ISSN PRINT 2319 1775 Online 2320 7876

 Journal Volume 13, Iss 02, 2024

FORMULATION AND EVALUATION OF FAST DISSOLVING TABLETS OF CINNARIZINE

[1]Mohd Shaqib, [2]Mohammad Mujahid [3]Prof Dr. Shamim Ahmad

[1] Research Scholar, **Translam Institute of Pharmaceutical Education and Research**

[2]Associate Professor, **Translam Institute of Pharmaceutical Education and Research**

[3]Director, **Translam Institute of Pharmaceutical Education and Research**

Abstract

Crosecarmellose Crospovidone, and pregelatinized starch were among the superdisintegrants used in varying concentrations to make the fast-
disintegrating cinnarizine tablets using direct compression method. Because magnesium stearate stuck to punches and dies, coground mixes of crospovidone and magnesium stearate were made in a ball mill to increase the stability and compatibility of the final product. The FTIR and DSC analyses demonstrated compatibility of the employed polymer and cinnarizine. As the concentration of superdisintegrants increases, the diintegration time decreases. Of all the formulations, the one using hypromellose as a superdisintegrant meets all the requirements to a satisfactory degree.

According to in vitro release experiments, formulation F5 released over 94.85% of the medication after 15 minutes, compared to
other formulations. Thus, it was discovered in this study that hypromellose was crucial

For the drug's rapid release, while crospovidone and magnesium stearate helped to increase the product's stability and compatibility. Currently, fast-dissolving pills are being developed to address the problems related to nausea and vomiting.

ISSN PRINT 2319 1775 Online 2320 7876

 Journal Volume 13, Iss 02, 2024

1. Introduction

The oral routes of medication delivery are widely accepted and account for about approximately 50-60% of all dosage formulas. Solid dosage forms are extensively utilised due to their straightforward administration, accurate dose, potential for, pain alleviation, and, most importantly, patient compliance. Tablets and capsules are the predominant solid dosage forms in use. Nevertheless, a notable drawback of these forms for numerous folks is the difficulty of ingesting them. Hydration is essential for the intake of oral medicines. Often, people struggle to consume conventional forms of medication, such tablets, in situations where water is unavailable. This is especially accurate in cases of motion sickness and abrupt episodes of coughing triggered by the common cold, allergies, and bronchitis. (Seager, H., *et.al*.1998).

Advantages of Fast Dissolving Tablet:-

- FDTs are solid dosage forms that allow for precision dosing and high drug loading. They are particularly suitable for geriatric and paediatric patients and serve as an appropriate alternative to traditional tablets.
- Due to pregastric absorption, the medications' bioavailability is altered, resulting in a reduced need for dosages. This alteration improves patient compliance and also affects clinical reports.
- Fast dissolving tablets do not need the use of water for ingestion. They may be consumed without water, making them suitable for those who are on the go or do not have instant access to water. This makes them a handy choice for patients who travel often or for those who are busy and do not always have water readily available.
- As a result, the likelihood of patients adhering to their medication regimen is improved.
- They are very handy and easy to give because to their solid unit dose form. They are particularly suitable for elderly, paediatric, uncooperative, & individuals. Fast dissolving pills are very safe and easy to take, as they do not pose a risk of asphyxia in the airways caused by physical blockage during the act of swallowing.
- **Cinnarizine Tablet:-**
- Cinnarizine is used for the treatment of inner ear and balance disorders, including vertigo and nausea. Additionally, it aids in the prevention of motion sickness. Sensory receptors located inside

ISSN PRINT 2319 1775 Online 2320 7876

Journal Volume 13, Iss 02, 2024

the ear provide signals to the brain, providing it with information on your bodily motion. In addition to receiving signals from your eyes and muscles, these neurons contribute to the maintenance of your body's equilibrium. If the nerves in one of your ears transmit an excessive, insufficient, or inaccurate number of signals to your brain, it creates a discrepancy with the signals provided by your other ear, your eyes, or your body.

2 MATERIALS AND METHODS:

2.1 UV Spectrophotometric method for cinnarizine:-

Using UV Spectroscopy Method, the standard calibration curve of cinnarizine at 310 nm in pH 7.4 phosphate buffer was determined.

