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FORMULATION AND EVALUATION OF RIZATRIPTAN FAST DISSOLVING TABLETS UTILIZING DIFFERENT SUPER DISINTEGRANTS WITH SPECIAL EMPHASIS ON FENUGREEK

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ABSTRACT

Introduction: FDTs (Fast Dissolving Tablets) are intended to dissolve quickly, allowing for excellent oral delivery without the need of water. Chewing these formulations also provides improved convenience and simplicity of administration, as well as a substantial potential effectiveness in improving patient compliance, particularly in populations that have difficulty swallowing traditional solid oral dose forms. **Materials and Methods:** Rizatriptan was used as API and different super disintegrants were used. Fenugreek was one of the super disintegrant. Pre formulation studies were performed on the raw materials. Different formulations were prepared using different technique and they were evaluated for various parameters. **Results:** The purpose of this study was to find the best combination of super disintegrants for the creation of Rizatriptan benzoate orally disintegrating tablets. Ten formulations were prepared with different super disintegrants. Formulation F8 containing fenugreek as super disintegrant was found to be more efficacious as compared to other formulations. **Conclusion:** Croscarmellose sodium, sodium starch glycolate, and Cross-povidone were used as super disintegrants. A total of ten formulations were produced using the direct compression technique & assessed for friability, in-vitro dispersion time, hardness, wetting time, and water absorption ratio. The highest percentage

drug release was determined to be 99.80 in formulation FD8.

INTRODUCTION

Because of its simplicity in terms of self-administration, compactness, proper amount, and ease of manufacture, the tablet is the most often used dosage. One drawback of traditional tablets is that they are difficult for young and geriatric people to swallow.

To address these issues, researchers created a new medication delivery method known as a rapid dissolving tablet. Fast dissolving tablets are solid dosage forms containing medicinal drugs that dissolve quickly, typically within a few seconds when put on the tongue, and do not need extra water to aid ingestion.[1,2] This new dose form is appropriate for people of all ages, especially youngsters, the elderly, and patients who have trouble swallowing traditional tablets and capsules. By adding suitable disintegrating agents and/or highly water-soluble additives in tablet formulation, current methods of producing rapid dissolving tablets maximise the porosity of the tablet matrix. The simplest method of producing tablets is via direct compression. The action of disintegrants, water-soluble excipients, & effervescent agents is responsible for the disintegration and solubilization of directly compressed tablets. Disintegrants perform an important part in the disintegration and dissolution of FDTs produced via direct compression in many instances. FDT (Fast Dissolving Tablet) has the advantages of a faster start of action, better patient acceptability, and increased bioavailability.[3]

Many individuals in today's world suffer from migraines. Migraine[4] is characterised by a pounding headache on one side, as well as neurological and visual symptoms. The attack may last for a long time. Rizatriptan benzoate is a medication used in the treatment of migraine. It is a 5HT1B/1D receptor agonist that is used to treat migraines. It is the first triptan that is more effective than other triptans. To prevent the patient from a migraine attack, measures must be taken quickly. The goal of this research is to develop a rizatriptan benzoate dosage form that can deliver the medication as quickly as feasible, allowing for a fast start of action while requiring no water for swallowing. The fast disintegration of tablets is accomplished via the sublimation technique, which involves the formation of pores in the tablets as a result of the sublimation of volatile components added to the tablets. Saliva will enter these holes, causing the tablets to disintegrate quickly in the oral cavity. The porous structure allows for quicker water absorption and therefore promotes wicking action, resulting in speedier breakdown.[5,6]

One of the methods, direct compression, necessitates the addition of super disintegrants to the formulation and the employment of highly. The introduction of super disintegrants such as cross linked Croscarmellose Sodium, Crospovidone, and others in the creation of FDT provided immediate disintegration of the tablet when it was put on the tongue, releasing the medication into saliva. Rizatriptan benzoate FDT were made by direct compression utilising super disintegrants such as sodium starch glycolate as diluents, and menthol as a sublimating agent in this study.

Pharmaceutical formulation development, on the other hand, is focused on the development of novel drug delivery systems in order to enhance patient compliance. As a result, for a patient-oriented drug delivery system, it is essential to individualise medication treatment in order to optimise drug levels and manufacturing technology.

MATERIALS AND METHODS

In this study, a complimentary sample of Rizatriptan Benzoate was provided by Cipla Ltd. Kurkumbh, Pune. India's Ion Exchange Ltd gave Indion 414. Arihant Trading Co., Mumbai, India, supplied Carboxymethylcellulose calcium. Glenmark Pharmaceuticals Ltd., Colvale, Goa gifted crospovidone, avicel PH-102, mannitol, magnesium stearate, talc, and aspartame. The chemical substances that were employed were of the highest analytical quality.

