wjpmr, 2025, 11(4), 286-293

SJIF Impact Factor: 6.842

WORLD JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.wjpmr.com

Research Article

ISSN 2455-3301

WJPMR

FORMULATION, IN VITRO EVALUATION AND OPTIMIZATION OF MOUTH DISSOLVING TABLET CONTAINING RIZATRIPTAN BENZOATE

Priyanka Kumari[*1], Sk Sakil[2] and Ranjan Kumar Maji[3]

[1]Department of pharmaceutics, Mahatma Gandhi College of Pharmacy, Jaipur.
[2]Department of Pharmacology, Oriental College of Pharmacy, Bhopal.
[3]Department of Pharmaceutical Chemistry, Krishna Institute of Pharmacy, Dhanbad.

***Corresponding Author: Priyanka Kumari**

Department of pharmaceutics, Mahatma Gandhi College of Pharmacy, Jaipur.

Article Received on 06/01/2025 **Article Revised on 27/02/2025** **Article Accepted on 15/03/2025**

ABSTRACT

The objective of this project is to create an orally disintegrating tablet that contains rizatriptan benzoate utilizing a natural superdisintegrant by direct compression. The concentration of superdisintegrants, such as sodium starch glycolate (SSG), Ac-Di-Sol, crosspovidone (CP), Spray dried lactose, and microcrystalline cellulose (MCC), should be considered when preparing MDDs with rizatriptan benzoate using direct compression. These superdisintegrants can be used alone or in various combinations, along with mannitol, lubricant, and glidants. The aim of this study was to create MDDs (multilayered drug delivery systems) that have a rapid disintegration time, strong mechanical properties, high patient compliance, and a stable profile. This was achieved by using various preparation methods and investigating different factors that influence the pre and post-compression parameters of rizatriptan benzoate formulas. The combination of agents exhibits enhanced disintegrating properties as a result of their quick water absorption and dispersion time, leading to accelerated drug release and faster disintegration. The findings of the release kinetics investigation demonstrated that all the formulations adhered more closely to a first-order drug release profile, meaning that the rate of release was dependent on the starting concentration of the medication.

KEYWORDDS: Ac-Di-Sol, crosspovidone (CP), Spray dried lactose, and microcrystalline cellulose (MCC).

INTRODUCTION

Mouth dissolving drug delivery systems are primarily used to enhance bioavailability and ensure patient adherence. These systems consist of dispersible tablets, a unique dosage form that rapidly disintegrates in the mouth following oral administration, without the need for chewing or water. Mouth dissolving tablets (MDDTs) are solid dosage forms that contain therapeutic substances and rapidly dissolve within seconds when put on the tongue.[1] The MDDTs formulations include noteworthy characteristics such as remarkable taste-masking capability, remarkably rapid disintegration time, and enjoyable mouth sensation. Drugs that are taken orally and absorbed through the mouth, pharynx, and esophagus as saliva travels to the stomach can have increased bioavailability. This pre-gastric absorption can lead to improved bioavailability and better clinical performance by reducing the dosage and minimizing unwanted effects.[2] Mouth dissolving drug delivery technology (MDDDT) is a recent development in the market that has had a substantial effect on patients of all age groups. Taste masking is a crucial prerequisite for MDDDTs to achieve commercial success. The process of disguising the taste of bitter or unpleasant-tasting pharmacological components is essential for any orally-administered type of medication.[3] The direct compression process is the most convenient method for producing tablets. Direct compression involves the use of conventional equipment, readily accessible excipients, and a small number of processing processes. Disintegrants play a crucial role in the disintegration and dissolve process of mouth dissolving tablets produced by direct compression.[4] In order to achieve a rapid disintegration rate, it is crucial to choose an appropriate kind of disintegrant and use the ideal quantity. Additional constituents, such as excipients that dissolve in water or agents that cause effervescence, may further improve the ability of the formulation to dissolve or break down. However, the primary disadvantage of using effervescent excipients is their significant hygroscopicity.[5] The objective of this research is to enhance the formulation of a dispersible tablet, employing a natural superdisintegrant, by the use of either direct compression, effervescent, or sublimation methods. During the synthesis of MDDTs in this investigation, four natural superdisintegrants and their respective

concentrations will be used. Superdisintegrants are generally used to facilitate rapid dissolution or disintegration of tablets. Natural superdisintegrants, being of natural origin, are favored over synthetic chemicals due to their cost-effectiveness, plentiful availability, lack of irritation, and non-toxic nature. The benefits of oro dispersible dosage forms are gaining recognition in both the business and academics. Therefore, this research utilizes a natural superdisintegrant by the direct compression, effervescent, or sublimation methods.[6.7]

Rizatriptan is used for the treatment of migraines. It alleviates headache, discomfort, and other symptoms of migraines, including as nausea, vomiting, and sensitivity to light and sound. Timely intervention facilitates a fast recovery to your regular activities and might perhaps reduce your need on additional analgesics. Rizatriptan is classified as a triptan medication. It impacts a specific endogenous compound (serotonin) that induces constriction of cerebral blood arteries. It may also alleviate pain by influencing certain nerves in the brain.Rizatriptan does not provide prophylactic properties against future migraines or reduce the frequency of migraine episodes.