2.2 Preparation of stock solution

A stock solution of cinnarizine was made by dissolving 100 mg of accurately weighed standard cinnarizine in 100 ml of methanol. Next, the stock solution was examined using UV spectroscopy after being properly diluted to a concentration of 10 µg/ml. The absorption peak of cinnarizine was detected at a wavelength of 310 nm, which was selected as the reference value for constructing the calibration curve of cinnarizine.

2.2.1Standard solution

Optimal operational solution solution was appropriately diluted with methanol to achieve a concentration of 100 µg/ml. To generate aliquots, extract 1, 2, 3, 4, 5, and 6 millilitres of the working standard solution. To achieve concentrations of 2, 4, 6, 8, 10, 12, 14, & 16 µg/ml, mix it with methanol in a 10 ml volumetric flask. Measure the absorbance at a wavelength of 310 nm using a reagent blank once again; create a graph to represent the calibration curve.

2.2.3 Physical drug Excipients Compatibility Studies:-Fourier Transforms infrared spectroscopy:-

To confirm the pure drug and polymer interaction, an FTIR investigation was conducted. Cinnarizine as a pure drug was studied in conjunction with SSG, Crospovidone, Hypromellose, and Pregelatinized starch. The pure drug powder was created by applying high pressure to 100 kg/cm for two minutes, inside a potassium bromide pellet. The tablet that was obtained was examined at Shimadzu, Japan's FTIR 8400S. KBr was examined in the samples. To ascertain the medication and polymers, the procedure was repeated. (Rajnikant M. *et.al.* 2013).

2.2.4 DSC Studies:

The physical mixture of cinnarizine and polymers was subjected to a DSC thermogram, which revealed the absence of distinctive polymer peaks and the presence

ISSN PRINT 2319 1775 Online 2320 7876

 Journal Volume 13, Iss 02, 2024

of cinnarizine peaks that had been slightly moved from their original positions.

2.2.5 Micrometry study of Powder:

Bulk density

The calculation of bulk density involves the addition of a known mass of powder to a cylinder. Density is determined by mass(Rajnikant M. *et.al.* 2013).

LBD = Wt powder/Vol powder

……. (1)

Tapped density:

In order to calculate the taped This method requires first weighing known powder and then transferring it to a 10 ml mechanical tap cylinder. Tape begins until there is a slight volume change. (Rajnikant M. *et.al.* 2013).

TBD = Powder wt/Tapped vol powder

…….. (2)

Carr's index:

Differentiating the powder's LBD & TBD and calculating the value at which the crowded depressed can help determine how quickly the powder dissolves (P.N. Remya, et.al. 2012).

The formula used to determine Carr's index is:

$$\% \text{ Carr's index} = \frac{\text{TBD}-\text{LBD}}{\text{TBD}} \times 100$$

……. (3)

Hausner's ratio:

The composition of quick dissolving tablets and dry power merge were solved using the Hausner's proportion equation. (Rajnikant M. *et.al.* 2013).

. Hausner's ratio $= \frac{\text{TBD}}{\text{LBD}}$

……. (4)

Angle of repose:

The re-establishment angle was studied with a funnel method and following formula. ((Rajnikant M. *et.al.* 2013).

$\text{Tan } \theta = \frac{H}{R}$

……. (2.5)

2.3 Preparation of Fast Dissolving Tablets of cinnarizine

Sieve No. 60 was used to filter out sodium starch glycolate, cross povidone, and cinarizine individually. The medication was combined in the weight proportions shown in the table below with the polymers and additional substances. After that, powder mixture is lubricated with magnesium separate & compressed into tablets on amulti-punch12-station tablet machine using7.5mm flat-face round tools. To produce tablets with a hardnessof3 to 5 kg/cm2, the compression force varied. (Sharma S, Gupta GD, 2008)

2.4 Evaluation Parameters of Compressed Tablet:

2.4.1 Tablet Hardness:

With the help of a Monsanto hardness test, the hardness of Cinnarizine tablets has been carefully controlled. Hardness of the tablets was measured, and resistance of 10 tablets to rapidly dissolve with a known weight was

ISSN PRINT 2319 1775 Online 2320 7876

 Journal Volume 13, Iss 02, 2024

recorded. in kg/cm2 for each group. (Lachman.L, *et.al.1991*).

2.4.2 Tablet Thickness:

The fast-dissolving pills' purposeful thickness A Vernier calliper was used to measure average value after five pills were consumed. (Nandgude T,*et.al* 2007).