Pre-formulations

Solubility analysis

A drug's physicochemical property of solubility, especially aqueous solubility, is important. The strength of a drug must be 1-8 in the physiological pH range for a medication to reach the body and help the patient, it must first be in the fluid medium. If a medication's solubility is less than optimal, it might be worth considering growing its solubility. Owing to low solubility (10mg/ml) at 37°C, there may be inadequate or abnormal absorption over pH ranges 1-7. A new compound, on the other side, necessitates the understanding of two fundamental properties.

- Dissociation constant (pKa)
- Intrinsic solubility (Co)

Powder flow properties[7]

(a) Tapped Density (T.D)

It is the ratio of minimum volume to the tapped volume. A measuring cylinder containing a

known mixing mass was tapped with a density device. This approach was used to calculate the density tapped (ρ).

$P_t = M/V_t$

Where, ρ_t is tapped density, M is blend weight, V_t is tapped volume.

(b) Bulk Density (B.D)

The mixture was placed into a graduating cylinder and the apparent bulk density was produced (ρ_b). Bulk density is the ratio of weight of powder to the bulk volume. The approach was used for measuring volume density.

$P_b = M/V_b$

Where, ρ_b is bulk density, V_b is bulk volume

(c) Compressibility index

The following measurement of the compressibility (I) index is the best way to calculate powder flow. It provides a view into how effectively a material will flow.

$I = (\rho_t - \rho_b)/ \rho_t*100$

Where, ρ_t is tapped density, ρ_b is bulk density.

(d) Hausner Ratio (HR)

It is defined as the ratio of T.D to the B.D. The HR is a simple indirect powder flow measurement. The calculation formula is as follows-

$HR = \rho_t / \rho_b$

Where, ρb is bulk density and ρt is tapped density.

More H.R (>1.25) mean better flow properties than lower H.R (1.25).

(e) Angle of Repose

It was determined by using the funnel method. The blend was placed into a funnel that could be raised vertically before the required cone height was achieved (h). After calculating the radius of the layer, the angle of repose (Θ) was determined using the formula-

$\tan \Theta = h/r$

Therefore,

$\Theta = \tan^{-1} h/r$

Where, r is radius of cone, h is height of cone and Θ is angle of repose.

Table 1: Angle of response as an indication of powder flow properties.

Angle of repose	Type of flow
<25	Excelent
25-30	Good

30-40	Passable
>40	Very poor

Partition coefficient

It is also referred to as the diffusion coefficient. It is a ratio that is independent of the diluted substances concentration of a solution type. If Log P = 0, both water and the partitioning solvent are soluble in the same way. The lipophilic of a chemical molecule is usually represented as a partition coefficient or logarithm P is expressed as a ratio for the concentration of the unionized substance in organic and aqueous phases to the balance:

P (o/w) = (Co/w) equlibrium

log p = (unionized compound) organic/(unionized compound) aqueous

The solubility in the partitioning solvent is 100,000 times if the log P of a compound is five. A substance with a log P ratio of 2 is 100 times more water-soluble. P values greater than 1 indicate lipophilic drugs, while P values less than 1 indicate hydrophilic drugs.

Formulation method for fast dissolving tablet

1. Direct compression method

This method is the simplest and cheapest way of producing tablets. This approach can now be applied to produce FDS because of the presence of stronger additives, like sugar-based excipients and superdisintegrants.[8]

(a) Sugar based excipients

The sugar based excipients, in particular bulking agents like mannitol, maltilol, polydextrose, xylitol, lactilol, isomalt, dextrose, fructose, sorbitol,and starch hydrolysate, which have high water solubility and sweet and masking the taste and a pleasant flavour were used.

(b) Super disintegrants

The addition of excipients modifies the disintegration rate & therefore the dissolution of many disintegrating tablet techniques focusing on this method. Other formulation additives involving soluble in water excipients and effervescent inhibitors have even further accelerated the disintegration process. The efficacy of a FDT relies on the capacity of the tablet to easily dissolve, which is achieved through the use of superdisintegrant.

2. Zydis technology

It is the first new tablet device available on the market. In this step, the drug is formed by

lyophilizing or freeze into a gelatin matrix. The resultant material is very small and arrives in packages of blisters. It also uses microencapsulation, which uses resin and polymer to disguise the metal flavour of the medicine. Unlike other conventional tablets, this technology seems to be more bioavailable. The most important advantage of this method is its portability, but the freezing procedure is an expensive manufacturing process.[9]

3. Orasolv techonology

In this procedure, the active substance is masked. It has a sparkling dissolving agent. The compound and excipient combination is crushed at low pressures to decrease the disintegration time.