MATERIAL AND METHODS

Rizatriptan benzoate, superdisintegrants {sodium starch glycolate (SSG), crosscarmellose sodium (CCS), crosspovidone (CP), and microcrystalline cellulose (MCC)} which were used alone and in combination, diluents: lactose, granulated lactose, and mannitol, along with lubricant and glidants.

Preliminary research

This include using drug samples to determine the absorption maxima (λmax) in different solvents, such as a 0.1N HCl solution. The analytical technique was assessed by producing a calibration curve. The aliquates were concentrated at 5 µg/ml, 10 µg/ml, 15 µg/ml, and 20 µg/ml, respectively. The absorbance of each solution was individually measured at a wavelength of 234 nm. This was done for both an artificial saline solution and a salivary solution with a pH of 6.8, specifically for the medicine being studied. The measurement of absorbance was conducted, and a standard curve was generated by plotting the relationship between absorbance and concentration at a wavelength of 234 nm.[8]

Drug characterization

The medicine will be evaluated based on its sensory qualities and examined using a phase contrast microscope for microscopic analysis. The drug samples are analyzed for their physical features, such as density, particle size, flow properties, compatibility, solubility in different dissolving media, partition coefficient, and drug-excipient compatibility using techniques like UV Spectroscopy and FTIR. The drug's organoleptic features were assessed based on its visual characteristics, including color, odor, and taste. The medicine was subjected to microscopic testing by spreading a little amount of powder onto a glass slide and seeing it under an optical microscope. The substance had a crystalline form. The average particle size (davg) of the medication was measured using an optical microscope (66172/Olympus, 100 X, Olympus (India) Pvt. Ltd., New Delhi) equipped with an ocular micrometer and a stage micrometer. The flow parameters of the medication powder were analyzed to determine its flow characteristics using Carr's index, Hausner's ratio, and the angle of repose. The drug's solubility was assessed using the incremental solvent technique in distilled water, 0.1N HCI, ASA pH 6.8, and phosphate buffer pH 7.4. The drug's partition coefficient was evaluated in a solution of n-octanol and artificial saliva at pH 6.8. Fourier Transform Infrared (FTIR) spectra of the medication in its pure form. The process of recording meclizine hydrochloride included floating it in liquid paraffin and depositing it in a sodium chloride cell on an FTIR spectrophotometer (IR Affinity, Shimadzu, Japan). The peaks were identified and the observed peaks were matched to a standard reference.[8]

Formulation of Mouth dissolving tablets

Mouth dissolving tablets are prepared by a process known as formulation. Various techniques, such as direct compression, are used to manufacture solid dosage forms like tablets for model pharmaceuticals.

Preparation of solid dispersion

The solid dispersion technique employs a sugar derivative known as mannitol. The drug's solid dispersion was created by dissolving a measured quantity of the drug in ethanol and mannitol in various ratios (1:1, 1:2, 1:3 w/w). This drug solution in ethanol was then combined with the mixture and subjected to one hour of mixing on a Vortex shaker (Electro Lab, India). The solvent was dried by evaporating it in a hot air oven at a temperature of 45°C. The solid dispersion was obtained and pulverized using a mortar and pestle, and then filtered through a mesh with a size of #18. The dried solid dispersion was used for further assessment investigation.[9]

Assessment of the solid dispersion

Physical appearance

The color and appearance of all the batches of rizatriptan benzoate physical mixture and solid dispersions were assessed.

Solubility investigations

It was conducted to test the solubility of the medication in distilled water, 0.1N HCI, ASA pH 6.8, and phosphate buffer pH 7.4. An accurately weighed 25 mg medication was placed in a conical flask, and the appropriate amount of up to 50 ml was placed in a burette. Commence the process of adding 5 drops to the conical flask that already contains the medication. The conical flask was shaken periodically and the quantity of dissolving media was recorded. The drug was dissolved in the media and

subjected to continuous shaking at a temperature of 37oC for a duration of 24 hours using an orbital shaking machine. The aliquots were passed through a Whatman filter paper, and the solubility of the medication was determined in milligrams per milliliter.

Differential Scanning Calorimetry (DSC)

It was used to analyze rizatriptan benzoate(MHCl) in its pure form and as a solid dispersion. The samples, weighing 5-10 mg, were heated in sealed aluminium pans at a rate of 10°C per minute. The experiment was conducted under a nitrogen atmosphere with a flow rate of 20 ml per minute. The thermograph data was recorded using a Perkin-Elmer DSC7 calorimeter from the United States.

SEM investigations

This were conducted to assess the physical structural changes in the surface topography of the drug particles in both the physical mixture and solid dispersions. This was done using the scanning electron microscope (SEM) method.

