World Journal of Pharmaceutical Science and Research
www.wjpsronline.com
Research Article
ISSN: 2583-6579
SJIF Impact Factor: 5.111
Year - 2025
Volume: 4; Issue: 4
Page: 319-333

FORMULATION AND OPTIMIZATION OF PERINDOPRIL ERBUMINE FAST-DISSOLVING ORODISPERSIBLE TABLETS

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Article Received: 26 June 2025 | | Article Revised: 17 July 2025 | | Article Accepted: 10 August 2025

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DOI: https://doi.org/10.5281/zenodo.16888837

How to cite this Article: Dr. Amol U. Gayke, Prasad A. Mokal, Prof. Vikas Shinde, Riddhi D. Thorat, Dr. Sushil Patil (2025). FORMULATION AND OPTIMIZATION OF PERINDOPRIL ERBUMINE FAST-DISSOLVING ORODISPERSIBLE TABLETS. World Journal of Pharmaceutical Science and Research, 4(4), 319-333. https://doi.org/10.5281/zenodo.16888837

ABSTRACT

The present study aimed to formulate and evaluate orodispersible tablets (ODTs) of Perindopril Erbumine using natural, synthetic, and co-processed superdisintegrants to enhance disintegration, dissolution, stability and bioavailability. Perindopril Erbumine, an ACE inhibitor with limited oral bioavailability (40–45%) and a half-life of 5–10 hours, is used in the treatment of hypertension and cardiovascular conditions. ODTs were prepared via direct compression using Irbesartan as active ingredient, HPMC, Eudragit L 100, Aspartame, Ethyl cellulose, Dimethyl sulfoxide, Propylene glycol, Ethanol and superdisintegrants such as Moringa oleifera, Crospovidone, and Croscarmellose, including co-processed blends (1:1 ratios) at concentrations of 10% and 15%. FTIR studies confirmed no drug–excipient interactions. Pre-compression and post-compression evaluations indicated good flow properties and acceptable physical characteristics. Among all formulations, F7 (Moringa oleifera and Crospovidone, 1:1 at 10%) demonstrated optimal performance with the shortest disintegration time (21 sec), wetting time (27 sec), and highest drug release (99.5% at 30 minutes). This study highlights the potential of natural-synthetic co-processed superdisintegrants in developing effective orodispersible formulations.

KEYWORDS: Orodispersible tablet, Perindopril Erbumine, Super disintegrants, Direct Compression method, Hypertension, Co-processed, Moringa oleifera.

1. INTRODUCTION

In recent years, orodispersible tablets (ODTs) have gained significant attention in the field of drug delivery due to their ease of administration, especially for pediatric, geriatric, and dysphagic patients.[1] These tablets disintegrate rapidly in

the mouth without the need for water, leading to faster onset of action and improved patient compliance.[2] The development of ODTs focuses not only on convenience but also on enhancing the bioavailability and therapeutic efficacy of drugs that undergo significant first-pass metabolism or have poor solubility.[3-4]

Perindopril Erbumine is an angiotensin-converting enzyme (ACE) inhibitor widely prescribed for the treatment of hypertension, heart failure, and for reducing the risk of cardiovascular events.[5] Despite its therapeutic effectiveness, Perindopril Erbumine suffers from moderate oral bioavailability (approximately 40–45%) due to hepatic metabolism and a biological half-life ranging between 5 to 10 hours. Enhancing its disintegration and dissolution through ODT formulation could potentially lead to improved absorption and therapeutic action.[6-7]

Superdisintegrants are crucial components in the formulation of ODTs as they facilitate the rapid breakup of tablets upon contact with saliva. Traditionally used superdisintegrants include Crospovidone and Croscarmellose sodium, both synthetic in nature and known for their high efficiency in improving disintegration.[8] However, there has been growing interest in exploring natural polymers due to their biocompatibility, availability, non-toxicity, and cost-effectiveness. *Moringa oleifera*, a natural plant-derived polymer, has shown promising disintegrant properties owing to its swelling capacity and biodegradability.[9]

Furthermore, the concept of co-processed superdisintegrants combinations of two or more disintegrants to enhance functionality offers improved performance compared to individual agents. Co-processing can lead to synergistic effects, improving compressibility, disintegration time, and drug release profile.[10] In this study, combinations of Moringa oleifera with Crospovidone and Croscarmellose in a 1:1 ratio were explored to investigate their efficiency in orodispersible tablet formulations.[11]

The current research focuses on formulating Perindopril Erbumine ODTs using both individual and co-processed superdisintegrants via the direct compression technique. Formulations were developed with varying concentrations (10% and 15%) of the selected disintegrants. Preformulation studies, including Fourier-transform infrared spectroscopy (FTIR), were performed to assess the compatibility of the drug with the excipients. The prepared tablets were subjected to pre- and post-compression evaluations including hardness, friability, disintegration time, wetting time, drug content uniformity, and in vitro drug release studies.

The primary objective of this study is to identify the most effective formulation that demonstrates rapid disintegration, enhanced dissolution, and optimal physical properties. Special emphasis was placed on the performance of co-processed disintegrants in achieving faster drug release and improved bioavailability. The outcomes of this study aim to contribute to the development of patient-friendly, fast-acting oral dosage forms of Perindopril Erbumine, enhancing therapeutic efficacy and patient adherence.