2.4.3 Friability:

Using a Roche Friability tester, the tablet's friability served as a reliable indicator of its solidity. First, 20 tablets are taken, precisely weighed, and then transferred to a friability testing. The tester was run for four minutes at 25 rpm or up to 100 revolutions. % of the damage in mass friability was justified using the formula

(Gore S *et.al.*2000)..

2.4.4 Weight variation:

This technique is used to vary the weight of the tablets. Twenty tablets were measured on an electronic balance and weighed in grammes each. Next, determined the tablet's average weight and looked for variations in tablet weight. (Nandgude T,*et.al* 2007).).

% Variation = Individual wt - Average wt/Average wt × 100 ……. (2.8)

2.4.5 Disintegration Test:

A The disintegration test was carried out at a temperature of 37°C ± 2°C using 900 ml of distilled water. Each formulation's tablet disintegration time was measured using the disintegration test apparatus. The six tubes that make up the device contained a single pill in pure water. To every tube was placed one disc. It was determined how long it took, in seconds, for the pills to completely dissolve and for there to be no discernible mass inside the device. (Nandgude T,*et.al* 2007).).

2.4.6 Wetting Time and Water Absorption Ratio:

A6.5 cm diameter Petri dish contains6 ml of water and contains folded tissue paper. A pre-weighed tablet was placed on the tissue paper, enough time passed to fully saturate it. The wettest time is the time the water reaches the top of the tablet. fully saturate it. Subsequently, the damp tablet was measured in terms of weight.

The following formula was used: (Gore S *et.al.*2000).

R = Wa-Wa/ Wb *X* 100

……. (2.9)

2.4.7 Dispersion Time:

Submerged in a pH 6.8 solution of 10 cc phosphate buffer. The amount of time needed for the tablet to fully disperse was calculated.

5.5 In-vitro dissolution studies:

Utilising an electrolab dissolving test unit running at 50 rpm, an in-vitro dissolution research was conducted. 500 cc of phosphate buffer pH 6.8 was employed as dissolving medium; It underwent filtration after a duration of two minutes. Amount of dissolved drug was determined by UV spectroscopy using 310nm sampling of pH 7.4 phosphate buffers. This is done using UV spectrometers. Then the cumulative

ISSN PRINT 2319 1775 Online 2320 7876

 Journal Volume 13, Iss 02, 2024

percentage of drug release was calculated. A portion of the5 millilitre liquid media is extracted at specified time and maintained at370.50C. (Gore S *et.al.*2000)

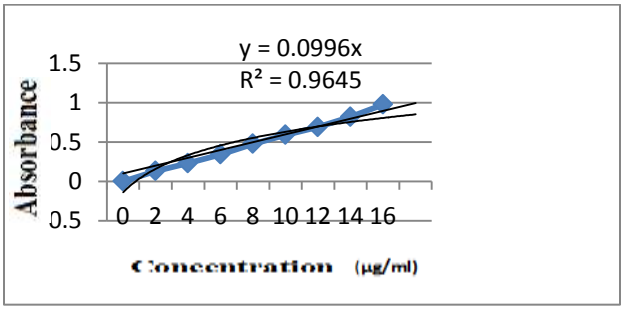
2.6 Stability studies:

The optimised formulation (F5) stability experiments were conducted in compliance with ICH guidelines. For 180 days, the right formulation was stabilised at 40±2°C & 75±5% relative humidity. Following that period, the product's colour, hardness, disintegration speed, and in vitro release were assessed. (Gohel, M.,*et.al.* 2004).

RESULTS

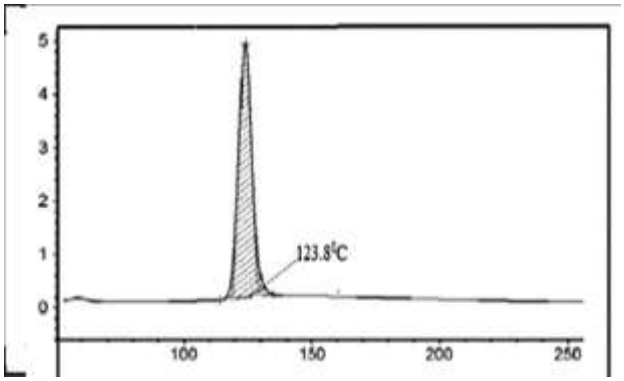
3.1. UV Spectroscopy-

Using UV Spectroscopy Method, wave length was around 310 nm in pH 7.4 phosphate buffers after the drug sample was scanned.