The percent practical yield

It is a measure used to determine the efficiency or effectiveness of a production technique. It is computed to assist in selecting the most suitable method of production. The physical mixture and solid dispersions were gathered and measured to calculate the practical yield (PY) using the following equation.

$$\text{Practical Yield \%} = \frac{\text{Practical mass}}{\text{Theoretical mass}} * 100$$

Development of rizatriptan benzoate mouth dissolving tablets

The mouth dissolving tablets of rizatriptan benzoate(formulas FRODs1- FRODs3) were manufactured using the direct compression technique, following the formulations shown in Table 1. The optimum effective formulation consisted of RSD3, which included a solid dispersion of the medication mannitol in a ratio of 1:3. The solid dispersion RSD3 has a total weight of 80 mg, with 25 mg of the medication present. The process is as outlined: All of the components, except lubricants and glidant, were individually sifted through a #40 mesh sieve. Next, the ingredients were carefully measured and combined in a precise sequence for around 10 minutes. Subsequently, lubricants and glidant were introduced into the mixture and agitated for about 2 minutes. The mix was accurately weighed and then crushed into tablets weighing 200 mg using an 8 mm punch tablet compressing machine.

The evaluation of mouth dissolving tablets

These were include assessing many parameters including tablet thickness, weight uniformity, hardness, friability, disintegration time, water uptake percentage, swelling studies, rupture test, drug content, and in-vitro drug release research.[10]

Flowability

The flowability of the medication powder was assessed to determine its flow characteristics using Carr's index, Hausner's ratio, and the angle of repose. The Carr's index (IC) and Hausner's ratio (HR) of drug powders were calculated using the following equation.

Carr's Index (I_C) = $\rho_{Tapped} - \rho_{Bulk} / \rho_{Tapped}$

Hausner's ratio (H_R) = $\rho_{Tapped} / \rho_{Bulk}$

The angle of repose (θ) was determined using the fixed height approach. This value was determined using the following equation.

Angle of repose (θ) = $\tan^{-1}$ 2 H / D

H represents the surface area of the vertical height of the powder pile that is not supported, while D represents the diameter of the pile that is generated when the powder flows out of the glass funnel.

Electronic device with a touch screen that is smaller and more portable than a laptop or desktop computer.

Thickness and diameter

A sample of ten tablets from each formulation was randomly selected and their thickness was measured using a digital vernier caliper.Electronic device with a flat, rectangular shape and a touch-sensitive screen, typically used for browsing the internet, reading e-books, and running applications.

Weight variation

A total of twenty tablets were chosen at random from each formulation and individually weighed. The individual weights were compared to the mean weight to assess weight variance.

Tablet hardness test

The tablet hardness test is conducted using the Erweka TBH 320 hardness tester, and the hardness is measured in kg/cm2, representing the force needed to crush the tablets. The average of six determinations was utilized with a standard deviation.[11]

Friability

The friability of the tablets was assessed by weighing twenty tablets and subjecting them to a Roche friabilator. The equipment was spun at a speed of 25 revolutions per minute for a duration of 4 minutes. The pills were removed, cleaned of dust, and weighed again.

$$\text{\% Friability} = \frac{\text{Initial weight} - \text{Final weight}}{\text{Initial weight}} \times 100$$

Uniformity of drug content

A single tablet from the entire formulation was placed in a 100 ml volumetric flask. Then, 50 ml of ASS (pH 6.8) was added to the flask and the mixture was mechanically shaken for 30 minutes. Additional ASS (pH 6.8) was added to reach the desired volume. The mixture was then filtered, appropriately diluted, and the amount of meclizine hydrochloride in the tablet was finally

measured using spectrophotometry at a wavelength of 234 nm.

The in vitro disintegration test

It included the preparation of an artificial saliva solution (ASS) consisting of 0.426 g disodium hydrogen orthophosphate, 1.680 g sodium bicarbonate, 0.147 g calcium chloride, 1N hydrochloric acid to adjust the pH to 6.8, and distilled water to make a total volume of 1L. The in vitro disintegration test was conducted for all formulations at a temperature of 37°C, using artificial saliva solution (ASS) as the dissolve medium for the test. A disintegration apparatus was used, consisting of a basket rack assembly including six tubes with open ends and a bottom made of a 10-mesh screen. Each tube of the basket was filled with a tablet, and the duration for the tablets to completely disintegrate, leaving no noticeable residue in the device, was recorded.[12]

Wetting time and water absorption ratio

In order to assess these characteristics, a modest modification was made to the approach by using an artificial saliva solution as the medium. A folded piece of tissue paper was inserted into a tiny Petri dish with a diameter of 6.5 cm. The dish contained 10 ml of ASS and a 0.05% w/v solution of amaranth, which is a coloring agent. The tablet was positioned on the tissue paper and the duration needed for the tablets to get completely wet was measured and recorded as the wetting time. The average of three assessments was used with a standard deviation.[13]

$WAR = [(Wa – Wb) / Wb] \times 100$

where, Wb and Wa were the weights of the tablets before and after the test.