2. MATERIALS AND METHODS

2.1 Materials

The chemicals were obtained from different sources and used as received. Irbesartan was a gift sample from Cipla Pharmaceuticals, India. HPMC, Eudragit L 100, Aspartame, Ethyl cellulose, Dimethyl sulfoxide, Propylene glycol, Ethanol were obtained from Research-Lab Fine Chem Industries, Mumbai.

2.2. Characterization of drug

a) Organoleptic properties: The sample of Perindopril Erbumine was analyzed for its color, odor and physical appearance.

b) Determination of Melting Point: Melting point of Perindopril Erbumine was determined by open capillary method using Thiele's tube. Average of triplicate reading was taken, and compared with literature.

2.3. Spectroscopic analysis

a) Determination of λ max

Stock solution of 100 µg/ml was prepared by adding 10mg of pure Perindopril Erbumine in 10ml of solvent phosphate buffer (pH6.8). Then, 1ml of stock solution was taken and suitably diluted with solution of phosphate buffer to make 10µg/ml of Perindopril Erbumine solution. The solution was then filtered and its UV spectrum was recorded in the wavelength range 200 - 400 nm.

b) Preparation of calibration curve for Perindopril Erbumine

Stock solution of 100µg/ml of Perindopril Erbumine was prepared in solvent phosphate buffer (pH6.8) and further subsequently diluted with phosphate buffer (pH6.8) to get solutions with concentration range 2-14 µg/ml. The solutions were then filtered and analyzed spectrophotometrically at 225 nm using UV-Spectrophotometer (Jasco V630, Japan) and standard curve was plotted and values of slope, intercept and coefficient of correlation were calculated.

c) Solubility

The solubility of Perindopril Erbumine was determined in different solvent system and buffer. An excess quantity of the drug was mixed with 10ml of each solvent in screw capped glass tubes and shaken on constant water bath shaker.

2.4. Compatibility studies between drug and excipients

Incompatibility is the result of mixing of two or more substances and is detected by physical, chemical and therapeutic qualities. It may affect the safety, efficacy and appearance of the dosage form. It is therefore of prime importance for formulation scientist to determine possible incompatibility between active ingredient(s) and excipient(s) use to make final dosage form. In this study, we examined infrared analysis to detect any interaction (chemical or physical) or formation of bonds between drug and polymer.

2.5 Fourier transform infrared spectrometry (FTIR)[12]

Infrared spectroscopy is one of the most powerful analytical techniques which offer the possibility of chemical identification. This technique when coupled with intensity measurements may be used for quantitative analysis. One of the most important advantages of IR over the other usual methods of structural analysis is that it provides useful information about the structure of molecule quickly, without tiresome evaluation methods. The technique is based upon the simple fact that a chemical substance shows marked selective absorption in the IR region. After absorption of IR radiation the molecules of chemical substance vibrates at many rates of vibration, giving rise to close packed absorption bands, called IR absorption spectrum which may extend over wide wavelength range. Various bands will be present in IR spectrum which will correspond to the characteristic functional groups and bonds present in a chemical substance. Thus, an IR spectrum of a chemical substance is a fingerprint for its identification.

2.6 EXPERIMENTAL WORK

Table 1: Formulation composition of orodispersible tablet of Perindopril Erbumine.

Ingredients	Formulation Code					
Mg/Tablet	**F_1**	**F_2**	**F_3**	**F_4**	**F_5**	**F_6**
Perindopril Erbumine	25	25	25	25	25	25
Crospovidone	10	15	-	-	-	-
Croscaramellose	-	-	10	15	-	-
Moringa oleifera	-	-	-	-	10	15
Aspartame	15	15	15	15	15	15
MCC	60	55	60	55	60	55
Mannitol	86	86	86	86	86	86
Magnesiumstearate	2	2	2	2	2	2
Talc	2	2	2	2	2	2
Total wt. (mg)	200	200	200	200	200	200

Table 2: Formulation composition of orodispersible tablet of Perindopril Erbumine with co-processed excipients.

Ingredients	Formulation Code			
Mg/Tablet	**F_7**	**F_8**	**F_9**	**F_{10}**
Perindopril Erbumine	25	25	25	25
Moringa+Crospovidone (1:1)	10	15	-	-
Moringa+Croscarmellose (1:1)	-	-	10	15
Aspartame	15	15	15	15
MCC	60	55	60	55
Mannitol	86	86	86	86
Magnesiumstearate	2	2	2	2
Talc	2	2	2	2
Totalwt. (mg)	200	200	200	200

1. Isolation and purification of Moringa oleifera gum[13-14]

The gum was collected from trees (injured site). It was dried, ground and passed through sieve no 80. Dried gum (10 g) was stirred in distilled water (250 ml) for 6-8 h at room temperature. The supernatant was obtained by centrifugation. The residue was washed with water and the washing were added to separate supernatant. The procedure was repeated four more times Finally the supernatant was made up to 500 ml and treated with twice the volume of acetone by continuous stirring. The precipitated material was washed with distilled water and dried at 50-60 °C under vacuum.

Fig. 1: Dried Crude MOG.

Fig. 2: Trituration of Crude MOG.

