e., drug, Lactose monohydrate, colloidal silicon dioxide, superdisintegrating agents were sifted through mesh no.40 and were collected in mortar and mixed well to get a uniform mixture. Magnesium stearate was sifted through mesh no.60 sieve, collected into the mortar containing other ingredients and mixed (added lastly as it is hydrophobic may affect dissolution and disintegration profile due to more time of mixing).

Evaluation of Tablets:

I. Pre-compression Parameters:

A. Angle of Repose(θ):

Angle of repose (a) was determined using funnel method. The blend was poured through a funnel that can be raised vertically until a maximum cone height (*h*) was obtained. The radius of the heap (*r*) was measured and angle of repose was calculated.

Tan θ =h/r

Where θ is the angle of repose

Table 2: Relationship between Angle of Repose (θ) and flow properties.

Angel of Response (θ)	Flow
<25	Excellent
25-30	Good
30-40	Passable
>40	Very poor

Method: A funnel was filled to the brim and the test sample was allowed to flow smoothly through the orifice under gravity. From the cone formed on the graph sheet was taken to measure the area of pile, thereby evaluating the flowability of the granules. Height of the pile was also measured.

B. Bulk Density:

Both loose bulk density (LBD) and tapped bulk density (TBD) were determined. A suitable amount of powder from each formulation, previously lightly shaken to break agglomerates formed, was introduced into a 10 ml measuring cylinder.

LBD= weight of the powder/ volume of the packing

TBD= weight of the powder/tapped volume of the packing

C. Carr's compressibility Index

Compressibility index of the powder was determined by Carr's compressibility index.

Table 3: Grading of the powders for their flow properties according to Carr's Index

Compressibility Index (Carr's Ratio %)	Flow
5-15	Excellent
12-16	Good
18-21	Fair to passable
23-35	Poor
33-38	Very poor
>40	Very very poor

Carr's index (%) = [(TBD-LBD) X 100] / TBD

Post-compression Parameters:

Uniformity of weight:

The test was carried out according to the Indian pharmacopoeia. Twenty tablets, from each formulation were individually weighed and the mean of tablet weight was calculated. The percentage weight variation was calculated individually comparing to mean tablet weight.

Hardness:

The fracture strength, which is defined as the force required to break a tablet by radial compression, was measured with a tablet hardness tester (Monsanto hardness tester) (n=3).

Friability: The pharmacopoeial limit of friability test for a tablet is not more than 1% using Tablet friability apparatus, carried out at 25 rpm for 4 min (100 rotations).

Percentage friability = 100(initial weight-final weight)/initial weight

(or)

% Friability = (Loss in weight / Initial weight) × 100

Wetting time:

The wetting time of the tablets was measured using a simple procedure.For measurement of wetting time five circular tissue papers of 10 cm diameter are placed in a Petri dish with a 10 cm diameter. Ten millimeters of water-containing Eosin, a water-soluble dye, is added to Petri dish. A tablet is carefully placed on the surface of the tissue paper in the Petri dish at room temperature.

Water absorption ratio:

The weight of the tablet before keeping in the Petri dish was noted (W_b) the wetted tablet from the Petri dish was taken and reweighed (W_a).the water absorption ratio, R was determined according to the following equation:

$$R=100(\ W_a- W_b\ )/W_b$$

Where W_b and W_a are the weight before and after absorption respectively.

***In vitro* dispersion time:**

In vitro dispersion time was measured by using 10ml of phosphate buffer pH 6.8 in 25 ml beaker at 37± 0.5 ˚C temperature. Time required for dispersion of the tablets was noted. In each formulation three tablets were tested (n=3).