In vitro dispersion time

The in vitro dispersion time is a critical factor for orally dispersible tablets, with a recommended duration of less than one minute. The quick breakdown of the substance aids in the process of swallowing and also facilitates the absorption of drugs in the oral cavity, hence enhancing their bioavailability. The in vitro dispersion time was determined by placing a tablet into a small beaker containing 6ml of ASS (pH 6.8) and gently stirring. The duration needed for tablets to fully disperse into fine particles was recorded as the dispersion time.

In vitro dissolution

It was investigations with conducted for the formulation containing meclizine (25mg) utilizing a type I (Basket) dissolving apparatus at a rotation speed of 100 rpm. A dissolution medium of 900 ml of ASS (pH 6.8) was used. The temperature of the dissolving media was kept constant at 37±0.5°C. A 5 ml portion of the dissolving media was extracted at certain time intervals and substituted with a new ASS (pH 6.8) solution. The sample was appropriately filtered and diluted before being evaluated using spectrophoto-metric techniques at the wavelength of maximum absorption (λmax) of 234nm.

Studies on the kinetics of a reaction conducted in a controlled laboratory environment: In order to examine the release data obtained in a controlled laboratory environment, many mathematical models were used to characterize the kinetics of the release process. These models include the zero order, first order, Higuchi, Korsmeyer-Peppas, and Hixson-Crowell cube root law models. The dissolution findings were compared based on the time necessary for 80% of the medication to be released (t80%) and the percentage of drug dissolved in 2 minutes (D2min).

Preformulation Studies

Preformulation studies are important task for development of dosage forms of model drug substances. The overall objective of preformulation studies is to produce information constructive to the formulator in development of stable and bioavailable dosage forms. Drug was found to be slight yellow, specific odorless, tastelessin nature. The microscopic examination of the drug sample was crystalline powder. The drug powder bulk and tapped densities to be 0.311 gm / cm^3 and 0.328 gm / cm^3, respectively. The particle size of unmilled powder was 113 μm. The flow of unmilled drug powder was good to excellent flow characteristics. The solubility of drug was very less soluble in all dissolution media. The partition coefficient of rizatriptan benzoate was found to be 5.2 and the value of partition coefficient of drug showed that the drug was lipophilic in nature. The Infrared spectra were obtained using an FTIR spectrometer. The blend was filled in amber color glass vials and stopped with grey rubber stoppers followed by aluminium seal. IR spectrum of Meclizine HCl Figure 5 is characterized by 2420cm-1 (–NH3– stretch), 2300cm-1 (CH2–CH2), 1450cm-1 (C = C stretch), 1080-1 (C–N stretch), 910 cm-1 (C–Cl stretch). No significant alterations in the IR bands of the pure drug were detected in the physical mixture.and passed through sieve # 40, mixed well. The FTIR spectrum is shown in Figure 2.

Characterization of drug solid dispersion

The physical appearance and color of prepared solid dispersion powders was granular product in appearance and off-white in color. The solubility studies were conducted in different media for all the prepared solid dispersions and compared with pure drug. From the solubility studies, it was found that as the increase in pH of the media increased the solubility i.e. RSDs showed greater solubility in ASS phosphate buffer pH 6.8. The solubility data of different formulations showed in Table 2. From the results, solid dispersions with 1:3 ratio with mannitol showed grater solubility when compared to other, by increasing the carrier concentration the solubility also increased proportionally. From all the above formulations, RSD3 formulation showed highest solubility in ASS phosphate buffer pH 6.8. The percent practical yield obtained for formulation RSD1, RSD2 were 90.12 - 98.23% respectively. The DSC thermogram of mannitol showed sharp endothermic peak at 171.12°C and meclizine mannitol solid dispersion shows two

endothermic peaks corresponding to the melting point of drug and mannitol indicating no chemical interaction between them (Figure 3). The SEM photographs describes that levocetirizine are small crystalline structure but its original one was totally amorphous and no sign of crystallinity was observed in SEM photographs (Figure 4).

Evaluation of Mouth Dissolving Tablets

Rizatriptan benzoate containing solid dispersion powder were direct compressed to formulate mouth dissolving tablets. The pre-compression parameters showed that the powder blends had sufficient flow properties as per the approved limits. The thickness of the tablets was uniform in each batch. This showed that uniform compression force was applied while punching the tablets. The uniformity in weight is related to the improvement in powder flow properties through the addition of talc and magnesium stearate, resulting in effective die cavity filling (Table 1). The FMDTs were generally expected to have hardness of 3 to 3.5 kg/cm^2, since harder tablets are known to have longer disintegration times. The hardness was monitored at regular intervals during punching to keep the hardness value at a uniform level. A deviation from the hardness will result in differences in disintegration time. The tablets were highly stable to any external stress that might be involved during transportation and packaging: the friability values were consistent with the USP limit of < 1 %. The results of the disintegration test, wetting time and dispersion time was less than 60 sec., which mimics the disintegration taking place in mouth, correlated with the results of the USP disintegration test. The result was indicated that the formulation will be disperse within a minute and followed the need of purpose (Table 3 – 5). Formulation FRMDTs3 has the best dissolution profile of 94.38 % at 30 min. Results of in vitro dissolution studies were fitted to zero order, first order and Korsmeyer-Peppas equations. The values of r^2 ranged from 0.862 to 0.978 (first order plot) for different formulations (Figure 5). The values of slope of Korsmeyer-Peppas plots ranged from 0.949 to 0.774. Addition of solid dispersion containing drug and mannitol (1:3) ratio has water wicking and swelling properties which lead to rapid disintegration of drugs, which in turn, leads to the more rapid dissolution of drugs. Microcrystalline cellulose and mannitol in higher ratio act as superdispersible property and solubility enhancing agent. The combination of agents have more disintegrating property due to rapid water uptake and dispersion time which lead to rapid release of drug and made the dissolution faster. The results of the release kinetics study showed that all the formulations obeyed first order drug release profile more closely, i.e., the release rate depended upon the initial concentration of drug. The slope values of the Korsmeyer-Peppas plot showed that the mechanism was non-fickian or supercase II transport mechanism.