2. Preparation of orodispersible tablets by direct compression method

All ingredients were passed through #60 sieve. Then required quantity of all ingredients were weighed for a batch size of 100 tablets and mixed uniformly in a mortar except talc and magnesium stearate. Finally magnesium stearate and talc were added as lubricant and mixed for 5min. This uniformly mixed blend was compressed in to tablets containing 25mg drug using 9mm flat face surface punches on a Rimek-1 rotary tablet machine by direct compression method. Total weight of tablet was kept 200mg.

3. Preparation of co-processed excipients

The co-processed excipients were prepared solvent evaporation method. A blend of 1:1 ratio of Moringa oleifera and Crospovidone or Moringa oleifera and Croscaramellose were added to 10ml of ethanol. The contents of beaker was mixed thoroughly and stirred continuously till most of ethanol evaporated. The wet coherent mass was granulated through #44meshes sieve. The wet granules were dried in a hot air oven at60^{o}C for 20 minutes. The dried granules were shifted through#44 mesh sieve stored in air tight container till further usage.

2.7. Evaluation of orodispersible tablets

A. Pre-compression parameters of the powder blend[15-17]

a. Bulk density

b=M/ Vb

where, M- is the mass of powder (gm).

Vb - is the bulk volume of the powder.

b. Tapped density

t = M/Vt

where, M- is the mass of powder (gm).

Vt - is the tapped volume of the powder.

c. Compressibility index

Carr's Index = Tapped density - Bulk Density/ Tapped density x 100

Table 3: Grading of compressibility of powder according to Carr's index.

Carr's Index	Flow Property
5-15	Excellent
12-16	Good
18-21	Fair to passable
23-35	Poor
3-38	Very Poor
<40	Extremely Poor

d. Hausner's ratio

The powder with low inter particle friction had ratio of approximately 1.2, whereas more cohesive less free flowing powders have ratio greater than 1.6. Hausner's ratio of less than 1.25 indicates good flow properties of the powder blends or granules.

Hausner's ratio = Tapped density / Bulk Density

e. Angle of repose

tan (θ) = h / r

(θ) = tan -1(h / r)

Where; θ = Angle of repose

r = Radius of the base

h =Height from tip of funnel to the surface of graph paper.

Table 4: Grading of powder flow property according to angle of repose.

Angle of repose	Flow Property
<25	Excellent
25-30	Good
30-40	Passable
>40	Very poor

B. Post compression study of prepared Perindopril Erbumine tablets[18-20]

a. Hardness

Hardness was measured using the Monsanto hardness tester. The tablet is compressed between the holding anvil and piston connected to a direct force reading gauge. The dial indicator remains at the reading where the tablet breaks and it returned to zero by depressing a reset button.

b. Friability

6 tablets were weighed and placed in the besto friabilator test apparatus, the tablets were exposed to rolling and repeated shocks, resulting from free falls within the apparatus. After 100 revolutions the tablets were de-dusted and weighted again. The friability was determined as the percentage loss in weight of the tablets. The loss of less than 1% in weight is generally considered acceptable. Percent friability was calculated as follows:

% Friability = W initial – W final / W initial x 100

c. Thickness

The thickness of the tablets was determined using a Vernier caliper. Three tablets from each batch were used and average values were calculated.

d. Weight variation

20 tablets were selected randomly from the lot and weighed individually to check for weight variation. Weight variation specification as per I.P.

Table 5: Weight variation specification per IP.

Average Weight of Tablet	% Deviation
80 mg or less	±10
More than 80mg but less than 250 mg	±7
250 mg or more	±5

e. Determination of % Drug content

Tablet to 10 mg of Perindopril Erbumine were weighed accurately and dissolved in suitable quantity of solvent mixture phosphate buffer (pH 6.8). The drug content was determined at 225 nm by UV spectrophotometer. Each sample analyzed in triplicate. The percent drug content was determined.

f. Wetting time

Five circular tissue papers of 10-cm diameter were placed in a petri dish with a 10- cm diameter. 10 ml of water at 370C+0.50C containing eosin, a water-soluble dye was added to the petri dish. A tablet was carefully placed on the surface of tissue paper. The time required for water to reach the upper surface of the tablets was noted as the wetting time.

g. Water absorption ratio

A piece of tissue paper folded twice was placed in a small petri dish containing 10 ml of water. A tablet was put on the paper and the time required for complete wetting was measured. The wetted tablet was then weighed. Water absorption ratio R, was determined using following equation.

R = Wa – W b / Wb ×100

Where, Wa= weight of tablet after absorption;

Wb = weight of tablet before absorption

g. In-vitro disintegration time

The time for disintegration of Fast dissolving tablets is generally less than 1min and actual disintegration time that patient can experience ranges from 5 to 30s. The disintegration test for fast dissolving tablet should mimic disintegration in mouth within saliva. Disintegration time was measured using a modified disintegration method. For this purpose, a Petri dish was filled with 10 ml of water at 37^0C+0.5^{0}C. The tablet was carefully put in the center of the petri dish and the time for the tablet to completely disintegrate into fine particles was noted.

h. In-vitro drug release study

In-vitro drug release of Perindopril Erbumine orodispersible tablets was determined using USP Dissolution Apparatus II (Paddle type). The dissolution test was performed using 900 ml 6.8pH phosphate buffer at 37^0C+0.5^{0}C. The speed of rotation of paddle was set at 50 rpm. 5 ml samples were withdrawn at time points of 5, 10, 15, 20, 25 and 30min and same volume was replaced with fresh media. Absorbance of solution was checked by UV spectrophotometer at a wavelength of 223 nm and drug release was determined from standard curve.