4. Durasolv technology

It needs the usage of fillers, lubricants and medicines. The formulation are manufactured on a standard tablet unit & the finished tablets in traditional blister packs are shipped. It is good for medicines with low doses.

5. Melt granulation

A water-soluble binder is used in the melting granulation method to easily agglomerate drug powders. The advantage of this method over conventional crystallization is that water or chemical solvents are not used. This process takes less time and consumes less resources than wet granulation because no drying period exists. It is a safe means of accelerating the breakdown of compounds not so water soluble, such as griseofulvin.[10] In this process, a hydrophilic waxy binder (PEG – 6 – stearate and Superpolystate) is used to prepared fast dissolving tablet with a mechanical integrity. Superpolystate waxy material has a freezing point of 32–36°C and Hydrophilic Liphophilic Balance scale of 9. As a consequence, it not only serves as binder, but may also help disintegrate pills since they melt in the mouth and easily dissolve without residues.[11]

6. Spray drying

Gelatine may be used in this process as a supportive material and as a matrix, croscarmellose and mannitol, as a super disintegrating agent or as a bulking agent. In less than 20 seconds spray dry powder tablets verified disintegration into aqueous media. The formula contained bulking agents including mannitol and croscarmellose, lactose, glycolate, super glycoside and acidic acid ingredients and/or alkaline (e.g., NaHCO). The powder, which was pressed into capsules, quickly disintegrated and melted. In comparison to direct compression tablets,

optimum release and partial disintegration with the Kollidon CL excipient basis were observed, highlighting the superiority of spray drought over direct compression technique.[12]

7. Nanonization

A new nano melting technology entails growing the particle size of the medicine to nanotype by framing the material using a patented wet- milling technique. The drug's nanocrystals are stabilised by surface adsorption on select stabilisers against agglomeration and then inserted in the MDTs. This technique is particularly good for low water-soluble medicines. Quick nano disintegration/dissolution leading to enhanced absorption & thus greater bio-availability & reduction of dosage, cost- effective processing, conventional container due to their exceptional durability and a wide variety of doses are other benefits of this technology.[13]

8. Sublimation

These large porosity (approximately 30 percent) compressed tablets rapidly dissolved in saliva within 15 seconds.[14] The technique of wet granulation was used to produce granules containing crospovidone, nimusulide, camphor, and lactose. Camphor was sublimated by vacuum exposure from dried granules.[15] Conventional techniques such as direct compression wet granulation & dry granulation may often be utilised, with extremely super disintegrant, soluble excipients s and/or effervescent forms.

Evaluation of tablet[16]

After the manufacture of tablets, evaluation of the dosage form wass performed to ensure appropriate tablet production. A number of tests were used to evaluate tablets. Friability, disintegration period, weight, tablet size, and wetting time were some evaluation parameters taken in consideration**.**

1. General appearance

Odour, color, taste, surface structure, & physical defects were all checked to establish visual recognition & overall elegance.

2. Uniformity of weight

The weights were measured individually using a digital balance of total 20 tablets. The content was weighed and find out whether it is consistent. The following table displays the data.

Table 2: Weight variation limits for tablets as per IP.

Average of tablets (mg)	Maximum % different allowed
130 or less	10
130 – 324	7.5
More than 324	5

3. Friability

The Roche friabilator was used to evaluate the tablet's friability. The samples are imperilled to scratches and flabbergasted in a chamber. The roche fribility rotated at 25 rotation per minute and the tablets drops from a height of 6 inch for each turn. The appratus was filled with a pre- weighed sample of tablets and turned 100 times. With a light muslin cloth, the tablets were reweighed and dusted. The method for determining friability (F %) is:

$F\ \% = [1 – (W_0/W)]*100$

Where, Wo is the initial weight of tablet, W is the weight of tablet after test.

4. Disintegration test

According to various published sources, the amount of saliva required for proper tablet disintegration does indeed vary depending on the mode of disintegration, however, none of the IP or USP disintegration tests were large enough to reproduce it in vivo. An modified method was used to figure out the time of tablet disintegration. It was run through a 10- mesh sieve, which obtained a dissolving or dissolution capacity of 2 ml below the cylindrical tube. Six millilitres of Soren's buffer (pH 6.8) are introduced into the solution such that four millilitres of the solution was located below the mesh and two millilitres above the mesh. By simply picking the tablet up and dropping it into the sieve, the entire tray began to move. To measure the tablet disintegration period, we used all of the time it took for all of the ions to enter the sieve. the mean meaning is arrived at by picking out six tablets from the total population.

5. Tablet thickness

It is essential to know the tablet's thickness in order to reproduce it as well as count it on filling equipment. In certain filling units, the standardisation width of the tablet is used as a counting unit. The thickness of ten tablets was measured using a micrometre (Mityato, Japan).