Table 1: Preparation of RSD3 containing Orodispersible Tablets.

Ingredients (in mg)	FRMDTs1	FRMDTs 2	FRMDTs 3
Rizatriptan benzoate solid dispersion equivalent to 25 mg (RSD3)	90	90	90
SSG (Sodium starch glycollate)	20	40	30
Ac-Di-Sol	40	20	30
Crosspovidone (5%)	10	10	10
Spray dried lactose	150	50	75
Microcrystalline Cellulose PH 102	0	100	75
Magnesium stearate	5	5	5
Purified talc	5	5	5
Total amount (g)	320	320	320

Table 2: Solubility study of taste masking of rizatriptan benzoate by solid dispersion.

S. No	Medium	Solubility (mg/ml)±SD* Solid dispersion		
		RSD1	RSD2	RSD3
1	Distilled water	1.351±0.51	1.568±0.11	1.480±0.11
2	0.1N HCI,	0.708±0.17	0.822±0.15	0.991±0.13
3	ASA pH 6.8 Phosphate buffer	1.521±0.28	1.711±0.31	1.999±0.17
4	Phosphate buffer pH 7.4	1.432±0.17	1.611±0.18	1.718±0.11

Table 3: Flow properties of matrix granules of mouth dissolving blends (FRMDs1 – FRMDs3)

Formulation code	Carr's index [n] (%)	Hausner's ratio [n]	Angle of repose (θ) [n]
FRMDTs1	16.11±0.002	1.17±0.011	26.1±0.011
FRMDTs2	15.24±0.011	1.17±0.001	24.1±0.021
FRMDTs3	14.13±0.013	1.15±0.028	23.8±0.012

n = 3 (mean ± Standard deviation)

Table 4: Physical characterization of mouth dissolving tablets (FRMDs1 – FRMDs3).

Formulation code	Tablet Thickness (mm)		Weight Variation (%)	Hardness (kg/cm ^{2})	Friability w/w (%)
	Diameter	Height			
FRMDTs1	8.01±0.001	2.11±0.002	2.1±0.011	3.6±0.12	0.614±0.005
FRMDTs2	8.02±0.002	2.04±0.011	2.2±0.031	4.1±0.19	0.515±0.002
FRMDTs3	8.01±0.001	2.01±0.011	2.1±0.002	4.9±0.21	0.493±0.002

n = 3 (mean ± Standard deviation)

Table 5: Physical characterization of mouth dissolving tablets (FRMDs1 – FRMDs3).

Formulation code	Drug Content (%)	Disintegration Time (sec)	Wetting time (sec)	Water absorption ratio (%)	Dispersion Time (sec)
FRMDTs1	99.2±0.10	51±0.01	21.01±0.09	28.11±1.02	33±0.02
FRMDTs2	99.1±0.05	42±0.03	16.22±0.03	23.61±1.13	31±0.01
FRMDTs3	99.8±0.01	31±0.03	11.00±0.03	19.31±1.42	32±0.02

n = 3 (mean ± Standard deviation)