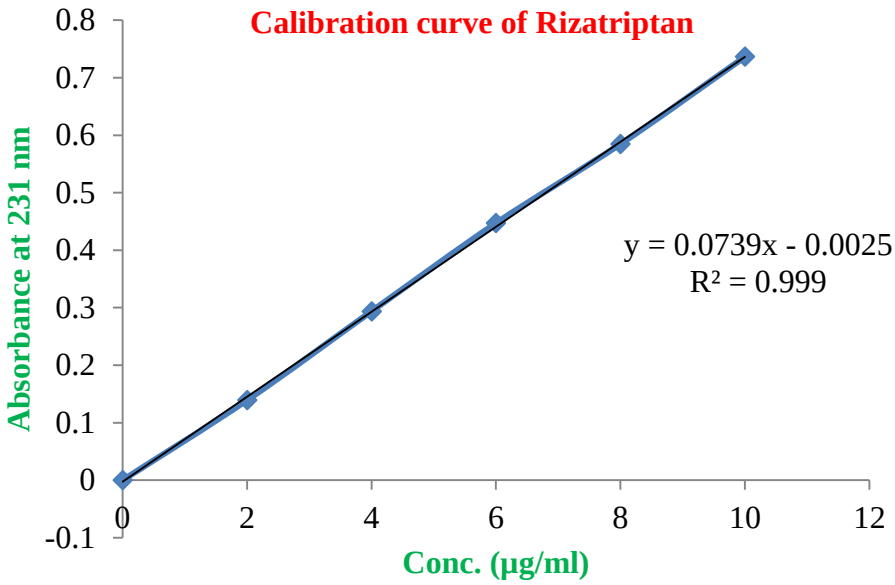
***In vitro* dissolution study:**

ODTs were evaluated for dissolution behavior. Dissolution test was carried out using USP apparatus 2, paddle type. Dissolution was carried out with the rotation speed of 50 rpm using 900 ml of phosphate buffer pH 6.8 as the dissolution medium maintained at a temperature of 37 ± 0.5°C. Samples were withdrawn at predetermined time interval, diluted suitably and analyzed at 231nm for cumulative drug release using UV-Visible spectrophotometer.

RESULTS & DISCUSSION

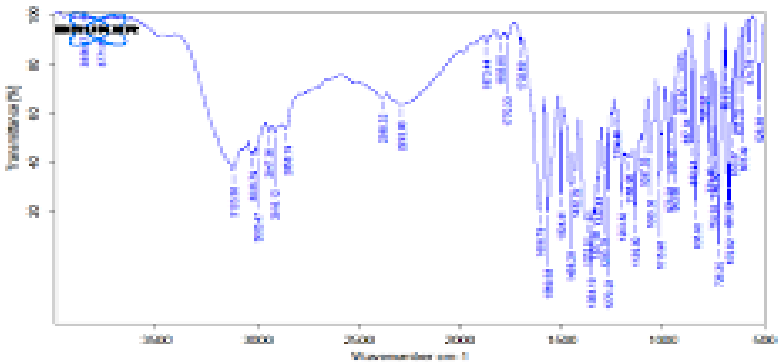
Determination of λ_{max}:

Rizatriptan was dissolved in distilled water and further diluted with 0.1N HCI. Then the solution was scanned for maximum absorbance in UV double beam spectrophotometer (Shimadzu 1700) in the range from 200 to 400 nm, using 0.1N HCI as blank. The λ_{max} of the drug was found to be 226 nm.



Drug-Excipient Compatibility Studies

The results obtained with IR studies showed that there was no interaction between the drug and other excipients used in the formulation.



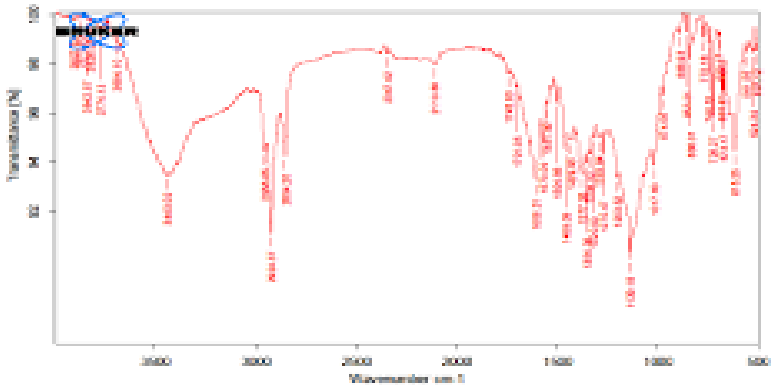


Figure 2: FTIR Spectra of Rizatriptan (Pure Drug) V/S FTIR Spectra of Rizatriptan FDT.

Results of pre-compression parameters for Rizatriptan tablets

Pre-compression parameters:

Powder ready for compression containing drug and various excipients were subjected for pre-compression parameters to study the flow properties of granules, to achieve uniformity of tablet weight. The results of all the preformulations parameters are given table

Angle of repose (θ):

The data obtained from angle of repose for all the formulations were found to be in the range of 24.19° and 28.56° which reveals good flow property. All formulations showing angle of repose within 30°, indicates a good flow property of the granules.