6. Hardness

The force needed to shatter a tablet in a diametric compression force is known as tablet hardness. The hardness tester utilized in the research was a Monsanto hardness tester, that uses an integrated spring to apply stress to the tablet diametrically.[17]

7. In-vitro dissolution studies

The design was evaluated in-vitro in 900 ml of Sorenson's phosphate buffer (pH 6.8) as the dissolution medium, utilizing the USP paddle mechanism at 50 rpm. 37.4 percentage of the time, of 5 mL of aliquot was withdrawn at the appropriate time intervals. After filtering via Whatmann filter paper, spectrophotometric measurements were taken at 260nm. To maintain the constant volume throughout the examination, an equal amount of fresh medium, prewarmed at the same temperature, was substituted into the dissolution media with their sampling.

8. Content uniformity

Ten tablet are taken out in glass motar and ten others were randomly included. To determine the mass of the 10 milligrammes of drug, the solution was weigh and dissolving in Sorenson's buffer (pH 6.8). At first with 9.0 ml of Solution One in a second volumetric flask, ten millilitres of Solution One solution was diluted to ninety millilitres of Solution One (pH 6.8). The substance was spectrophotometrally calibrated at 260 nm.

9. Wetting time

The procedure was used to calculate solid dosage form wetting time. A folded sheet of paper (12 cm X 10.60 cm) was placed in a tiny Petri dish (ID = 65 cm) consist of 6 ml of Sorenson's phosphate buffer (pH 6.8). The time it took for the paper to totally wet was recorded using a tablet mounted on top of the sheet. Three experiments were carried out for each batch, with the standard deviation measured.

10. In-vitro dispersion time

Dropped dosage was arranged into a 6 millilitres of Soren's buffer to decide the incubation period (pH 6.7). For randomly dispersed design, three tablets from each vial were selected and tested.

RESULT AND DISCUSSION

Ten formulations were designed, using higher and lower level of super disintegrants. The

formulations contain 5 mg of rizatriptan benzoate and different superdisintegrants such as crospovidone, carboxymethylcellulose calcium, fenugreek, and indion 414 along with other excipients. The tablet weight was determined to be around 150 mg on average. The correct volumes were weighed before the mix was run through a 40-pound screen. After all the materials had been mixed, the magnesium stearate and flavoring agents were also evenly included. Magnesium stearate and the flavoring agents were added to the medicine and the excipients, and they were combined for an additional two minutes. One punch tablet compression machine was used to compress the tablet mixture to an 8 mm diameter, convex surface (Cadmach, Ahmedabad). One hundred tablets per formulation were made in one batch. Mouth feel was enhanced using excipients (liquids) that could be directly compressed, as well as avicel pH102 and mannitol. Ten formulations were developed and tested in addition to the commercially available method. The composition of different formulations is mentioned in the Table 3.

Table 3: Composition of different batches of different of Mouth disintegrating tablets of Rizatriptan benzoate.

Ingredients	Quantity (mg) present in each tablet									
	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
Rizatriptan benzoate	7.25	7.25	7.25	7.25	7.25	7.25	7.25	7.25	7.25	7.25
Crosspovidone	6	-	-	3	-	3	-	3	-	-
CMC calcium	-	6	-	3	3	-	-	-	3	-
Indion 414	-	-	3	-	3	3	-	-	-	3
Fenugreek	-	-	-	-	-	-	3	3	3	3
Avicel PH102	111	111	114	111	111	111	114	111	111	111
Mannitol	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5
Magnesium stearate	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
Talc	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48
Aspartame	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
Mixed fruit, dry mix powder	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
American mint DC 213	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45

Evaluation

Thickness and weight variation of the pills were examined as prescribed by the compendial process. digital Vernier Caliper was used to measure the thickness of 10 tablets (Mututoyo, Japan). To compensate for the variable weight, twenty pills were randomly picked and individually weighed using an electronic scale (Precisa 310M, Switzerland). For determining

weight variance, individual weights were compared to the average weight. Abrasive particles have been subjected to maximum compression using the machine known as the Monsanto hardness tester (Campbell Electronics, Mumbai) to find the fracture strength, which is the force necessary to break a tablet by compressive radial forces. Roche Friabilator was used to determine friability of 20 tablets to be 18% (Electrolab, Mumbai). Twenty preweighed tablets spun for 4 min at 25 rpm. After weighing out the pills and taking out the fines. The length of time necessary for a pill to dissolve in 5 ml of phosphate buffer pH 6.8 was recorded by using a Petri dish (i.d.= 6.5 cm) with a piece of tissue paper folded twice and soaked in the buffer.

Table 4: Evaluation of tablet parameter.