3. RESULT

3.1 Spectroscopic analysis

a. Determination of λ max

The standard solution of Perindopril Erbumine of concentration 10 µg/ml showed maximum absorbance at the wavelength of 216 nm (Fig No. 3). Hence the λ max of Perindopril Erbumine was found to be 216 nm.

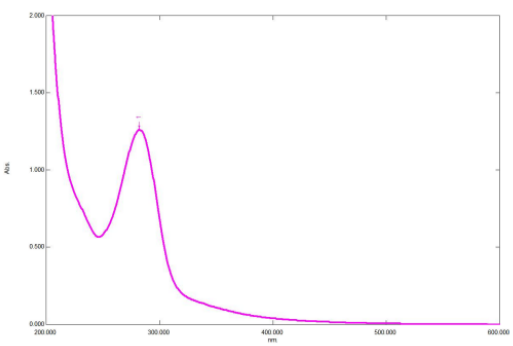

Fig. 3: UV spectrum of Perindopril Erbumine in phosphate buffer (pH 6.8).

b. Calibration curve Perindopril Erbumine

Standard calibration curve of Perindopril Erbumine was obtained by plotting absorbance vs concentration using UV spectroscopy. The λ max of Perindopril Erbumine in phosphate buffer, (pH 6.8) was determined to be 255 nm respectively.

Table 6: Data for calibration curve of Perindopril Erbumine in phosphate buffer (pH6.8).

Sr. No.	Concentration (µg/ml)	Absorbance at 216 nm
1	0	0
2	2	0.104
3	4	0.176
4	6	0.258
5	8	0.339
6	10	0.409
7	12	0.487
8	14	0.569

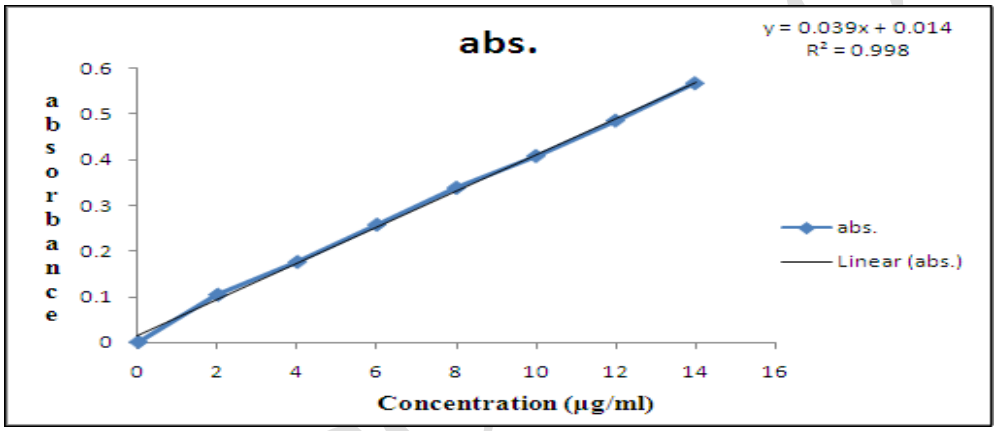

Fig. 4: Calibration curve of Perindopril Erbumine.

3.2. Compatibility study between drug and polymers

In FTIR spectra of Perindopril Erbumine, all the important peaks were found to be present, which confirmed the purity of sample. The peaks observed at different wave numbers and the functional group associated with these peaks for drug.

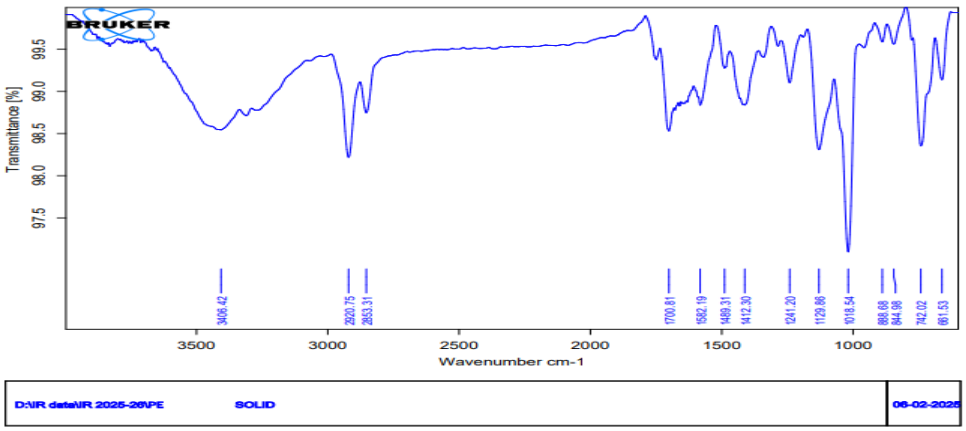

Fig. 5: FTIR spectroscopy of Perindopril Erbumine.

Table 7: Interpretation of IR spectra of Perindopril Erbumine.