Graph 1 Standard Graph Curve of cinnarizine

3.2. DSC Studies cinnarizine:



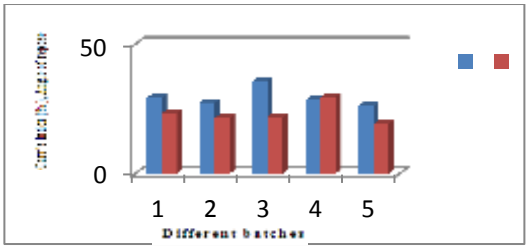
Graph 2 Differential Scanning Calorimetry of cinnarizine

3.3 Evaluation of Powders for Fast Dissolving Tablet:

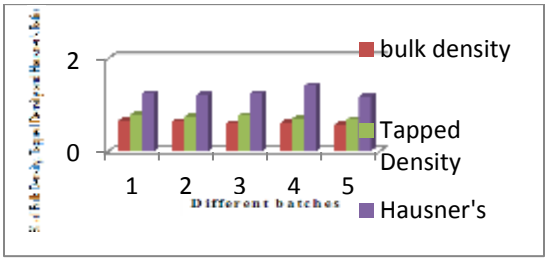
Discussion:-

The physical combinations of rapid dissolving tablets were evaluated from the angle of release, with results ranging from 26.100.12 to 35.800.28. And Carr's index values ranging from 19.090.6 to 29.530.8% for all batches of powders, showing good to low compressability and flowability. The result is a Hausner ratio of 1.180.24to1.410.20. In all batches, the density ratio was 0.580.51to0.650.41,andthe density ratio of the tapped density ratio was 0.680.01to0.780.24,suggestingthat it was possible and had a low flow characteristics.

ISSN PRINT 2319 1775 Online 2320 7876



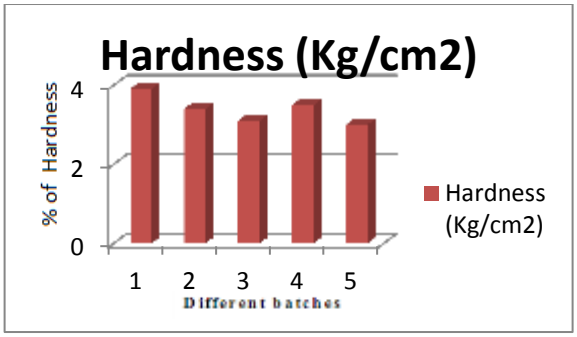
Graph 3 Graphical the Carr's index & Angle of repose were



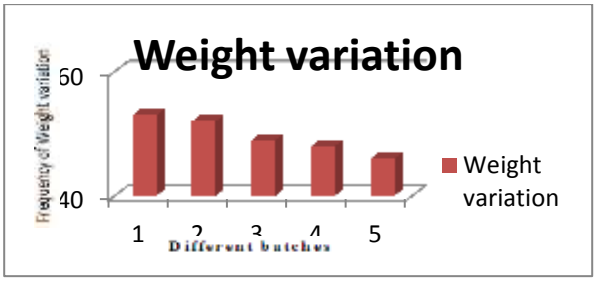
Graph 4 The graph displays the observed in various batches of the formulation.

3.4 Evaluation Parameters of Compressed Tablet:

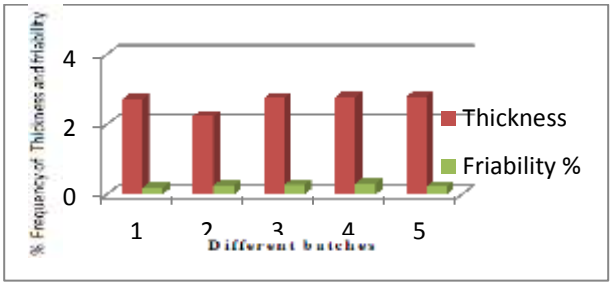
The physical characteristics hardness ranged from 3.1±0.61 to 3.9±0.35 kg/cm2. All produced tablets had friability ranging from 0.19±0.21 to 0.31±0.22%. The measured range for thickness was 2.24±0.12 to 2.74±0.04 mm. All tablets were found to vary in weight by 46±1.14 to 53±1.24 mg. The results showed that the dispersion time was around 31±0.3 to 39±0.5, the disintegration time was 32.85±1.0 to 59.78±1.4, and the wetting time was 35.25±1.22 to 60.12±1.21.