Formulation	Thickness (mm)± SD	Hardness (Kg/cm^2) ±SD	Friability (%) SD	Weight variation (mg) ±SD
F1	3.65±0.03	2.18±0.26	0.131	150.7±1.07
F2	3.62±0.03	2.09±0.21	0.133	150.8±1.36
F3	3.62±0.05	2.04±0.10	0.132	150.5±0.82
F4	3.63±0.01	2.09±0.13	0.199	149.3±1.42
F5	3.63±0.04	2.19±0.20	0.094	150.2±1.01
F6	3.67±0.08	2.24±0.24	0.066	149.8±1.36
F7	3.64±0.06	2.19±0.0.26	0.065	149±1.39
F8	3.62±0.03	2.29±0.20	0.130	150.6±0.40
F9	3.57±0.03	2.24±0.17	0.065	150.4±0.82
F10	3.60±0.04	2.04±0.10	0.065	150.3±0.81

The table 3 and 4 shows all the tablet parameters under investigation. The tablet thickness was measured to be 3.60 ± 0.04 to 3.65 ± 0.03mm, while their weight was measured to be 149.0 ± 1.39 to 150.8 ± 1.36mg. 2.04 ± 0.10 to 2.24± 0.24 kg/cm2, which was an indicator of excellent mechanical resistance of the tablets. While evaluating the ability of swelling disintegrators to contain water in the presence of little water, the threshold time for wetting was determined to be 8.03 seconds to 13.60 seconds. As shown in Figure 1 all of the tablet formulations completely disintegrated in vitro and in vivo in 4.64±0.112 to 7.15±0.78 s and 6.26±0.07 to 19.93±1.95 s respectively.

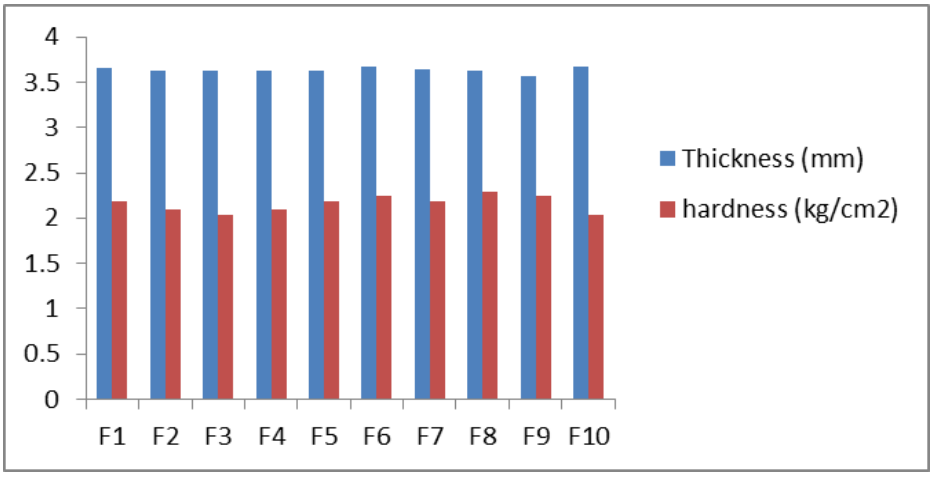

Figure 1: Systematic representation of Thickness and Hardness of different formulation.

Out of the 10 available formulations, F6 was the thickest as observed in Figure 1. The minimum thickness was observed in F9. Whereas the others in the range of 3.62 - 3.64. The hardness of formulation F8 was found to be highest with other formulations in the range of 2.09-2.24. The hardness was least in the formulation F3 and F10 **Figure 2.**

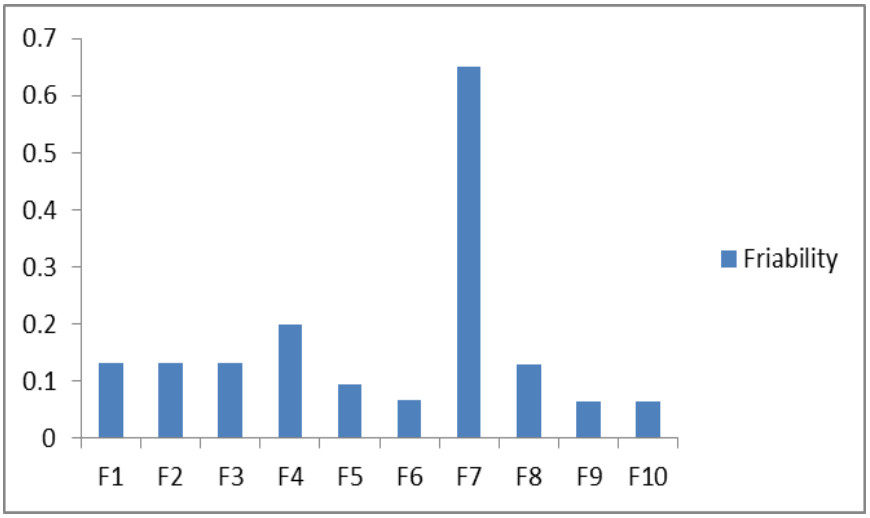

Figure 2: Systematic representation of Friability of different formulation.