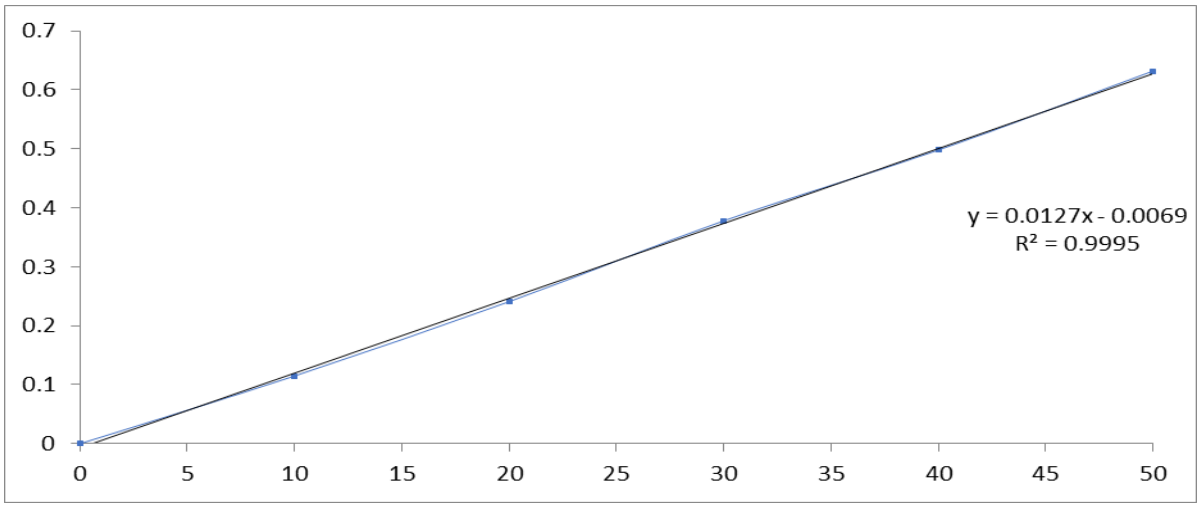

Figure 1: Standard curve of drug in ASS (pH 6.8) solution (234 nm).

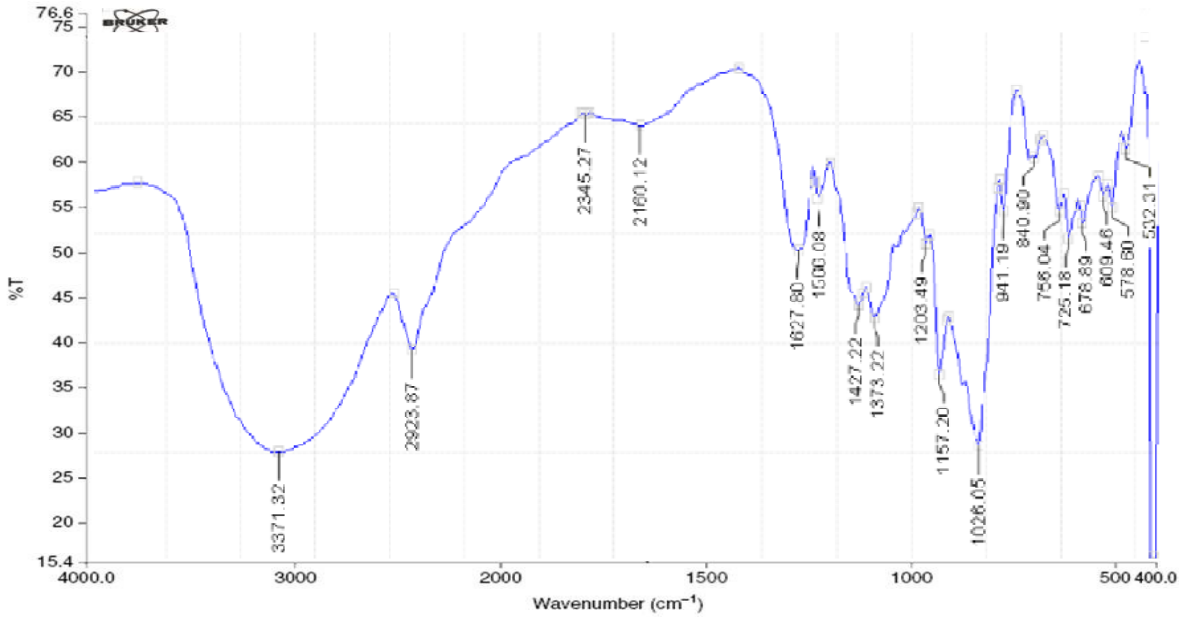

Figure 2: The I. R. Spectrum of drug sample.

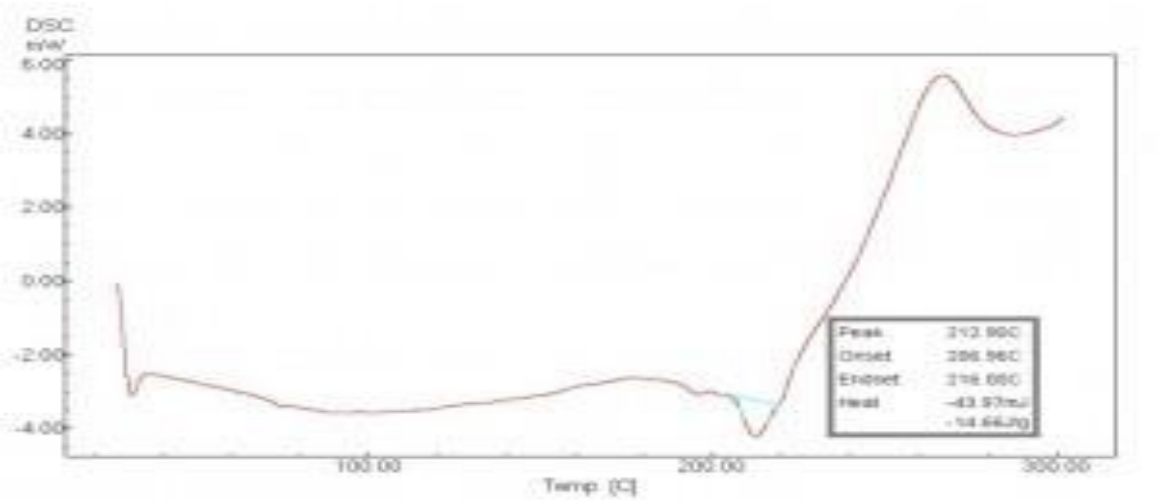

Figure 3: DSC of drug and all excipients (RSD3).