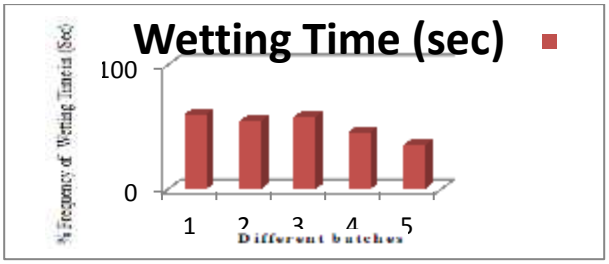
Graph 5 Graphical representation of Hardness



Graph 6 Graphical representation of weight variation



Graph 7 Graphical representations of Thickness & friability

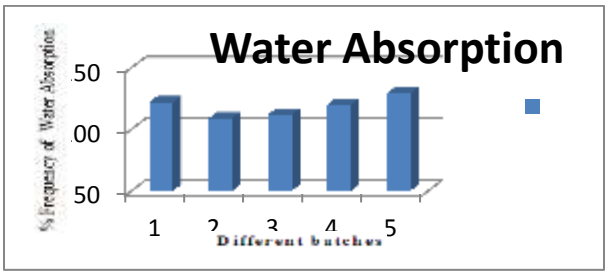


ISSN PRINT 2319 1775 Online 2320 7876

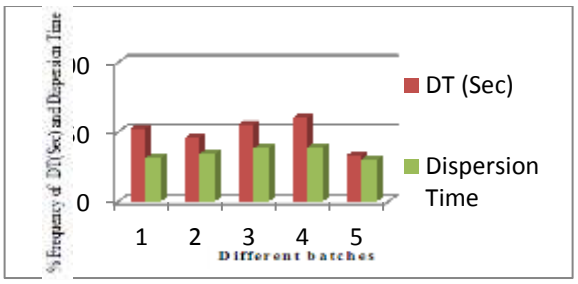
 Journal Volume 13, Iss 02, 2024

Time/ Min	% Release drug				
Formulation	F1	F2	F3	F4	F5
0	0	0	0	0	0
3	50.2±0.18	52.45±0.21	50.91±0.91	54.8±0.17	59.39±1.29
6	56.49±0.18	55.42±0.42	60.14±1.31	59.45±0.81	65.77±1.21
9	59.01±0.19	60.41±0.67	61.11±1.24	59.59±1.28	74.79±1.19
12	69.45±0.34	70.01±0.14	71.41±1.23	65.14±1.42	86.87±1.14
15	79.85±1.14	72.9±0.90	73.95±0.90	74.10±1.31	94.85±0.17

Graph 8 Graphical representation of Wetting Time



Graph 9 Graphical representation of Water absorption



Graph 10 Graphical representation of Disintegration

3.5 In-Vitro Drug Release Studies:

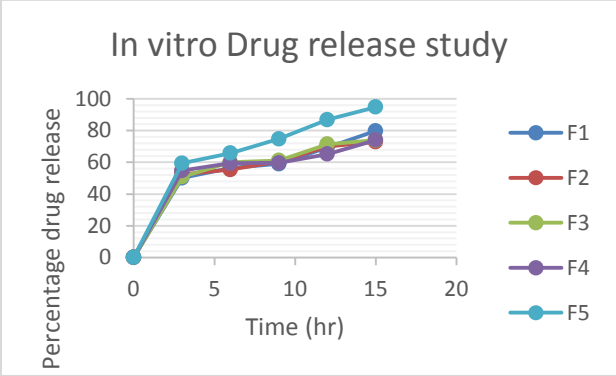
Table 3.6 Release studies F1-F5

The data is Disintegration testing equipment was used to assess the time of decomposition of each formulation. The decomposition time of the tablet was measured(32.851.0to59.781.4) and the decomposition time of10 ml of pH 6.8 phosphate buffer solution was measured as between 310.3 and 390.5.Theresults showed that the proportion of drugs released from the formulasF1,2and3(55,20.18to79,851.14), 52,45-221.21%,and50,910.91to73,950.90, respectively, was 5.It was discovered that the percentage of drugs released from F4 and 5 formulations was 54.80.17 to 74.101.31% and 59.391.29 to 94.850.17%,respectively. F5 formulations have been shown to release the batters faster (in15minutes) than other formulations, as they contain the highest concentration of super decomposition agents. During the stability experiments of Formulation5,no significant color changes were observed.