The friability was maximum in case of F4 formulation and minimum for the F7, F9 and F10. The friability of F1, F2 and F3 was almost similar.

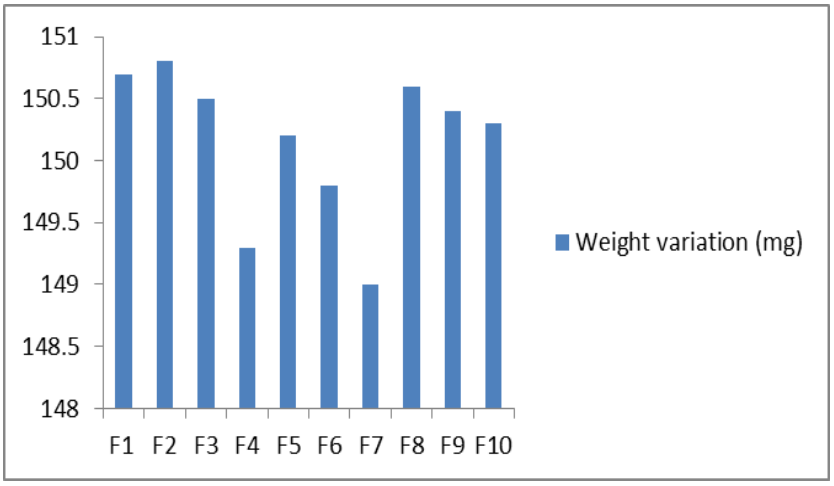

Figure 3: Systematic representation of Weight variation of different formulation.

Weight variation was highly seen in formulation F7 and F4. Rest all formulations showed little variations in their weight **Figure 3**.

In vitro release rate studies

USP dissolution test equipment Type II (Labindia, Mumbai) was used to determine the in vitro release rate of rizatriptan benzoate oral dissolving tablets using a paddle stirrer at 50 rpm, utilising 500 ml of 0.1 N HCl (pH 1.2) as dissolving medium. Each test included one pill. We withdrew a portion of the dissolving media (5 ml) at certain time intervals (2 minutes) and measured the absorbance at 280 nm. The concentration of the dissolving medium that was removed and replenished was the same as before. The cumulative proportion of medicine released over time was computed and shown. All the planned formulations and the existing marketing strategy were analyzed for dissolution.

In vitro dissolution times were observed for the tablets containing individual super disintegrants. While still true, all four were successful disintegrators. Calcium CMC tablets that included crospovidone and crospovidone together had the fastest disintegration rate. Indion 414 showed similar and maybe equivalent disintegration when used alone, however the quickest rate of disintegration was shown when it was employed in conjunction with calcium CMC rather than with the other possible additives. While alone, fenugreek was shown to disintegrate after 18-19 seconds, it worked more quickly when taken in conjunction with Crospovidone, which brought its total disintegration time down to 15-16 seconds.

Table 5: In Vitro release properties of Rizatriptan benzoate from prepared formulation.

Time	Cumulative % drug released									
	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
30 sec	0.11± 0.041	0.52± 0.081	1.04± 0.001	3.02± 0.07	0.65± 0.07	0.74± 0.06	0.40± 0.026	0.75± 0.031	0.14 ± 0.04	59.65 ± 0.03
1 min	70.09± 0.07	72.20± 0.025	64.82± 0.036	62.41± 0.048	55.19± 0.072	59.65± 0.037	66.16± 0.04	62.26± 0.053	55.90± 0.08	62.41 ± 0.04
2 min	79.24± 0.13	82.09± 0.143	75.64± 0.079	74.50± 0.129	58.23± 0.085	62.48± 0.019	80.52± 0.019	67.66± 0.109	87.64± 0.03	78.81 ± 0.07
3 min	74.92± 0.032	78.81± 0.076	77.48± 0.095	81.67± 0.063	66.63± 0.019	65.70± 0.061	87.23±0.33	68.32± 0.051	84.90± 0.06	81.67 ± 0.06
4 min	75.40± 0.053	71.01± 0.061	80.40± 0.047	77.51± 0.059	78.12± 0.056	66.63± 0.162	76.06± 0.049	69.56± 0.094	80.27± 0.01	89.17 ± 0.17
5 min	73.30± 0.017	77.98± 0.084	95.22± 0.20	76.18± 0.023	89.17± 0.17	68.65± 0.049	73.88± 0.149	71.83± 0.061	79.91± 0.10	93.00 ± 0.14
6 min	89.46± 0.017	93.22± 0.23	98.45± 0.23	85.34± 0.31	98.66± 0.22	73.45± 0.56	72.99± 0.091	86.44± 0.56	-	-
7 min	95.36± 0.12	99.89± 0.56	-	90.55± 0.02	-	82.74± 0.32	-	-	-	-
8 min	-	-	-	97.56± 0.10	-	90.55± 0.03	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-

F1 to F10 represents the various tablet formulation of Rizatriptan benzoate and Marketed product is the conventional commercial tablet formulation of Rizatriptan benzoate. Where T=time and MP represents marketed products **Figure 4**.