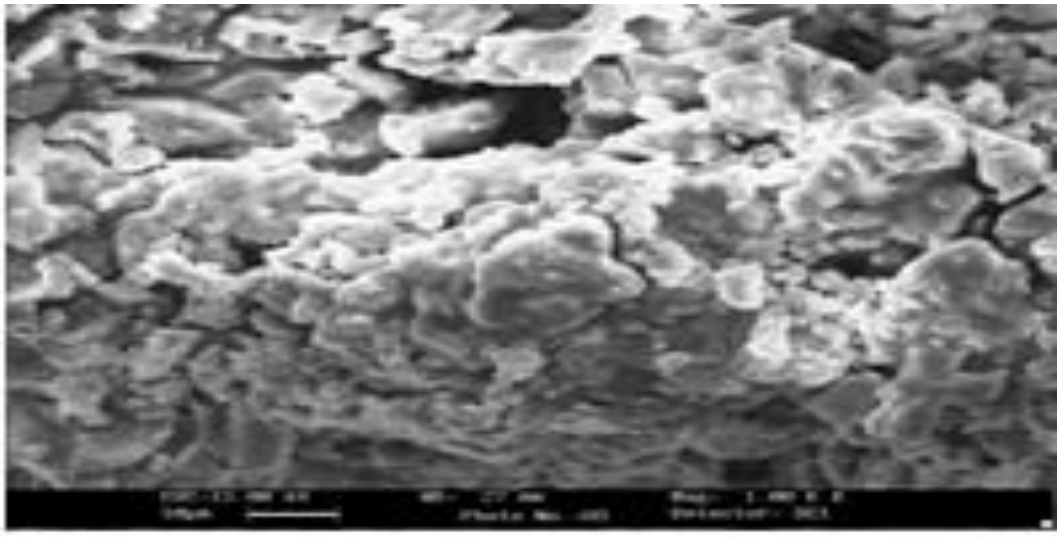

Figure 4: SEM photograph of drug and all excipients (RSD3).

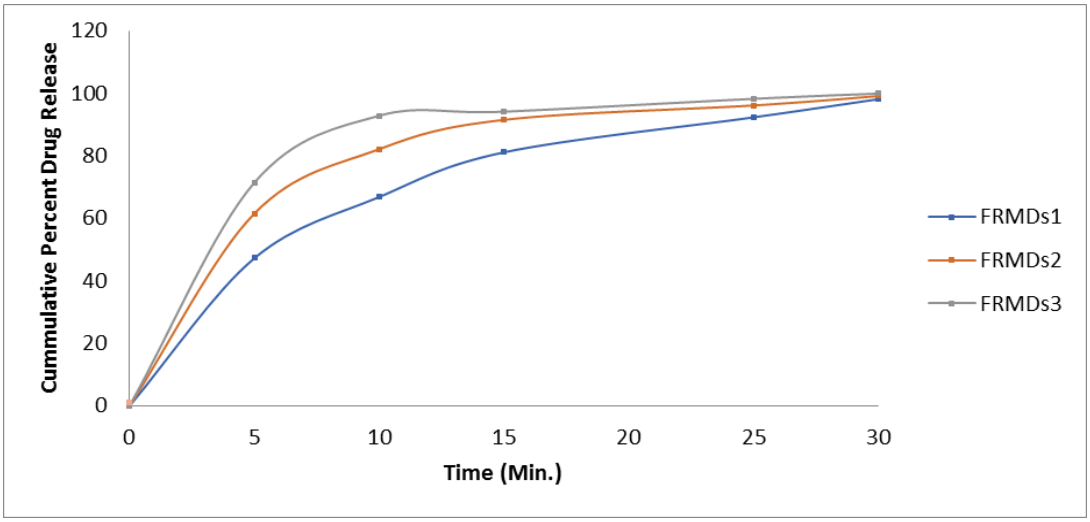

Figure 5: Zero-order plots of mouth dissolving tablets (FRMDs1 – FRMDs3).