Wavenumber (cm^{-1})	Type of Vibration	Functional Group Assignment
3300-3500	Broad stretching	N-H stretching (amide, secondary amine)
2900-3000	C-H stretching	Aliphatic CH (CH_2, CH_3 groups)
1720-1750	C=O stretching	Ester (-COO-)
1680-1720	C=O stretching	Carboxyl (-COOH)
1600-1650	C=O and N-H bending	Amide (-CONH-)
1400-1470	C-H bending	Methyl ($-CH_3$) groups
1200-1300	C-O stretching	Ester (-COO-) and carboxyl (-COOH) groups
1000-1100	C-N stretching	Amine (N-H) groups

3.4. Evaluation of Orodispersible Tablets

3.4.1. Pre-compression Parameters of the Powder Blend

Table 8: Physical Parameters of formulation blends of all batches.

Formulation code	Bulk density (gm/cm^3)	Tapped density (gm/cm^3)	Compressibility Index (%)	Hausner's ratio	Angle of Repose(ɵ)
F_1	0.45±0.04	0.52±0.04	13.46±0.09	1.15±0.03	27±0.2
F_2	0.45±0.02	0.53±0.06	15.07±0.07	1.17±0.07	24±1.04
F_3	0.43±0.015	0.50±0.09	14.62±0.07	1.17±0.05	27±0.9
F_4	0.42±0.06	0.51±0.05	17.93±0.02	1.21±0.07	26±0.7
F_5	0.44±0.04	0.53±0.07	16.97±0.04	1.20±0.01	25±1.2
F_6	0.44±0.04	0.52±0.03	15.36±0.06	1.18±0.04	27±1.8
F_7	0.48±0.09	0.55±0.03	13.30±0.06	1.15±0.06	23±0.7
F_8	0.47±0.07	0.54±0.04	12.07±0.02	1.13±0.02	25±0.9
F_9	0.46±0.05	0.53±0.03	13.58±0.011	1.15±0.07	25±0.9
F_{10}	0.46±0.0	0.56±0.05	18.42±0.09	1.22±0.05	24±0.7

Values are of (n±SD), n=3.

Various micromeritics properties of the powder blend from the each batch are summarized in table No.8. The powder blend of various formulation containing drug and polymer were evaluated for the bulk density, tapped density, Compressibility Index, angle of repose, Hausner's ratio. These IPQC parameters were evaluated for the flow properties and the compressibility of powder blend.

1. Bulk density and Tapped density

The bulk density of powder depends on particle size distribution, particle shape and tendency of particle to adhere together. The value for LBD and TBD were found to be in the range of 0.42-0.48 gm/cm3 and 0.50-0.56 gm/cm3 indicating good packing capacity.

2. Angle of repose, Compressibility Index and Hausner's ratio

The angle of repose is a characteristic of internal friction or cohesion of the particles. If the value of angle of repose is high powder cohesive and if angle of repose low is non- cohesive. Compressibility index range from 12.07 -18.42%. Generally compressibility index values result in good flow properties. Hausner's ratio in the range 1.13 -1.21 for all formulation indicating good flow properties.

3.4.2. Post compression evaluation of Orodispersible tablet

Table 9 Post-compression Evaluation data of prepared orodispersible tablet.

Formulation code	Hardness (kg/cm^2)	Friability (%)	Thickness (mm)	Weight variation test (mg)	Drug content (%)
F_1	2.97±0.025	0.41±0.030	3.59±0.14	199±2.08	98.12±0.91
F_2	2.86±0.017	0.58±0.041	3.51±0.054	197±2.00	98.56±0.24
F_3	3.04±0.025	0.67±0.045	3.67±0.045	200±1.74	97.94±0.47
F_4	3.00±0.021	0.50±0.047	3.62±0.044	199±1.97	97.53±0.64
F_5	3.01±0.020	0.50±0.045	3.65±0.032	199±1.91	98.56±0.77
F_6	3.05±0.015	0.41±0.035	3.63±0.041	198±2.03	98.35±0.74
F_7	3.00±0.021	0.33±0.034	3.59±0.045	199±1.94	99.48±0.84
F_8	3.04±0.027	0.50±0.036	3.57±0.057	198±2.01	99.17±1.03
F_9	2.99±0.030	0.58±0.049	3.66±0.42	200±1.45	98.76±0.97
F_{10}	3.02±0.043	0.41±0.045	3.64±0.097	200±1.66	99.07±0.29

Values are of (n±SD), n=3.

Tablets of each formulation type (F1-F10) were evaluated for parameter such as thickness, hardness; friability and drug content given in table no.9 tablet with acceptable physical properties were obtained in all formulations studied. The % deviation in weight on tablet was ±7 for each formulation batch as per IP limit according to IP. This shows uniform die fill during tablet compression.

- ✓ The hardness of tablet was measured on Monsanto hardness tester. The hardness was range 2.86-3.05 kg/cm2
- ✓ The friability of tablet calculated by Besto friability tester and was found to be in the range 0.419-0.670%.
- ✓ As there was no much variation in thickness of tablet in each formulation, the thickness of tablet for each batch within the range of 3.51-3.66.
- ✓ The tablets were analyzed for potency. The drug content uniformity was in range of 97.53-99.48 % showing uniform distribution of drug in tablet.