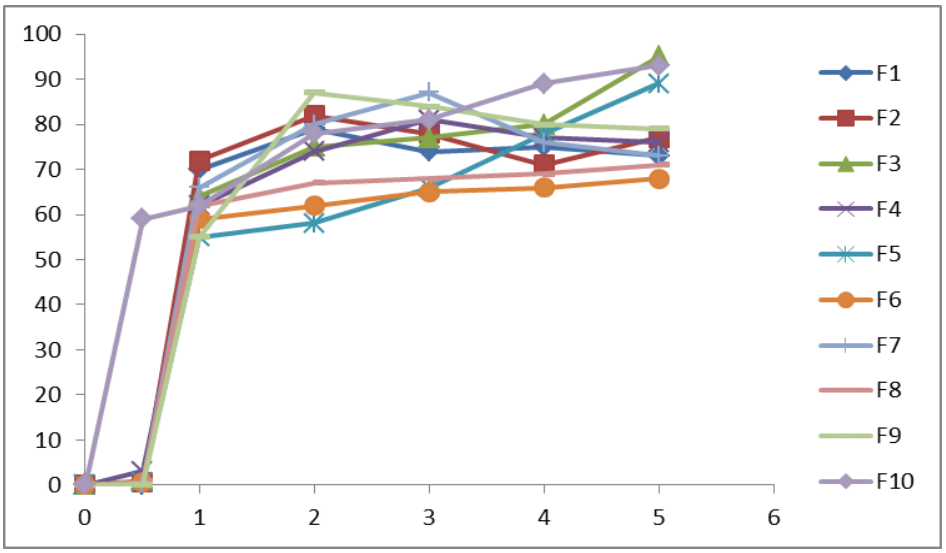

Figure 4: In Vitro release properties of Rizatriptan benzoate from prepared formulation.

Concentration of API in different formulations

Table 3.6: Concentration of rizatriptan in different formulation.

Formulation	Rizatriptan content$ (mg)	Assay	
		Rizatriptan content$ (%) ± SD	Rizatriptan Content$ mg/tab
F1	4.988	100.96±0.68	5.048
F2	4.938	101.32±0.78	5.066
F3	4.896	98.84±1	4.942
F4	4.914	98.50±0.77	4.925
F5	4.903	98.05±0.57	4.902
F6	4.912	98.26±0.73	4.911
F7	4.923	97.70±0.54	4.885
F8	4.950	98.98±0.63	4.948
F9	4.887	98.18±0.82	4.908
F10	4.900	99.01±0.75	4.950

The drug concentration was highest in formulation F1 and then in F8. The minimum concentration of Rizatriptan was seen in F9. Rest all formulations showed similar drug content.

When taking the results from Table 3.2 into consideration, the testing showed that the tablets had rizatriptan benzoate content of between 97.70 ± 0.54 and 101.32 ± 0.78% of the stated claim. Rizatriptan benzoate followed Beer's law as solutions of rizatriptan benzoate in the concentration range of 5-50 µg/ml. All tablets that were treated with homogeneity of drug content, discovered to contain rizatriptan benzoate, had the label claim verified to be correct by analysis to be within 100% of the claim.

Stability studies

Stable tablets were studied at 40˚F/75% RH for a month. After that, the tablets were tested for their softness, brittleness, dissolution time, wetting time, consistency, and assay validity. The IR spectroscopy findings concluded that the medicine is safe and stable with all of the excipients. To verify that there was no interaction between the components of the formulation and the rizatriptan, the IR spectra of the formulations revealed the typical peaks of pure rizatriptan medication.

The drug release of F7 was the slowest as compared to the others. The drug release was fastest in case of F8. Almost 100% of drug was released within 7-8 minutes of contact. Other formulations took 7-25 minutes for releasing the drug.

In-vitro disintegration time

According to above data, it is seen that the combination of crospovidone and calcium CMC had the quickest disintegration time, which was 4.65 ± 0.11 seconds. Within the same period, a mixture of F8 including crospovidone and Fenugreek, with a similar disintegration time of 4.94 ± 0.36 s, released only 88.66% of the medication compared to a release of 99.82% within the same time of the F8 formulation comprising crospovidone and fenugreek. The best formulated formulation in F8 was found to be Formula F8.