Bulk density:

Bulk density (BD) and tapped density (TD) for the blend was performed. The loose bulk density and tapped bulk density for the entire formulation blend varied from 0.508 gm/cc to 0.5438 gm/cc and 0.5941 to 0.6408 respectively.

Carr's compressibility index:

The results of Carr's consolidation index or compressibility index (%) for the entire formulation blend ranged from 14.30% to 17.53% had shown excellent compressibility index values up to 15% result in good to excellent flow properties. As shown in previous research work.

Pre-compression parameters for Rizatriptan tablets

Results of post-compression parameters

Formulation code	Bulk density g/cc	Tapped density (g/cc)	Angle of repose	Carr's index (%)
F1	0.5434	0.6341	25.28	14.3037
F2	0.5212	0.6294	27.20	17.1909
F3	0.5937	0.6098	25.14	15.7592
F4	0.5098	0.5998	24.19	15.0050
F5	0.5438	0.6401	26.41	15.044
F6	0.5345	0.6296	28.56	16.296
F7	0.512	0.6210	25.71	17.5362
F8	0.5342	0.6408	26.38	16.6354
F9	0.5088	0.5941	26.01	14.3578

Hardness: The hardness of all the tablets was maintained within the 2.00 kg/cm to 4.00 kg/cm. The mean hardness test results are tabulated in table.

Friability test: The friability was found in all designed formulations in the range 0.42 to 0.74% to be well within the approved range (<1%). The friability study results were tabulated in table.

Weight variation test:

The weight variation was found in all designed formulation in the range 97 to 100 mg. The mean weight variation test results are tabulated in table.
All the tablets passed weight variation test as the average percentage weight variation was within 7.5% i.e. in the pharmacopieal limits.

In-vitro disintegration time:

The in vitro disintegration time is measured by the time taken to undergo uniform disintegration. Rapid disintegration within several minutes was observed in all the formulations. The in vitro disintegration time of Rizatriptan prepared by direct compression method by super disintegrants were found to be in the range of 18 to 11sec fulfilling the official requirements.
Based on the in vitro disintegration time, formulation F3 were found to be promising and showed a disintegration time of 11 sec.
Disintegrating study showed that the disintegrating times of the tablets decreased with combination of both sodium starch glycolate and cross carmellose with different concentrations. It also showed least disintegration time in comparison with the all other formulation because of their lowest hardness and the porous structure is responsible for faster water uptake, hence it facilitates swelling action in bringing about fast disintegration.

Wetting time:

Wetting time closely related to the inner structure of the tablet. The results of wetting time are shown in table. The wetting time were found to be in the range of 11 to 18sec.

Water absorption ratio: Water absorption ratio for all the formulations found in the range 11 to 16%. The results of water absorption ratio for tablets were shown in table.

Post-compression parameters of Rizatriptan tablets

Formulation	Hardness	Friability	Thickness	Weight variation
F1	3.5	0.69	3.21	100
F2	3.5	0.46	3.30	99
F3	4.0	0.72	3.12	101
F4	4.0	0.72	3.29	102
F5	3.6	0.68	3.34	99
F6	3..5	0.43	3.36	98
F7	4.0	0.42	3.29	99
F8	3.8	0.45	3.36	97
F9	3.7	0.54	3.30	100