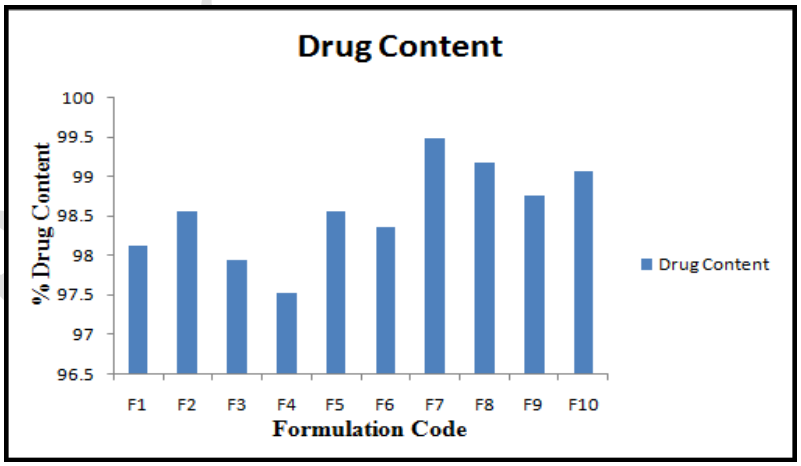

Fig. 6: Drug content of orodispersible tablet for different formulation batches.

Table 10: Post-compression Evaluation of wetting time, Water absorption ratio and dispersion time of orodispersible tablet.

Formulation code	Wetting time (sec.)	Water absorption ratio	In vitro dispersion time (sec.)
F_1	37±0.001	43±0.012	34±0.14
F_2	41±0.007	47±0.009	38±0.022
F_3	49±0.004	51±0.021	36±0.090
F_4	45±0.000	48±0.016	42±0.013

F_5	36±0.001	39±0.019	32±0.041
F_6	32±0.003	37±0.004	29±0.19
F_7	27±0.000	32±0.007	21±0.091
F_8	31±0.001	34±0.004	28±0.012
F_9	37±0.009	39±0.014	35±0.21
F_{10}	38±0.007	41±0.021	34±0.19

Values are of (n±SD), n=3.

1. Wetting time of orodispersible tablet

All formulations were evaluated for wetting time described in methodology. The average wetting time of all formulation in the range 27-49sec.

The wetting time of batch F7 is 27sec. and is the lowest wetting time in all formulation batches.

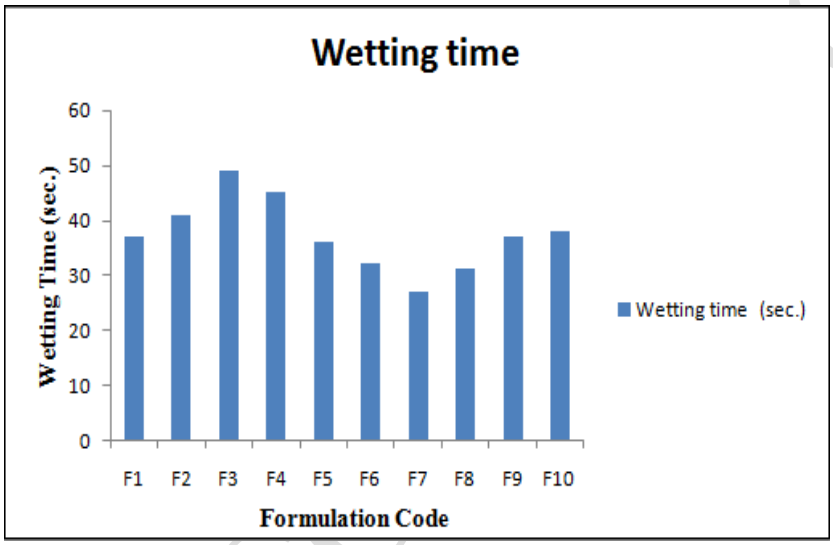

Fig. 7: Wetting time of orodispersible tablet for different formulation batches.

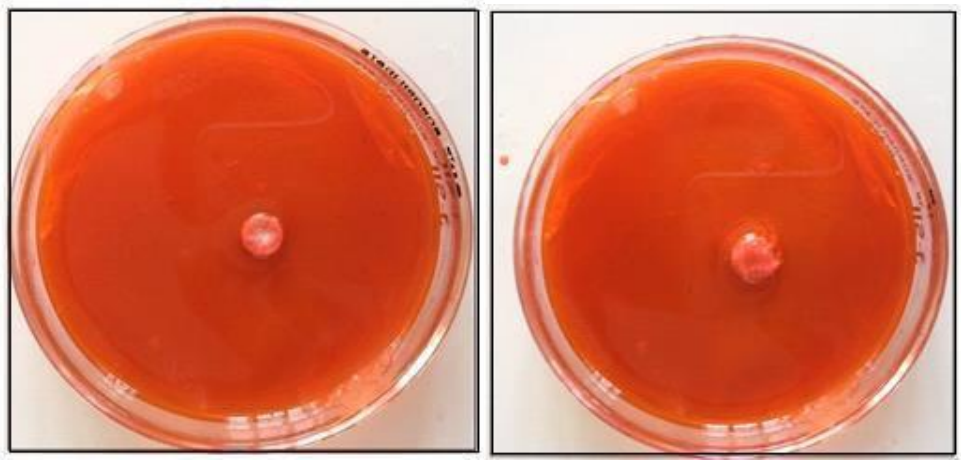

Fig. 8: Wetting time of orodispersible tablet for different time period.