ISSN PRINT 2319 1775 Online 2320 7876

 Journal Volume 13, Iss 02, 2024

Only slight variations in the hardness, disintegration time and the controlling vitro release of the drug were noted. All data were evaluated for 180 days at 402°C/755% RH, in accordance with ICH recommendations.. It was found that formulation F5 released the batter faster—within 15 minutes—than the other formulations because it included the highest concentration of superdisintegrants.



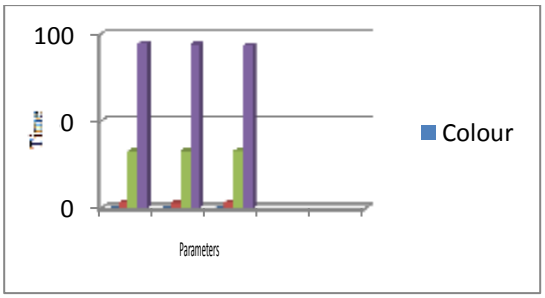
Graph 11 Percentage drug release of cinnarizine

3.6 Stability Studies:

Table 3.7 Stability study

S. No.	Parameters	Initial	1 Month	3Month	6Month
1	Colour	White	-	-	-
2	Hardness	3.0±0.34	3.0±0.30	3.0±0.28	3.0±0.1
3	Disintegration time (sec)	32.85 ±1.0	32.85 ±1.0	32.86 ±1.2	33.00 ±1.26
	In-	94.85	94.21	94±	93.2
4	Vitro Drug Release	±0.17	±0.12	0.0.21	4±1.08

Throughout the course of Formulation 5's stability experiments, no significant variations in colour were seen. Only slight variations in hardness, disintegration time, & adjustable in vitro drug release were noted. All data were assessed in accordance with ICH recommendations for 180 days at 40±2°C/75±5% RH.



Graph 12 Stability studies of F5 formulation

DISCUSSION

Following the completion of the experimental design, a preformulation study was carried out. This involved scanning the drug sample, measuring the wave length in pH 7.4 phosphate buffers at a range of concentrations (0–12 µg/ml), finding the absorbance to be between 0.1298 and 0.6901, and plotting the results on a concentration vs. absorbance graph. To confirm the pure drug and polymer interaction, an FTIR investigation was

ISSN PRINT 2319 1775 Online 2320 7876

 Journal Volume 13, Iss 02, 2024

conducted. Cinnarizine as a pure drug was studied in conjunction with SSG, Crospovidone, Hypromellose, and Pregelatinized starch. The pure drug powder was created by applying high pressure to 100 kg/cm for two minutes, inside a potassium bromide pellet. The medication and other excipients do not interact; all of the ingredients are safe to use together. In order to assess the powder's flow property, The physical mixes used for the fast-dissolving tablets were assessed in terms of their Angle of Repose. The results varied between 26.100.12 and 35.800.28, while the Carr's index values for all batches' powder ranged from 19.09±0.6 to 29.53±0.8%, showing a range of compressibility and flow ability from good to bad. The Hausner ratio values obtained ranged from 1.18±0.24 to 1.41±0.20. To determine the bulk density of a powder, a cylinder is filled with a known mass of the powder. The bulk density ratio varied throughout all batches. 0.58±0.51 to 0.65±0.41, and the tapped density ratio from 0.68±0.01 to 0.78±0.24, suggesting both possible and poor flow properties.

The drug, cross povidone, and sodium starch glycolate were each processed through sieve No. 60 independently to produce the quick dissolving. The medication was combined in the weight proportions shown in the table below with the polymers and additional substances.