While F7 was formulated only with fenugreek, it provided a quick drug release time of 4.66 seconds, but the protracted release period of total drug release was 44 minutes. Because fenugreek is also a masking agent used to conceal the taste of medications, it might be that this is due to complexation of fenugreek with rizatriptan benzoate. F8 in formulation with crospovidone was able to break down 4.94±0.33 seconds and had full drug release after 6 minutes. It may be possible that the beneficial effects seen in this example are a consequence of the removal or blockage of the complexing activity of fenugreek with the medicine, as a consequence of the presence of crospovidone, leading to a great dissolving profile with a synergistic effect of super disintegrant.

For HPLC testing of tablet samples, the 1-month samples had a rizatriptan content of 97.42±1.02% of the claim labelled, while the 90-day samples had a rizatriptan content of 100.15±0.42% of the claim labelled. The UV/V spectrophotometry measured drug content, which ranged from 97.06±0.28% to 97.94±0.36% of the claimed concentration. In addition, the other physical and chemical qualities were discovered to be acceptable. The 1-month short-term stability testing verified that the medication content and other parameters were unchanged for manufactured formulations.

The formulation included crospovidone (4%) and Fenugreek (2%) as super disintegrants. Even though the excipients in use are widely recognized and well- established. However, these ingredients have not been utilized to create mouth dissolving tablets using rizatriptan benzoate. It was important to implement a practical and simple procedure that used normal tableting equipment to provide a quick disintegration and prompt drug release. Exhibiting increased release rates of rizatriptan benzoate was not anything unique to any formulation; it was displayed by all formulations except for the one that failed to meet compendial and other standard standards.

By summarizing the results of all parameters assessed, we can conclude that formulation F8 was better in respect of disintegration time whereas the formulation F7 showed hardness, friability, and weight variation in range. The evaluation confirmed that use of fenugreek as super disintegrant could be a useful alternative.

Other scientist also studied the fast-dissolving tablets. Yadav *et al*. researched fast-dissolving method of medication administration has become more popular and accepted as a novel approach, which is simple to give and leads to improved patient compliance. Different methods, such as direct compression, tablet moulding, frozen drying, spray drying nanonization, may provide a fast dissolution drug delivery system. Oral quick-dissolving tablets are examples of several current technologies which may accept different physicochemical, pharmacokinetic and pharmacodynamic medicines.[19]

Keny et al. studied is to create rizatriptan benzoate oral dissolving tablets that provide the desired results. The direct compression technique was used to make rizatriptan benzoate mouth disintegrating tablets utilising superdisintegrants crospovidone, Indion 414, carboxymethylcellulose calcium and Indion 234. The formulation with the combination of crospovidone and Indion 234 produced the greatest results. The tablets, in addition to meeting all official and other requirements, have a greater rate of release.[20]

Vidyadhara *et al.* assessed the formulation and fast dissolving Benzoate Rizatriptan tablets produced using effervetic and sublimation techniques utilizing effervescent agents such as sodium bicarbonate and citric acid, such as Cross Carmellose Sodium super disintegrant agents. Among all of the formulation's tablets produced utilizing menthal and cross carmellose sodium as sublimation techniques were super-disintegrant, and Avicel PH 112 as diluents exhibited quicker disintegration and faster medication release.[21]

Raut *et al.* investigated attempts to create an anti-migraine medication formulation. The patents for usage and dosage for Rizatriptan Benzoate would expire in future, therefore, to create a dosage form for an ANDA application as an innovative product. Innovations on oral dispersible tablets are both aimed at improving the performance of the dosage form by reducing the period of disintegration and enhancing patient conformity by concealing the ingredient's disagreeable taste by using direct compression. Direct Compression Techniques may be inferred that the Orodispersible Tablet of Rizatriptan benzoate has a lower cost, greater potential, and application in future for formulation than that of the Lyophilization

Technique.[22]

CONCLUSION

By obtaining a Rizatriptan benzoate formulation that is providing a fast-dissolving aptitude as tablets by direct compression technique while boosting an outstanding bioavailability, our research produced a substantial and enthusiastic result. Apart from that, Rizatriptan benzoate formulations had a better drug releasing propensity than other synthetic formulations, which could only be achieved by using natural super disintegrants like Fenugreek. This may be due to saliva fluid penetrating the tablet's pores, which enhances the swelling ability of super disintegrants, resulting in enough hydrodynamic pressure for rapid and total disintegration. The highest percentage drug release was determined to be 99.80 in formulation FD8, with fenugreek seed mucilage accounting for 4%.

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