2. Water absorption ratio

All formulations were evaluated for water absorption ratio as described in the methodology. The average water absorption ratio of all formulations was found in the range of 32-51 sec.

3. In vitro dispersion time of orodispersible tablet

All the formulation were evaluated for the in vitro dispersion tme described in methodology. The average dispersion time for all the batches in the range 21-48sec. The dispersion time for all the co-processed superdisintegrant batches in the range 21- 35sec.in that the F7 batch having the dispersion time 21 sec.

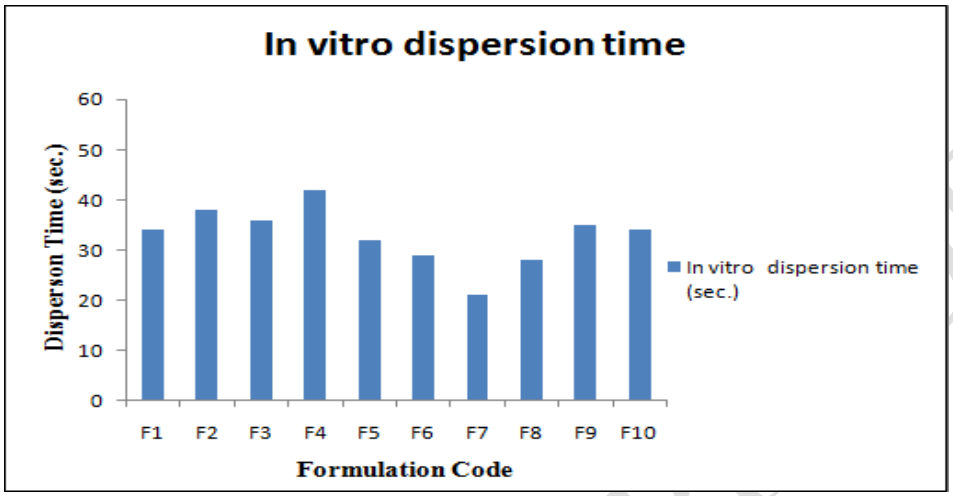

Fig. 9: In vitro dispersion time of orodispersible tablet for different formulation batches.

3.4.3. In vitro dissolution test for Perindopril Erbumine tablet

The drug release studies were performed by USP type 2 dissolution test apparatus. The phosphate buffer pH 6.8 was used as dissolution medium. The temperature and speed of apparatus were maintained at 37^0±0.5^0C and 50 rpm respectively. The sample were withdrawn at predetermined time interval and analyzed for drug concentration at 216 nm by using UV- visible spectrophotometer after filtrations were taken.

Table 10: In vitro dissolution test for Perindopril Erbumine tablet.

Parameter	Value
Dissolution medium	900 ml phosphate buffer Ph 6.8
Temperature	37^0C±1^0C
RPM	50
Tablet taken	1 tablet
Volume withdraw	5ml
Volume made up to	5ml
wavelength	225nm
Beers range	0-5µg/ml

Table 11: In vitro Dissolution data- formulation F1-F6batches

(min)	F_1	F_2	F_3	F_4	F_5	F_6
0	0	0	0	0	0	0
5	51.87±0.48	46.50±0.72	49.04±0.47	44.97±1.39	57.49±0.79	52.87±0.43
10	57.05±0.25	55.47±0.51	59.90±1.42	51.05±0.49	64.67±1.22	61.00±024
15	64.58±0.14	59.97±0.025	65.12±1.06	58.42±1.47	69.07±0.91	75.38±1.45
20	79.71±0.19	64.21±0.91	70.27±0.74	64.70±0.77	77.92±0.23	79.25±0.97
25	83.05±0.001	77.47±1.02	75.97±1.54	72.58±0.12	81.91±1.24	85.73±0.81
30	92.05±0.001	85.06±0.27	80.95±0.41	78.21±1.49	94.54±1.39	91.40±127

Values are of (n±SD), n=3.

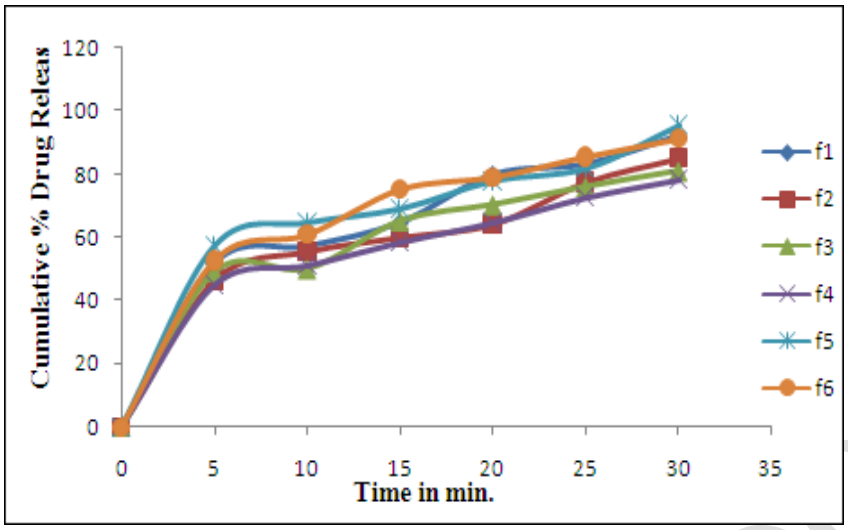

Fig. 10: Dissolution profile of Orodispersible tablet for F1-F6 batche.