After that, 12-station tablet machine utilising 7.5mm flat face round tooling. In order to create tablets with a hardness ranging from 3 to 5 kg/cm2, the compression force was varied. Once the fast-dissolving tablet formulation is complete, it is submitted to quality control parameters.

physical characteristics of tablet hardness were measured and found to range from 3.1±0.61 to 3.9±0.35 kg/cm2. A Roche Friability testing was used to determine the tablet's friability, which ranged from 0.19±0.21 to 0.31±0.22%. The measured range for thickness was 2.24±0.12 to 2.74±0.04 mm. All tablets were found to vary in weight by 46±1.14 to 53±1.24 mg. The experiment involved wetting the sample for 35.25±1.22 to 60.12±1.21, absorbing water for 109±1.40 to 129±1.56, then disintegrating the sample in 900 ml of distilled water at 370C±2 0C. Disintegration testing equipment was used to assess the time of decomposition of each formulation. The decomposition time of the tablet was measured(32.851.0to59.781.4) and the decomposition time of10 ml of pH 6.8 phosphate buffer solution was measured as between 310.3 and 390.5.The results showed that the proportion of drugs released from formulasF1,2and 3(55,20.18to79,851.14), 52,45-221.21%,and50,910.91to73,950.90, respectively, was 5.It was discovered that the percentage of drugs released from F4 & 5 formulations was 54.80.17to74.101.31% and59.391.29 to 94.850.17%, respectively. F5formulations have been shown to release

ISSN PRINT 2319 1775 Online 2320 7876

 Journal Volume 13, Iss 02, 2024

the batters faster (in15minutes) than other formulations, as they contain the highest concentration of super decomposition agents. During the stability experiments of Formulation5,no significantcolor changes were observed. Only slight variations in the hardness, disintegration time and the control in vitro release of the drug were noted. All data were evaluated for 180 days at 402°C/755% RH, in accordance with ICH recommendations.

CONCLUSION

CMC, Crospovidone, and pregelatinized starch were among the superdisintegrants used in varying concentrations to make the fast-disintegrating cinnarizine tablets using direct compression method. Because magnesium stearate stuck to punches and dies, coground mixes of crospovidone and magnesium stearate were made in a ball mill to increase the stability and compatibility of the final product. The FTIR and DSC analyses demonstrated compatibility of the employed polymer and cinnarizine. of all the formulations, the one using hypromellose as a superdisintegrant meets all the requirements to a satisfactory degree. According to in vitro release experiments, formulation F5 released over 94.85% of the medication after 15 minutes, compared to other formulations. Thus, it was discovered in this study that hypromellose was crucial for the drug's rapid release, while crospovidone and magnesium stearate helped to increase the product's stability and compatibility. Currently, fast-dissolving pills are being developed to address the problems related to nausea and vomiting.

References:

1. Rajnikant M. Suthar1 , Narendra P. Chotai1 and Digesh D. Shah2. "Formulation and Evaluation of Fast Dissolving Tablets of Ondansetron by Solid Dispersion in Superdisintegrants." *Indian Journal of Pharmaceutical Education and Research* | Vol 47 | Issue 3 | Jul–Sep, 2013.
2. Bookya Padmaja a, Raparla Ramakrishna, Sriramula Sravani. "Formulation and Evaluation of Fast Dissolving Tablets of Captopril." Bookya Padmaja et al. / *Journal of Pharmacy Research* 2014,8(7),963-968.
3. Singh Jaskirat, Walia Manpreet, Harikumar S L. "Formulation and Evaluation of fast dissolving tablets of Rosuvastatin." *Journal of Drug Delivery & Therapeutics;* 2014, 4(5), 173-181.
4. Bookya Padmaja 1, Raparla Ramakrishna 1 , Goutham Goud. "Formulation and Evaluation of Fast Dissolving Tablets of Ranitidine Hydrochloride." *Bookya Padmaja et al. / Journal of Pharmacy Research* 2015,9(2),165-169.