Post-compression parameters of Rizatriptan tablet

Post formulation studies

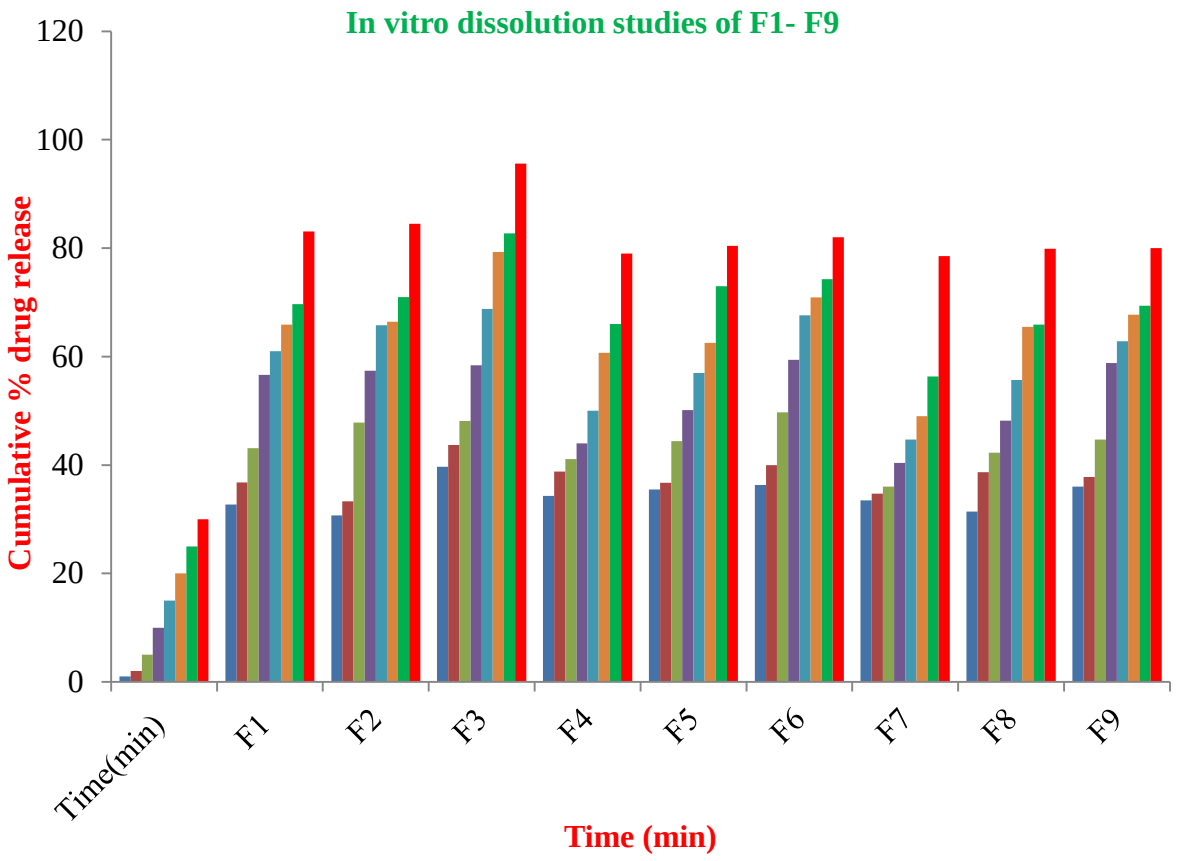
Formulation code	*In-vitro* dispersion time (sec)	Wetting time (sec)	Water absorption ratio (%)
F1	22	27	101
F2	18	25	102
F3	**11**	18	**105**
F4	50	33	90
F5	40	25	92
F6	30	21	102
F7	30	29	90
F8	26	26	102
F9	20	20	101

Table 6: Post formulation studies of Rizatriptan tablets

In vitro dissolution studies:

Dissolution rate was studied by using USP type-2 apparatus using 900ml of phosphate buffer pH (6.8) as dissolution medium. Temperature of the dissolution medium was maintained at 37±0.5ºc, aliquot of dissolution medium withdrawn at every 15 sec interval and filtered. The absorbance of the filtered solution was measured by UV spectrophotometric method at 231nm and concentration of the drug was determined from the standard calibration curve. The dissolution of Cetrizine hydrochloride from the tablets is shown in the figures 1, 2 3, 4 (table no: 7) cumulative percentage drug release profiles.

Cumulative percentage drug release profiles,**In vitro dissolution studies of Rizatriptan tablets**



Time (min)	F1	F2	F3	F4	F5	F6	F7	F8	F9
1	32.7	30.7	**39.7**	34.3	35.5	36.3	33.5	31.4	36
2	36.8	33.3	**43.7**	38.8	36.7	40	34.7	38.7	37.8
5	43.1	47.8	**48.1**	41.1	44.4	49.7	36	42.3	44.7
10	56.6	57.4	**58.4**	44	50.1	59.4	40.4	48.2	58.8
15	61	65.8	**68.8**	50	57	67.6	44.7	55.7	62.8
20	65.9	66.4	**79.3**	60.7	62.5	70.9	49	65.5	67.7
25	69.7	71	**82.7**	66	73	74.3	56.3	65.9	69.4
30	83.1	84.5	**95.6**	79	80.4	82	78.5	79.9	80.0

Fig 4: Drug release profile of formulations F1 - F9

RESULTS AND DISCUSSION

In the present work oral disintegrating tablets of rizatriptan by using super disintegrants were prepared by direct compression method.