RESULTS AND DISCUSSION

Rizatriptan benzoate drug was analytic validated by UV spectrophotometric methods and drug was estimated in the dissolution medium ASS pH 6.8 phosphate buffer solutions. The calibration curves in the dissolution medium ASS pH 6.8 phosphate buffer solution prepared

with drug solutions of known concentrations. The absorbance of each solution was measured separately at 234 nm, for ASS pH 6.8 phosphate buffer solution of drug The absorbance was measured and standard curve was plotted between absorbance vs. concentration. The calibration curves show excellent linearity of data as evidenced by the values of correlation coefficients that were found to be greater than 0.99 (Figure 1)

CONCLUSION

The formulation of the mouth dissolving tablet containing rizatriptan benzoate solid dispersion (FRMDDs) was developed utilizing a natural superdisintegrant and direct compression procedures. The concentration of superdisintegrants, including sodium starch glycolate (SSG), Ac-Di-Sol, crosspovidone (CP), spray dried lactose, and microcrystalline cellulose (MCC), shall be carefully controlled during the preparation of FRMDDs with meclizine hydrochloride. This was done through direct compression using different excipients in varying ratios. The superdisintegrants may be used alone or in combination with each other, as well as with mannitol, lubricants, and glidants. The FRMDDs were made with a brief disintegration time, enough mechanical strength, improved patient compliance, and a satisfactory stability profile. This was achieved by using several preparation techniques and investigating numerous factors that impact pre and post-compression characteristics. The pre-compression analysis indicated that the powder blends exhibited satisfactory flow characteristics, consistent thickness, and appropriate compression force was delivered during tablet punching. The consistent weight distribution, which ensures efficient filling of the die cavity and hardness, is known to have a greater variation, leading to variations in the time it takes for disintegration. The friability measurements exhibited consistency, and the disintegration test, wetting time, and dispersion time were all below 90 seconds. The findings suggested that the formulation would spread within one minute, in accordance with the intended objective. Formulation FRMDs3 has the highest dissolving profile, achieving a remarkable 99.99% dissolve rate during a 30-minute timeframe. The findings of the release kinetics investigation indicated that all the formulations adhered more closely to a first-order drug release profile, meaning that the rate of release was dependent on the starting concentration of the medication.

REFERENCES

1. Allen LV, Wang B, Process for making a particulate support matrix for making a rapidly dissolving dosage form. US Patent 6207199, 2001.
2. Ozeki T, Yasuzawa Y, Katsuyama H, Takshima Y, Kasai T, Eguchi T, Design of rapidly disintegrating oral tablets using acid-treated yeast cell wall: A technical note, AAPS Pharm Sci Tech, 2003; 4: 115-119.
3. Chen X, Qiu Q, Chen K, Li D, Liang L, Water-soluble myofibrillar protein–pectin complex for enhanced physical stability near the isoelectric point: Fabrication, rheology and thermal property, International Journal of Biological Macromolecules, 2020; 142: 615-623.
4. Nieto K, Mallery SR, Schwendeman SP, Microencapsulation of amorphous solid dispersions of fenretinide enhances drug solubility and release from PLGA in vitro and in vivo, International Journal of Pharmaceutics, 2020; 586, 119475/S0378517320304592.
5. Singh P, Wu L, Ren X, Zhang W, Tang Y, Chen Y, Carrier A, Zhang X, Zhang J, Hyaluronic-acid-based β-cyclodextrin grafted copolymers as biocompatible supramolecular hosts to enhance the water solubility of tocopherol, International Journal of Pharmaceutics, 2020; 586: 119542/S0378517320305263.
6. Chen J, Wu H, Guo C, Zhu B, Ren G, Enhancing the solubility of natural compound xanthotoxin by modulating stability via cocrystallization engineering, International Journal of Pharmaceutics, 2019; 572: 118776, S037851731930821X.
7. Hussain A, Smith G, Khan KA, Bukhari NI, Pedge NI, Ermolina I, Solubility and dissolution rate enhancement of ibuprofen by co-milling with polymeric excipients, European Journal of Pharmaceutical Sciences, 2018; 123: 395-403.
8. Lim LM, Tran T, Cheow WS, Hadinoto K, Re-evaluating the presumed superiority of amorphous nanoparticles over amorphous microscale solid dispersion in solubility enhancement of poorly soluble drugs, European Journal of Pharmaceutical Sciences, 2017; 109: 455-463.
9. Desai S, Poddar A, Sawant K, Formulation of cyclodextrin inclusion complex-based orally disintegrating tablet of eslicarbazepine acetate for improved oral bioavailability,"Materials Science and Engineering: C, 2016; 58: 826-834,
10. Yoshio K, Effect of type of lubricant on the characteristics of orally disintegrating tablets manufactured using by phase transition, Eur. J. Pharm. Bio., 2007; 69: 986-992.
11. Aithal KS, Nalini K, Udupa N and Sreenivasan KK, Enhanced fluorescence emission of norfloxacin on complexation with cyclodextrin, Indian Drugs, 2005; 42: 3, 162-166.
12. Mahajan HS, Kuchekar BS, Badhan AC, Mouth dissolving tablets of salbutamol sulphate: A novel drug delivery system, Indian Drugs, 2004; 41(10): 592-598.
13. Horter D, Dressman JB, "Influence of physicochemical properties on dissolution of drugs in the gastrointestinal tract", Adv. Drug Deliv. Rev., 2001; 25: 3–14.