ISSN PRINT 2319 1775 Online 2320 7876

5. Durga Bhavani P1, Raghavendra Rao Ng2. "Formulation and Evaluation of Fast Dissolving Tablets of Valsartan by Vacuum Drying Technique." *Asian J Pharm Clin Res*, Vol 9, Issue 2, 2016, 73-79.
6. Prasad Kasgavade and More Swapnil. "Formulation and evaluation of fast dissolving tablet of Ciprofloxacin." *International Journal of Advances in Pharmaceutics ISSN:* 2320–4923.
7. S. M. Shahidulla 1 , Mohib Khan 2 and K. N. Jayaveera. "Development of Ondansetron HCL Fast Disintegrating tablets using 32 Factorial design." Shahidulla et al., *IJPSR*, 2017; Vol. 8(5): 2143-2148.
8. Pankaj Bhardwaj and Shikha Baghel Chauhan. "Formulation and Evaluation of Orodispersible Tablets of Metformin Hydrochloride Using Agar as Natural Super Disintegrant." Bhardwaj and Chauhan, *IJPSR*, 2018; Vol. 9(10): 4220-4228.
9. Yogita Rayate, Dr. Shrinivas Mohite, Shital Shewale, Aishwarya Patil. "Formulation and Evaluation of Fast Dissolving Tablets of Pioglitazone" *Asian J. Pharm. Tech.* 2019; 9(1):23-26.
10. Rajeshwar V and Vasudha Bakshi. "Formulation development and evaluation of fast dissolving tablets of Diltiazem HCL." *The Pharma Innovation Journal* 2019; 8(3): 156-160.
11. Dangore CK, Gaidhane AK, Khapne AK, Wadher KJ, Umekar MJ. Formulation and Evaluation of Fast Dissolving Tablets of Paracetamol Using Superdisintegrants." *Int. J. Pharm. Sci. Rev. Res.*, 60(2), January - February 2020; Article No. 15, Pages: 90-93.
12. P.N Remya, Dr. N Damodharan, Lokendra Sharma. "Formulation and Evaluation of Fast Disintegrating Orodispersible Tablets of Ondansetron Hydrochloride." *P.N.Remya et al /J. Pharm. Sci. & Res.* Vol.4(5), 2012, 1810-1813.
13. Devendra Revanand Rane, Hemant Narhar Gulve, Vikas Vasant Patil, Vinod Madhaorao Thakare, Vijay Raghunath Patil. "Formulation and evaluation of fast dissolving tablet of albendazole." Rane et al., *International Current Pharmaceutical Journal* 2012, 1(10): 311-316.
14. Sharma S, Gupta GD: Formulation and characterization of fast-dissolving tablets of promethazie theolate. Asian journal of pharmaceutics- January-2008.
15. Lachman.L, Lieberman.A, Kinig.J.L. (1991) The Theory and Practice of Industrial

ISSN PRINT 2319 1775 Online 2320 7876

 Journal Volume 13, Iss 02, 2024

16. Pharmacy, 4th edition, Varghese Publishing House, Bombay. 67-68.
17. Nandgude T, Bhise K, Shinde V, Sharma D. Mouth dissolving tablet: geriatrics and paediatrics friendly drug delivery. Indian Drugs. 2007; 4:271-302.
18. United States Pharmacoepia. Asian Ed Convention Inc, 2005, 233-245.
19. P.N Remya, Dr. N Damodharan, Lokendra Sharma. "Formulation and Evaluation of Fast Disintegrating Orodispersible Tablets of Ondansetron Hydrochloride." *P.N.Remya et al /J. Pharm. Sci. & Res.* Vol.4(5), 2012, 1810-1813.
20. Babji Movva, D Laxman Kumar, K Mohan Ravi Kumar. "Formulation and Evaluation of Fast Dissolving Tablets of Ranitidine Hydrochloride by hole Technology." *Asian J Pharm Clin Res*, Vol 6 Issue 4, 2013,143-147.
21. Rajnikant M. Suthar1, Narendra P. Chotai1 and Digesh D. Shah2. "Formulation and Evaluation of Fast Dissolving Tablets of Ondansetron by Solid Dispersion in Superdisintegrants." *Indian Journal of Pharmaceutical Education and Research* | Vol 47 | Issue 3 | Jul–Sep, 2013.
22. P.N Remya, Dr. N Damodharan, Lokendra Sharma. "Formulation and Evaluation of Fast Disintegrating Orodispersible Tablets of Ondansetron Hydrochloride." *P.N.Remya et al /J. Pharm. Sci. & Res.* Vol.4(5), 2012, 1810-1813.
23. Gore S, Devarajan P. Mouth dissolving tablets Design of *in vitro* disintegration test. Ind J Pharm Sci. 2000; 62(6):508.
24. Gohel, M., Patel, M., Amin, A., Agrawal, R., Dave, R., & Bariya, N. (2004). Formulation design and optimization of mouth dissolve tablets of nimesulide using vacuum dryingtechnique. *AAPS Pharm. Sci. Tech.*, 5(3), e36.