- The study demonstrated the effect of three different super disintegrants crospovidone (CP), croscarmellose sodium (CCS), and sodium starch glycolate (SSG) (in different ratios) on dissolution performance of formulations of oral disintegrating tablets of Cetrizine hydrochloride.
- Rizatriptan 10 mg i.e. tablet weight of 100 mg prepared using different concentration of super disintegrants CP, SSG & CCS in different ratios of 2 %, 4 %, 8% respectively.
- All the tablets of rizatriptan were subjected to weight variation, hardness, friability, in vitro disintegration time, drug content uniformity, water absorption ratio, wetting time, and in vitro drug release. Based on the above studies following conclusions can be drawn.
- Tablets were found to be good and were free from chipping and capping.
- The low values of average weight of the prepared tablets indicate weight uniformity within the batches prepared.
- The hardness of the prepared tablets was found to be in the range of 2 to 4kg/cm^2.
- The friability values of the prepared tablets were found to be less than 1%.
- The in vitro disintegration time of oral disintegrating tablets of rizatriptan by using super disintegrants were found to be in the range of 11 to 50 sec fulfilling the official requirements.
- Based on the in vitro disintegration time, formulation F3 was found to be promising and showed a dispersion time, wetting time of 11 sec and 18 sec respectively, which facilitate the faster dispersion.

- All the formulations have displayed good water absorption ratio which indicate better and faster swelling ability of the disintegrants in the range of 90 % - 105 % in presence of little amount of water.
- The drug release from oral disintegrating tablets of rizatriptan were found to be in the range of 80.0% to 95.6% at the end of 30 minutes.
- Among all the 9 formulations the best formulation is (F3) with 8 % of crospovidone (CP) showed faster disintegration time within 11sec when compared to the other formulations and it showed 95.6% drug release at the end of 30 mins.
- Irrespective of disintegrants, increased concentration of disintegrant increases percentage drug release.
- The dissolution rate and percentage drug release of crospovidone (CP), alone as disintegrant is higher when compared to the tablets with croscarmellose sodium (CCS), sodium starch glycolate (SSG) at initial time points.

SUMMARY

Oral disintegrating drug delivery system (ODDS) is one such novel approach to increase consumer acceptance by virtue of rapid disintegration, self-administration without water or chewing. Orally disintegrating tablets (ODT) are solid unit dosage forms like conventional tablets, but are composed of superdisintegrants, which help them to disintegrate the tablet rapidly in saliva without the need to take it with water.

- In introduction the various principles involved in the oral disintegrating tablets, theory regarding various polymers used in preparing oral disintegrating tablets has been explained.
- The Aim and objectives involved in the proposed work were given.
- In Review of literature past work in connection with the design and evaluation of oral disintegrating tablets were entitled which were reported in scientific journals.
- In Methodology the materials used throughout the work was entitled and the methods followed in the investigation were discussed.
- Result and Discussion presented in the form of tablets, graphs and figures, the results obtained are explained and discussed in detail.
- Conclusions were entitled. Scheme of the work that has been followed in the research work was given.

CONCLUSION

Rizatriptan oral disintegrating tablets were prepared using different concentrations of superdisintegrants like Croscarmellose sodium (CCS), Sodium starch glycolate (SSG). Tablets were prepared by direct compression method and evaluated for hardness, friability, wetting time, disintegration time and percent drug release. FT-IR studies revealed that there was no interaction between Rizatriptan and the excipients used in the study. The results indicated that formulation prepared with 8% crospovidone was found to be optimized (F3) which provides maximum drug release (95.6%) and minimum disintegration time (less than 20sec). Dissolution rate of tablets with croscarmellose sodium (CCS), sodium starch glycolate (SSG) improves when concentration increased from 2% to 4% and 4% to 8%. Dissolution rate of tablets with sodium starch glycolate (SSG) was significantly less when compared to the tablets with croscarmellose sodium (CCS), at initial time points. From the above results of the study it can be concluded that the best formulation is with 8 % of crospovidone (CP) showed faster disintegration time within 11sec when compared to the other formulations and it showed 95.6% drug release at the end of 30 min.

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