Table 12: In vitro Dissolution data- formulation F7-F10 batches.

(min)	F_7	F_8	F_9	F_{10}
0	0	0	0	0
5	60.52±1.24	58.37±0.75	57.07±1.47	58.00±1.91
10	64.17±1.21	65.70±1.27	60.15±0.24	64.01±0.99
15	73.90±0.94	69.56±1.39	76.45±1.51	71.26±0.41
20	87.00±0.55	78.90±1.33	81.70±1.00	79.06±1.22
25	94.07±0.74	85.64±1.78	89.73±0.79	85.29±0.27
30	99.27±1.52	95.74±0.60	93.72±0.21	91.97±0.37

Values are of (n±SD),n=3.

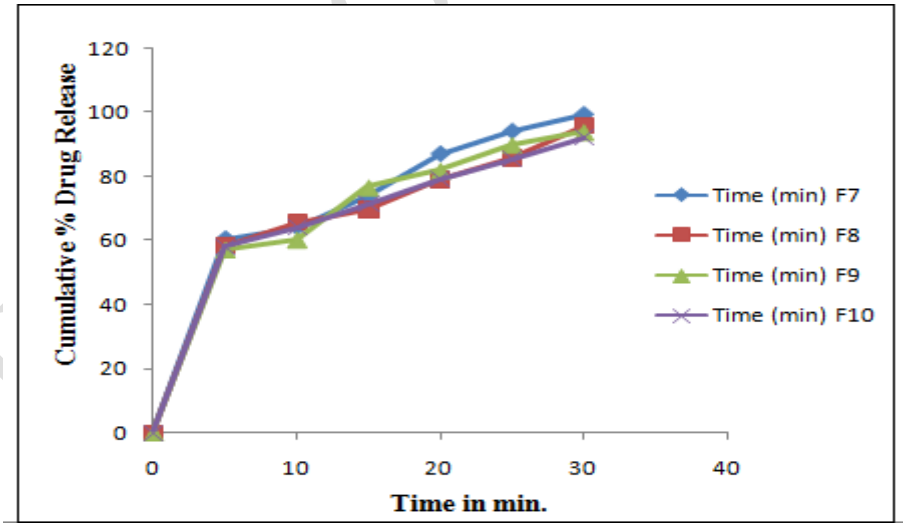

Fig. 11: Dissolution profile of Orodispersible tablet for F7-F10 batches.

The drug release profiles for tablet made by direct compression and 7.12. The % drug release for F1-F6 batches within 30 minutes is 92.054%, 85.062%, 80.951%, 78.210%, 94.541%, 91.407% and the % drug release for the co-processed superdisintegrants F7-F10 batches 99.270%, 95.749%, 93.726%, 91.970%. From above results the co-processed superdisintegrants shows maximum release of drug. The F7 is optimized batch showing 99.270% release within 30 minutes. So F7 batch shows maximum release of drug.

3.4.4. Stability study of the optimized formulation (F7)

During the stability studies no change in color was observed in the tablet formulation. From the results, it was noted that there were no significant changes in appearance, wetting time, in vitro dispersion time, drug content as well as percent drug release. Therefore, no evidence of degradation of drug was observed. All the values of evaluation after stability are tabulated and drug release study is exhibited.

The optimized F7 formulation was evaluated for in-vitro drug release studies. The results indicated that there was no significant change in in-vitro drug release studies which is similar to the formulations under optimum conditions.

Table 13: Stability study of F7 formulation.

Period	Wetting time (sec.)	In vitro dispersion time (sec.)	Drug Content (%)
0 day	27±0.000	21±0.091	99.48±0.84
30 days	27±0.010	21±0.004	99.49±0.87

Values are of (n±SD), n=3

Table 14: Results of drug release study of optimized F7 formulation during stability study.

Time (min)	Before stability study	30 days
0	0	0
5	60.52±1.24	59.92±1.24
10	64.17±1.21	63.97±1.21
15	73.90±0.94	72.99±0.84
20	87.00±0.55	86.93±0.65
25	94.07±0.74	93.99±0.74
30	99.27±1.52	99.00±0.77

Values are of (n±SD), n=3

4. CONCLUSION

In conclusion, the present study successfully formulated orally disintegrating tablets (ODTs) of Perindopril Erbumine using co-processed superdisintegrants, enhancing patient compliance and therapeutic effectiveness. The optimized F7 batch, containing Moringa oleifera and Crospovidone in a 1:1 ratio, demonstrated the shortest disintegration time (21 seconds), rapid wetting, and maximum drug release. FTIR studies confirmed drug-excipient compatibility. The formulation significantly improved dissolution, potentially enhancing bioavailability and offering a convenient dosage form for patients with dysphagia. The direct compression method used was simple, cost-effective, and industrially feasible, making it a promising approach for the development of ODTs for cardiovascular therapy.

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